

**Cannock Chase District
Council**

**Environmental Protection Act
1990, Part 2A: Supplementary
Limited Sampling Investigation**

**Haig Close, High Town,
Cannock, Staffordshire**

April 2013

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CONTENTS

1	INTRODUCTION	1
1.1	Terms of Reference.....	1
2	BACKGROUND INFORMATION	3
2.1	Site Setting	3
2.2	Previous Investigations and Reports.....	5
3	PRELIMINARY CONCEPTUAL MODEL	7
3.1	Introduction	7
3.1.1	Potential Pollutant Linkages.....	8
4	SITE INVESTIGATION	11
4.1	Scope and Methodology	11
4.2	Ground Conditions.....	12
4.3	Field Evidence of Potential Contamination	13
5	RESULTS	13
5.1	Soil Analysis Results	13
5.2	Leachability Analysis Results	15
5.3	Groundwater Analysis Results.....	16
5.4	Safety of Water Supply Pipes and Tap Water Analysis Results.....	17
5.5	Gas Monitoring Results	18
5.6	Summary.....	19
6	ASSESSMENT OF POTENTIAL HUMAN HEALTH RISKS	21
6.1	Statistical Analysis of Selected Concentrations	21
6.2	Averaging Areas, Suitability of Dataset	21
6.3	Outlier Test	22
6.3.1	Hypothesis Testing	22
6.4	Statistical Assessment Results.....	23
6.4.1	Metals.....	23
6.4.2	TPH Aliphatic Band >C ₂₁ -C ₃₅	23
6.4.3	Benzene	24
6.4.4	Benzo(a)pyrene	24
6.4.5	Statistical Analysis Conclusion.....	24
6.5	Institute of Occupational Medicine (IOM) – Assessment of benzo(a)pyrene and other PAHs	25
6.5.1	Selection of Assessment Criterion	25
6.5.2	Derivation of IOM Assessment Criterion	25

6.5.3	Conclusion.....	26
7	UPDATED CONCEPTUAL SITE MODEL.....	27
8	SUMMARY AND CONCLUSION	28
8.1	Summary.....	28
8.2	Conclusion.....	28

FIGURES

Figure 2.1 - Site Location.....	5
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TABLES

Table 2.1 - Site Setting.....	3
Table 3.1 - Potential Receptors.....	7
Table 3.2 - Potential Pollutant Linkages (reproduced from 2011 investigation).....	9
Table 4.1 - Field Evidence of Potential Contamination	13
Table 5.1 - Soil Analysis Results Screening Exceedance Summary.....	14
Table 5.2 - Soil Leachate Analysis Results Screening Exceedance Summary	15
Table 5.3 - Groundwater Results Screening Summary.....	16
Table 5.4 – UKWIR Screen	17
Table 5.5 - Summary of Gas Monitoring Data	18
Table 6.1 - Summary of Statistical Analysis – Haig Close (Residential).....	23
Table 7.1 –CSM, Post-Site Investigation.....	27

DRAWINGS

106270-600: Exploratory Hole Location Plan
106270-601: Contaminant Exceedance Plots

APPENDICES

Appendix A	Initial Site Investigation Report, May 2011
Appendix B	Limitations Statement
Appendix C	Exploratory Hole Logs
Appendix D	Gas Monitoring Results
Appendix E	Chemical Analysis Results
Appendix F	Tier 1 Screening Spreadsheets
Appendix F1	Soils Analysis
Appendix F2	Leachability Analysis
Appendix F3	Groundwater Analysis
Appendix F4	Tap Water Analysis
Appendix F5	Statistical Analysis
Appendix G	PAH Assessment
Appendix H	Severity and Probability of Risk (after CIRIA 552)

1 INTRODUCTION

1.1 Terms of Reference

Grontmij Limited (Grontmij) was appointed by Cannock Chase District Council (the Council) to assist the Council to advance their inspection strategy to identify contaminated land under Part 2A of the Environmental Protection Act 1990 (Part 2A).

Contaminated Land is defined in Section 78A(2) of Part 2A of the 1990 Act as:

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

- *(a) significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *(b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.*

Further information is provided in the Act and the April 2012 Contaminated Land Statutory Guidance.

Grontmij understand that the Council prioritised a number of sites for limited sampling on the basis of the Council's Part 2A Inspection Strategy advanced initially under the 2006 statutory guidance. The site subject to this report, at Haig Close, Cannock, was considered to be sensitive because:

- The Site comprises an area of land which, from historical mapping, appears to have been infilled with unknown material and;
- The Site is considered to be sensitive as residential properties with gardens overly the inferred extent of in-filled ground and the Site is underlain by a Principal aquifer.

The initial inspection process was undertaken by Grontmij in two phases: a Desk Top Study (January 2010) followed by an initial limited sampling investigation (December 2010, reported in May 2011).

The initial inspection comprised the excavation of shallow hand dug pits and was undertaken in public areas such as verges and open grass. Infill material to 0.7m below ground level (bgl) containing ash, brick, coal and glass fragments were recorded within four of the five hand pits undertaken. The base of the infill material was not proven. Chemical analysis identified that the concentration of arsenic in two samples and benzo(a)pyrene in four samples exceeded the generic screening value applicable to the generic residential housing scenario, where plants are grown for human consumption. Further details of this previous investigation are included within Section 2.2.

Based on the findings of the initial inspection, further work was recommended and an application was made by the Council to obtain funding from the Contaminated Land Capital Grants funding programme to undertake this further work.

This report presents the findings of the investigation work, assesses the significance of the contaminant concentrations detected, and makes recommendations on the need for any further work.

The information contained herein presents the findings of the supplementary limited sampling inspection undertaken in February 2013. In order to provide an overall context to the ground conditions at the site, the 2010 investigation results have also been included within the assessment.

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

2 BACKGROUND INFORMATION

2.1 Site Setting

The site's setting and location is summarised in Table 2.1 and Figure 2.1. The site setting is also shown on Drawing No. 106270-600.

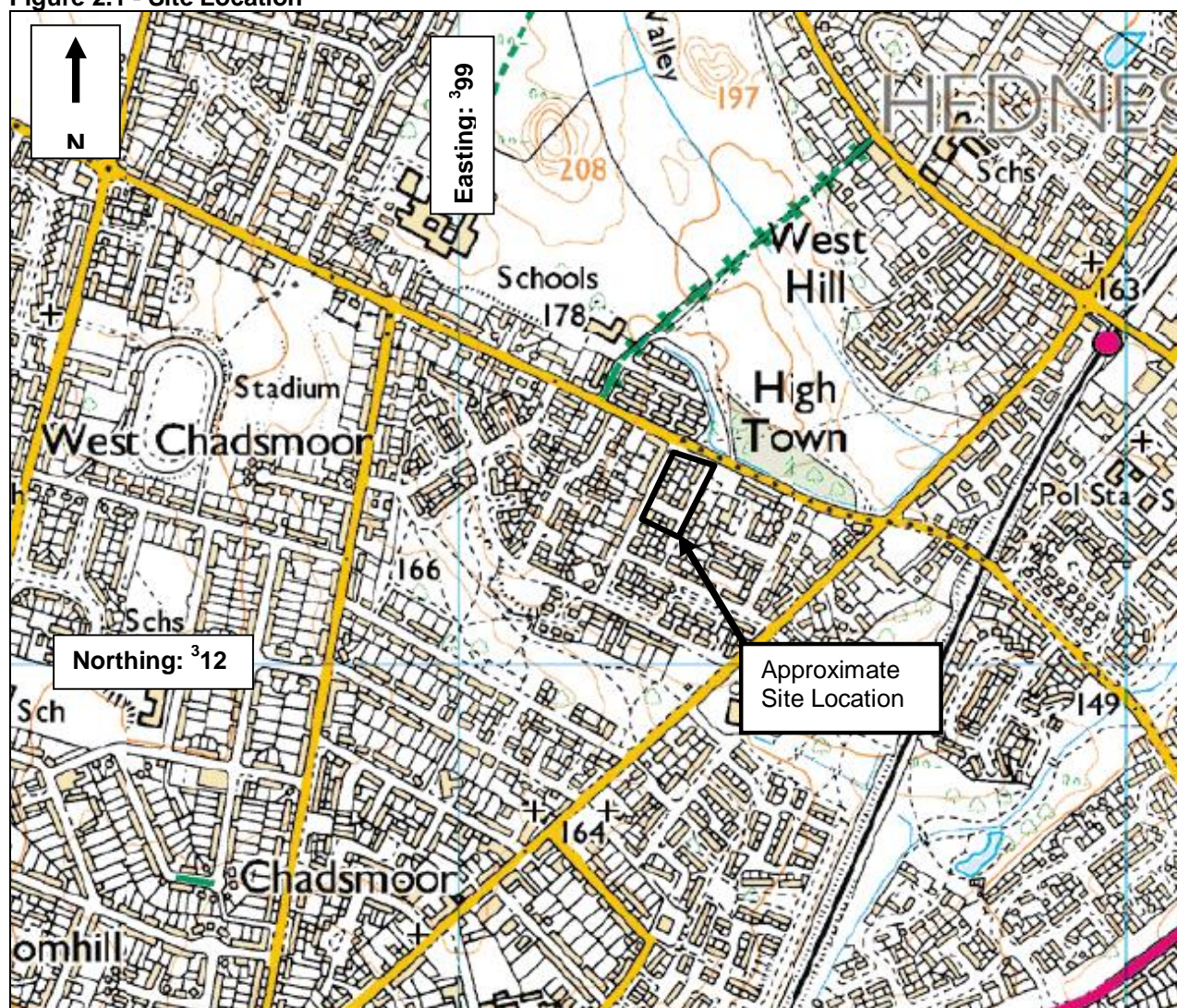
Table 2.1 - Site Setting

Data	Information
Address	The site is located south of Belt Road and east of Platt Street, and is intersected by Haig Close (see Drawing 1). The general site address is Haig Close, High Town, Cannock, Staffordshire (nearest postcode is WS11 5TR)
Current site use	Residential houses and gardens. Houses first appear on the 1990 historical map, indicating construction between 1983 (the next available historic map) and 1990.
Grid Reference	Centre of site is located at approximate National Grid Reference (NGR) 399340, 312230.
Site Area	Approximately 0.88 ha
Topography	The Site falls slightly towards the south-east
Surrounding land use	The site is surrounded by further residential bungalows with garden areas. The north-eastern corner of the site forms part of a wider area of grassed open space
Mapped Geology	British Geological Survey (BGS) 1:63,360 scale map sheet 154 (Lichfield) and the BGS website Geindex tool indicate superficial deposits of Diamicton Till overlying solid geology of the Kidderminster Formation (interbedded sandstone and conglomerate). The depth to rockhead is not indicated, however, a BGS borehole (SJ91SE) located some 300m to the south east recorded 125' (38m) thickness of marl, sand, silt, and sand and pebbles.
Hydrogeology	The Environment Agency classifies the Kidderminster Formation as a Principal aquifer. Principal aquifers are layers of rock or drift deposits that have high inter-granular and/or fracture permeability and usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale The Diamicton Till overlying the Kidderminster Formation is regarded as an unproductive stratum (i.e. former non-aquifer).
Source Protection Zones (SPZs)	The Environment Agency indicates that the site does not lie within a SPZ.
Surface Waters	An un-named minor watercourse is located approximately 10m north (likely up hydraulic gradient as the surrounding topography rises to the north) of the northern site boundary. A pond is located approximately 500m south-east (likely down hydraulic gradient, following the general topography of the surrounding area) of the site.
Historical Land Use	Environment Agency records provided to the Council indicate that the site was formerly labelled as "Haig Close Landfill Site" and was subsequently developed as residential housing. Historical maps indicate that the northern part of the site formerly comprised a gravel pit from 1886 until 1954, when it was backfilled with unknown material. No details pertaining to the dates of infilling or types of infill material are supplied. Housing was constructed at the site between 1983 and 1990. An additional historic landfill accepting inert and household waste is indicated approximately 175m to the south-west of the site, being operational between

Data	Information
	31 st December 1948 – 1952. This landfill is registered to have received both inert waste such as bricks, concrete and glass etc and household waste from dwellings of various types including houses, caravans, houseboats, campsites and prisons, and wastes from schools, colleges and universities. The site pre-dates the Control of Pollution Act 1974 and thus is unlikely to have operated under a formal licence.
Ecologically designated sites ¹	MAGIC search indicates none within 500m of site centre
Scheduled Monuments	None identified by Pastscape website within 500m of site centre

¹ Includes sites designated as Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Special Area of Conservation (SAC, including candidate sites), Special Protection Area (SPA including potential sites), listed Wetlands of International Importance (Ramsar site) and Local Nature Reserves (LNR).

Figure 2.1 - Site Location



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Plan is not to scale.

2.2 Previous Investigations and Reports

Grontmij has previously completed a desktop assessment of the site in 2010 (Report - Environmental Protection Act 1990, Part 2A: Desktop Study and Walkover - ref. R474/103912/V1/2010). The assessment included the review of on-line data resources, in-house mapping and records provided by the Council, and a site walkover.

A limited, shallow initial site investigation, comprising five shallow hand-dug trial holes and chemical analysis of five soils samples, was undertaken in December 2010, and reported to the Council in May 2011 (Report - Environmental Protection Act 1990, Part 2A: Initial Site Investigation - ref. R650/106270/V1/2011).

The 2010-11 investigation identified arsenic and PAH concentrations which could potentially pose an unacceptable risk to sensitive receptors as their concentrations exceeded generic assessment criteria (GAC) for human health.

The Grontmij 2011 initial investigation report is included within Appendix B. The Grontmij desk study undertaken in 2010 is included within the 2011 report as an appendix.

Grontmij is not aware of any other existing reports concerning any previous investigation or remediation works associated with the site.

3 PRELIMINARY CONCEPTUAL MODEL

3.1 Introduction

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

UK legislation and statutory guidance on assessing land contamination recommends the use of a risk assessment process based on a review of sources of contamination/pathway/receptor² relationships for various environmental media. A key component of the overall risk assessment process is identification of “contaminant linkages” between contaminants and receptors. This can be accomplished through development of a site-specific Conceptual Site Model (CSM) in which the potential contaminants, pathways and receptors (elements) identified on-site are described. Each element can be defined as follows:

- *Contaminant/source:* A substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters.
- *Pathway:* A route or means by, or through, which a receptor is being exposed to, or affected by a contaminant or could be so exposed or affected.
- *Receptor:* A living organism, a group of living organisms, an ecological system or a piece of property which is listed in the 2012 Statutory Guidance and is being or could be harmed by a contaminant. A receptor may also be controlled waters which are being or could be polluted by a contaminant.

Development of a CSM allows a conceptual understanding of the surface and subsurface environment at the site, potential contaminant linkages and the likely behaviour of any contaminants within that regime. Table 3.1 lists all of the identified receptors present at the site.

A summary of the preliminary CSM (reproduced from the Grontmij 2011 investigation report) is provided in this section in respect of Human Health and of Controlled Waters. It is intended that the CSM is developed and refined as further information becomes available through additional stages of assessment and interpretation.

Table 3.1 - Potential Receptors

Receptor Type	Receptors	Notes
Humans	On-site residents	Residential properties (houses and gardens) above indicative extent of landfill. Potential for residents to grow and consume vegetables
	Construction workers	No redevelopment proposed
	Future occupants of the site	Residential properties (houses and gardens) above indicative extent of landfill.
	Off site commercial workers or residents	Possibly exposed to potential gases and leachate migrating off-site through permeable strata.
Ecosystems	Any designated ecological system ³ , or living organism forming part of such a system	MAGIC website indicates no ecologically designated sites within 500m of the site.

² The 2012 revised Statutory Guidance for Part 2A of the 1990 Environmental Protection Act uses the terminology “contaminant/source/receptor”.

³ 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	Notes
Property (Flora and Fauna)	Owned or domesticated animals	Pets within residential gardens
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 above indicative extent of landfill.
	Scheduled Monuments	MAGIC and Pastscape websites indicates no monuments on site.
Controlled Waters ⁴	Inland freshwaters	A pond lies with 500m to the south east of the site.
	Groundwater	The Bromsgrove Sandstone Formation beneath the Site is regarded as a Principal aquifer. A SPZ (total catchment) lies within 250m to the north east.

3.1.1 *Potential Pollutant Linkages*

The potential pollutant linkages identified after the initial preliminary investigation stage are presented in Table 3.2

⁴ as defined in the Water Resources Act Section 104. Generally includes most surface water bodies excluding drains which discharge into sewers.

Table 3.2 - Potential Pollutant Linkages (reproduced from 2011 investigation)

No.	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
1	Residents of properties above infilled ground (including children playing in gardens)	Arsenic and benzo(a)pyrene in made ground, principally around HP2 up to 44mg/kg and 1.7mg/kg, respectively	Direct ingestion / dermal contact / inhalation of dust / inhalation of vapours / consumption of home-grown vegetables	Medium	Low to Likely	Low to Moderate	Insufficient data available to draw firm conclusion (only a basic suite of testing was undertaken, only five samples have been obtained, limited depth-specific analysis can be undertaken) – infill has been identified across the site and higher contaminant concentrations may be present. Limited further assessment is required in order to increase the sample population and determine the significance of the detected concentrations
2	Residents of properties above infilled ground	Potential methane and carbon dioxide or volatile gases from decomposition of deleterious elements of landfill material	Movement into buildings, subsequent asphyxiation and explosion risk	Medium	Likely	Moderate	As monitoring of landfill gases were not undertaken during the limited investigation (as not considered appropriate within shallow hand pits which did not prove the base of the infill/waste) gas risk is unknown. Further assessment is therefore required to include wells drilled to the base of the infill/waste material and measurement of ground gas concentrations & flow rates
3	Residents of properties above in-filled ground	Potential elevated metals and TPH concentrations within made ground.	Chemical attack and permeation of water supply pipes	Medium	Low	Moderate / Low risk	Limited investigation data is available (note no relevant parameters for UKWIR guidelines were analysed). Materials used for connection of each house to the South Staffordshire Water main are unknown, and assumed to be potentially susceptible to attack. Hence further assessment is required. Prior experience dictates that concentrations of contaminants in most Made Ground soils tend to exceed UKWIR guidelines, so tap water testing is recommended to assess current risk

No.	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
4	Property (structures) - sub-surface concrete foundations	Sulphate and pH	Contact with foundations	Medium	Low	Low / moderate	Based on limited investigation data (a basic suite of testing was undertaken which didn't include sulphate) further assessment is required
5	Controlled Waters: Principal aquifer beneath site (Kidderminster Formation)	Potential contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching and vertical contaminant migration to aquifer	Medium	Likely	Moderate	Due to limited depth of initial investigation holes, which did not prove the base of the infill/waste material, and lack of soil leachate analysis, further assessment is required

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 extract in Appendix G.

4 SITE INVESTIGATION

In order to further examine the potential pollutant linkages identified in Table 2.2, an additional exploratory site investigation was undertaken on the 19th of February 2013, with gas monitoring undertaken on four occasions, at approximately weekly intervals until 22nd March 2013. The details of the 2013 site investigation are presented below.

4.1 Scope and Methodology

The supplementary site investigation included the following:

- Obtaining plans of underground services and CAT-scanning proposed drilling locations, using a Radiodetection CAT1 and signal generator;
- Drilling four window sample holes (WS101 – WS104) to a maximum depth of 6.0m bgl, at the locations shown on Drawing 106270-600;
- Advancing seven hand dug pits (HP101 to HP107) to a maximum depth of 1.0 mbgl, to examine shallow soil conditions and augment the coverage of the site provided by the above window sampler holes;
- Logging soil arisings in accordance with (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 representative spatial and depth coverage of the site;
- Submitting retained soil and groundwater samples to Alcontrol Geochem in cooled cool-boxes and under full chain of custody documentation, and instructing the analysis of samples of soil, leachability and groundwater analysis;
- Undertaking four ground gas monitoring rounds, using a Gas Data Ltd GFM435 gas analyser with internal flow pod, and;
- Collection of tap water samples from five representative properties, for analysis at Alcontrol Geochem and screening against UK drinking water standards, to examine the risk of contaminant permeation into the drinking water supply.

The window sample holes, which were drilled by Sherwood Drilling Services using a Geotool GTR 780 Window Sampling Rig, were positioned in areas of public open space within the extent of the infill, as indicated on historical mapping. Window sampler positions were selected on the basis of achieving representative coverage of the site.

The purpose of the window sample holes was to; examine shallow and deeper soil conditions (including determination of presence / otherwise of clay or mudstone beneath the made ground); enable the retention of samples for laboratory testing; and facilitate the installation of shallow 19mm diameter dedicated gas monitoring wells and deeper 50mm dedicated groundwater monitoring wells in each window sampler hole.

In order to provide an holistic overview of the ground and chemical conditions at the site, the 2011 investigation results have been included alongside the 2013 investigation results and are discussed in the following sections. The 2011 investigation comprised the following:

- Advancement of five hand dug pits (HP01 to HP05) to a maximum depth of 0.7m bgl.
- Soil chemical analysis of five samples obtained from the hand dug pits.

4.2 Ground Conditions

The ground conditions have been based on both the 2011 and 2013 investigations.

Made Ground

Made Ground was encountered in all but one of the exploratory holes to depths of between 0.5mbgl and 3.9mbgl. Although material within HP101 (between 0.6mbgl and its termination at 0.9mbgl) was possibly natural superficial deposits, no Made Ground was encountered in WS104 in the north of the site. The Made Ground was generally thicker towards the east and southeast of the site, which ties in with historical mapping that indicated the former gravel pit was located in that area of the site.

The Made Ground material was predominantly granular in nature, comprising black and brown gravelly sand. The gravel content comprised fine to coarse quartz, brick and concrete, with occasional ash, tile and coal fragments, and rare plastic, metal and clinker components.

Superficial Deposits

Superficial deposits comprising Glacial Till were encountered in the southwest of the site in seven of the eleven exploratory holes (WS102-104, HP102 and HP104-106) below the Made Ground at depths of between 0.25mbgl and 1.9mbgl. Where encountered, the Glacial Till was proven to depths of between 1.0mbgl and 4.0mbgl. The Glacial Till was predominantly granular in nature, comprising brown and light brown slightly silty gravelly medium sand. The gravel content comprised fine to coarse quartz. However, soft to firm red brown, slightly sandy clay was encountered in WS102 and WS103.

Solid Geology

Weathered Kidderminster Formation was encountered in the north and east of the site in two of the eleven exploratory holes (WS101 and WS104) at depths of between 3.75mbgl and 3.9mbgl beneath the Made Ground in WS101 and the Glacial Till in WS104. The Kidderminster Formation was not encountered in hand pits HP101 and HP103-107, which were terminated at approximately 1.0mbgl. Where encountered, the Kidderminster Formation was proven to the base of the exploratory holes at depths of between 1.0mbgl and 6.0mbgl.

The weathered Kidderminster Formation was predominantly granular in nature, comprising reddish brown gravelly medium sand. The gravel content comprised fine to coarse quartz. The weathered Kidderminster Formation was occasionally encountered as silty or clayey sand, or as sandy gravelly clay.

Groundwater

Groundwater was encountered within the Glacial Deposits and Kidderminster Formation as damp or wet strata in each of the four window sampler holes, at depths of between 2.0mbgl (WS101, WS102 & WS103) and 4.9mbgl (WS104).

During monitoring, groundwater was encountered in all four of the monitoring wells typically at depths of between 1.48mbgl and 4.63mbgl. On a single monitoring visit on the 7th of March 2013, groundwater was recorded at 0.46mbgl in WS103 (within the Made Ground / Glacial Deposits), approximately 1.0m shallower than usually identified, while the groundwater levels recorded in the remaining monitoring wells were consistent with the other findings. However, this is not thought to be typical of local groundwater levels, and this specific record cannot be fully explained at this stage. With the exception of WS104, the water levels recorded were shallower than the top of the response zone during each of the monitoring rounds.

Based on the general topography of the area and the depth to groundwater, the groundwater flow is likely to be flowing in line with the topography towards the east and south east.

The above findings are discussed further in Section 7 (updated CSM). Exploratory hole logs, providing full details of the strata encountered, are included within Appendix C. Full records of groundwater monitoring are included in the monitoring results in Appendix D.

4.3 Field Evidence of Potential Contamination

The hand pit arisings and window sample cores were inspected for visual and olfactory evidence of potential contamination. A summary of field observations recorded in both the initial 2011 investigation and the current 2013 investigation is presented in Table 4.1 below:

Table 4.1 - Field Evidence of Potential Contamination

Exploratory Hole	Depth from (m bgl)	Depth to (m bgl)	Visual and Olfactory Evidence of Contamination ¹
HP01	0.15	0.70	Brick, ash, coal and metal fragments
HP02	0.50	0.70	Ash, coal and glass fragments
HP04	0.50	0.70	Ash, brick and glass fragments
HP05	0.00	0.50	Brick and ash
WS101	0.10	3.90	Brick, plastic, concrete, coal and ash
WS102	0.15	1.90	Brick, concrete, plastic, metal and whole bricks
WS103	0.00	1.10	Brick, concrete, pottery and tile
HP101	0.00	0.40	Brick, concrete, plastic, metal and coal
HP102	0.25	0.50	Coal, clinker and ash
HP103	0.00	1.00	Brick and coal with ash between 0.3mbgl and 0.6mbgl
HP104	0.00	0.50	Brick, coal, concrete and tile
HP105	0.00	0.70	Brick, concrete and tile
HP106	0.00	0.80	Brick, concrete, metal and ash
HP107	0.00	0.80	Brick, concrete and tile

5 RESULTS

5.1 Soil Analysis Results

Ten soil samples were submitted for laboratory analysis as part of the 2013 investigation, under full chain of custody documentation and within chilled cool-boxes, 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 adequate spatial coverage of the site, while also further investigating areas of concern identified as part of the previous investigations. All soil samples obtained (with the exception of those taken from WS104) were from the Made Ground. The soil sample from WS104 was taken from the topsoil as no Made Ground was present at this location.

Table 5.1 presents a summary of any exceedances identified during screening of the analysed results. The following tables incorporate the results of the initial 2011 investigation, undertaken in May 2011 (five samples), as well as the additional 2013 site investigation (ten samples). As such, they present a summary of all chemical testing undertaken for the site to date. 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 order of 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;

Full analytical testing results are included as Appendix E and soil screening sheets are presented in Appendix F1.

Table 5.1 - Soil Analysis Results Screening Exceedance Summary

Determinand	No. of Samples Tested	Minimum Value (mg/kg)	Maximum Value (mg/kg)	SGV / GAC ¹ (mg/kg)	Locations where SGV or GAC are exceeded
Arsenic	15	2.95	86.2	32	HP02 (0.3mbgl & 0.7mbgl), HP102 (0.4mbgl) and HP106 (0.7mbgl)
Lead ²	15	48.1	542	450	HP102 (0.4mbgl)
Nickel	15	18.7	152	130	HP102 (0.4mbgl)
Vanadium	15	16.0	86.8	75	HP102 (0.4mbgl) and WS103 (0.3mbgl)
Asbestos screen	11	Asbestos containing materials (including fibres) detected in a single location as - Trace, loose fibres in soil - Chrysotile (White) asbestos in HP103 (0.4mbgl)			
Polycyclic Aromatic Hydrocarbons (PAHs)	10	All concentrations below GAC for individual compounds, with exception of results below:			
Benzo(a)pyrene	10	0.3	3.24	0.94	HP01 (0.3mbgl), HP02 (0.3mbgl & 0.7mbgl), HP04 (0.7mbgl) and WS101 (0.7mbgl)
Benzene	5	<0.009	0.471	0.16	HP103 (0.4mbgl)
TPH – CWG Hydrocarbons	6	All banded aliphatic/aromatic TPH-CWG laboratory results were below limit of detection with exception of below:			
TPH Aliphatics band >C ₂₁ – C ₃₅	6	3.69	26.4	21 ³	HP106 (0.7mbgl) and WS101 (0.7mbgl)

Bold values indicate locations where observed concentrations exceed the screening value are at their maximum.

¹ All fifteen samples were tested for Soil Organic Matter (%SOM) content. A minimum value of 2.16% and a maximum of 20% were recorded, with a mean of 8.81%. It is therefore justified, where SGVs or GAC are influenced by SOM, to use the SGVs and GAC generated using a 2.5% SOM value in CLEA in 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 Screening value for TPH Aliphatic band >C₂₁ – C₃₅ is set at solubility saturation limit.

Arsenic, lead, nickel and vanadium were all recorded at concentrations which exceeded their relative screening values in HP102 (0.4mbgl). Arsenic also exceeded in soils obtained from HP02 and HP106, with an additional vanadium exceedance in WS103. All of which were located in the central and western areas of the site.

Benzo(a)pyrene was recorded at concentrations greater than its GAC in 50% (five from 10) of the samples tested, with the greatest concentration observed within WS101 in the north east of the site.

Benzene was recorded at concentrations greater than its GAC in a soil sample obtained from HP103, with TPH aliphatic band >C₂₁-C₃₅ exceeding the adopted tier 1 screening values in two of the six samples tested (HP106 and WS101). The greatest concentration of TPH was recorded in HP106.

Asbestos containing materials (ACMs) were identified in a single sample as trace (which according to ALcontrol laboratory definition is “*where only one or two fibres were identified*”) loose fibres of chrysotile (white) asbestos. Asbestos was not encountered in any of the other ten samples screened.

5.2 Leachability Analysis Results

The strata underlying the Made Ground were identified to be predominantly granular, and are unlikely to prevent leaching. PAHs, heavy metals and TPHs were identified within the Made Ground at the site. On this basis, soil samples were retained for leachability testing, in order to consider the potential risk to controlled waters at the site (Principal aquifer beneath the site).

Five soil samples were submitted for soil leachate analysis (BS12457 2:1 single stage test, which supersedes the older NRA leachate test). The samples were selected for analysis on the basis of field observations of potential contamination, plus with the aim of achieving good site coverage.

The purpose of the leachability analysis is to assess the potential mobility of contaminants present within the made ground and natural ground. This enables the risk to controlled waters receptors (in this instance groundwater beneath the site) posed by potential contaminants within soils to be established with greater confidence. To determine the potential for impacts on groundwater quality with regards to its potential use as a drinking water resource, the leachability results were screened against the UK Drinking Water Standards (UK DWS). In the absence of a UK DWS, the leachability results have been screened against a World Health Organisation (WHO) drinking water standard.

Table 5.2 presents a summary of the leachate analysis results.

Full analytical testing results are included in Appendix E and soil screening sheets are presented in Appendix F2.

Table 5.2 - Soil Leachate Analysis Results Screening Exceedance Summary

Determinand	No of Samples Tested	Minimum Value	Maximum Value	Adopted Groundwater Screening Value	Locations where Screening Values are exceeded
Arsenic	5	1.9	19	10 ¹	HP103 (0.4mbgl)
Lead	5	0.28	26	10 ¹	HP106 (0.7mbgl)
Polycyclic Aromatic Hydrocarbons (PAHs)	5	All concentrations below screening values for individual compounds, with exception of results below:			
Benzo(a)pyrene	5	<0.009	0.032	0.01 ¹	HP101 (0.6mbgl) and WS101 (0.7mbgl)
Sum of 4 PAH - benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene	5	<MDL	0.37	0.1 ¹	HP101 (0.6mbgl)

Values are presented as **ug/l** and are rounded as applicable to the screening values used. <MDL is less than the laboratory method detection limit for each compound summed.

Bold values indicate locations where observed concentrations exceed the quoted screening value.

¹ Value from Water Supply (Water Quality) Regulations 2011

² Value from World Health Organisation Drinking Water Guidelines 4th Edn.

Leachable concentrations of arsenic and lead were recorded which exceeded their relative screening values in HP103 (0.4mbgl) and HP106 (0.7mbgl) respectively.

Leachable concentrations of benzo(a)pyrene were recorded which exceeded their relative screening values in HP101 (0.6mbgl) and WS101 (0.7mbgl). HP101 (0.6mbgl) also contained leachable concentrations of the sum of 4 PAHs which exceeded their associated screening value.

5.3 Groundwater Analysis Results

The Kidderminster Formation underlying the site is identified as a Principal aquifer. Due to the presence of elevated (greater than their respective screening values) soil concentrations and leachable concentrations of heavy metals, PAHs and TPH groundwater testing was deemed appropriate, in order to consider the potential risk to controlled waters at the site (Principal aquifer beneath the site).

In total eight groundwater samples were submitted for analysis to ALcontrol. The samples were obtained during two monitoring visits on the 26th of February and the 13th of March 2013. Groundwater was obtained on both occasions from each of the four window sample 50mm diameter wells.

The purpose of the groundwater analysis was to assess the concentrations of contaminants present within the groundwater. This enabled the risk to controlled waters receptors (groundwater beneath the site) posed by potential contaminants to be established with greater confidence. To determine the potential for impacts on groundwater quality with regards to its potential use as a drinking water resource, the groundwater results were screened against the UK DWS. In the absence of a UK DWS, the leachability results were screened against a WHO drinking water standard.

Table 5.3 presents a summary of the groundwater analysis results.

Full analytical testing results are included in Appendix E and soil screening sheets are presented in Appendix F3.

Table 5.3 - Groundwater Results Screening Summary

Determinand	No of Samples Tested	Minimum Value (µg/l)	Maximum Value (µg/l)	Adopted Groundwater Screening Value (µg/l)	Locations where Screening Values are exceeded*	
					Monitoring Round 1	Monitoring Round 2
Polycyclic Aromatic Hydrocarbons (PAHs)	8	All concentrations below screening values for individual compounds, with exception of results below:				
Benzo(a)pyrene	8	<0.009	16.2	0.01 ¹	All four window sample locations	All four window sample locations
Sum of 4 PAH - benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene	8	<MDL	44.88	0.1 ¹	All four window sample locations	All four window sample locations
TPH – CWG Hydrocarbons	8	All banded aliphatic/aromatic TPH-CWG laboratory results were below limit of detection with exception of below:				
TPH Aromatic band >C ₈ – C ₁₀	8	19	386	10	All four window sample locations	WS101, WS103, WS104
TPH Aromatic band >C ₁₀ – C ₁₂	8	16	174	10	All four window sample locations	WS101, WS103, WS104
TPH Aromatic band >C ₁₂ – C ₁₆	8	<10	32	10	-	WS103, WS104
TPH Aromatic band >C ₁₆ – C ₂₁	8	<10	120	10	-	WS102, WS103, WS104
TPH Aromatic band >C ₂₁ – C ₃₅	8	<10	584	10	WS104	All four window sample locations

Determinand	No of Samples Tested	Minimum Value (µg/l)	Maximum Value (µg/l)	Adopted Groundwater Screening Value (µg/l)	Locations where Screening Values are exceeded*	
					Monitoring Round 1	Monitoring Round 2
TPH Aliphatic band >C ₆ – C ₈	8	<10	15	10	WS103, WS104	WS103
TPH Aliphatic band >C ₈ – C ₁₀	8	28	575	10	All four window sample locations	WS101, WS103, WS104
TPH Aliphatic band >C ₁₀ – C ₁₂	8	24	261	10	All four window sample locations	WS101, WS103, WS104
TPH Aliphatic band >C ₁₂ – C ₁₆	8	<10	100	10	-	WS103
TPH Aliphatic band >C ₁₆ – C ₂₁	8	<10	907	10	WS101, WS104	All four window sample locations
TPH Aliphatic band >C ₂₁ – C ₃₅	8	<10	5060	10	WS101, WS102, WS104	All four window sample locations

Values are presented as **ug/l** and are rounded as applicable to the screening values used. <MDL is less than the laboratory method detection limit for each compound summed.

Bold values indicate locations where observed concentrations exceed the quoted screening value.

¹ Value from Water Supply (Water Quality) Regulations 2011

² Value from World Health Organisation Drinking Water Guidelines 4th Edn.

*

Concentrations of benzo(a)pyrene and the sum of PAHs were found to exceed the adopted Tier 1 screening values in all eight samples from the four individual monitoring wells (WS101 to WS104).

TPHs (aromatic >C₈-C₃₅ and aliphatic >C₆-C₃₅) were identified at concentrations exceeding the adopted Tier 1 screening values in all eight samples from the four individual monitoring wells. However, only groundwater sampled from WS103 was identified as have exceedances of all 11 of the individual aromatic and aliphatic TPH bands.

5.4 Safety of Water Supply Pipes and Tap Water Analysis Results

UKWIR Preliminary Assessment

As a preliminary assessment, soil quality data was screened against current stringent UKWIR parameters⁵. The preliminary assessment indicated that the concentrations of total VOCs, total BTEX & MTBE and total SVOC in soil exceed PVC pipe performance criteria in one sample (HP103).

Concentrations of total VOC, total SVOC and TPH bands C₁₀-C₁₆ in soil exceed PE pipe performance criteria in four samples (HP103, WS101, and WS102). A summary of the UKWIR screen is presented in Table 5.4:

Table 5.4 – UKWIR Screen

Determinand	No of Samples Tested	Maximum Value	PE Threshold	PVC Threshold	Locations where Screening Values are exceeded
Total VOCs	5	0.71	0.5	0.125	HP103 (0.4mbgl)
Total BTEX & MTBE	6	0.06	0.1	0.03	WS102 (0.4mbgl)
Total SVOCs (excluding PAHs and others*)	5	3.64	2	1.4	WS101 (0.7mbgl)
EC5-EC10	6	0.071	2	1.4	-
EC10-EC16	6	14.25	10	-	WS101 (0.7mbgl)
EC16-EC40	6	219.21	500	-	-

⁵ 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be Use in Brownfield Sites. UK Water Industry Research, 2010 (as re-issued)

Determinand	No of Samples Tested	Maximum Value	PE Threshold	PVC Threshold	Locations where Screening Values are exceeded
Phenol	5	<0.1	2	0.4	-
Chlorinated Phenols & Cresols	5	<0.1	2	0.04	-

Values are presented as **mg/kg** and are rounded as applicable to the screening values used.

Bold values indicate locations where observed concentrations exceed the quoted screening value.

* - Phenols, Ethers, Nitrobenzene, Ketones, Aldehydes

The UKWIR screening values, and methodology of assessment, is recognised within the industry as being unrealistic, as some threshold values are almost unachievable and based on a very specific set of conditions. As an alternative means of assessing whether human health may be adversely affected by drinking water from pipes in contact with soil containing contaminants, samples of drinking water were collected from taps at six properties on 19th February 2013.

Tap Water Analysis

At the instruction of Cannock Chase Council, samples were obtained from properties where access was available on the day of site works (Haig Close no's. 1, 4 and 15 and Platt Street no's. 9 and 13), after allowing the tap to run for one minute. The samples were submitted to ALcontrol for chemical analysis for metals, PAHs, BTEX and MTBE and VOCs. The results of the analyses were compared to UK DWS taken from the Water Supply (Water Quality) Regulations 2000 (as amended) and **no exceedances** over the UK DWS were identified. Full testing results are included in Appendix E and soil screening sheets are presented in Appendix F4:

5.5 Gas Monitoring Results

Four initial rounds of ground gas monitoring were undertaken, using a Gas Data Instrument GFM435 with internal flow pod. A summary of the maximum gas monitoring results recorded at each well is presented in Table 3.4, with full monitoring data in Appendix D.

Table 5.5 - Summary of Gas Monitoring Data

Well	Maximum Values Recorded During Monitoring Events:						Gas Screening Value ¹ (l/hr)	Situation "A" Characteristic Situation ¹
	Steady CH ₄ (%)	Steady O ₂ (%) ²	Steady CO ₂ (%)	Steady CO (ppm)	Steady H ₂ S (ppm)	Flow (l/hr)		
WS101 _s	0.0	14.7	2.9	0	0	0.1	0.0029	1
WS101 _d	0.0	19.1	1.3	3	0	0.1	0.0013	1
WS102 _s	0.0	18.7	0.9	4	0	0.1	0.0009	1
WS102 _d	0.0	19.2	0.9	1	0	0.1	0.0009	1
WS103 _s	0.0	16.3	2.0	3	0	0.1	0.0020	1
WS103 _d	0.0	18	1.5	87	0	0.1	0.0015	1
WS104 _d	0.0	14.8	4.4	23	0	0.1	0.0044	1
Atmospheric Pressure and trend during day of monitoring, and weather while on site:				28/02/2013		1009mb, steady; part overcast		
				07/03/2013		972-971mb, falling, overcast, rain		
				13/03/2013		989-985mb, falling; part overcast, rain		
				22/03/2013		991mb, gently rising; cloudy		

s - Indicates shallow 19mm diameter installation

d - Indicates deeper 50mm diameter installation

Readings obtained within a 3 minute measurement period, obtained with a GFM435 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.

¹ CIRIA 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, a flow of 0.01 l/hr (the detection limit of the laboratory equipment) is assumed.

² Minimum concentration recorded

The summary data presented above indicates that methane and carbon dioxide are representative of CIRIA characteristic situation 1. 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.

Typically carbon monoxide (CO) was recorded at levels up to 1ppm. However, during the second monitoring (the 7th March 2013) visit concentrations were generally between 0ppm and 4ppm, with concentrations of 23ppm in WS104 and 87ppm in WS103. On the same visit the monitoring of WS103 recorded groundwater levels much shallower than usual and differential atmospheric pressures of -6mb. No hydrogen sulphide was recorded during any of the monitoring visits.

5.6 Summary

Concentrations of arsenic, lead, nickel, vanadium, benzo(a)pyrene, benzene and TPH aliphatics band >C₂₁ – C₃₅ were found to exceed the adopted Tier 1 soil screening values. In addition, leachable concentrations of arsenic, lead, benzo(a)pyrene and PAHs were found to exceed the adopted Tier 1 screening values.

Asbestos has been identified in a single sample from HP103 at a depth of 0.4mbgl. This was identified as containing a trace amount of Chrysotile (white) asbestos fibres, loose within the soil matrix. According to laboratory and UKAS definitions a trace amount constitutes no more than one or two identified fibres.

In groundwater, concentrations of benzo(a)pyrene and the sum of PAHs were found to exceed Tier 1 screening values in all four locations. Multiple bands of both aromatic and aliphatic TPH bands were also found to exceed adopted Tier 1 screening values.

Based on the data it is possible that the concentrations of contaminants at the site could adversely affect drinking water pipes depending on the materials used. However, analysis of tap water from on-site properties did not identify contaminants above UK DWS, and all PAH, TPH and VOC concentrations were less than the limit of detection.

With regard to soil-gases, the concentrations of methane and carbon dioxide recorded are unlikely to pose a risk to human health. However, during the second monitoring visit, concentrations of CO of 23ppm in WS104 and 87ppm in WS103 were identified, although CO was typically not detected at a concentration in excess of 1ppm.

CO can be the result of incomplete combustion associated with underground landfill fires and/or can be a trace element of ground gas. Therefore, concentrations of CO could possibly be influenced by other ground gases within the ground and thus the concentration observed could be the result of interference rather than actual true reading. It should also be noted that the deep wells within three of the exploratory locations were flooded at the time of the monitoring (i.e. the water head was shallower than the top of the response zone), which can affect instrument performance. Repeat monitoring during the drier spring/summer season may be beneficial.

Table 2.2 of CIRIA 665 indicates a long-term (i.e. most stringent) occupational exposure limit (OEL) of 30ppm for CO, and a long-term (i.e. most stringent) Environmental Exposure Limit (EAL) of 0.35mg/m³ (1.15ppm CO). The former of these two values is protective of people in the workplace, the latter of the general public – considered to be a benchmark of protection while not

having a statutory basis⁶. The upper concentration measured at this site straddle these two limit values. However given the concentrations are measured in ground gas and not air samples, and no significant ground gas pressure was recorded, these are not thought to be indicative of gas risk to the residents, though further monitoring would be useful to explain the anomalous results.

⁶ The last paragraph of p27 of Environment Agency Horizontal Guidance Note H1 – Integrated Pollution Prevention and Control: Environmental Assessment and Appraisal of BAT (V6, 2003) states that “Although these (EALs) do not carry any statutory basis, they are, again, a benchmark for harm against which any exceedance should be viewed as unacceptable.

6 ASSESSMENT OF POTENTIAL HUMAN HEALTH RISKS

The combined results of the 2011 and 2013 investigations identified the following potential human health risks:

- Soil concentrations of arsenic, lead, nickel, vanadium, benzo(a)pyrene, TPH aliphatic band >C₂₁-C₃₅ and benzene identified as being in excess of their adopted screening values.

Given the distribution of the soils samples taken (spatially and vertically), the generally uniform nature of the geology across the site in terms of composition and the one source type (infilled land), it was considered justifiable at this stage to undertake statistical analysis on those contaminants where exceedances of a GAC occurred to further define the potential risk from these contaminants.

6.1 Statistical Analysis of Selected Concentrations

Guidance regarding how data collection, data review and statistical testing interact to produce defensible conclusions regarding the condition of land is provided within Guidance on Comparing Soil Contamination Data with a Critical Concentration (“the guidance”) ⁷.

In order for statistical analysis to be applied, the dataset under inspection should strictly be the result of an unbiased sampling strategy. The sampling strategy undertaken at the Haig Close site was undertaken in an unbiased manner and exploratory holes were positioned in order to gain generally even coverage of the areas occupied by residential developments. The sampling strategy was limited by the existence of public roads and paths, private access drives and patios that were covered by hardstanding, and areas of the site occupied by buildings. It is, however, considered that the areas investigated are likely to be representative of the infill material beneath the site as a whole.

Within each exploratory hole, contaminated land practitioners typically sample and analyse a “representative worst case” sample of the soil encountered. –Such sampling and testing gives an indication of “representative worst case” conditions, as so while such sampling is arguably biased, the bias is towards over-estimating typical concentrations of contaminants in the soil across the site. Therefore, if the mean concentration of such “representative worst case” samples is below the SGV or GAC, it follows that soil conditions across the site as a whole are also likely to be below the relevant SGV or GAC.

Statistical analysis of the dataset has therefore been undertaken for any contaminants with the potential to pose a risk to human health and is described below.

6.2 Averaging Areas, Suitability of Dataset

The first step of statistical analysis is to define the “averaging area” over which data would be examined. An averaging area is an area of soil which, when sampled, is considered to provide a representative indicator of how much contaminant a receptor is exposed to.

As samples have only been taken within seven of the 18 rear gardens contained within the site boundary, and the whole of the site is within the bounds of a recorded historic landfill, it is considered that the whole site would form a single averaging area rather than be split into specific

⁷ The Chartered Institute of Environmental Health, CL:AIRE and The Soil and Groundwater Technology Association; May 2008.

parts. On this basis, there is enough data present to undertake adequate statistical analysis of each of the contaminants identified at the beginning of this section as presenting a potential risk to human health.

6.3 Outlier Test

The second stage of statistical analysis requires a test to identify whether any outliers, potentially indicative of laboratory error or a separate population of data (for which a separate averaging area should be defined), are present.

The Guidance indicates that an outlier should only be excluded from a population of data if;

- a) The outlier is obviously and demonstrably the result of an error that can be identified and explained - in which case the correct value should be identified and the dataset amended, where possible, or the erroneous value excluded with justification, or*
- b) The outlier clearly indicates that more than one soil population exists within the dataset and this can be justified by (or informs the further development of) the conceptual model - in which case the different population expressed by the outlier(s) should be explored in more detail either by reviewing and refining zoning decisions and treating outlier values as a separate population or even individually or, if necessary, by undertaking further site sampling to verify conditions in the vicinity of outlier values.*
- c) In all other cases, outlying data should be assumed to be genuine and reflective of the full range of soil concentrations to which receptors may be exposed.*

6.3.1 Hypothesis Testing

The third stage of statistical analysis is to define a null and alternative hypothesis, then statistically examine whether the null hypothesis should be rejected.

In a Part 2A scenario, the null (H_0) and alternative (H_1) hypothesis to be tested is:

'Is there sufficient evidence that the true mean concentration of the contaminant (μ) is greater than the critical concentration (C_c)?'

The Null Hypothesis (H_0) and the Alternative Hypothesis (H_1) are therefore:

- $H_0 \quad \mu \leq C_c$ i.e. the true mean concentration is equal to or less than the critical concentration.
- $H_1 \quad \mu > C_c$ i.e. the true mean concentration is greater than the critical concentration (i.e. this is the question asked of the statistical test)

The Guidance provides a detailed explanation of the hypothesis testing procedure. In summary, **in the Part 2A context**, the following is undertaken:

- If $\mu \leq C_c$, then there is no evidence to reject H_0 , meaning that it is likely that the true population mean is equal to or less than the critical concentration.
- If $\mu > C_c$, then there is a possibility that H_0 should be rejected and the risk presented should be considered further..

The results of the statistical assessment are detailed below.

6.4 Statistical Assessment Results

Statistical tests were undertaken using the EIC Statistics Calculator v.2 and the results are provided in Appendix E. A summary of the calculator output is presented in Tables 6.1:

Table 6.1 - Summary of Statistical Analysis – Haig Close (Residential)

Analyte	No. of samples	No. > C _c	Mean Conc. mg/kg	$\mu > C_c$?	Outliers	Distribution / Test	Critical Conc. C _c mg/kg
Metals							
Arsenic	15	4	23.70	No (95% evidence to reject H1)	Yes	Chebychev	32
Lead	15	1	172.10	No (95% evidence to reject H1)	Yes	Chebychev	450
Nickel	15	1	42.93	No (95% evidence to reject H1)	Yes	Chebychev	130
Vanadium	15	2	34.62	No (95% evidence to reject H1)	Yes	Chebychev	75
PAHs							
Benzo(a)pyrene	10	5	1.02	Yes (60% evidence to reject H ₀)	Yes	One sample t-test	0.94
TPH							
Aliphatic band >C ₂₁ -C ₃₅	6	2	16.01	No (95% evidence to reject H1)	No	One sample t-test	21
VOCs							
Benzene	8	1	0.084	No (95% evidence to reject H1)	Yes	Chebychev	0.16

6.4.1 Metals

Concentrations of arsenic, lead, nickel and vanadium were identified at concentrations greater than their respective GAC screening values. During statistical analysis a single outlier was identified for each of the four metals, (the highest recorded value of each, and the only exceedances of lead and nickel). However, the statistical analysis was undertaken on the whole dataset, including the identified outliers. In each case the true mean concentration of the sample sets were below their respective critical concentrations. Therefore, the concentrations of arsenic, lead, nickel and vanadium present at the site are unlikely to present an unacceptable risk to human health.

6.4.2 TPH Aliphatic Band >C₂₁-C₃₅

Concentrations of TPH aliphatic band >C₂₁-C₃₅ were identified at concentrations greater than their screening value in two locations (HP106 and WS101). Statistical analysis undertaken on the data set, indicated that the true mean concentration of the sample set is less than its respective critical concentration and as such the concentrations of aliphatic band >C₂₁-C₃₅ are unlikely to present an unacceptable risk to human health.

6.4.3 Benzene

Benzene was identified at a concentration in excess of its screening value in a single location (HP103) which was identified as an outlier. Statistical analysis of the whole dataset including the identified outlier indicated that the true mean concentration of the sample set is less than its respective critical concentration and as such the concentrations of benzene are unlikely to present an unacceptable risk to human health.

6.4.4 Benzo(a)pyrene

Concentrations of benzo(a)pyrene were identified at concentrations greater than its screening value in five of the 10 (50%) samples tested (WS101 and HP01-04). During statistical analysis of the benzo(a)pyrene data, a single outlier was identified, (3.24mg/kg in WS101). Initial statistical analysis of the whole dataset, including the outlier, indicated that on the balance of probability, the null hypothesis should be rejected with 60% evidence against the Ho, and thus the alternative hypothesis should be accepted. As such, initial statistical analysis suggests that the true mean concentration of the whole sample set, including the identified outlier, is higher than the critical concentrations and as such could potentially pose an unacceptable risk to human health.

However, the identified outlier appears to be part of a separate dataset, in that the concentrations of benzo(a)pyrene (as well as almost all other PAHs) at WS101 are almost double that of the next highest concentration. In addition to this the Made Ground encountered within WS101 is significantly thicker than that identified elsewhere on site, extending to a depth of 3.9mbgl, compared to the next deepest in WS102 at 1.9mbgl.

Following this the outlier was removed from the dataset and additional statistical analysis of the remaining dataset was undertaken. The results of this are summarised in table 6.2 below.

Table 6.2 - Summary of Statistical Analysis (benzo(a)pyrene only) – Haig Close (Residential)

Analyte	No. of samples	No. > C _c	Mean Conc. mg/kg	$\mu > C_c ?$	Outliers	Distribution / Test	Critical Conc. C _c mg/kg
PAHs							
Benzo(a)pyrene	9	4	0.78	No (77% evidence to reject H1)	No	One sample t-test	0.94

As can be seen from the summary table above, the statistical analysis indicates that on the balance of probability, there is not enough evidence against the null hypothesis and as such it could be accepted, suggesting that concentrations of benzo(a)pyrene are unlikely to present an unacceptable risk to human health.

This does however indicate that concentrations of benzo(a)pyrene in the vicinity of WS101 do still have the potential to present an unacceptable risk to human health and further investigation is required.

6.4.5 Statistical Analysis Conclusion.

Based on the statistical analysis, benzo(a)pyrene around the identified outlier at WS01 has been highlighted for further consideration.

6.5 Institute of Occupational Medicine (IOM) – Assessment of benzo(a)pyrene and other PAHs

The approach adopted to form the basis of risk of exposure to benzo(a)pyrene was based on the work undertaken by the Institute of Occupational Medicine and is detailed below. This approach considers the toxicology of PAHs and specifically the concentrations in soils that may represent a significant possibility of significant harm.

This section provides an outline summary of the IOM approach to generating its assessment criterion for benzo(a)pyrene (and other PAHs). Further, more detailed information is included within Appendix G and should be read in conjunction with the sections below.

6.5.1 Selection of Assessment Criterion

To provide further assessment of those concentrations which exceed the GAC (i.e. those which may pose more than a minimal risk to human health) the assessment criterion value derived by IOM has been used.

The IOM carried out a review for Brent Council on polycyclic aromatic hydrocarbons (PAHs) in 2009, to assess the toxicological properties of PAH above GACs in residential housing sites to support Brent Council to make an assessment of soil concentrations above which may constitute significant possibility of significant harm (SPOSH) at the Brent site.⁸ Although the report was developed specifically for one site in Brent, the toxicological considerations used provide a useful input into other similar sites, and the document has been issued as a public domain document.

The IOM toxicological review has been assessed by Grontmij and is considered authoritative and the lines of evidence appropriate for use at Haig Close.

Following review of the IOM work it has been agreed between Grontmij and the Council that an assessment criterion of 17 mg/kg will be adopted for benzo(a)pyrene as a threshold below which SPOSH will not be considered to occur.

6.5.2 Derivation of IOM Assessment Criterion

The information provided below is a summary of the how the derivation of the IOM value of 17mg/kg was achieved. Further, more detailed information is provided within Appendix G.

The value of 17 mg/kg is the lower end of a range (for which the upper end is 36 mg/kg) proposed by IOM as a concentration range at which it could be argued that, if greatly exceeded “*the potential for significant harm would be significant, unless measures are in place to prevent exposure*”⁹.

The range of 17mg/kg to 36 mg/kg benzo(a)pyrene was derived by considering a number of toxicological assumptions, and assumptions about exposure. These are described in detail within Appendix G. Appropriate toxicological criteria for cancer endpoints were identified by expert toxicologists and were based on rodent studies for the oral route of entry and on epidemiological studies for the inhalation pathway. IOM selected appropriate uncertainty factors, based on guidance from the Committee on Carcinogenicity.

⁸ Toxicological Review of the Risks of Exposure to Soil Containing Polycyclic Aromatic Hydrocarbons 2009

⁹ The report also notes that “*It would clearly be inappropriate to discriminate between soils that contained PAH contents that were marginally above a discrete guideline value from those that were marginally below that value.*”

IOM identified “a typical toddler aged between 1 and 2 years with a body weight of 11.4 kg” as the critical receptor and assumed a “long term mean intake of soil and dust” of 100 mg/day. This is a conservative assumption as typically the critical receptor is identified as being a young child between 0 and 6 years of age. An additional allowance of a factor of two was made for inhalation of indoor dust. An adjustment was also made for the fact that other PAHs besides benzo(a)pyrene were present within the soil. This resulted in a range of 1.7 mg/kg to 3.6 mg/kg. This range was adjusted by a further factor of ten to exclude normal background concentrations of benzo(a)pyrene content in urban soils, resulting in the range of 17 mg/kg to 36 mg/kg of benzo(a)pyrene in soil.

It is also noted that the report undertaken by IOM states that:

“Given that the exposure modelling is based on reasonable worst case assumptions, soil concentrations between 7 and 17 mg/kg may be tolerable given that the removal of contaminated soils could give rise to temporary exposure of residents to B[a]P during any remediation works and that this could have a much greater impact on their lifetime exposure than if the soil had remained undisturbed.”

6.5.2.1 Other Assessment Criterion

It should be noted that it is acknowledged that the Health Protection Agency¹⁰ identified a different toxicological criterion for the assessment of land contamination, which is lower than that used in the derivation of the IOM value of 17 mg/kg. The different toxicological criterion was the use of a lower range of Point of Departure (POD) which in the case of benzo(a)pyrene is referred to as a BMDL₁₀. However, the differences between the two values are relatively small, compared to the uncertainty factors that are subsequently applied. Further discussion regarding the different criterion used is provided in Appendix G.

Equally Grontmij are aware of decisions on SPOSH made by other local authorities where selecting a different POD has resulted in the threshold of SPOSH has been selected at higher soil concentrations.

Overall the arguments presented by IOM are considered to be a robust starting point for considering the question of SPOSH at sites where PAH contamination is present.

6.5.3 Conclusion

As the maximum concentration for benzo(a)pyrene from the 10 soils samples analysed was 3.24mg/kg is less than the IOM value of 17 mg/kg the site is not considered to present a significant possibility of significant harm with regard to benzo(a)pyrene.

¹⁰ HPA Contaminated Land Information Sheet Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs), Health Protection Agency v5 2010

7 UPDATED CONCEPTUAL SITE MODEL

The CSM presented earlier (Section 3) was updated using the findings of the limited sampling investigation as presented in the following table

Table 7.1 –CSM, 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	Arsenic, lead, nickel, vanadium, TPH, benzene and Benzo(a)pyrene in shallow soils	Direct ingestion/dermal contact/inhalation of dust/inhalation of vapours/consumption of home-grown vegetables	Medium	Unlikely	Low	The concentrations recorded are not considered to present a risk of significant harm to human health and so no further assessment is needed.
Residents of properties above infilled ground	ACMs encountered in trace quantities at a single location	Direct ingestion/dermal contact/inhalation of dust/inhalation of fibres	Medium	Unlikely	Low	The concentrations recorded are not considered to present a risk of significant harm to human health and so no further assessment is needed.
Residents of properties above infilled ground	Ground gas	Movement into buildings, subsequent asphyxiation	Medium	Low likelihood	Low/Moderate	Based on the monitoring undertaken ground gas is unlikely to present a risk to residents.
Residents of properties above in-filled ground	Arsenic, lead, nickel, vanadium, TPH, benzene and Benzo(a)pyrene in shallow soils	Chemical attack and permeation of water supply pipes	Medium	Unlikely	Low	Tap water analysis indicates no exceedances of contaminants above DWS.
Principal aquifer beneath the site.	Benzo(a)pyrene and TPH identified in groundwater	Vertical contaminant migration to aquifer	Medium	Unlikely	Low	Leachable contaminants within the made ground and concentrations in groundwater are unlikely to pose a risk of significant pollution to the Principal aquifer. No further assessment is needed.

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 G for further details

8 SUMMARY AND CONCLUSION

8.1 Summary

- Review of historical mapping and information provided Cannock District Council identified that residential housing at Haig Close, High Town, Cannock, Staffordshire was built over a former landfill (unknown waste materials deposited/dates of operation).
- The northern part of the site is indicated to overlie a former gravel pit, operational between approx 1886 and 1954, after which it was backfilled with unknown material.
- The site is likely to have been infilled prior to 1974 CoPA regulatory controls.
- Residual contamination associated with former site activities was identified to potentially pose a risk to the health of residents now living at the site, and to controlled waters, warranting further investigation.
- Investigations at the site have encountered up to 3.9m of infill material, which was noted to contain ash, brick, coal and glass fragments with occasional clinker in the majority of the exploratory holes undertaken.
- Arsenic, benzo(a)pyrene and PAH in made ground soils were recorded at concentrations which are not considered to present unacceptable risks to site users.
- Trace amounts of asbestos fibres were detected in one sample only, at a depth of 0.4m bgl within a landscaped area. In consideration of the data obtained, asbestos is not considered to present unacceptable risks to site users.
- Ground gas monitoring has not recorded elevated concentrations of carbon dioxide or methane. However, anomalous carbon monoxide data was obtained on one occasion.
- Concentrations of contaminants in shallow groundwater and leachable concentrations of contaminant in soils and are considered low, and further assessment of risks to controlled water bodies is not warranted.

8.2 Conclusion

Overall the results do not suggest that the made ground materials sampled contain elevated concentrations of contamination that indicate a significant risk of significant harm.

Although no detailed groundwater assessment has been undertaken, we conclude that potential risks are not sufficient to warrant further investigation at this stage. However, information on potential controlled waters risks has not been discussed with the Environment Agency and their opinion should be sought.

Therefore, on the basis of the preceding assessment and the limitations listed in Appendix A, Grontmij consider that the site is suitable for its current use and should not meet the

definition of contaminated land under Part 2A of the Environmental Protection Act 1990. No further assessment is recommended to meet the requirement of the statutory guidance.

Should any additional information be provided to the Council on the ground conditions beneath the land, the conclusions of this report should be re-assessed in light of any such further information, should the situation arise.

DRAWINGS







100
90
80
70
60
50
40
30
20
10
0



NOTES

KEY

	STUDY SITE BOUNDARY
	WS1 WINDOW SAMPLER HOLES (4No.), (FEBRUARY 2013)
	HP1 HAND PITS (7No.) (FEBRUARY 2013)
	HP1 HAND PITS (5No.) (DECEMBER 2010)

A	FIRST ISSUE	MIC	ML	SL	26.03.13
REV	AMENDMENTS	BY	CHKD	APRD	DATE



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CLIENT



PROJECT
HAIG CLOSE

TITLE
**EXPLORATORY HOLE
LOCATION PLAN**

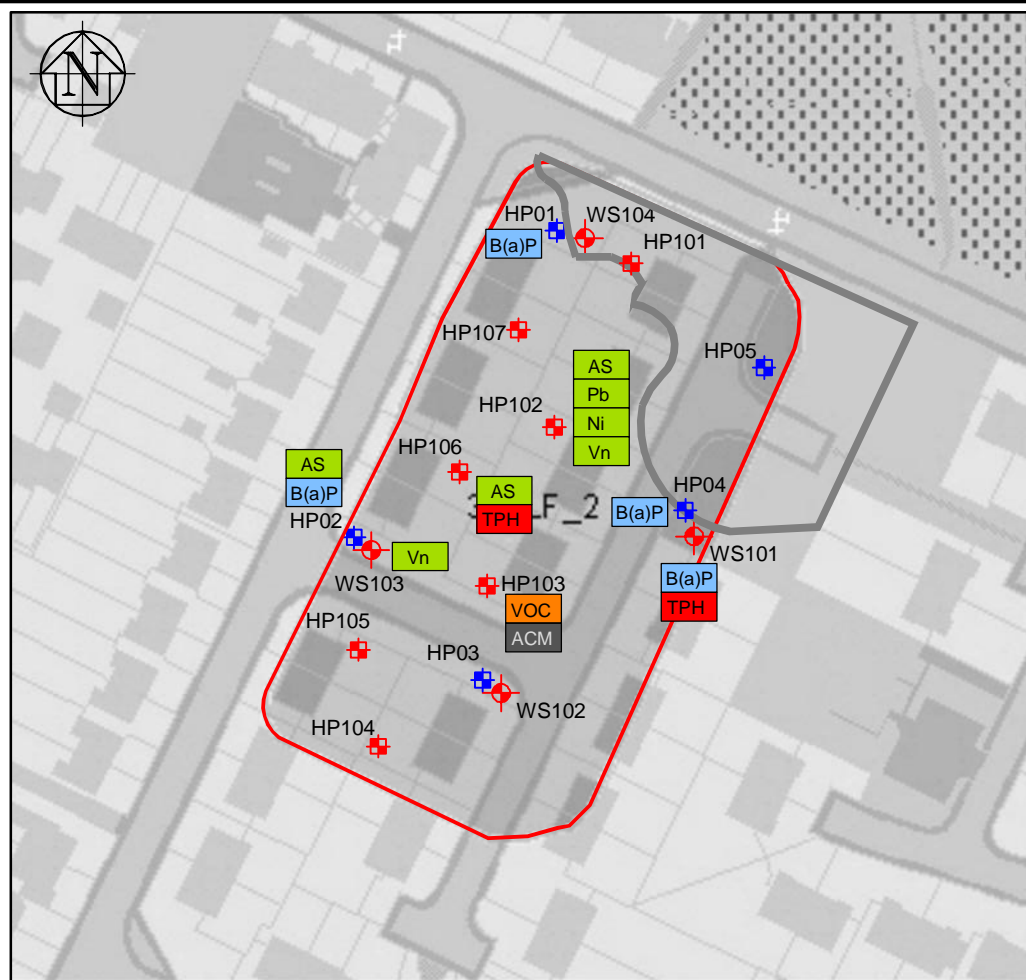
STATUS
FINAL

DRAWN M.CLARK	CHECKED M.LAWSON	APPROVED S.LAYTON
DATE 26.03.13	DATE 26.03.13	DATE 26.03.13

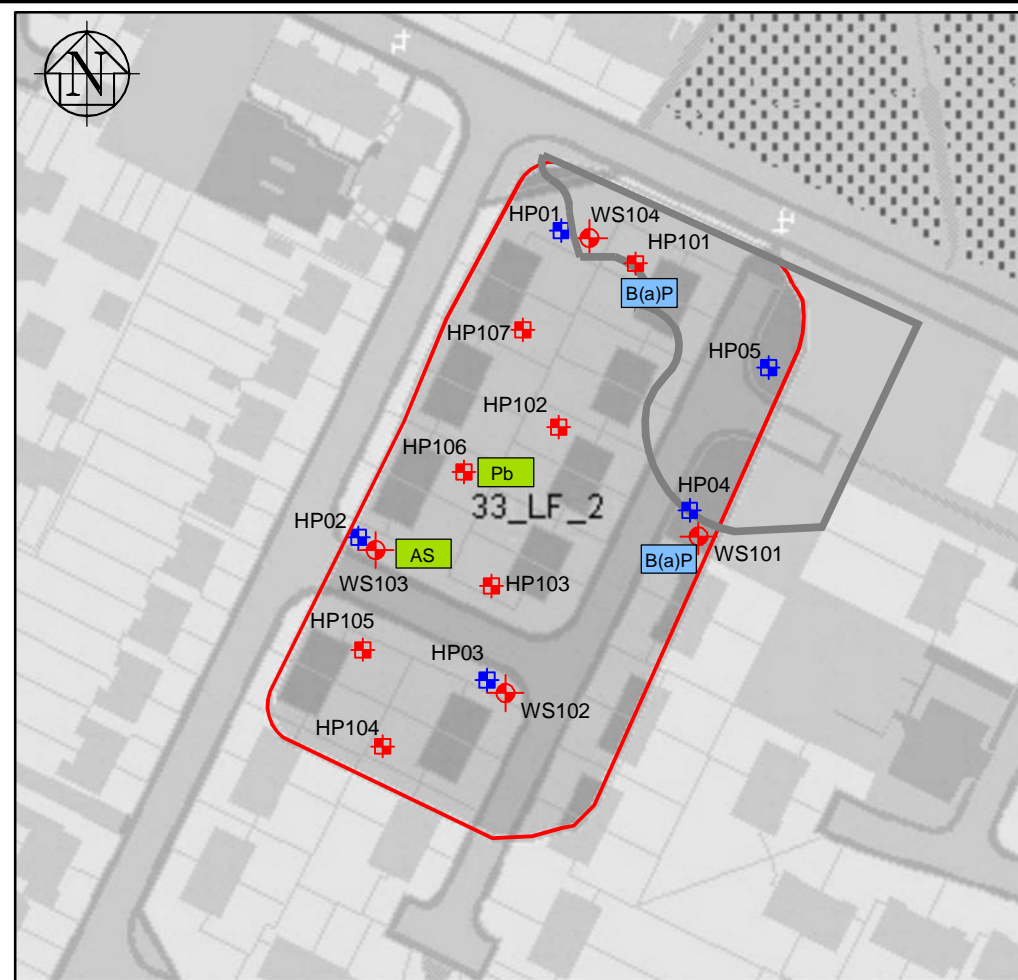
SCALE
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ORIGINAL DRAWING SIZE
297 x 420 - A3

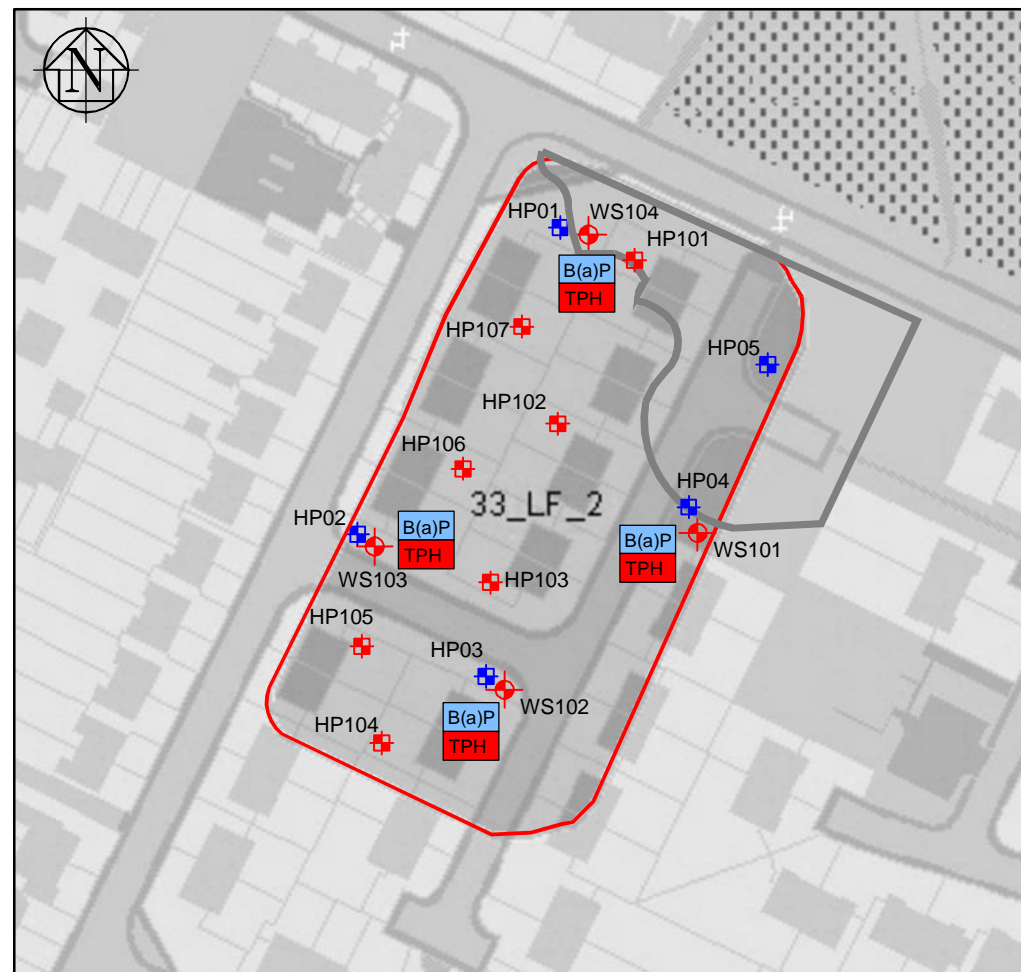
DRAWING No 106270-600	REV. A
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SOIL CONCENTRATIONS EXCEEDING SGV/GAC - RESIDENTIAL WITH PLANT UPTAKE AT 2.5% SOM



LEACHATE CONCENTRATIONS EXCEEDING UK DWS



GROUNDWATER CONCENTRATIONS EXCEEDING UK DWS

NOTES

KEY

- STUDY SITE BOUNDARY
- WS1 WINDOW SAMPLER HOLES (4No.), (FEBRUARY 2013)
- HP1 HAND PITS (7No.) (FEBRUARY 2013)
- HP1 HAND PITS (5No.) (DECEMBER 2010)
- INDICATIVE BOUNDARY OF HISTORICAL GRAVEL PIT
- AS ARSENIC
- B(a)P BENZO(a)PYRENE
- VOC BENZENE
- ACM ASBESTOS CONTAINING MATERIAL
- TPH HYDROCARBONS

A	FIRST ISSUE	MIC	ML	SL	26.03.13
REV	AMENDMENTS	BY	CHKD	APRD	DATE

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CLIENT



PROJECT

HAIG CLOSE

TITLE

EXCEEDANCE PLAN
(TIER 1 SCREENING)

STATUS

FINAL

DRAWN	CHECKED	APPROVED
M.CLARK	M.LAWSON	S.LAYTON
DATE	DATE	DATE
26.03.13	26.03.13	26.03.13

SCALE	ORIGINAL DRAWING SIZE
NTS	297 x 420 - A3

DRAWING No	REV.
106270-601	A

**APPENDIX A
LIMITATIONS STATEMENT**

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 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 B
INITIAL INVESTIGATION WITH APPENDICIES

**Cannock Chase District
Council**

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

**Haig Close Landfill, High Town,
Cannock, Staffordshire**

May 2011

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CONTENTS

1	INTRODUCTION.....	1
1.1	Terms of Reference.....	1
2	BACKGROUND INFORMATION	2
2.1	Site Setting	2
2.2	Previous Reports	4
3	INITIAL INVESTIGATION.....	8
3.1	Scope and Methodology.....	8
3.2	Results	8
3.2.1	Ground Conditions	8
3.2.2	Adequacy of Investigation Depth and Extent.....	8
3.2.3	Field Evidence of Potential Contamination	9
3.2.4	Soil Analysis Results.....	9
3.2.5	Gas Monitoring.....	10
3.2.6	Safety of Water Supply Pipes	11
4	UPDATED CONCEPTUAL SITE MODEL.....	13
4.1	Introduction	13
4.2	Contaminants	13
4.3	Receptors	13
4.4	Pathways	13
5	SUMMARY AND CONCLUSION.....	16
6	RECOMMENDATIONS FOR FURTHER WORK	17

FIGURES

Figure 2.1 - Site Location.....	4
---------------------------------	---

TABLES

Table 2.1 - Site Setting.....	2
Table 2.2 - Potential Pollutant Linkages	5
Table 3.1 - Field Evidence of Potential Contamination.....	9
Table 3.2 - – Soil Analysis Results Summary	10
Table 3.3 - WRAS Threshold Screen.....	12
Table 4.1 – Pollutant Linkages, Post-Site Investigation.....	14

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	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.

Contaminated Land is defined in Section 78(2) of Part 2A of the Environmental Protection Act 1990 as:

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

- *significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *pollution of controlled waters is being, or is likely to be, caused.*

Further information is provided in the Act and associated statutory guidance (DEFRA Circular 01/2006 – EPA 1990, Part 2A: Contaminated Land).

Grontmij has 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, at Haig Close, Cannock, is considered to be sensitive as 24 residential properties with gardens overlie part of an infilled gravel pit (indicated on historical maps from 1886 and shown as infilled by 1954). The site is also underlain by a principal aquifer, which leachate from the infill could be adversely affecting.

The site occupies an area of approximately 0.88 ha.

Following the completion of a desktop study (see Appendix A), Grontmij subsequently implemented an initial exploratory investigation in December 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. The site setting is also shown on Drawing 1.

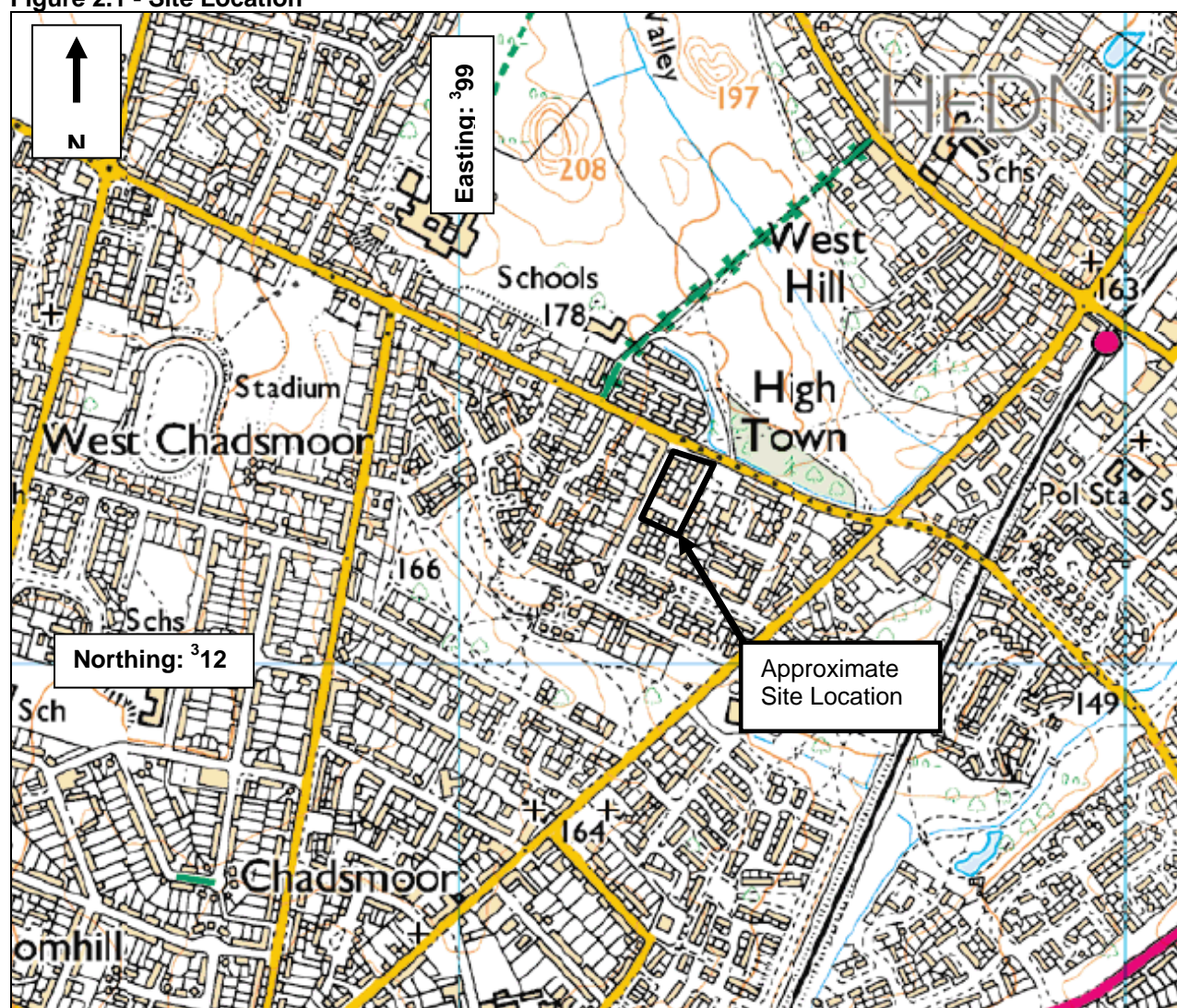
Table 2.1 - Site Setting

Data	Information
Address	Site is located south of Belt Road and east of Platt Street, and is intersected by Haig Close (see Drawing 1). The general site address is Haig Close, High Town, Cannock, Staffordshire (nearest postcode is WS11 5TR)
Current site use	Residential houses and gardens. Houses first appear on the 1990 historical map, indicating construction in the 1970s or 80s
Grid Reference	Centre of site is located at approximate NGR 399340, 312230
Site Area	Approximately 0.88 ha
Topography	Site falls towards the south-east at a moderate decline
Surrounding land use	The site is surrounded by further residential bungalows with garden areas. The north-eastern corner of the site forms part of a wider area of open space
Mapped Geology	British Geological Survey (BGS) mapping indicates superficial deposits of Diamicton Till overlying solid geology of the Kidderminster Formation (interbedded sandstone and conglomerate)
Hydrogeology	The Environment Agency website classifies the Kidderminster Formation as a principal aquifer. Principal aquifers are layers of rock or drift deposits that have high inter-granular and/or fracture permeability and usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale The Diamicton Till is regarded as an unproductive stratum (i.e. former non-aquifer)
Source Protection Zones (SPZs)	The Environment Agency website indicates that the site does not lie within a SPZ
Surface Waters	An un-named minor watercourse is located approximately 10m north (likely up hydraulic gradient) of the northern site boundary. A pond is located approximately 500m south-east (likely down hydraulic gradient) of the site
Historical Land Use	Environment Agency records provided to the council indicate that the whole site formerly operated as a landfill site and was subsequently developed as residential housing. The landfill is shown on the Environment Agency "What's In Your Back Yard" website although no details pertaining to the dates of operation or types of waste disposed are supplied. Historical maps indicate that the northern part of the site formerly comprised a gravel pit from 1886 until 1954, when it was backfilled with unknown material An additional historic landfill accepting inert and household waste is indicated approximately 175m to the south-west of the site, being operational between 31 st December 1948 – 1952. This landfill is registered to have received both inert waste such as bricks, concrete and glass etc and household waste from dwellings of various types including houses, caravans, houseboats, campsites and prisons, and wastes from schools, colleges and universities. The site pre-dates the Control of Pollution Act 1974 and thus is unlikely to have operated under a formal licence

Data	Information
Ecologically designated sites ¹	MAGIC search indicates none within 500m of site centre
Scheduled Monuments	None identified by Pastscape website within 500m of site centre

¹ Includes sites designated as Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Special Area of Conservation (SAC, including candidate sites), Special Protection Area (SPA including potential sites), listed Wetlands of International Importance (Ramsar site) and Local Nature Reserves (LNR).

Figure 2.1 - Site Location



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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 procedures² and statutory guidance³. The CSM is re-presented as Table 2.2 overleaf.

² CLR11 Model Procedures for the Management of Land Contamination (EA & DEFRA September 2004)

³ 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)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
1	Residents of properties above infilled ground (including children playing in gardens)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs, asbestos	Dermal contact and direct ingestion, inhalation of dust/vapours, consumption of home-grown vegetables	Medium	Likely	Moderate	Risk is greatest where possibly impacted soils are exposed, for example when digging a vegetable patch or when children play outdoors. Properties are constructed directly above a potentially significant contamination source. Soil sampling and analysis is required to provide clarity on current risk
2	Residents of properties above infilled ground	Methane and carbon dioxide from decomposition of deleterious elements of landfill material	Movement into buildings, subsequent asphyxiation and explosion risk	Medium	Likely	Moderate	Installation and monitoring of wells for measuring ground gas concentrations/flow rates is required to provide clarity on current risk. Gases could also migrate from the former landfill located to the south-west of the site, although low permeability clay material beneath the sites (if not previously quarried out) would inhibit gas migration.
3	Subsurface services serving the buildings (principally water supply)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Chemical attack and tainting of water supply could occur at high contaminant concentrations / severe pH levels	Mild	Likely	Low/moderate	Further site investigation data required to refine assessment/Conceptual Site Model
4	Property (Structures) – sub-surface concrete	Sulphate and pH	Contact between contaminants and concrete	Mild	Likely	Low/moderate	Further site investigation data required to refine assessment/Conceptual Site Model

No.	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
5	Principal aquifer (Kidderminster Formation) beneath site	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching of soil contaminants to aquifer	Medium	Likely	Moderate	Although mapping indicates site is underlain by (probably low-permeability) Diamicton till, it is likely that the Diamicton was quarried out prior to landfilling at the site. Need to confirm ground conditions beneath the site and depth/concentration of any leachable soil contaminants
6	Un-named stream 10m north of the northern site boundary (and fish within)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching from made ground to water table; off-site migration of dissolved contaminants within groundwater (and uptake by fish)	Medium	Unlikely	Low	Low-permeability Diamicton Till, if not quarried out beyond the site, likely to prevent horizontal movement of dissolved contaminants in any shallow groundwater which is in hydraulic connectivity with the stream. Groundwater in deeper Principal aquifer is likely to be too deep to be in hydraulic continuity with the stream. Stream is also likely to be hydraulically upgradient of the study site. No further assessment proposed.

No.	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
7	Pond 500m south-east of the site (and fish within)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching from made ground to water table; off-site migration of dissolved contaminants within groundwater (and uptake by fish)	Medium	Unlikely	Low	Low-permeability Diamicton Till, if not quarried out beyond the site, likely to prevent horizontal movement of dissolved contaminants in any shallow groundwater which is in hydraulic connectivity with the pond. Groundwater in deeper Principal aquifer is likely to be too deep to be in hydraulic continuity with the pond. Pond is downgradient of the study site, but is 500m away, offering significant potential for attenuation and dilution of dissolved contaminants along the 500m flowpath. 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 extract in Appendix B.

3 INITIAL INVESTIGATION

In order to further examine the potential pollutant linkages identified in Table 2.2, an initial site investigation was designed with regard to BS10175:2001, and was undertaken on the 16th December 2010. This section describes the site investigation undertaken and results obtained.

3.1 Scope and Methodology

The initial site investigation included the following:

- Obtaining plans of underground services and CAT-scanning proposed drilling locations, using a Radiodetection CAT1 and signal generator;
- Advancing five hand dug pits (HP01 – HP05) to a maximum depth of 0.7m, to examine shallow soil conditions;
- Logging soil arisings in accordance with (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 representative 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.

3.2 Results

3.2.1 Ground Conditions

Made ground

Made ground was encountered in all hand pits to termination depth at 0.7m below ground level (bgl), although material between 0.5 – 0.7m bgl within HP05 was possibly natural superficial deposits. Topsoil was encountered within HP01 and HP02. The Made Ground material was predominantly granular in nature, comprising brown very gravelly sand. The gravel content comprised fine to coarse quartz and sandstone, with occasional brick and coal fragments.

Evidence of potential infill was encountered within four of the five hand pits at depth ranging between 0.15m and 0.5m bgl (see Table 3.1 below), and was encountered to the termination depth of the pits at 0.7m bgl. The infill material included ash, brick, and metal fragments.

Groundwater

Groundwater was not encountered during the initial shallow investigation.

The above findings are discussed further in Section 4 (updated CSM). Hand pit logs are included within Appendix C.

3.2.2 Adequacy of Investigation Depth and Extent

The advanced hand dug pits provided adequate spatial coverage of the site for an initial investigation, but further spatial coverage is required to improve the understanding of the site (see Sections 4 to 6). The base of the Made Ground was not proven during the investigation (except possibly within HP05), meaning that the full profile of infill/waste and associated contaminants and gas generating potential remains unknown (and requiring of further investigation). Additionally, the hand pits were advanced in lower-risk areas of the site (i.e.

open space), so it is desirable to obtain analyses from higher-risk areas (i.e. residential gardens).

3.2.3 Field Evidence of Potential Contamination

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

Table 3.1 - Field Evidence of Potential Contamination

Exploratory Hole	Visual and Olfactory Evidence of Contamination
HP01	0.15 – 0.7m bgl: made ground contains brick, ash, coal and metal fragments
HP02	0.5 – 0.7m bgl: made ground contains ash, coal and glass fragments
HP03	None
HP04	0.5 – 0.7m bgl: made ground contains ash, brick and glass fragments
HP05	0 – 0.25m bgl: made ground contains brick fragments 0.25 – 0.5m bgl: made ground contains ash

3.2.4 Soil Analysis Results

Five 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 adequate spatial coverage of the site.

Table 3.2 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 order of 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;

Full analytical testing results are included as Appendix D.

Table 3.2 -- Soil Analysis Results Summary

Determinand	No. of Samples Tested	Minimum Value	Maximum Value	SGV / GAC ¹	Locations where SGV or GAC are exceeded
Arsenic	5	10.6	44.3	32	HP02 (0.3m and 0.7m bgl)
Barium	5	142	715	1300	-
Beryllium	5	1.31	4.49	51	-
Boron (water-soluble)	5	<1	3.32	291	-
Cadmium	5	1.41	4.45	10	-
Chromium, hexavalent	5	<0.6	<1.2	4.3	-
Chromium, total	5	10	37	3000	-
Copper	5	30.2	153	2330	-
Lead ²	5	95.6	438	450	-
Mercury ³	5	<0.14	0.281	170	-
Nickel	5	19.1	63.4	130	-
Selenium	5	<1	1.92	350	-
Vanadium	5	22.1	52.1	75	-
Zinc	5	294	1,900	3750	-
Asbestos screen	3	No asbestos containing materials (including fibres) detected			-
Polycyclic Aromatic Hydrocarbons (PAHs)	5	All concentrations below GAC for individual compounds, with exception of result below:			-
Benzo(a)pyrene	5	0.3	1.73	0.94	HP01 (0.3m), HP02 (0.3m & 0.7m), HP04 (0.7m)

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 Eleven samples were tested for Soil Organic Matter (%SOM) content. A minimum value of 0.9% and a maximum of 3.4% were recorded, with a mean of 2.3% and median of 2.4%. It is therefore justified, where SGVs or GAC are influenced by SOM, to use the SGVs and GAC generated using a 2.5% SOM value in CLEA in 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, whereas 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 methyl mercury compounds are likely to be very low'.

3.2.5 Gas Monitoring

Given the limited scope and depth of the initial investigation, gas monitoring wells were not installed.

3.2.6 Safety of Water Supply Pipes

Two publications have been reviewed in regard to potential risks to water supply pipes posed by contaminants in the ground:

- “Guidance for the Protection of Water Supply Pipes to be Used in Brownfield Sites” (UK Water Industry Research {UKWIR}, ref 10/WM/03/21, 2010 (re-issued version));
- The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land (Water Regulations Advisory Scheme {WRAS}, ref 9-04-03, October 2002).

Both reports present methodologies for the assessment of soil conditions and the specification of appropriate pipework materials to mitigate the presence of contaminants.

WRAS Screen

A comparison between the chemical analysis results obtained from samples taken at 0.7m and the older WRAS screening values is presented in Table 3.3. The deepest soil samples were selected for comparison as 1.2m is the typical maximum depth at which water pipes are laid within the highway, with local service connections to properties typically much shallower (note, the table below does not constitute a full screen against all WRAS parameters; only the parameters tested for are listed).

Table 3.3 - WRAS Threshold Screen

Analyte	Maximum Analysis Result (mg/kg)	WRAS Threshold Value (mg/kg)
pH	7.37 – 7.52	<5 or >8
Arsenic	40	10
Cadmium	3.1	3
Chromium (hexavalent)	<1.2	25
Chromium (total)	24	600
Lead	235	500
Mercury	0.28	1
Selenium	<1	3
Polyaromatic Hydrocarbons	20.5	50

Bold values indicate exceedance of WRAS threshold value

The maximum concentration of arsenic and cadmium recorded exceeds the WRAS threshold values (the concentration within HP04 also exceeds this value).

UKWIR Screen

The UKWIR approach is the most recent and reflects further studies undertaken since the WRAS document was published in 2002. Key features of the UKWIR report include:

- A pipework material-specific assessment procedure (Table 3.1 of the report). This allows chemical analysis results to be compared to various threshold criteria associated with six possible pipework material types;
- The discounting of metallic pipework (other than copper or steel/ductile iron with protective wrapping) as a modern pipework material;
- The specification of a different chemical testing suite to that recommended in the earlier WRAS document, including the use of physio-chemical parameters and exclusion of analysis for metals (given the above discounting of metallic pipework).

However as the chemical analysis for the site was scheduled prior to the publication of the re-issued UKWIR report (despite a re-issue data of 2010, the report was not available until January 2011), no relevant parameters (apart from pH) required for a UKWIR screen (as summarised in Appendix G) have not been analysed for and hence further assessment is not possible.

Screening Summary

Based on the existing investigation data it is possible that the concentrations of contaminants at the site could adversely effect drinking water quality, depending on the materials used for water distribution (South Staffordshire Water pipes) and local connections to the South Staffordshire network (probably installed by the house builder).

The results of the intrusive investigation are discussed in more detail within 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).

- Concentrations of arsenic in two samples were detected in soil at concentrations in excess of the screening values relevant for a residential site with plant uptake;
- Concentrations of benzo(a)pyrene in four samples 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 UKWIR and WRAS guidelines, protective of water distribution pipework:

- Maximum soil pH, arsenic, cadmium.

Gas concentrations within the infill/waste material beneath the site, and leachable contaminant concentrations within the infill/waste, are currently unknown.

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 (including children playing in gardens)	Arsenic and benzo(a)pyrene in shallow soils up to 44 mg/kg and 1.7 mg/kg, respectively	Direct ingestion/dermal contact/inhalation of dust/inhalation of vapours/consumption of home-grown vegetables	Medium	Low to Likely	Low to Moderate	Insufficient data available to draw firm conclusion (only a basic suite of testing was undertaken, only five samples have been obtained, limited depth-specific analysis can be undertaken) – infill has been identified across the site and higher contaminant concentrations may be present. Limited further assessment is required in order to increase the sample population and determine the significance of the detected concentrations (see section 6)
Residents of properties above infilled ground	Potential methane and carbon dioxide or volatile gases from decomposition of deleterious elements of landfill material	Movement into buildings, subsequent asphyxiation and explosion risk	Medium	Likely	Moderate	As monitoring of landfill gases were not undertaken during the limited investigation (as not considered appropriate within shallow hand pits which did not prove the base of the infill/waste) gas risk is unknown. Further assessment is therefore required (see section 6) to include wells drilled to the base of the infill/waste material and measurement of ground gas concentrations & flow rates
Subsurface services serving the buildings (principally water supply)	Arsenic concentration and pH values in shallow soils exceed UKWIR and WRAS guideline screening criteria	Chemical attack and tainting of water supply could occur at severe pH levels	Medium	Low to Likely	Low / moderate	Limited investigation data is available (note no relevant parameters for UKWIR guidelines were analysed). Materials used for connection of each house to the South Staffordshire Water main are unknown, and assumed to be potentially susceptible to attack. Hence further assessment is required. Prior experience dictates that concentrations of contaminants in most Made Ground soils tend to exceed UKWIR guidelines, so tap water testing is recommended to assess current risk (see section 6)

Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability of Linkage Occuring ¹	Overall Risk ¹	Comments
Property (structures) – residential buildings on site	Decomposable or compressible elements of infill	Differential settlement of infill, causing structural failure of buildings	Medium	Unlikely	Low	Although a detailed inspection of buildings has not been undertaken, no obvious evidence of structural failure was noted in the field and all properties at the site appear to be currently occupied. As buildings appear to be fit for occupancy, it is unlikely that significant harm to the building has been caused or is being caused (ref: DEFRA Circular 01/2006 p86 – this is statutory guidance accompanying the Environmental Protection Act 1990)
Property (structures) - sub-surface concrete foundations	Sulphate and pH	Contact with foundations	Medium	Low to likely	Low / moderate	Based on limited investigation data (a basic suite of testing was undertaken which didn't include sulphate) further assessment is required (see section 6)
Principal aquifer (Kidderminster Formation) beneath site	Potential contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Vertical contaminant migration to aquifer	Medium	Likely	Moderate	Due to limited depth of initial investigation holes, which did not prove the base of the infill/waste material, and lack of soil leachate analysis, further assessment is required (see section 6)

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 identified that residential housing at Haig Close, High Town, Cannock, Staffordshire was built over a former landfill (unknown waste materials deposited/dates of operation). The northern part of the site is indicated to overlie a former gravel pit, operational between approx 1886 and 1954, after which it was backfilled with unknown material. The site is likely to have been infilled prior to 1974 (i.e. within an unregulated regime). The waste material potentially poses a risk to human health, water supply pipes and groundwater;
- An initial investigation encountered 0.7m of infill material, which was noted to contain ash, brick, coal and glass fragments within four of the five hand pits undertaken. The base of infill material was not proven;
- Chemical analysis identified that the concentration of arsenic in two samples and benzo(a)pyrene in four samples exceeded the generic screening value applicable to the generic residential housing scenario, where plants are grown for human consumption. Given the clear presence of infill at the site, limited further shallow investigation is recommended to enhance the dataset and enable confidence in conclusions in regard to risk posed to human health;
- Given the shallow depth of the initial investigation, gas monitoring has not been undertaken. The potential for infill material to generate significant quantities of ground gases is unknown. Boreholes, with monitoring installations, should be advanced to the base of the infill, to enable gas monitoring and also limited testing of deeper soil contaminants, should field evidence of volatile (gas-generating) contaminants be identified;
- As the full infill profile has not been investigated, and leaching testing has not been undertaken, the potential for contamination within the infill material to leach to controlled waters (i.e. groundwater within the Kidderminster Formation) is not currently known. The above boreholes should be used to collect soil samples (for leaching tests) and, if groundwater is encountered, groundwater samples for chemical analysis. Dual monitoring installations in the wells may be required.

On the basis of the preceding assessment, limitations listed in Appendix B, and initial soil sample analysis at the site we consider that the site has the potential to meet the definition of contaminated land under Part 2A of the Environmental Protection Act 1990. However as this assessment is based on limited information, further investigation is required as detailed within the following section.

6 RECOMMENDATIONS FOR FURTHER WORK

The initial investigation has established that the concentration of arsenic and PAHs in soil exceed the SGV/GAC applicable to the generic residential housing scenario. The base of the landfill has not been proven, and the potential of the site to generate ground gases or leachate is unknown. Shallow soil contamination may pose a risk to drinking water supply pipes.

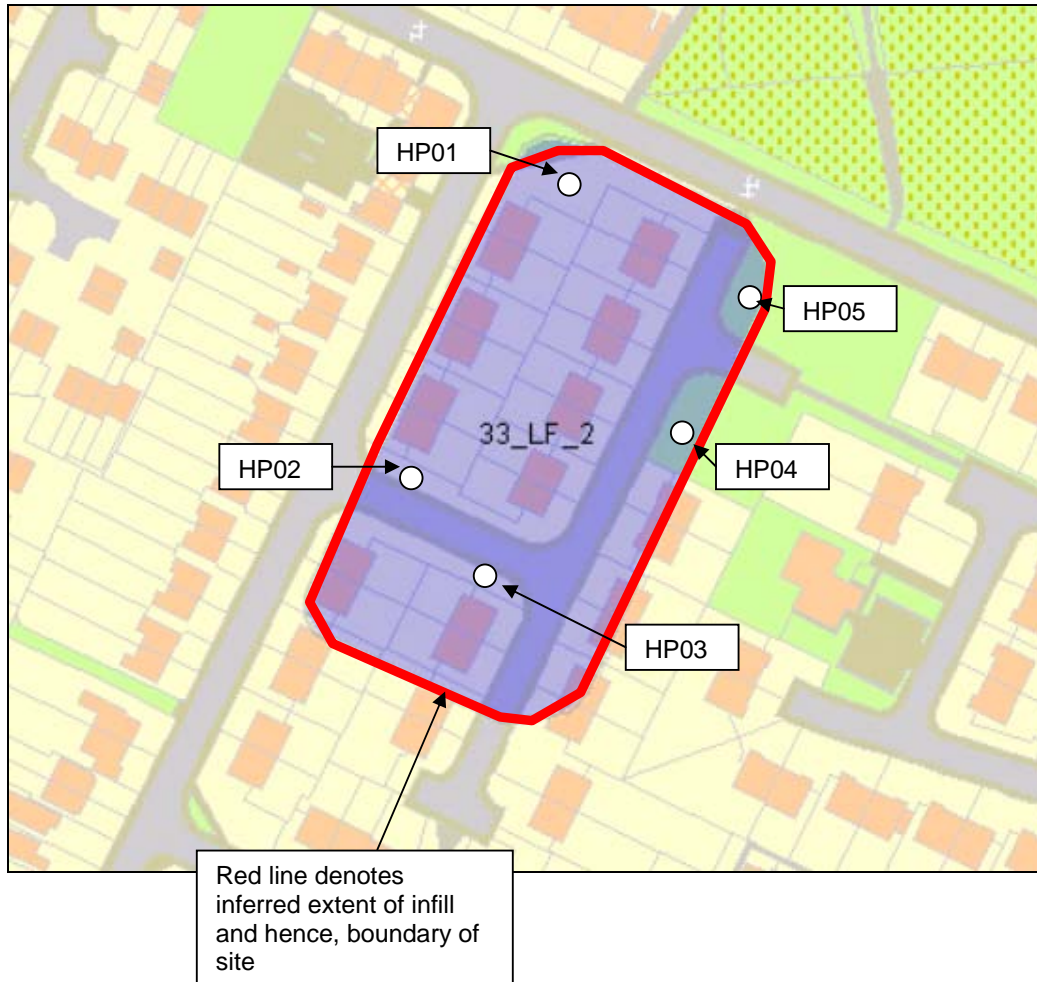
Based on these risks, it is recommended that a second phase of intrusive investigation is undertaken at the site. This investigation will comprise seven hand dug trial pits to 1.0m bgl to provide greater spatial coverage (in particular within garden areas not targeted during the initial investigation) and four drilled boreholes to approximately 6m bgl to prove the base of the landfill, confirm the likely absence of superficial deposits and groundwater depth, enable well installation for gas and groundwater monitoring, and determine whether the landfill is providing a source of ongoing vertical contaminant leaching to groundwater beneath the site.

As there are a number of verge areas and an area of open space at the site which can be accessed by a smaller drilling rig, tracked window sampler holes are recommended for the borehole investigation. As there are a number verge areas and an area of open space at the site which can be accessed by a smaller drilling rig, tracked window sampler holes are recommended for the investigation, rather than hand-held holes, in order to improve the depth penetration achieved.

Four initial rounds of gas monitoring are proposed, to be extended to six visits (in accordance with guidance in CIRIA report C665) if the initial monitoring dictates the need.

DRAWINGS

Drawing 1 – Hand Pit Location Plan



APPENDIX A

Cannock Chase District
Council

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

**Haig Close Landfill, High Town,
Cannock, Staffordshire**

August 2010

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CONTENTS

1	INTRODUCTION.....	1
1.1	Terms of Reference.....	1
1.2	Site Setting	1
1.3	Summary of available site investigation information	3
1.4	Walkover	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.....	11

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

APPENDICES

Appendix A	Limitations Statement
Appendix B	Severity and Probability of Risk (after CIRIA report 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 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 comprise 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,
- Undertaking desktop reviews and walkovers, culminating in the production of reports for each priority site to improve the understanding of the sites and inform the planning of intrusive site investigations.

The prioritisation exercise identified an initial 12 sites requiring detailed desktop study and walkovers, including Haig Close landfill which is discussed within this report. The site is considered to be sensitive as the residential properties overlie part of an infilled gravel pit (indicated on historical maps from 1886 and shown as infilled by 1954). The site is also underlain by a principal aquifer.

The site comprises 24 residential properties with gardens, occupying an area of approximately 0.88 ha.

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

1.2 Site Setting

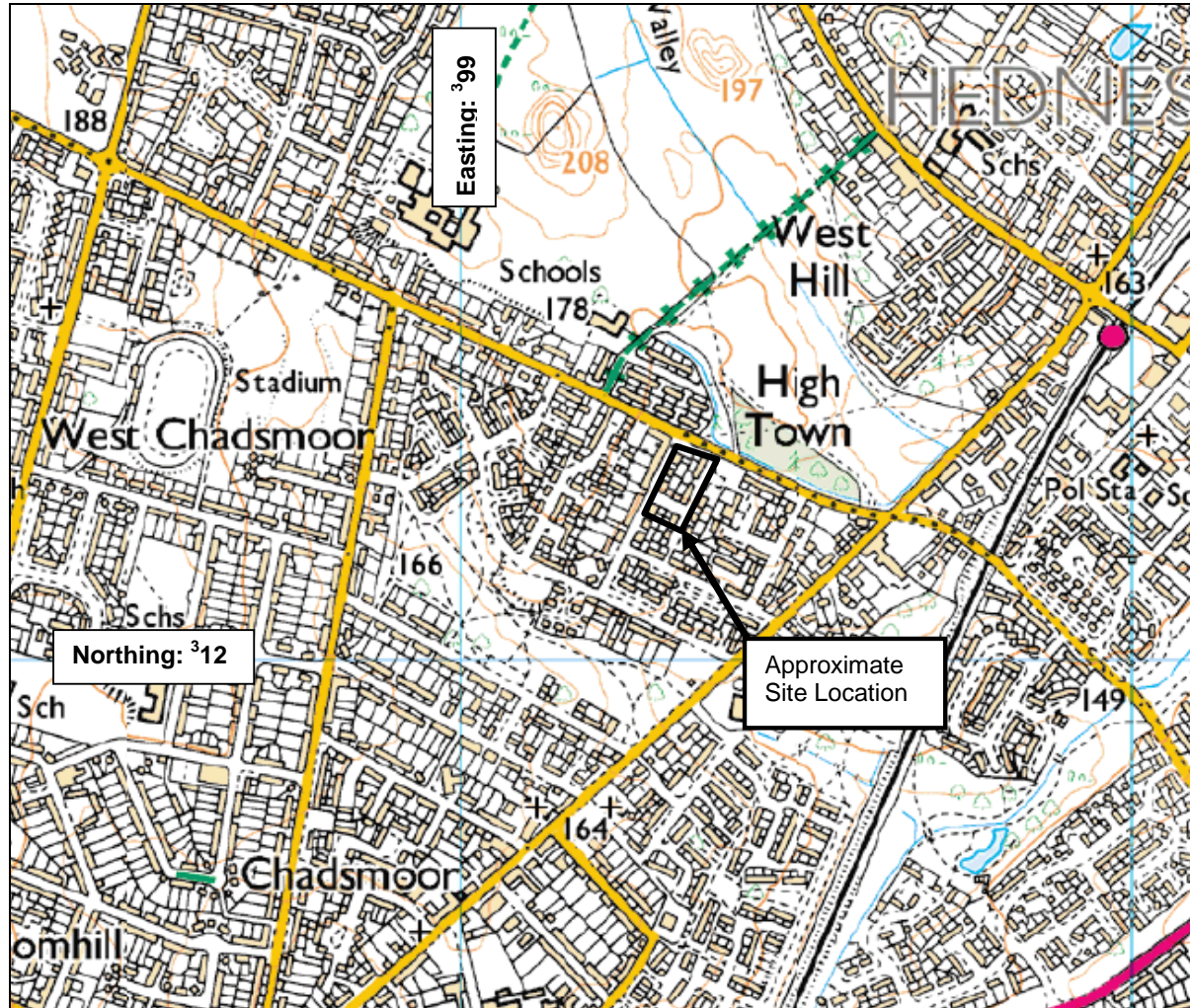
The setting of the site is summarised in Table 1.1. The location of the site is shown on Figure 1.1, and Drawing 1 provides surrounding land-use details.

Table 1.1 – Site Setting

Data	Information
Address	Site is located south of Belt Road and east of Platt Street, and is intersected by Haig Close (see Drawing 1). The general site address is: Haig Close, High Town, Cannock, Staffordshire. The nearest postcode to the site is WS11 5TR
Current site use	Residential houses and gardens – these houses first appear on the 1990 historical map although they appear to date from c. 1970s.
Grid Reference	Centre of site is located at approximate NGR 399340,312230
Site Area	Approximately 0.88 ha
Topography	Site falls towards the south-east at a moderate grade
Surrounding land use	The site is surrounded by residential bungalows with garden areas. The north-eastern corner of the site forms part of a wider area of open space
Mapped Geology	British Geological Survey (BGS) mapping indicates superficial deposits of Diamicton Till overlying solid geology of the Kidderminster Formation (interbedded sandstone and conglomerate)
Coal Mining	A Coal Authority report ordered for a nearby site (approximately 75m west of the study site) indicated the site is at risk from underground workings 140 – 370m beneath the surface, the last date of recorded workings being 1933. The report also indicates no knowledge of mine entries within 20m of the site boundary. However, the study site is outside of this search buffer, and mine entries may exist beneath the site at depth. It is therefore recommended that a Coal Authority report is obtained for the site
Hydrogeology	The Environment Agency website classifies the Kidderminster Formation as a principal aquifer. Principal aquifers are layers of rock or drift deposits that have high inter-granular and/or fracture permeability and usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. The Diamicton Till is regarded as an unproductive stratum (i.e. former non-aquifer)
Source Protection Zones (SPZs)	The Environment Agency website indicates that the site does not lie within a SPZ
Surface Waters	A un-named minor watercourse is located approximately 10m north (probably upgradient) of the northern site boundary. A pond is located approximately 500m south-east (probably downgradient) of the site
Historical Land Use	Environment Agency records provided to the council indicate that the whole site formerly operated as a landfill site and was subsequently developed as residential housing. The landfill is shown on the Environment Agency “What’s In Your Back Yard” website although no details pertaining to the dates of operation or types of waste disposed of are supplied. Historical maps indicate that the northern part of the site is also shown to overly a former gravel pit from 1886 until 1954, when it was backfilled An additional historic landfill accepting inert and household waste is indicated approximately 175m to the south-west of the site, being operational between 31 st December 1948 – 1952. This landfill is registered to have received both inert waste such as bricks, concrete and glass etc and household waste from dwellings of various types including houses, caravans, houseboats, campsites and prisons, and wastes from schools, colleges and universities. The site pre-dates the Control of Pollution Act 1974 and thus is unlikely to have operated under a formal license

Data	Information
Ecologically designated sites ¹	MAGIC search indicates none within 500m of site boundary

Figure 1.1 – Site Location



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Plan is not to scale.

1.3 Summary of available site investigation information

Cannock Chase Council have supplied Grontmij with a site investigation report pertaining to a parcel of land located approximately 75m west of the study site, undertaken by Crossfield Consulting Limited in May 2005. The investigation was not undertaken within the inferred extent of landfilled material beneath the study site, and has been used only for the purposes of the historical map review (as presented in Table 1 above).

¹ Includes sites designated as Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Special Area of Conservation (SAC, including candidate sites), Special Protection Area (SPA including potential sites), listed Wetlands of International Importance (Ramsar site) and Local Nature Reserves (LNR).

1.4 Walkover

The site has been subject to a walkover, carried out from the public highway. No obvious evidence of contamination was identified during the inspection, but such evidence is unlikely to be uncovered by a visual inspection of land occupied by residential properties.

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 and information gathered during the walkover. 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^{2,3}, 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 the Council, and a preliminary site walkover. The following potential sources of contaminants have been identified:

- The site is underlain by a historical landfill site, which could contain contaminants including (but not limited to) metals, hydrocarbons (including poly-aromatic hydrocarbons - PAHs), VOCs, SVOCs and asbestos
- Methane and carbon dioxide gas from the decomposition of any biodegradable material within the landfill site.

² CLR11 Model Procedures for the Management of Land Contamination (EA & DEFRA September 2004)

³ 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 PPS23⁴ 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. Gardens assumed to be used for growing food crops
	Construction staff and site investigation personnel	✗	Not known if 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. Level of risk likely to be same, or lower, than on-site residents, and is not considered further
Ecosystems	Any designated ecological system ⁵ , or living organism forming part of such a system	✗	Inspection of MAGIC website has identified that the site does not lie within 500m of an ecologically designated site
Property (Flora and Fauna)	Crops, including timber	✗	Not present
	Produce grown domestically, or on allotments for consumption	✓	Gardens assumed to be used for growing food crops. Risk posed is considered to be covered by human health (residential with gardens) pathway and is not considered further
	Livestock	✗	Not present
	Other owned or domesticated animals	✓	Pets in residential properties. Risk posed is considered to be similar to that posed to on-site residents, and is not examined further
	Wild animals which are the subject of shooting or fishing rights	✓	Fish may be present in the minor watercourse to north of site and pond 500m to SE
Property (Buildings & Structures)	A 'building' means any structure, including any part below ground level, but	✓	Residential houses (and in particular, water service pipes and foundations) above

⁴ Planning Policy Statement (PPS) 23: Planning and Pollution Control, Annex 2: Development on Land Affected by Contamination

⁵ Includes sites designated as Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Special Area of Conservation (SAC, including candidate sites), Special Protection Area (SPA including potential sites), listed Wetlands of International Importance (Ramsar site) and Local Nature Reserves (LNR).

Receptor Type	Receptors	Present (✓/✗)	Notes
	does not include plant or machinery within a building		indicative extent of landfill
Controlled Waters ⁶	Territorial waters	✗	None feasibly close enough to be affected
	Coastal waters	✗	None feasibly close enough to be affected
	Inland Freshwaters	✓	Un-named minor watercourse 10m north (probably upgradient) of northern site boundary. Pond 500m south-east (downgradient) of site
	Groundwater	✓	Kidderminster Formation beneath site is classified as a principal aquifer, but mapping indicates it is overlain by Diamicton Till

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.

2.1.4 Potential Pollutant Linkages

The pollutant linkages identified are presented in Table 2.2.

⁶ As defined in the Water Resources Act 1991 (Part III, Section 104). Generally includes most surface water bodies excluding drains which discharge into sewers.

Table 2.2 - Potential Pollutant Linkages

No	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
1	Residents of properties above infilled ground (including children playing in gardens)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs, asbestos	Dermal contact and direct ingestion, inhalation of dust/vapours, consumption of home-grown vegetables	Medium	Likely	Moderate	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 (there is a possibility based on the historic map review and EA website details that the site may not have been used as a formal landfill). There also exists the potential for migration of soil gases from the former landfill located to the south-west of the site although due to the possible presence of low permeability clay material beneath the site (if not previously quarried out) this would inhibit off-site landfill gas migration. Due to a number of uncertainties, soil sampling and analysis is required to provide clarity on current risk
2	Residents of properties above infilled ground	Methane and carbon dioxide from decomposition of deleterious elements of landfill material	Movement into buildings, subsequent asphyxiation and explosion risk	Medium	Likely	Moderate	Installation and monitoring of wells for measuring ground gas concentrations/flow rates is required to provide clarity on current risk

No	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
3	Subsurface services serving the buildings (principally water supply)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Chemical attack and tainting of water supply could occur at high contaminant concentrations / severe pH levels	Mild	Likely	Low/moderate	Further site investigation data required to refine assessment/Conceptual Site Model
4	Property (Structures) – sub-surface concrete	Sulphate and pH	Contact between contaminants and concrete	Mild	Likely	Low/moderate	Further site investigation data required to refine assessment/Conceptual Site Model
5	Principal aquifer (Kidderminster Formation) beneath site	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching of soil contaminants to aquifer	Medium	Likely	Moderate	Diamicton till, which would probably prevent leaching, has probably been quarried out prior to landfilling at the site. Need to confirm ground conditions beneath the site and depth/concentration of any leachable soil contaminants

No	Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability Of Linkage Occuring ¹	Overall Risk ¹	Comments
6	Un-named stream 10m north of the northern site boundary (and fish within)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching from made ground to water table; off-site migration of dissolved contaminants within groundwater (and uptake by fish)	Medium	Unlikely	Low	Diamicton Till, if not quarried out, likely to prevent leaching to water table. If till is absent, groundwater in major aquifer is likely to be too deep to be in hydraulic continuity with the stream. Stream is also likely to be upgradient of the study site. No further assessment proposed
7	Pond 500m south-east of the site (and fish within)	Contaminants including (but not limited to) metals and hydrocarbons, (including PAHs), VOCs, SVOCs	Leaching from made ground to water table; off-site migration of dissolved contaminants within groundwater (and uptake by fish)	Medium	Unlikely	Low	Diamicton Till, if not quarried out, likely to prevent leaching to water table. If till is absent, groundwater in major aquifer is likely to be too deep to be in hydraulic continuity with the pond. Pond is downgradient of the study site but is 500m away, offering significant potential for attenuation and dilution of dissolved contaminants along the 500m flowpath. 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 extract in Appendix B

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 undertaken to examine the likelihood of pollutant linkages existing at the site.

Based on review of the coal authority report obtained during investigation of a nearby site and historical presence of Western Cannock Colliery to the north-east of the site, it is advised that a coal authority report is obtained for the site and reviewed prior to commencement of this investigation.

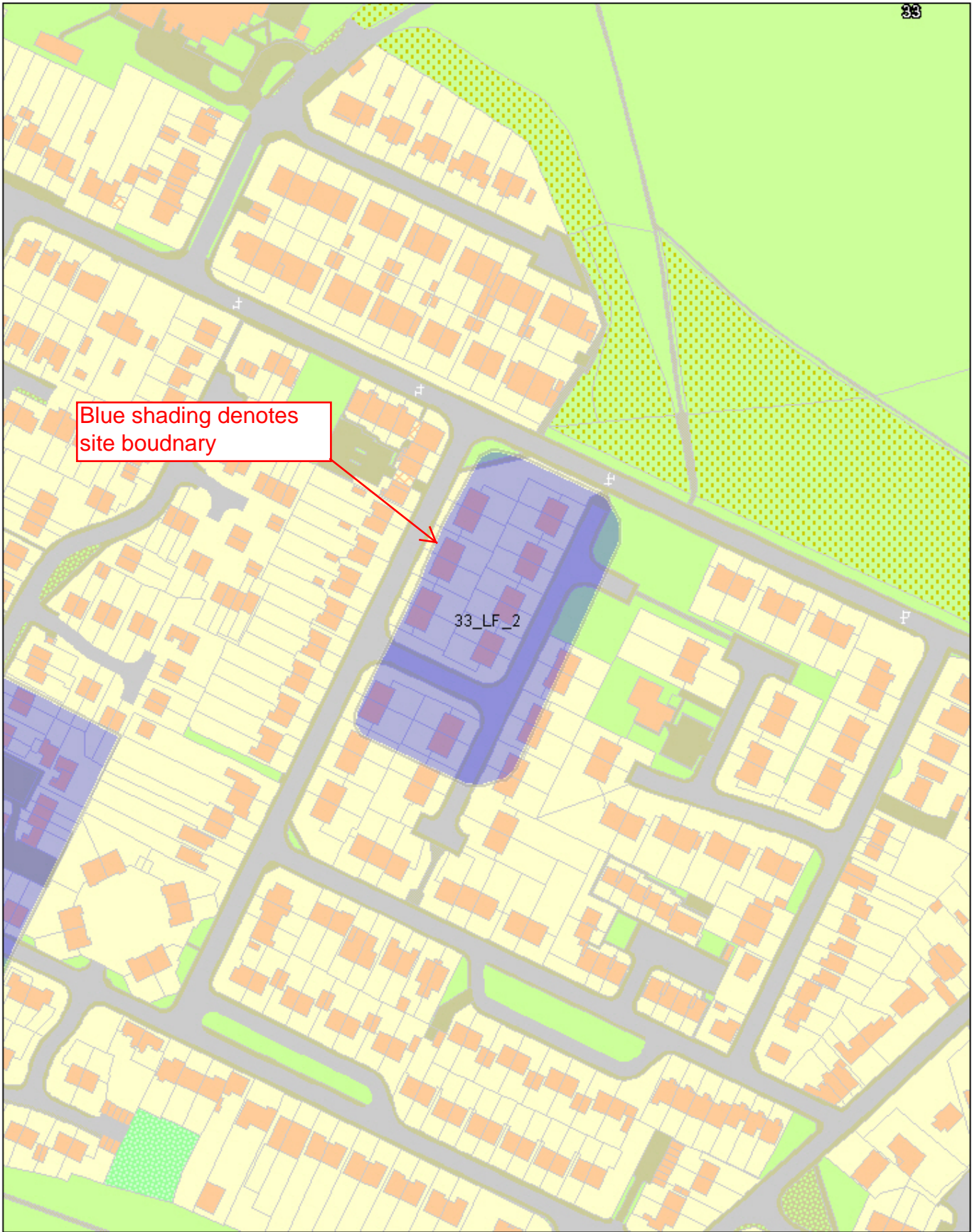


33_LF_2
Haig Close,
High Town,
Cannock, St



NOT TO SCALE

DATE



Appendix A (of desk study): 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.
6. The scope of this study, as agreed with Cannock Chase Council, comprised a review of available information, and data was not purchased from a proprietary database.

**Appendix B (of desk study):
 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	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.

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

Notes:

Logged by BJD

1. No groundwater was encountered within any of the below trial pits
2. Sample frequency: 0.1m, 0.3m & 0.7m
3. All pits undertaken on 16/12/2010

HP No: 1	House Address: N/A	Location of HP: Open Land on Haig Close
Depth (M BGL):	Strata Description:	Additional notes:
0.00 - 0.15	MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to angular quartz	
0.15 - 0.70	MADE GROUND: Brown gravelly SAND and ASH. Gravel is fine to very coarse angular to subrounded quartz, brick, sandstone and coal.	Metal fragments noted.
HP No: 2	House Address: N/A	Location of HP: Open Land on Haig Close
Depth (M BGL):	Strata Description:	Additional notes:
0.00 - 0.15	MADE GROUND: Brown gravelly SAND with rootlets and wood fragments. Gravel is fine to coarse subangular to angular quartz (Topsoil).	
0.5 - 0.7	MADE GROUND: Dark brown sandy gravelly ASH. Gravel is fine to coarse angular to subrounded quartz, brick, and coal.	Glass fragments noted.
HP No: 3	House Address: N/A	Location of HP: Open Land on Haig Close
Depth (M BGL):	Strata Description:	Additional notes:
0.00 - 0.70	MADE GROUND: Brown very gravelly SAND. Gravel is fine to coarse angular to subrounded quartz and sandstone.	No evidence of contamination
HP No: 4	House Address: N/A	Location of HP: Open Land on Haig Close
Depth (M BGL):	Strata Description:	Additional notes:
0.00 - 0.50	MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to angular quartz and sandstone.	No evidence of contamination
0.50 - 0.70	MADE GROUND: Brown gravelly SAND and ASH. Gravel is fine to coarse subangular to angular quartz, sandstone and brick.	Glass fragments noted.
HP No: 5	House Address: N/A	Location of HP: Open Land
Depth (M BGL):	Strata Description:	Additional notes:
0.00 - 0.25	MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to subrounded brick and quartz.	Brick fragments noted.
0.25 - 0.5	MADE GROUND: Black sandy ASH	
0.5 - 0.7	POSSIBLE MADE GROUND: Red brown gravelly SAND. Gravel is fine to coarse subangular to subrounded quartz.	

APPENDIX D



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

Attention: Gareth Taylor

CERTIFICATE OF ANALYSIS

Date: 11 January 2011
Customer: H_GRONTMIJ_SOL
Sample Delivery Group (SDG): 101222-10
Your Reference:
Location: Haig Close
Report No: 110397

We received 15 samples on Wednesday December 22, 2010 and 5 of these samples were scheduled for analysis which was completed on Tuesday January 11, 2011. 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:

Sonia McWhan

Laboratory Manager



1291
GROUP



SDG: 101222-10
Job: H_GRONTMIJ_SOL-49
Client Reference:

Location: Haig Close
Customer: Grontmij
Attention: Gareth Taylor

Order Number:
Report Number: 110397
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2622349	HP01		0.10	16/12/2010
2622351	HP01		0.30	16/12/2010
2622353	HP01		0.70	16/12/2010
2622354	HP02		0.10	16/12/2010
2622355	HP02		0.30	16/12/2010
2622356	HP02		0.70	16/12/2010
2622357	HP03		0.10	16/12/2010
2622359	HP03		0.30	16/12/2010
2622361	HP03		0.70	16/12/2010
2622362	HP04		0.10	16/12/2010
2622363	HP04		0.30	16/12/2010
2622364	HP04		0.70	16/12/2010
2622365	HP05		0.10	16/12/2010
2622366	HP05		0.30	16/12/2010
2622367	HP05		0.70	16/12/2010

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





SDG: 101222-10
 Job: H_GRONTMIJ_SOL-49
 Client Reference:

Location: Haig Close
 Customer: Grontmij
 Attention: Gareth Taylor

Order Number:
 Report Number: 110397
 Superseded Report:

Test Schedule

SOLID Results Legend  Test  No Determination Possible	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
		2622351	HP01		0.30	250g Amber Jar 400g Tub
		2622355	HP02		0.30	250g Amber Jar 400g Tub
		2622356	HP02		0.70	250g Amber Jar 400g Tub
		2622364	HP04		0.70	250g Amber Jar 1kg TUB
		2622366	HP05		0.30	250g Amber Jar 1kg TUB
Asbestos Containing Material Screen	All	NDPs: 0 Tests: 3				
Boron Water Soluble	All	NDPs: 0 Tests: 5				
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 5				
Metals by iCap-OES (Soil)	Arsenic	NDPs: 0 Tests: 5				
	Barium	NDPs: 0 Tests: 5				
	Beryllium	NDPs: 0 Tests: 5				
	Cadmium	NDPs: 0 Tests: 5				
	Chromium	NDPs: 0 Tests: 5				
	Copper	NDPs: 0 Tests: 5				
	Lead	NDPs: 0 Tests: 5				
	Mercury	NDPs: 0 Tests: 5				
	Nickel	NDPs: 0 Tests: 5				
	Selenium	NDPs: 0 Tests: 5				
	Vanadium	NDPs: 0 Tests: 5				
	Zinc	NDPs: 0 Tests: 5				
PAH by GCMS	All	NDPs: 0 Tests: 5				
pH	All	NDPs: 0 Tests: 5				
Sample description	All	NDPs: 0 Tests: 5				
Total Organic Carbon	All	NDPs: 0 Tests: 5				



SDG: 101222-10
 Job: H_GRONTMIJ_SOL-49
 Client Reference:

Location: Haig Close
 Customer: Grontmij
 Attention: Gareth Taylor

Order Number:
 Report Number: 110397
 Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
2622351	HP01	0.30	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	Tile
2622355	HP02	0.30	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	None
2622356	HP02	0.70	Black	Top Soil	0.063 - 0.1 mm	Stones	None
2622364	HP04	0.70	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	None
2622366	HP05	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: 101222-10
 Job: H_GRONTMIJ_SOL-49
 Client Reference:

Location: Haig Close
 Customer: Grontmij
 Attention: Gareth Taylor

Order Number:
 Report Number: 110397
 Superseded Report:

Table of Results - Appendix

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		
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		
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.



SDG: 101222-10
 Job: H_GRONTMIJ_SOL-49
 Client Reference:

Location: Haig Close
 Customer: Grontmij
 Attention: Gareth Taylor

Order Number:
 Report Number: 110397
 Superseded Report:

Test Completion Dates

Lab Sample No(s)	2622351	2622355	2622356	2622364	2622366
Customer Sample Ref.	HP01	HP02	HP02	HP04	HP05
AGS Ref.					
Depth	0.30	0.30	0.70	0.70	0.30
Type	SOLID	SOLID	SOLID	SOLID	SOLID
Asbestos Containing Material Screen	06-Jan-2011	06-Jan-2011			06-Jan-2011
Boron Water Soluble	07-Jan-2011	07-Jan-2011	06-Jan-2011	07-Jan-2011	07-Jan-2011
Hexavalent Chromium (s)	07-Jan-2011	07-Jan-2011	07-Jan-2011	07-Jan-2011	07-Jan-2011
Metals by iCap-OES (Soil)	07-Jan-2011	07-Jan-2011	06-Jan-2011	07-Jan-2011	07-Jan-2011
PAH by GCMS	10-Jan-2011	10-Jan-2011	10-Jan-2011	09-Jan-2011	11-Jan-2011
pH	07-Jan-2011	07-Jan-2011	06-Jan-2011	07-Jan-2011	07-Jan-2011
Sample description	06-Jan-2011	06-Jan-2011	05-Jan-2011	06-Jan-2011	06-Jan-2011
Total Organic Carbon	07-Jan-2011	07-Jan-2011	06-Jan-2011	07-Jan-2011	07-Jan-2011

SDG: 101222-10
 Job: H_Grontmij_SOL-49
 Client Reference:

Location: Haig Close
 Customer: Grontmij
 Attention: Gareth Taylor

Order Number:
 Report Number: 110397
 Superseded Report:

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.

20. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

21. 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.

22. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

23. 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.

24. 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.

SOLID MATRICES EXTRACTION SUMMARY				
ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DOM	SOX THERM	GRAMMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOX THERM	GRAMMETRIC
THIN LAYER CHROMATOGRAPHY	D&C	DOM	SOX THERM	IATROSCAN
ELEMENTAL SULPHUR	D&C	DOM	SOX THERM	HPLC
PHENOLS BY GCMS	WET	DOM	SOX THERM	GCMS
HERBICIDES	D&C	HEXANE ACETONE	SOX THERM	GCMS
PESTICIDES	D&C	HEXANE ACETONE	SOX THERM	GCMS
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	GCMS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE ACETONE	MICROWAVE TM28.	GCMS
C8-C10 (C8-C10) EZ FLASH	WET	HEXANE ACETONE	SHAKER	GC/EZ
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE ACETONE	SHAKER	GC/EZ
SEM VOLATILE ORGANIC COMPOUNDS	WET	DOM ACETONE	SONICATE	GCMS

LIQUID MATRICES EXTRACTION SUMMARY			
ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAHMS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCMS
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)	GCMS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCMS
SVOC	DOM	LIQUID/LIQUID SHAKE	GCMS
FREESULPHUR	DOM	SOLID PHASE EXTRACTION	HPLC
PEST COP/OPP	DOM	LIQUID/LIQUID SHAKE	GCMS
TRIAZINE HERBS	DOM	LIQUID/LIQUID SHAKE	GCMS
PHENOLS MS	DOM	SOLID PHASE EXTRACTION	GCMS
TPH by INFRARED (R)	TCE	LIQUID/LIQUID SHAKE	HPLC
MINERAL OIL BY R	TCE	LIQUID/LIQUID SHAKE	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GCMS

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).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anorthophyllite	-
Fibrous Tremolite	-

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.

APPENDIX E

Appendix E: 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:

Severity Category	Description	Examples
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
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
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)
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:

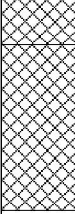
	Severity			
Probability	Severe	Medium	Mild	Minor
High	Very high	High	Moderate	Low/moderate
Likely	High	Moderate	Low/moderate	Low
Low	Moderate	Low/moderate	Low	Very low
Unlikely	Low/moderate	Low	Very low	Very low

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

APPENDIX C
EXPLORATORY HOLE LOGS


Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: - Level: -	Date 16/12/2010
Location: Haig Close, Cannock		Dimensions: 0.30m Depth 0.70m	Scale 1:25
Client: Cannock Chase Council			Logged By BJD

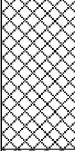

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES		0.15			MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to angular quartz.
0.30	ES					MADE GROUND: Brown gravelly SAND and ASH. Gravel is fine to very coarse angular to subrounded quartz, brick, sandstone and coal. With metal fragments.
0.70	ES					Trialpit Complete at 0.70 m

Remarks: Hand dug pit to 0.70m bgl. Brick, coal and metal fragments noted, however no olfactory evidence of contamination noted.

Groundwater:



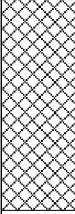
Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: - Level: -	Date 16/12/2010
Location: Haig Close, Cannock		Dimensions: 0.30m Depth 0.70m	Scale 1:25
Client: Cannock Chase Council			Logged By BJD

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES					MADE GROUND: Brown gravelly SAND with rootlets and wood fragments. Gravel is fine to coarse subangular to angular quartz.
0.30	ES		0.50			MADE GROUND: Dark brown sandy gravelly ASH. Gravel is fine to coarse angular to subrounded quartz, brick, and coal. With glass fragments.
0.70	ES		0.70			Trialpit Complete at 0.70 m

Remarks:	Hand dug pit to 0.70m bgl. Brick, coal and glass noted, however no olfactory evidence of contamination noted.
Groundwater:	



Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: - Level: -	Date 16/12/2010
Location: Haig Close, Cannock		Dimensions: 0.30m	Scale 1:25
Client: Cannock Chase Council		Depth 0.70m	Logged By BJD

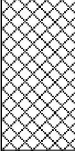

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES					MADE GROUND: Brown very gravelly SAND. Gravel is fine to coarse angular to subrounded quartz and sandstone.
0.30	ES					
0.70	ES		0.70			
						Trialpit Complete at 0.70 m
1						
2						
3						
4						

Remarks: Hand dug pit to 0.70m bgl. No visual or olfactory evidence of contamination noted.

Groundwater:




Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 16/12/2010
Location: Haig Close, Cannock			Dimensions: 0.30m	Scale 1:25
Client: Cannock Chase Council			Depth 0.70m	Logged By BJD



Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES					MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to angular quartz and sandstone.
0.30	ES		0.50			
0.70	ES		0.70			MADE GROUND: Brown gravelly SAND and ASH. Gravel is fine to coarse subangular to angular quartz, sandstone and brick.
Trialpit Complete at 0.70 m						

Remarks: Hand dug pit to 0.70m bgl. Brick and glass noted, however no olfactory evidence of contamination noted.

Groundwater:



Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: - Level: -	Date 16/12/2010
Location: Haig Close, Cannock		Dimensions: 0.30m Depth 0.70m	Scale 1:25
Client: Cannock Chase Council			Logged By BJD


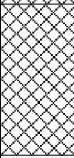
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES		0.25			MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse subangular to subrounded brick and quartz.
0.30	ES					MADE GROUND: Black sandy ASH.
0.70	ES		0.70			MADE GROUND: Red brown gravelly SAND. Gravel is fine to coarse subangular to subrounded quartz. (POSSIBLE GLACIAL DEPOSITS)
Trialpit Complete at 0.70 m						

Remarks: Hand dug pit to 0.70m bgl. Brick noted, however no olfactory evidence of contamination noted.

Groundwater:



Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 19/02/2013
Location: Haig Close, Cannock			Dimensions: 0.30m Depth 0.90m	Scale 1:25
Client: Cannock Chase Council				Logged By ML



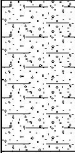
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.60	ES		0.40			MADE GROUND: Turf over black brown slightly silty gravelly SAND. Gravel is fine occasionally medium, subangular to subrounded quartzite, brick and concrete and rare plastic, metal and coal.
			0.90			MADE GROUND: Red brown occasionally mottled brown sandy GRAVEL. Gravel is fine to coarse, subrounded to rounded quartzite. (POSSIBLE GLACIAL DEPOSITS)
Trialpit Complete at 0.90 m						
1 2 3 4						

Remarks: Hand dug pit to 0.90m bgl. Brick, concrete, plastic, metal and coal noted, however no olfactory evidence of contamination noted.

Groundwater:



Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 19/02/2013
Location: Haig Close, Cannock			Dimensions: 0.30m Depth 1.00m	Scale 1:25
Client: Cannock Chase Council				Logged By ML

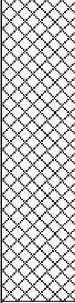
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.40	ES		0.25			MADE GROUND: Turf over black brown slightly gravelly silty medium SAND. Gravel is fine to medium, subangular to subrounded quartzite and brick.
			0.50			MADE GROUND: Black brown mottled orange gravelly medium SAND. Gravel is fine to medium occasionally coarse, subangular coal, clinker and ash.
			1.00			Red brown slightly clayey gravelly medium SAND. Gravel is fine to medium, subrounded quartzite. With clayey pockets. (GLACIAL DEPOSITS)
Trialpit Complete at 1.00 m						
1						
2						
3						
4						

Remarks: Hand dug pit to 1.00m bgl. Brick, coal, clinker and ash noted, however no olfactory evidence of contamination noted.

Groundwater:



Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 19/02/2013
Location: Haig Close, Cannock			Dimensions: 0.30m Depth 1.00m	Scale 1:25
Client: Cannock Chase Council				Logged By ML

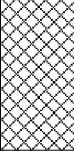


Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.40	ES		1.00			MADE GROUND: Turf over dark brown slightly silty slightly gravelly medium SAND. Gravel is fine to medium, subangular to subrounded quartzite and brick and occasional coal.
						Trialpit Complete at 1.00 m
						1
						2
						3
						4

Remarks: Hand dug pit to 1.00m bgl. Brick and coal noted, however no olfactory evidence of contamination noted.

Groundwater:



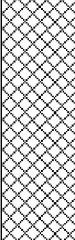

Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 19/02/2013
Location: Haig Close, Cannock		Dimensions: 0.30m Depth 1.00m		Scale 1:25
Client: Cannock Chase Council				Logged By ML

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.30	ES					MADE GROUND: Gravel over black brown slightly gravelly medium SAND. Gravel is fine to medium, subangular to subrounded quartzite, brick and coal and occasional concrete and tile.
			0.50			MADE GROUND: Brown mottled dark brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse, subrounded to rounded quartzite and rare brick fragments.
			0.70			Brown mottled dark brown slightly clayey SAND and GRAVEL. Gravel is fine to coarse, subrounded to rounded quartzite. (GLACIAL DEPOSITS)
			1.00			Trialpit Complete at 1.00 m

Remarks:	Hand dug pit to 1.00m bgl. Brick, concrete, tile and coal noted, however no olfactory evidence of contamination noted.
Groundwater:	



Project Name Cannock Part 2a		Project No. 106270-007	Co-ords: - Level: -	Date 19/02/2013
Location: Haig Close, Cannock			Dimensions: 0.30m Depth 1.00m	Scale 1:25
Client: Cannock Chase Council				Logged By ML

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.70	ES		0.80			MADE GROUND: Turf over brown slightly gravelly silty fine to medium SAND. Gravel is fine occasionally medium, subrounded to subangular quartzite and occasional brick and concrete and rare metal and ash.
			1.00			Brown slightly gravelly medium SAND. Gravel is fine to coarse, subrounded to rounded quartzite. (GLACIAL DEPOSITS)
Trialpit Complete at 1.00 m						
1						
2						
3						
4						

Remarks: Hand dug pit to 1.00m bgl. Brick, concrete, metal and ash noted, however no olfactory evidence of contamination noted.

Groundwater:

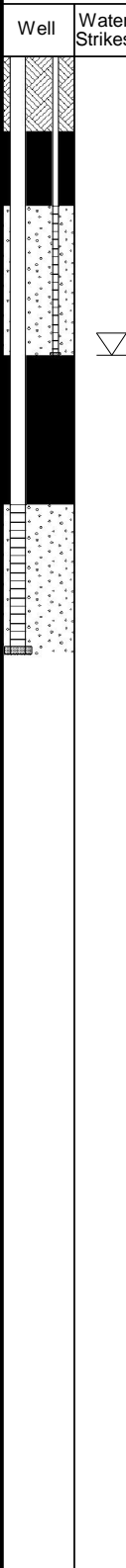


Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: -	Hole Type WLS
Location: Haig Close, Cannock		Level: -	Scale 1:50
Client: Cannock Chase Council		Dates: 19/02/2013	Logged By ML

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type				
				0.10			Turf over black brown silty gravelly medium SAND. Gravel is fine to medium, subangular to subrounded quartzite and brick fragments. (TOPSOIL)
		0.80	ES				MADE GROUND: Black brown slightly gravelly medium SAND. Gravel is fine to coarse, subangular to subrounded quartzite, brick fragments, concrete and plastic and occasional coal and rare ash.
				3.90			Red brown slightly silty slightly gravelly medium SAND. Gravel is fine to medium occasionally coarse, subrounded quartzite. (KIDDERMINSTER FORMATION)
				6.00			End of Borehole at 6.00 m

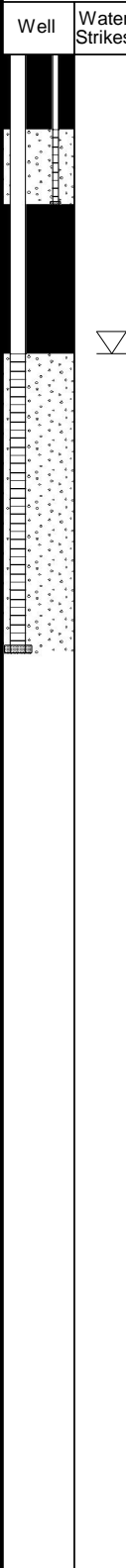





Remarks: Hand dug pit to 1.20m bgl. Installed respore zone between 1.00m-3.00m and 4.00m-6.00m. Brick, plastic, concrete, coal and ash noted, however no olfactory evidence of contamination noted.

Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: -	Hole Type WLS
Location: Haig Close, Cannock		Level: -	Scale 1:50
Client: Cannock Chase Council		Dates: 19/02/2013	Logged By ML

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	ES		0.15		Turf over black brown silty gravelly medium SAND. Gravel is fine to medium occasionally coarse, subangular to subrounded quartzite, brick fragments and concrete. With roots throughout. (TOPSOIL)	
					1.00		MADE GROUND: Black brown slightly gravelly medium SAND. Gravel is fine to medium, subangular to subrounded quartzite, brick fragments and concrete and occasional plastic and rare metal fragments. With occasional whole bricks.	
					1.90		MADE GROUND: Light brown mottled black brown slightly gravelly medium SAND. Gravel is fine to medium, subangular to subrounded quartzite, concrete and coal.	
							Soft to firm red brown slightly sandy slightly gravelly CLAY. Gravel is fine occasionally medium, subrounded to rounded quartzite. (GLACIAL DEPOSITS)	
							Red brown clayey medium SAND. (GLACIAL DEPOSITS)	
							Soft to firm red brown slightly sandy slightly gravelly CLAY. Gravel is fine occasionally medium, subrounded to rounded quartzite. (GLACIAL DEPOSITS)	
					4.00		End of Borehole at 4.00 m	

Remarks: Hand dug pit to 1.20m bgl. Installed respore zone between 1.00m-2.00m and 3.00m-4.00m. Brick, concrete, plastic and metal fragments noted, however no olfactory evidence of contamination noted.

Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: -	Hole Type WLS
Location: Haig Close, Cannock		Level: -	Scale 1:50
Client: Cannock Chase Council		Dates: 19/02/2013	Logged By ML

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type					Results
		0.30	ES				MADE GROUND: Turf over dark brown black slightly silty gravelly fine to medium SAND. Gravel is fine to coarse, subangular to subrounded quartzite, brick, concrete, pottery and tile fragments.	
								Light brown mottled grey slightly silty medium SAND. (GLACIAL DEPOSITS)
								Red brown medium SAND. (GLACIAL DEPOSITS)
								Soft to firm red brown slightly sandy CLAY. (GLACIAL DEPOSITS)
								Red brown medium SAND. (GLACIAL DEPOSITS)
						4.00		

Remarks: Hand dug pit to 1.20m bgl. Installed respse zone between 0.50m-1.00m and 2.00m-4.00m. Brick, concrete, pottery and tile noted, however no olfactory evidence of contamination noted.



Project Name Cannock Part 2a	Project No. 106270-007	Co-ords: -	Hole Type WLS
Location: Haig Close, Cannock		Level: -	Scale 1:50
Client: Cannock Chase Council		Dates: 19/02/2013	Logged By ML

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type				
		0.20	ES				
				0.25			Dark brown slightly silty slightly gravelly SAND. Gravel is fine to medium, subangular to subrounded quartzite and brick. With abundant roots and rootlets throughout. (TOPSOIL)
							Red brown SAND and GRAVEL. Gravel is fine to coarse, subrounded to rounded quartzite. With occasional clayey pockets. (GLACIAL DEPOSITS)
				3.75			Red brown coarse SAND. (KIDDERMINSTER FORMATION)
				4.90			Red brown slightly silty fine SAND. (KIDDERMINSTER FORMATION)
				6.00			End of Borehole at 6.00 m

Remarks: Hand dug pit to 1.20m bgl. Installed respse zone between 4.00m-6.00m. No visual or olfactory evidence of contamination noted.

**APPENDIX D
MONITORING RESULTS**

Site: *Haig Close, Cannock*

Job No. 106270-007

Monitoring Well Sampling & Testing Record

Date 28th February 2013

BH	Date	Monitored By	Water		Pipe Internal Diameter mm	Gas										Weather		MiniRae PID ppm	GW Monitoring notes
			Depth to water(mbgl)	Depth to base (mbgl)		Relative 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	H2S ppm	Gas Analyser	Atmospheric Pressure (on instrument) mbar	Conditions at Monitoring		
AMB strat	28/02/2013	ML								0.1		19.8				1009	Dry, part overcast, warm.		
WS01 _s	28/02/2013	ML	-	-	19	1009	-0.1	0	0.0000	2.8	0.0028	14.7	0	0		1009	Dry, part overcast, warm.	-	-
WS01 _d	28/02/2013	ML	2.35	6	50	1009	0.1	0	0.0000	0.4	0.0004	19.1	0	0		1009	Dry, part overcast, warm.	-	Purged 75 litres and sampled. NVO.
WS02 _s	28/02/2013	ML	-	-	19	1009	0.1	0	0.0000	0.6	0.0006	18.7	0	0		1009	Dry, part overcast, warm.	-	-
WS02 _d	28/02/2013	ML	1.6	4	50	1009	0.1	0	0.0000	0.5	0.0005	19.2	0	0		1009	Dry, part overcast, warm.	-	Purged dry and allowed to recharge. NVO.
WS03 _s	28/02/2013	ML	-	-	19	1009	0.1	0	0.0000	0.9	0.0009	16.3	0	0		1009	Dry, part overcast, warm.	-	-
WS03 _d	28/02/2013	ML	1.5	4	50	1009	0.1	0	0.0000	0.2	0.0002	18	0	0		1009	Dry, part overcast, warm.	-	Purged dry and allowed to recharge. NVO.
WS04	28/02/2013	ML	4.3	6	50	1009	0.1	0	0.0000	3.7	0.0037	14.8	0	0		1009	Dry, part overcast, warm.	-	Purged 50 litres and sampled. NVO.
AMB finish	28/02/2013	ML								0.1		19.8				1009	Dry, part overcast, warm.		

GSV (l/hr) = [gas well gas concentration (%v/v)] x [gas well flow rate (l/hr)]

100

NVO = No visual or olfactory evidence of contamination.

** where negative flow values or zero flow were recorded, the instrument detection limit of 0.1 l/hr is presented, in accordance with CIRIA 665 guidance

Site: Haig Close, Cannock

Job No. 106270-007

Monitoring Well Sampling & Testing Record

Date 7th March 2013

BH	Date	Monitored By	Water		Pipe Internal Diameter mm	Gas										Weather		MiniRae PID ppm	GW Monitoring notes
			Depth to water(mbgl)	Depth to base (mbgl)		Relative 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	H2S ppm	Gas Analyser	Atmospheric Pressure (on instrument) mbar	Conditions at Monitoring		
AMB start	07/03/2013	JS											20.5			GFM	972	Overcast - raining	
WS101 _s	07/03/2013	JS	-	-	19	0	0.01	0	0.0000	0.1	0.0001	20.6	0	0	GFM	972	Overcast - raining		
WS101 _d	07/03/2013	JS	2.475	5.585	50	0	0.01	0	0.0000	0.5	0.0005	20.1	3	0	GFM	972	Overcast - raining		
WS102 _s	07/03/2013	JS	-	-	19	0	0.01	0	0.0000	0.8	0.0008	19.4	4	0	GFM	971	Overcast - raining		
WS102 _d	07/03/2013	JS	1.64	4.2	50	0	0.01	0	0.0000	0.4	0.0004	20.3	0	0	GFM	971	Overcast - raining		
WS103 _s	07/03/2013	JS	-	-	19	0	0.01	0	0.0000	1.7	0.0017	17	3	0	GFM	971	Overcast - raining		
WS103 _d	07/03/2013	JS	0.455	3.95	50	-6	-0.01	0	0.0000	1.5	0.0015	19.6	87	0	GFM	971	Overcast - raining		
WS104	07/03/2013	JS	4.465	5.985	50	0	0.01	0	0.0000	4.4	0.0044	14.6	23	0	GFM	971	Overcast - raining		
AMB finish	07/03/2013	JS										20.4	0	0	GFM	971	Overcast - raining		

GSV (l/hr) = [gas well gas concentration (%v/v)] x [gas well flow rate (l/hr)]

100

NVO = No visual or olfactory evidence of contamination.

** where negative flow values or zero flow were recorded, the instrument detection limit of 0.1 l/hr is presented, in accordance with CIRIA 665 guidance

Site: Haig Close, Cannock

Job No. 106270-007

Monitoring Well Sampling & Testing Record

Date 13th March 2013

BH	Date	Monitored By	Water		Pipe Internal Diameter mm	Gas										Weather		MiniRae PID ppm	GW Monitoring notes	
			Depth to water (mbgl)	Depth to base (mbgl)		Relative 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	Gas Analyser	Atmospheric Pressure (on instrument) mbar	Conditions at Monitoring			
AMB start	13/03/2013	JS											20.7			GFM	989	Windy - partly overcast - cold	NA	
WS101	13/03/2013	JS	2.72	2.8	19	0	0.01	0	0.0000	2.5	0.0025	17.1	0	0	GFM	989	Windy - partly overcast - cold	NA	Not enough water to sample/purge	
WS101	13/03/2013	JS	2.56	5.65	50	0	0.01	0	0.0000	0.4	0.0004	20.2	0	0	GFM	987	Windy - partly overcast - cold	NA	Full purge (18L)	
WS102	13/03/2013	JS	Dry	-	19	0	0.01	0	0.0000	0.8	0.0008	19.7	0	0	GFM	987	Windy - partly overcast - cold	NA	No water	
WS102	13/03/2013	JS	1.48	4.12	50	0	0.01	0	0.0000	0.2	0.0002	20.5	0	0	GFM	986	Windy - partly overcast - cold	NA	Purged dry - slow recharge noted, 10L purged	
WS103	13/03/2013	JS	Dry	-	19	0	0.01	0	0.0000	0	0.0000	20.7	0	0	GFM	986	Windy - partly overcast - cold	NA	No water	
WS103	13/03/2013	JS	1.55	3.98	50	0	0.01	0	0.0000	0.7	0.0007	20.2	0	0	GFM	985	Windy - partly overcast - cold	NA	Purged dry - slow recharge noted, 12L purged	
WS104	13/03/2013	JS	4.53	5.98	50	0	0.01	0	0.0000	0.1	0.0001	20.5	0	0	GFM	985	Windy - partly overcast - cold	NA	Purged dry - slow recharge noted, 5L purged	
AMB finish	13/03/2013	JS										20.6			GFM	985	Windy - partly overcast - cold	NA		

GSV (l/hr) = [gas well gas concentration (%v/v)] x [gas well flow rate (l/hr)]

100

NVO = No visual or olfactory evidence of contamination.

** where negative flow values or zero flow were recorded, the instrument detection limit of 0.1 l/hr is presented, in accordance with CIRIA 665 guidance

Site: *Haig Close, Cannock*

Job No.

106270-007

Monitoring Well Sampling & Testing Record

Date

22-Mar-13

BH	Date	Monitored By	Water		Pipe Internal Diameter mm	Gas										Weather		MiniRae PID ppm	GW Monitoring notes
			Depth to water (mbgl)	Depth to base (mbgl)		Relative Pressure mb	Flow** l/hr	CH ₄ % v/v	CH ₄ GSV	CO ₂ % v/v	CO ₂ GSV	O ₂ % v/v	CO ppm	H ₂ S ppm	Gas Analyser	Atmospheric Pressure (on instrument) mbar	Conditions at Monitoring		
AMB start	13/03/2013	JS				0							20.5			GFM	985	0°C - falling pressure - overcast - WS 8.2m/s	
WS101 _s	13/03/2013	JS	-	-	19	0	0.01	-0.2	0.0000	2.9	0.0029	17.5	0	0	GFM	985	0°C - falling pressure - overcast - WS 8.2m/s		Silty - no odour
WS101 _d	13/03/2013	JS	2.65	5.53	50	0	0.01	-0.1	0.0000	1.3	0.0013	19.3	1	0	GFM	985	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
WS102 _s	13/03/2013	JS	-	-	19	0	0.01	0	0.0000	0.9	0.0009	19.6	1	0	GFM	984	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
WS102 _d	13/03/2013	JS	1.51	4.1	50	0	0.01	-0.1	0.0000	0.9	0.0009	19.7	1	0	GFM	983	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
WS103 _s	13/03/2013	JS	-	-	19	0	0.01	0.1	0.0000	2	0.0020	18.1	0	0	GFM	983	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
WS103 _d	13/03/2013	JS	1.51	3.9	50	0	0.01	-0.1	0.0000	0.6	0.0006	19.8	1	0	GFM	983	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
WS104	13/03/2013	JS	4.63	5.98	50	-5	0.01	-0.2	0.0000	2.3	0.0023	17	-1	0	GFM	982	0°C - falling pressure - overcast - WS 8.2m/s		Clear - no odour
AMB finish	13/03/2013	JS										20.1			GFM	982	0°C - falling pressure - overcast - WS 8.2m/s		

 $GSV (l/hr) = [gas\ well\ gas\ concentration\ (\%v/v)] \times [gas\ well\ flow\ rate\ (l/hr)]$

100

NVO = No visual or olfactory evidence of contamination.

** where negative flow values or zero flow were recorded, the instrument detection limit of 0.1 l/hr is presented, in accordance with CIRIA 665 guidance

APPENDIX E
LABORATORY CHEMICAL ANALYSIS RESULTS



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

Attention: Michael Lawson

CERTIFICATE OF ANALYSIS

Date: 14 March 2013
Customer: H_GRONTMIJ_SOL
Sample Delivery Group (SDG): 130223-6
Your Reference: 106270-007
Location: Haig Close, Cannock
Report No: 215910

We received 11 samples on Thursday February 21, 2013 and 10 of these samples were scheduled for analysis which was completed on Thursday March 14, 2013. 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.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6967202	HP101		0.60	19/02/2013
6967204	HP102		0.40	19/02/2013
6967205	HP103		0.40	19/02/2013
6967207	HP104		0.30	19/02/2013
6967208	HP105		0.50	19/02/2013
6967210	HP106		0.70	19/02/2013
6967211	HP107		0.40	19/02/2013
6967197	WS101		0.70	19/02/2013
6967199	WS102		0.40	19/02/2013
6967200	WS103		0.30	19/02/2013
6967201	WS104		0.20	19/02/2013

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



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

SOLID	Results Legend		Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
	Test	No Determination Possible					
Asbestos Identification (Soil)	All	NDPs: 0 Tests: 8	6967202	HP101		0.60	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
Boron Water Soluble	All	NDPs: 0 Tests: 10	6967204	HP102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
CEN Readings	All	NDPs: 0 Tests: 5	6967205	HP103		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5	6967207	HP104		0.30	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 5	6967208	HP105		0.50	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 6	6967210	HP106		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 5	6967211	HP107		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 6	6967197	WS101		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
GRO by GC-FID (S)	All	NDPs: 0 Tests: 6	6967199	WS102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
GRO by GC-FID (W)	All	NDPs: 0 Tests: 5	6967200	WS103		0.30	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 10					
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 5					
Mercury Dissolved	All	NDPs: 0 Tests: 5					
Metals by iCap-OES (Soil)	Arsenic	NDPs: 0 Tests: 10					
	Barium	NDPs: 0 Tests: 10					



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

SOLID	Results Legend		Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container														
	X Test	N No Determination Possible	6967202	HP101		0.60	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967204	HP102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967205	HP103		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967207	HP104		0.30	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967208	HP105		0.50	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967210	HP106		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967211	HP107		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967197	WS101		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967199	WS102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
			6967200	WS103		0.30	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB														
Metals by iCap-OES (Soil)	Beryllium	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Cadmium	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Chromium	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Copper	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Lead	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Mercury	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Nickel	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Selenium	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Vanadium	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Zinc	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 5	X		X			X		X		X		X							
PAH Value of soil	All	NDPs: 0 Tests: 8	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	
pH	All	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sample description	All	NDPs: 0 Tests: 10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Semi Volatile Organic Compounds	All	NDPs: 0 Tests: 5	X		X			X				X		X							



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

SOLID Results Legend X Test N No Determination Possible	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container															
	6967202	HP101		0.60	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB															
	6967204	HP102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB															
	6967205	HP103		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB															
	6967207	HP104		0.30	250g Amber Jar (AL 1kg TUB															
6967208	HP105		0.50	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB																
6967210	HP106		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB																
6967211	HP107		0.40	250g Amber Jar (AL 1kg TUB																
6967197	WS101		0.70	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB																
6967199	WS102		0.40	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB																
6967200	WS103		0.30	60g VOC (ALEE215) 250g Amber Jar (AL 1kg TUB																
Total Metals by ICP-MS	All	NDPs: 0 Tests: 5			X		X		X		X									
Total Organic Carbon	All	NDPs: 2 Tests: 9																		
Total Organic Carbon (Asb)	All	NDPs: 0 Tests: 1																		
Total Sulphate	All	NDPs: 0 Tests: 8																		
TPH CWG (W)	All	NDPs: 0 Tests: 5																		
TPH CWG GC (S)	All	NDPs: 0 Tests: 6																		
VOC MS (S)	All	NDPs: 0 Tests: 5																		
VOC MS (W)	All	NDPs: 0 Tests: 5																		



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
6967202	HP101	0.60	Orange	Sand	0.1 - 2 mm	Stones	Vegetation
6967204	HP102	0.40	Dark Brown	Sand	0.1 - 2 mm	Crushed Brick	Stones
6967205	HP103	0.40	Dark Brown	Sand	0.1 - 2 mm	Crushed Brick	Vegetation
6967207	HP104	0.30	Dark Brown	Sand	0.1 - 2 mm	Crushed Brick	Stones
6967208	HP105	0.50	Dark Brown	Loamy Sand	0.1 - 2 mm	Stones	Vegetation
6967210	HP106	0.70	Dark Brown	Loamy Sand	0.1 - 2 mm	Stones	Brick
6967211	HP107	0.40	Dark Brown	Silty Clay Loam	0.1 - 2 mm	Stones	None
6967197	WS101	0.70	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	None
6967199	WS102	0.40	Dark Brown	Sand	0.1 - 2 mm	Brick	Vegetation
6967200	WS103	0.30	Dark Brown	Sand	0.1 - 2 mm	Crushed Brick	Vegetation

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.



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

Results Legend		Customer Sample R	HP107	WS101	WS102	WS103		
#	ISO17025 accredited.							
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&\$@	Sample deviation (see appendix)							
		Depth (m)	0.40	0.70	0.40	0.30		
		Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
		Date Sampled	19/02/2013	19/02/2013	19/02/2013	19/02/2013		
		Sample Time						
		Date Received	21/02/2013	21/02/2013	21/02/2013	21/02/2013		
		SDG Ref	130223-6	130223-6	130223-6	130223-6		
		Lab Sample No.(s)	6967211	6967197	6967199	6967200		
		AGS Reference						
Component	LOD/Units	Method						
Soil Organic Matter (SOM)	<0.35 %	TM132	7.5 #	7.65 #	4.38 #	2.16 #		
pH	1 pH Units	TM133	8.16 M	7.81 M	8.06 M	8.25 M		
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #	<3 #	<1.2 #	<3 #		
Arsenic	<0.6 mg/kg	TM181	18.9 M	12.5 M	11.2 M	2.95 M		
Barium	<0.6 mg/kg	TM181	125 #	219 #	104 #	102 #		
Beryllium	<0.01 mg/kg	TM181	2.46 M	3.2 M	1.07 M	0.824 M		
Cadmium	<0.02 mg/kg	TM181	2.45 M	1.17 M	0.87 M	0.702 M		
Chromium	<0.9 mg/kg	TM181	14.7 M	16.1 M	12.9 M	39.5 M		
Copper	<1.4 mg/kg	TM181	65.7 M	37.8 M	28.5 M	36.9 M		
Lead	<0.7 mg/kg	TM181	162 M	104 M	86.3 M	48.1 M		
Mercury	<0.14 mg/kg	TM181	0.276 M	<0.14 M	0.164 M	<0.14 M		
Nickel	<0.2 mg/kg	TM181	33 M	33 M	18.7 M	44.7 M		
Selenium	<1 mg/kg	TM181	<1 #	<1 #	<1 #	<1 #		
Vanadium	<0.2 mg/kg	TM181	26.9 #	32.5 #	17.2 #	86.8 #		
Zinc	<1.9 mg/kg	TM181	721 M	379 M	279 M	96.2 M		
Polyaromatic hydrocarbons, Total	<10 mg/kg	TM213	12.7	44.5	<10	<10		
Sulphate, Total	<48 mg/kg	TM221	447 M		445 M	328 M		
Boron, water soluble	<1 mg/kg	TM222	1.22 M	1.31 M	<1 M	<1 M		



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Semi Volatile Organic Compounds

Results Legend		Customer Sample R	HP101	HP103	HP105	WS101	WS102	
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.		0.60	0.40	0.50	0.70	0.40	
aq	Aqueous / settled sample.		Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	
diss.filt	Dissolved / filtered sample.		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		21/02/2013	21/02/2013	21/02/2013	21/02/2013	21/02/2013	
(F)	Trigger breach confirmed		130223-6	130223-6	130223-6	130223-6	130223-6	
1-4&*\$@	Sample deviation (see appendix)		6967202	6967205	6967208	6967197	6967199	
Component	LOD/Units		Method					
Phenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Pentachlorophenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
n-Nitroso-n-dipropylamine	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Nitrobenzene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Isophorone	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Hexachloroethane	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Hexachlorocyclopentadiene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Hexachlorobutadiene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Hexachlorobenzene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
n-Dioctyl phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Dimethyl phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Diethyl phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
n-Dibutyl phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Dibenzofuran	<100 µg/kg	TM157	<100	<100	<100	270	<100	
Carbazole	<100 µg/kg	TM157	<100	<100	<100	293	<100	
Butylbenzyl phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
bis(2-Ethylhexyl) phthalate	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
bis(2-Chloroethoxy)methane	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
bis(2-Chloroethyl)ether	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
Azobenzene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Nitrophenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Nitroaniline	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Methylphenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Chlorophenylphenylether	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Chloroaniline	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Chloro-3-methylphenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
4-Bromophenylphenylether	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
3-Nitroaniline	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
2-Nitrophenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
2-Nitroaniline	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
2-Methylphenol	<100 µg/kg	TM157	<100	<100	<100	<100	<100	
1,2,4-Trichlorobenzene	<100 µg/kg	TM157	<100	<100	<100	<100	<100	



CERTIFICATE OF ANALYSIS

SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Semi Volatile Organic Compounds

Table with columns for Component, LOD/Units, Method, and results for samples HP101, HP103, HP105, WS101, and WS102. Includes a Results Legend and various chemical compounds like 2-Chlorophenol, Benzo(a)anthracene, etc.



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample R	HP101	HP102	HP106	WS101	WS102	WS103
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.60	0.40	0.70	0.70	0.40	0.30
M	mCERTS accredited.		Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
aq	Aqueous / settled sample.		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&*\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
GRO Surrogate % recovery**	%	TM089	114	27	11	35	80	114
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44	<44	<44	109	101	<44
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5	<5	<5	<5	<5
Benzene	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Toluene	<2 µg/kg	TM089	3.27	<2	<2	3.51	5.65	<2
Ethylbenzene	<3 µg/kg	TM089	4.36	<3	<3	7.02	20.3	4.72
m,p-Xylene	<6 µg/kg	TM089	6.55	<6	<6	12.9	22.6	<6
o-Xylene	<3 µg/kg	TM089	3.27	<3	<3	4.68	11.3	3.54
sum of detected mpo xylene by GC	<9 µg/kg	TM089	9.82	<9	<9	17.6	33.9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	<24	<24	28.1	59.9	<24
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	<10 µg/kg	TM089	<10	<10	<10	12.9	<10	<10
Aliphatics >C8-C10	<10 µg/kg	TM089	<10	<10	<10	18.7	10.2	<10
Aliphatics >C10-C12	<10 µg/kg	TM089	<10	<10	<10	18.7	<10	<10
Aliphatics >C12-C16	<100 µg/kg	TM173	<100	2430	2950	6570	1680	1100
Aliphatics >C16-C21	<100 µg/kg	TM173	<100	3880	5530	6720	4840	1120
Aliphatics >C21-C35	<100 µg/kg	TM173	3690	18200	26400	22300	16300	9270
Aliphatics >C35-C44	<100 µg/kg	TM173	<100	1970	4890	2190	3690	6580
Total Aliphatics >C12-C44	<100 µg/kg	TM173	3690	26500	39700	37800	26600	18100
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/kg	TM089	19.6	<10	<10	36.3	61	14.2
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10	<10	<10	12.9	<10	<10
Aromatics >EC12-EC16	<100 µg/kg	TM173	1550	3850	4150	7650	1880	1950
Aromatics >EC16-EC21	<100 µg/kg	TM173	4320	13900	16300	32500	5580	4400
Aromatics >EC21-EC35	<100 µg/kg	TM173	20300	62900	62400	116000	31400	32000
Aromatics >EC35-EC44	<100 µg/kg	TM173	7770	19900	23000	39500	15900	27400
Aromatics >EC40-EC44	<100 µg/kg	TM173	2880	6640	8400	15300	6580	12000
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	34000	101000	106000	196000	54800	65700
Total Aliphatics >C5-35	<100 µg/kg	TM173	3710	24500	34800	35600	22900	11500
Total Aromatics >C5-35	<100 µg/kg	TM173	26200	80700	82800	157000	39000	38300
Total Aliphatics & Aromatics >C5-35	<100 µg/kg	TM173	29900	105000	118000	192000	61900	49800



CERTIFICATE OF ANALYSIS

Validated

SDG: 130223-6
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

TPH CWG (S)

Table with columns for Results Legend, Customer Sample R, HP101, HP102, HP106, WS101, WS102, WS103, Component, LOD/Units, Method, and numerical data values.



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample R	HP101	HP103	HP105	WS101	WS102	
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.60	0.40	0.50	0.70	0.40	
M	mCERTS accredited.		Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	
aq	Aqueous / settled sample.		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4*\$#@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
Dibromofluoromethane**	%	TM116	110	106	87.6	89.6	97.5	
Toluene-d8**	%	TM116	95.5	94	110	94.6	99.6	
4-Bromofluorobenzene**	%	TM116	120	127	117	128	131	
Dichlorodifluoromethane	<4 µg/kg	TM116	<4	<4	<4	<4	<4	
Chloromethane	<7 µg/kg	TM116	<7	<7	<7	<7	<7	
Vinyl Chloride	<10 µg/kg	TM116	<10	<10	<10	<10	<10	
Bromomethane	<13 µg/kg	TM116	<13	<13	<13	<13	<13	
Chloroethane	<14 µg/kg	TM116	<14	<14	<14	<14	<14	
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<6	<6	<6	<6	
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<10	<10	<10	<10	
Carbon Disulphide	<7 µg/kg	TM116	<7	<7	<7	<7	<7	
Dichloromethane	<10 µg/kg	TM116	<10	<10	<10	<10	<10	
Methyl Tertiary Butyl Ether	<11 µg/kg	TM116	<11	<11	<11	<11	<11	
trans-1,2-Dichloroethene	<11 µg/kg	TM116	<11	<11	<11	<11	<11	
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<8	<8	<8	<8	
cis-1,2-Dichloroethene	<5 µg/kg	TM116	<5	<5	<5	<5	<5	
2,2-Dichloropropane	<12 µg/kg	TM116	<12	<12	<12	<12	<12	
Bromochloromethane	<14 µg/kg	TM116	<14	<14	<14	<14	<14	
Chloroform	<8 µg/kg	TM116	<8	<8	<8	<8	<8	
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<7	<7	<7	<7	
1,1-Dichloropropene	<11 µg/kg	TM116	<11	<11	<11	<11	<11	
Carbontetrachloride	<14 µg/kg	TM116	<14	<14	<14	<14	<14	
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<5	<5	<5	<5	
Benzene	<9 µg/kg	TM116	<9	471	<9	134	16	
Trichloroethene	<9 µg/kg	TM116	<9	<9	<9	<9	<9	
1,2-Dichloropropane	<12 µg/kg	TM116	<12	<12	<12	<12	<12	
Dibromomethane	<9 µg/kg	TM116	<9	<9	<9	<9	<9	
Bromodichloromethane	<7 µg/kg	TM116	<7	<7	<7	<7	<7	
cis-1,3-Dichloropropene	<14 µg/kg	TM116	<14	<14	<14	<14	<14	
Toluene	<5 µg/kg	TM116	5.97	14.1	<5	32.5	19.8	
trans-1,3-Dichloropropene	<14 µg/kg	TM116	<14	<14	<14	<14	<14	
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<10	<10	<10	<10	



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

VOC MS (S)

Results Legend			Customer Sample R		HP101	HP103	HP105	WS101	WS102	
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.60	0.40	0.50	0.70	0.40	
M	mCERTS accredited.				Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	
aq	Aqueous / settled sample.				19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	
dis.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 individual compounds within samples aren't corrected for the recovery				21/02/2013	21/02/2013	21/02/2013	21/02/2013	21/02/2013	21/02/2013
(F)	Trigger breach confirmed				130223-6	130223-6	130223-6	130223-6	130223-6	130223-6
1-4&5@	Sample deviation (see appendix)				6967202	6967205	6967208	6967197	6967199	
Component	LOD/Units	Method								
1,3-Dichloropropane	<7 µg/kg	TM116		<7	<7	<7	<7	<7		
				#	#	#	#	#		
Tetrachloroethene	<5 µg/kg	TM116		<5	<5	<5	<5	<5		
				M	M	M	M	M		
Dibromochloromethane	<13 µg/kg	TM116		<13	<13	<13	<13	<13		
				M	M	M	M	M		
1,2-Dibromoethane	<12 µg/kg	TM116		<12	<12	<12	<12	<12		
				M	M	M	M	M		
Chlorobenzene	<5 µg/kg	TM116		<5	<5	<5	<5	<5		
				M	M	M	M	M		
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
Ethylbenzene	<4 µg/kg	TM116		<4	22.2	5.48	12.3	26.6		
				M	M	M	& M	M		
p/m-Xylene	<14 µg/kg	TM116		<14	124	<14	32.2	33.1		
				#	#	#	& #	#		
o-Xylene	<10 µg/kg	TM116		<10	39	<10	<10	11.8		
				M	M	M	M	M		
Styrene	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
Bromoform	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
Isopropylbenzene	<5 µg/kg	TM116		<5	<5	<5	<5	<5		
				M	M	M	M	M		
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				#	#	#	#	#		
1,2,3-Trichloropropane	<17 µg/kg	TM116		<17	<17	<17	<17	<17		
				M	M	M	M	M		
Bromobenzene	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
Propylbenzene	<11 µg/kg	TM116		<11	<11	<11	<11	<11		
				M	M	M	M	M		
2-Chlorotoluene	<9 µg/kg	TM116		<9	<9	<9	<9	<9		
				M	M	M	M	M		
1,3,5-Trimethylbenzene	<8 µg/kg	TM116		<8	<8	<8	<8	<8		
				#	#	#	#	#		
4-Chlorotoluene	<12 µg/kg	TM116		<12	<12	<12	<12	<12		
				M	M	M	M	M		
tert-Butylbenzene	<12 µg/kg	TM116		<12	<12	<12	<12	<12		
				#	#	#	#	#		
1,2,4-Trimethylbenzene	<9 µg/kg	TM116		<9	38.3	<9	<9	<9		
				#	#	#	#	#		
sec-Butylbenzene	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
4-Isopropyltoluene	<11 µg/kg	TM116		<11	<11	<11	<11	<11		
				M	M	M	M	M		
1,3-Dichlorobenzene	<6 µg/kg	TM116		<6	<6	<6	<6	<6		
				M	M	M	M	M		
1,4-Dichlorobenzene	<5 µg/kg	TM116		<5	<5	<5	<5	<5		
				M	M	M	M	M		
n-Butylbenzene	<10 µg/kg	TM116		<10	<10	<10	<10	<10		
				M	M	M	M	M		
1,2-Dichlorobenzene	<12 µg/kg	TM116		<12	<12	<12	<12	<12		
				M	M	M	M	M		
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116		<14	<14	<14	<14	<14		
				M	M	M	M	M		
Tert-amyl methyl ether	<15 µg/kg	TM116		<15	<15	<15	<15	<15		
1,2,4-Trichlorobenzene	<6 µg/kg	TM116		<6	<6	<6	<6	<6		
				#	#	#	#	#		
Hexachlorobutadiene	<12 µg/kg	TM116		<12	<12	<12	<12	<12		
Naphthalene	<13 µg/kg	TM116		<13	901	<13	<13	<13		
				M	M	M	& M	M		



CERTIFICATE OF ANALYSIS

SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

VOC MS (S)

Table with columns for Results Legend, Customer Sample R, HP101, HP103, HP105, WS101, WS102, Component, LOD/Units, Method, and detection results for 1,2,3-Trichlorobenzene.



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP101 0.60 SOLID 19/02/2013 00:00:00 130223-6 6967202 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP102 0.40 SOLID 19/02/2013 00:00:00 130223-6 6967204 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP103 0.40 SOLID 19/02/2013 00:00:00 130223-6 6967205 TM048	12/03/13	Chris Swindells	Loose fibres in soil	Not Detected (#)	Trace (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP104 0.30 SOLID 19/02/2013 00:00:00 130223-6 6967207 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP106 0.70 SOLID 19/02/2013 00:00:00 130223-6 6967210 TM048	13/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected



CERTIFICATE OF ANALYSIS

SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP107 0.40 SOLID 19/02/2013 00:00:00 130223-6 6967211 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS102 0.40 SOLID 19/02/2013 00:00:00 130223-6 6967199 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS103 0.30 SOLID 19/02/2013 00:00:00 130223-6 6967200 TM048	11/03/13	Kevin Bowron	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.215

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Haig Close, Cannock

Moisture Content Ratio (%) 22.9

Dry Matter Content Ratio (%) 81.4

Case

SDG 130223-6

Lab Sample Number(s) 6967197

Sampled Date 19-Feb-2013

Customer Sample Ref. WS101

Depth (m) 0.70

Solid Waste Analysis

Total Organic Carbon (%) 4.44

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0281

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) 45.6

pH (pH Units) 7.81

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00186	<0.00012	0.00372	<0.0012	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
Chromium	0.00149	<0.00022	0.00298	<0.0022	0.5	10	70
Copper	0.00696	<0.00085	0.0139	<0.0085	2	50	100
Mercury Dissolved (CVAF)	0.0000111	<0.00001	0.0000222	<0.0001	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00199	<0.00015	0.00398	<0.0015	0.4	10	40
Lead	0.000283	<0.00002	0.000566	<0.0002	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	-	-	-	-	0.1	0.5	7
Zinc	0.00333	<0.00041	0.00666	<0.0041	4	50	200
Chloride	-	-	-	-	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	-	-	-	-	500	800	1000

Leach Test Information

Date Prepared 01-Mar-2013
 pH (pH Units) 8.08
 Conductivity (µS/cm) 223.00
 Temperature (°C) 20.30
 Volume Leachant (Litres) 0.310
 Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013

SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_GRONTMIJ_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.4
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967197
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS101
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	4.44	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	0.0281	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	45.6	-	-	-
pH (pH Units)	7.81	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.03	-
Boron	0.0434	<0.0094	0.0868	<0.094	-
Vanadium	0.00335	<0.00024	0.0067	<0.0024	-
PAH Spec MS - Aqueous (W)					
Naphthalene by GCMS	0.00048	<0.0001	0.00096	<0.001	-
Acenaphthene by GCMS	0.0000227	<0.000015	0.0000454	<0.00015	-
Acenaphthylene by GCMS	0.0000201	<0.000011	0.0000402	<0.00011	-
Fluoranthene by GCMS	0.0000635	<0.000017	0.000127	<0.00017	-
Anthracene by GCMS	0.0000274	<0.000015	0.0000548	<0.00015	-
Phenanthrene by GCMS	0.000091	<0.000022	0.000182	<0.00022	-
Fluorene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
Chrysene by GCMS	0.0000377	<0.000013	0.0000754	<0.00013	-
Pyrene by GCMS	0.0000597	<0.000015	0.000119	<0.00015	-
Benz(a)anthracene by GCMS	0.0000196	<0.000017	0.0000392	<0.00017	-
Benzo(b)fluoranthene by GCMS	<0.000023	<0.000023	<0.000046	<0.00023	-
Benzo(k)fluoranthene by GCMS	0.0000394	<0.000027	0.0000788	<0.00027	-
Benzo(a)pyrene by GCMS	0.0000321	<0.000009	0.0000642	<0.00009	-
Dibenzo(ah)anthracene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Benzo(ghi)perylene by GCMS	0.00003	<0.000016	0.00006	<0.00016	-
Indeno(123cd)pyrene by GCMS	0.0000191	<0.000014	0.0000382	<0.00014	-
PAH 16 EPA Total by GCMS	0.000942	<0.000247	0.00188	<0.00247	-
TPH CWG (W)					
Surrogate Recovery	-	-	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.5	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	223.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_Grontmij_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.4
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967197
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS101
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	4.44
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0281
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	45.6
pH (pH Units)	7.81
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
Aliphatics C5-C6	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C6-C8	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C8-C10	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C10-C12	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C12-C16	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C16-C21	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C21-C35	<0.01	<0.01	<0.02	<0.1	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.02	<0.1	-
Aromatics C6-C7	<0.01	<0.01	<0.02	<0.1	-
Aromatics >C7-C8	<0.01	<0.01	<0.02	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.03	-
Aromatics >EC8-EC10	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.02	<0.1	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.02	<0.1	-
Benzene by GC	<0.007	<0.007	<0.014	<0.07	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.02	<0.1	-
Toluene by GC	<0.004	<0.004	<0.008	<0.04	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.05	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.08	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	223.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Haig Close, Cannock		Haig Close, Cannock	
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.4
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967197
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS101
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	4.44
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0281
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	45.6
pH (pH Units)	7.81
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
o Xylene by GC	<0.003	<0.003	<0.006	<0.03	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.11	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.28	-
VOC MS (W)					
Dibromofluoromethane	-	-	-	-	-
Toluene-d8	-	-	-	-	-
4-Bromofluorobenzene	-	-	-	-	-
Dichlorodifluoromethane	<0.001	<0.001	<0.002	<0.01	-
Chloromethane	<0.001	<0.001	<0.002	<0.01	-
Vinyl Chloride	<0.001	<0.001	<0.002	<0.01	-
Bromomethane	<0.001	<0.001	<0.002	<0.01	-
Chloroethane	<0.001	<0.001	<0.002	<0.01	-
Trichlorofluoromethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Carbon Disulphide	<0.001	<0.001	<0.002	<0.01	-
Dichloromethane	<0.003	<0.003	<0.006	<0.03	-
Tert-butyl methyl ether	<0.001	<0.001	<0.002	<0.01	-
Trans-1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
2,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromochloromethane	<0.001	<0.001	<0.002	<0.01	-
Chloroform	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	223.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

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16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.4
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967197
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS101
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	4.44
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0281
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	45.6
pH (pH Units)	7.81
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
1,1,1-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Carbon tetrachloride	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Benzene	0.00172	<0.001	0.00344	<0.01	-
Trichloroethene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Dibromomethane	<0.001	<0.001	<0.002	<0.01	-
Bromodichloromethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Toluene	<0.001	<0.001	<0.002	<0.01	-
Trans-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
1,1,2-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Tetrachloroethene	<0.001	<0.001	<0.002	<0.01	-
Dibromochloromethane	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromoethane	<0.001	<0.001	<0.002	<0.01	-
Chlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,1,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
Ethylbenzene	<0.001	<0.001	<0.002	<0.01	-
p/m-Xylene	<0.001	<0.001	<0.002	<0.01	-
o-Xylene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	223.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.215
 Mass of dry sample (kg) 0.175
 Particle Size <4mm >95%

Site Location

Haig Close, Cannock
 Moisture Content Ratio (%) 22.9
 Dry Matter Content Ratio (%) 81.4

Case

SDG 130223-6
 Lab Sample Number(s) 6967197
 Sampled Date 19-Feb-2013
 Customer Sample Ref. WS101
 Depth (m) 0.70

Solid Waste Analysis

Total Organic Carbon (%) 4.44
 Loss on Ignition (%) -
 Sum of BTEX (mg/kg) 0.0281
 Sum of 7 PCBs (mg/kg) -
 Mineral Oil (mg/kg) -
 PAH Sum of 17 (mg/kg) 45.6
 pH (pH Units) 7.81
 ANC to pH 6 (mol/kg) -
 ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Styrene	<0.001	<0.001	<0.002	<0.01	-
Bromoform	<0.001	<0.001	<0.002	<0.01	-
Isopropylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,2,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromobenzene	<0.001	<0.001	<0.002	<0.01	-
Propylbenzene	<0.001	<0.001	<0.002	<0.01	-
2-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
Tert-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
Sec-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Isopropyltoluene	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,4-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
n-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromo-3-Chloropropane	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
Hexachlorobutadiene	<0.001	<0.001	<0.002	<0.01	-
Tert-amyl methyl ether	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared 01-Mar-2013
 pH (pH Units) 8.08
 Conductivity (µS/cm) 223.00
 Temperature (°C) 20.30
 Volume Leachant (Litres) 0.310
 Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
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CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.4
Particle Size <4mm	>95%		

Case

SDG	130223-6
Lab Sample Number(s)	6967197
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS101
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	4.44
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0281
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	45.6
pH (pH Units)	7.81
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Naphthalene	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	223.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967199

Sampled Date 19-Feb-2013

Customer Sample Ref. WS102

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 2.54

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0599

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.06

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00273	<0.00012	0.00546	<0.0012	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
Chromium	<0.003	<0.003	<0.006	<0.03	0.5	10	70
Copper	0.00475	<0.00085	0.0095	<0.0085	2	50	100
Mercury Dissolved (CVAf)	0.0000155	<0.00001	0.000031	<0.0001	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00208	<0.00015	0.00416	<0.0015	0.4	10	40
Lead	0.000398	<0.00002	0.000796	<0.0002	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	-	-	-	-	0.1	0.5	7
Zinc	0.00233	<0.00041	0.00466	<0.0041	4	50	200
Chloride	-	-	-	-	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	-	-	-	-	500	800	1000

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.32

Conductivity (µS/cm) 257.00

Temperature (°C) 20.50

Volume Leachant (Litres) 0.314

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013

SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_Grontmij_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967199
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS102
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	2.54	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	0.0599	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	8.06	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.03	-
Boron	0.0714	<0.0094	0.143	<0.094	-
Vanadium	0.00297	<0.00024	0.00594	<0.0024	-
PAH Spec MS - Aqueous (W)					
Naphthalene by GCMS	0.000116	<0.0001	0.000232	<0.001	-
Acenaphthene by GCMS	0.0000534	<0.000015	0.000107	<0.00015	-
Acenaphthylene by GCMS	<0.000011	<0.000011	<0.000022	<0.00011	-
Fluoranthene by GCMS	0.0000461	<0.000017	0.0000922	<0.00017	-
Anthracene by GCMS	<0.000015	<0.000015	<0.00003	<0.00015	-
Phenanthrene by GCMS	0.0000935	<0.000022	0.000187	<0.00022	-
Fluorene by GCMS	0.0000255	<0.000014	0.000051	<0.00014	-
Chrysene by GCMS	0.0000153	<0.000013	0.0000306	<0.00013	-
Pyrene by GCMS	0.0000352	<0.000015	0.0000704	<0.00015	-
Benz(a)anthracene by GCMS	<0.000017	<0.000017	<0.000034	<0.00017	-
Benzo(b)fluoranthene by GCMS	<0.000023	<0.000023	<0.000046	<0.00023	-
Benzo(k)fluoranthene by GCMS	<0.000027	<0.000027	<0.000054	<0.00027	-
Benzo(a)pyrene by GCMS	<0.000009	<0.000009	<0.000018	<0.00009	-
Dibenzo(ah)anthracene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Benzo(ghi)perylene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Indeno(123cd)pyrene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
PAH 16 EPA Total by GCMS	0.000385	<0.000247	0.00077	<0.00247	-
TPH CWG (W)					
Surrogate Recovery	-	-	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.5	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.32
Conductivity (µS/cm)	257.00
Temperature (°C)	20.50
Volume Leachant (Litres)	0.314
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967199

Sampled Date 19-Feb-2013

Customer Sample Ref. WS102

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 2.54

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0599

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.06

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
Aliphatics C5-C6	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C6-C8	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C8-C10	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C10-C12	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C12-C16	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C16-C21	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C21-C35	<0.01	<0.01	<0.02	<0.1	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.02	<0.1	-
Aromatics C6-C7	<0.01	<0.01	<0.02	<0.1	-
Aromatics >C7-C8	<0.01	<0.01	<0.02	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.03	-
Aromatics >EC8-EC10	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.02	<0.1	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.02	<0.1	-
Benzene by GC	<0.007	<0.007	<0.014	<0.07	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.02	<0.1	-
Toluene by GC	<0.004	<0.004	<0.008	<0.04	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.05	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.08	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.32

Conductivity (µS/cm) 257.00

Temperature (°C) 20.50

Volume Leachant (Litres) 0.314

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967199

Sampled Date 19-Feb-2013

Customer Sample Ref. WS102

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 2.54

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0599

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.06

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
o Xylene by GC	<0.003	<0.003	<0.006	<0.03	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.11	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.28	-
VOC MS (W)					
Dibromofluoromethane	-	-	-	-	-
Toluene-d8	-	-	-	-	-
4-Bromofluorobenzene	-	-	-	-	-
Dichlorodifluoromethane	<0.01	<0.01	<0.02	<0.1	-
Chloromethane	<0.01	<0.01	<0.02	<0.1	-
Vinyl Chloride	<0.01	<0.01	<0.02	<0.1	-
Bromomethane	<0.01	<0.01	<0.02	<0.1	-
Chloroethane	<0.01	<0.01	<0.02	<0.1	-
Trichlorofluoromethane	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
Carbon Disulphide	<0.01	<0.01	<0.02	<0.1	-
Dichloromethane	<0.03	<0.03	<0.06	<0.3	-
Tert-butyl methyl ether	<0.01	<0.01	<0.02	<0.1	-
Trans-1,2-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloroethane	<0.01	<0.01	<0.02	<0.1	-
Cis-1,2-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
2,2-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Bromochloromethane	<0.01	<0.01	<0.02	<0.1	-
Chloroform	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.32

Conductivity (µS/cm) 257.00

Temperature (°C) 20.50

Volume Leachant (Litres) 0.314

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967199
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS102
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	2.54
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0599
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.06
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
1,1,1-Trichloroethane	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
Carbontetrachloride	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichloroethane	<0.01	<0.01	<0.02	<0.1	-
Benzene	<0.01	<0.01	<0.02	<0.1	-
Trichloroethene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Dibromomethane	<0.01	<0.01	<0.02	<0.1	-
Bromodichloromethane	<0.01	<0.01	<0.02	<0.1	-
Cis-1,3-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
Toluene	<0.01	<0.01	<0.02	<0.1	-
Trans-1,3-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
1,1,2-Trichloroethane	<0.01	<0.01	<0.02	<0.1	-
1,3-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Tetrachloroethene	<0.01	<0.01	<0.02	<0.1	-
Dibromochloromethane	<0.01	<0.01	<0.02	<0.1	-
1,2-Dibromoethane	<0.01	<0.01	<0.02	<0.1	-
Chlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,1,1,2-Tetrachloroethane	<0.01	<0.01	<0.02	<0.1	-
Ethylbenzene	<0.01	<0.01	<0.02	<0.1	-
p/m-Xylene	<0.01	<0.01	<0.02	<0.1	-
o-Xylene	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.32
Conductivity (µS/cm)	257.00
Temperature (°C)	20.50
Volume Leachant (Litres)	0.314
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967199

Sampled Date 19-Feb-2013

Customer Sample Ref. WS102

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 2.54

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0599

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.06

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Styrene	<0.01	<0.01	<0.02	<0.1	-
Bromoform	<0.01	<0.01	<0.02	<0.1	-
Isopropylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.02	<0.1	-
1,2,3-Trichloropropane	<0.01	<0.01	<0.02	<0.1	-
Bromobenzene	<0.01	<0.01	<0.02	<0.1	-
Propylbenzene	<0.01	<0.01	<0.02	<0.1	-
2-Chlorotoluene	<0.01	<0.01	<0.02	<0.1	-
1,3,5-Trimethylbenzene	<0.01	<0.01	<0.02	<0.1	-
4-Chlorotoluene	<0.01	<0.01	<0.02	<0.1	-
Tert-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,2,4-Trimethylbenzene	<0.01	<0.01	<0.02	<0.1	-
Sec-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
4-Isopropyltoluene	<0.01	<0.01	<0.02	<0.1	-
1,3-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,4-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
n-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dibromo-3-Chloropropane	<0.01	<0.01	<0.02	<0.1	-
1,2,4-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
Hexachlorobutadiene	<0.01	<0.01	<0.02	<0.1	-
Tert-amyl methyl ether	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.32

Conductivity (µS/cm) 257.00

Temperature (°C) 20.50

Volume Leachant (Litres) 0.314

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
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14/03/2013 16:41:11

16:40:51 14/03/2013

SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_GRONTMIJ_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.211	Moisture Content Ratio (%)	20.5
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	83
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967199
Sampled Date	19-Feb-2013
Customer Sample Ref.	WS102
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	2.54	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	0.0599	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	8.06	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Naphthalene	<0.01	<0.01	<0.02	<0.1	-
1,2,3-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,3,5-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.32
Conductivity (µS/cm)	257.00
Temperature (°C)	20.50
Volume Leachant (Litres)	0.314
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates
 14/03/2013 16:41:11



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.198

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Haig Close, Cannock

Moisture Content Ratio (%) 13

Dry Matter Content Ratio (%) 88.5

Case

SDG 130223-6

Lab Sample Number(s) 6967202

Sampled Date 19-Feb-2013

Customer Sample Ref. HP101

Depth (m) 0.60

Solid Waste Analysis

Total Organic Carbon (%) 1.79

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 7.25

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00309	<0.00012	0.00618	<0.0012	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
Chromium	<0.003	<0.003	<0.006	<0.03	0.5	10	70
Copper	0.00788	<0.00085	0.0158	<0.0085	2	50	100
Mercury Dissolved (CVAf)	0.0000104	<0.00001	0.0000208	<0.0001	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00309	<0.00015	0.00618	<0.0015	0.4	10	40
Lead	0.00439	<0.00002	0.00878	<0.0002	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	-	-	-	-	0.1	0.5	7
Zinc	0.0276	<0.00041	0.0552	<0.0041	4	50	200
Chloride	-	-	-	-	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	-	-	-	-	500	800	1000

Leach Test Information

Date Prepared 01-Mar-2013
 pH (pH Units) 8.41
 Conductivity (µS/cm) 59.30
 Temperature (°C) 20.40
 Volume Leachant (Litres) 0.327
 Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013

SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_GRONTMIJ_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967202
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP101
Depth (m)	0.60

Solid Waste Analysis

Total Organic Carbon (%)	1.79	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	7.25	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.03	-
Boron	0.0367	<0.0094	0.0734	<0.094	-
Vanadium	0.00495	<0.00024	0.0099	<0.0024	-
PAH Spec MS - Aqueous (W)					
Naphthalene by GCMS	0.00016	<0.0001	0.00032	<0.001	-
Acenaphthene by GCMS	0.000019	<0.000015	0.000038	<0.00015	-
Acenaphthylene by GCMS	0.0000134	<0.000011	0.0000268	<0.00011	-
Fluoranthene by GCMS	0.00018	<0.000017	0.00036	<0.00017	-
Anthracene by GCMS	0.0000208	<0.000015	0.0000416	<0.00015	-
Phenanthrene by GCMS	0.0000914	<0.000022	0.000183	<0.00022	-
Fluorene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
Chrysene by GCMS	0.000159	<0.000013	0.000318	<0.00013	-
Pyrene by GCMS	0.00016	<0.000015	0.00032	<0.00015	-
Benzo(a)anthracene by GCMS	0.000109	<0.000017	0.000218	<0.00017	-
Benzo(b)fluoranthene by GCMS	0.0000924	<0.000023	0.000185	<0.00023	-
Benzo(k)fluoranthene by GCMS	0.000145	<0.000027	0.00029	<0.00027	-
Benzo(a)pyrene by GCMS	0.000145	<0.000009	0.00029	<0.00009	-
Dibenzo(ah)anthracene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Benzo(ghi)perylene by GCMS	0.0000781	<0.000016	0.000156	<0.00016	-
Indeno(123cd)pyrene by GCMS	0.0000572	<0.000014	0.000114	<0.00014	-
PAH 16 EPA Total by GCMS	0.00143	<0.000247	0.00286	<0.00247	-
TPH CWG (W)					
Surrogate Recovery	-	-	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.5	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.41
Conductivity (µS/cm)	59.30
Temperature (°C)	20.40
Volume Leachant (Litres)	0.327
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967202
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP101
Depth (m)	0.60

Solid Waste Analysis

Total Organic Carbon (%)	1.79
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	7.25
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
Aliphatics C5-C6	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C6-C8	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C8-C10	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C10-C12	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C12-C16	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C16-C21	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C21-C35	<0.01	<0.01	<0.02	<0.1	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.02	<0.1	-
Aromatics C6-C7	<0.01	<0.01	<0.02	<0.1	-
Aromatics >C7-C8	<0.01	<0.01	<0.02	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.03	-
Aromatics >EC8-EC10	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.02	<0.1	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.02	<0.1	-
Benzene by GC	<0.007	<0.007	<0.014	<0.07	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.02	<0.1	-
Toluene by GC	<0.004	<0.004	<0.008	<0.04	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.05	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.08	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.41
Conductivity (µS/cm)	59.30
Temperature (°C)	20.40
Volume Leachant (Litres)	0.327
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967202
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP101
Depth (m)	0.60

Solid Waste Analysis

Total Organic Carbon (%)	1.79
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	7.25
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
o Xylene by GC	<0.003	<0.003	<0.006	<0.03	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.11	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.28	-
VOC MS (W)					
Dibromofluoromethane	-	-	-	-	-
Toluene-d8	-	-	-	-	-
4-Bromofluorobenzene	-	-	-	-	-
Dichlorodifluoromethane	<0.01	<0.01	<0.02	<0.1	-
Chloromethane	<0.01	<0.01	<0.02	<0.1	-
Vinyl Chloride	<0.01	<0.01	<0.02	<0.1	-
Bromomethane	<0.01	<0.01	<0.02	<0.1	-
Chloroethane	<0.01	<0.01	<0.02	<0.1	-
Trichlorofluoromethane	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
Carbon Disulphide	<0.01	<0.01	<0.02	<0.1	-
Dichloromethane	<0.03	<0.03	<0.06	<0.3	-
Tert-butyl methyl ether	<0.01	<0.01	<0.02	<0.1	-
Trans-1,2-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloroethane	<0.01	<0.01	<0.02	<0.1	-
Cis-1,2-Dichloroethene	<0.01	<0.01	<0.02	<0.1	-
2,2-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Bromochloromethane	<0.01	<0.01	<0.02	<0.1	-
Chloroform	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.41
Conductivity (µS/cm)	59.30
Temperature (°C)	20.40
Volume Leachant (Litres)	0.327
Volume of Eluate VE1 (Litres)	

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967202

Sampled Date 19-Feb-2013

Customer Sample Ref. HP101

Depth (m) 0.60

Solid Waste Analysis

Total Organic Carbon (%) 1.79

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 7.25

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
1,1,1-Trichloroethane	<0.01	<0.01	<0.02	<0.1	-
1,1-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
Carbontetrachloride	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichloroethane	<0.01	<0.01	<0.02	<0.1	-
Benzene	<0.01	<0.01	<0.02	<0.1	-
Trichloroethene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Dibromomethane	<0.01	<0.01	<0.02	<0.1	-
Bromodichloromethane	<0.01	<0.01	<0.02	<0.1	-
Cis-1,3-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
Toluene	<0.01	<0.01	<0.02	<0.1	-
Trans-1,3-Dichloropropene	<0.01	<0.01	<0.02	<0.1	-
1,1,2-Trichloroethane	<0.01	<0.01	<0.02	<0.1	-
1,3-Dichloropropane	<0.01	<0.01	<0.02	<0.1	-
Tetrachloroethene	<0.01	<0.01	<0.02	<0.1	-
Dibromochloromethane	<0.01	<0.01	<0.02	<0.1	-
1,2-Dibromoethane	<0.01	<0.01	<0.02	<0.1	-
Chlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,1,1,2-Tetrachloroethane	<0.01	<0.01	<0.02	<0.1	-
Ethylbenzene	<0.01	<0.01	<0.02	<0.1	-
p/m-Xylene	<0.01	<0.01	<0.02	<0.1	-
o-Xylene	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.41

Conductivity (µS/cm) 59.30

Temperature (°C) 20.40

Volume Leachant (Litres) 0.327

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967202

Sampled Date 19-Feb-2013

Customer Sample Ref. HP101

Depth (m) 0.60

Solid Waste Analysis

Total Organic Carbon (%) 1.79

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 7.25

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Styrene	<0.01	<0.01	<0.02	<0.1	-
Bromoform	<0.01	<0.01	<0.02	<0.1	-
Isopropylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.02	<0.1	-
1,2,3-Trichloropropane	<0.01	<0.01	<0.02	<0.1	-
Bromobenzene	<0.01	<0.01	<0.02	<0.1	-
Propylbenzene	<0.01	<0.01	<0.02	<0.1	-
2-Chlorotoluene	<0.01	<0.01	<0.02	<0.1	-
1,3,5-Trimethylbenzene	<0.01	<0.01	<0.02	<0.1	-
4-Chlorotoluene	<0.01	<0.01	<0.02	<0.1	-
Tert-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,2,4-Trimethylbenzene	<0.01	<0.01	<0.02	<0.1	-
Sec-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
4-Isopropyltoluene	<0.01	<0.01	<0.02	<0.1	-
1,3-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,4-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
n-Butylbenzene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,2-Dibromo-3-Chloropropane	<0.01	<0.01	<0.02	<0.1	-
1,2,4-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
Hexachlorobutadiene	<0.01	<0.01	<0.02	<0.1	-
Tert-amyl methyl ether	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.41

Conductivity (µS/cm) 59.30

Temperature (°C) 20.40

Volume Leachant (Litres) 0.327

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.198	Moisture Content Ratio (%)	13
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	88.5
Particle Size <4mm	>95%		

Case

SDG	130223-6
Lab Sample Number(s)	6967202
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP101
Depth (m)	0.60

Solid Waste Analysis

Total Organic Carbon (%)	1.79
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	7.25
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Naphthalene	<0.01	<0.01	<0.02	<0.1	-
1,2,3-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-
1,3,5-Trichlorobenzene	<0.01	<0.01	<0.02	<0.1	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.41
Conductivity (µS/cm)	59.30
Temperature (°C)	20.40
Volume Leachant (Litres)	0.327
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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 Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.217	Moisture Content Ratio (%)	23.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	80.7
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967205

Sampled Date 19-Feb-2013

Customer Sample Ref. HP103

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 1.57

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 7.86

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.0193	<0.00012	0.0386	<0.0012	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
Chromium	0.00194	<0.00022	0.00388	<0.0022	0.5	10	70
Copper	0.00546	<0.00085	0.0109	<0.0085	2	50	100
Mercury Dissolved (CVAF)	0.000011	<0.00001	0.000022	<0.0001	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00265	<0.00015	0.0053	<0.0015	0.4	10	40
Lead	0.000373	<0.00002	0.000746	<0.0002	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	-	-	-	-	0.1	0.5	7
Zinc	0.006	<0.00041	0.012	<0.0041	4	50	200
Chloride	-	-	-	-	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	-	-	-	-	500	800	1000

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.49

Conductivity (µS/cm) 285.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.308

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.217	Moisture Content Ratio (%)	23.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	80.7
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967205
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP103
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	1.57
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	7.86
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.03	-
Boron	0.125	<0.0094	0.25	<0.094	-
Vanadium	0.00819	<0.00024	0.0164	<0.0024	-
PAH Spec MS - Aqueous (W)					
Naphthalene by GCMS	0.000143	<0.0001	0.000286	<0.001	-
Acenaphthene by GCMS	<0.000015	<0.000015	<0.00003	<0.00015	-
Acenaphthylene by GCMS	<0.000011	<0.000011	<0.000022	<0.00011	-
Fluoranthene by GCMS	0.0000369	<0.000017	0.0000738	<0.00017	-
Anthracene by GCMS	<0.000015	<0.000015	<0.00003	<0.00015	-
Phenanthrene by GCMS	<0.000022	<0.000022	<0.000044	<0.00022	-
Fluorene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
Chrysene by GCMS	<0.000013	<0.000013	<0.000026	<0.00013	-
Pyrene by GCMS	0.0000282	<0.000015	0.0000564	<0.00015	-
Benz(a)anthracene by GCMS	<0.000017	<0.000017	<0.000034	<0.00017	-
Benzo(b)fluoranthene by GCMS	<0.000023	<0.000023	<0.000046	<0.00023	-
Benzo(k)fluoranthene by GCMS	<0.000027	<0.000027	<0.000054	<0.00027	-
Benzo(a)pyrene by GCMS	<0.000009	<0.000009	<0.000018	<0.00009	-
Dibenzo(ah)anthracene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Benzo(ghi)perylene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Indeno(123cd)pyrene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
PAH 16 EPA Total by GCMS	<0.000247	<0.000247	<0.000494	<0.00247	-
TPH CWG (W)					
Surrogate Recovery	-	-	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.5	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.49
Conductivity (µS/cm)	285.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.308
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.217	Moisture Content Ratio (%)	23.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	80.7
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967205
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP103
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	1.57
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	7.86
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
Aliphatics C5-C6	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C6-C8	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C8-C10	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C10-C12	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C12-C16	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C16-C21	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C21-C35	<0.01	<0.01	<0.02	<0.1	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.02	<0.1	-
Aromatics C6-C7	<0.01	<0.01	<0.02	<0.1	-
Aromatics >C7-C8	<0.01	<0.01	<0.02	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.03	-
Aromatics >EC8-EC10	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.02	<0.1	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.02	<0.1	-
Benzene by GC	<0.007	<0.007	<0.014	<0.07	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.02	<0.1	-
Toluene by GC	<0.004	<0.004	<0.008	<0.04	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.05	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.08	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.49
Conductivity (µS/cm)	285.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.308
Volume of Eluate VE1 (Litres)	

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Haig Close, Cannock		Haig Close, Cannock	
Mass Sample taken (kg)	0.217	Moisture Content Ratio (%)	23.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	80.7
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967205
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP103
Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	1.57
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	7.86
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
o Xylene by GC	<0.003	<0.003	<0.006	<0.03	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.11	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.28	-
VOC MS (W)					
Dibromofluoromethane	-	-	-	-	-
Toluene-d8	-	-	-	-	-
4-Bromofluorobenzene	-	-	-	-	-
Dichlorodifluoromethane	<0.001	<0.001	<0.002	<0.01	-
Chloromethane	<0.001	<0.001	<0.002	<0.01	-
Vinyl Chloride	<0.001	<0.001	<0.002	<0.01	-
Bromomethane	<0.001	<0.001	<0.002	<0.01	-
Chloroethane	<0.001	<0.001	<0.002	<0.01	-
Trichlorofluoromethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Carbon Disulphide	<0.001	<0.001	<0.002	<0.01	-
Dichloromethane	<0.003	<0.003	<0.006	<0.03	-
Tert-butyl methyl ether	<0.001	<0.001	<0.002	<0.01	-
Trans-1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
2,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromochloromethane	<0.001	<0.001	<0.002	<0.01	-
Chloroform	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.49
Conductivity (µS/cm)	285.00
Temperature (°C)	20.30
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Volume of Eluate VE1 (Litres)	

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SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.217	Moisture Content Ratio (%)	23.9
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	80.7
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967205

Sampled Date 19-Feb-2013

Customer Sample Ref. HP103

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 1.57

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 7.86

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
1,1,1-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Carbon tetrachloride	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Benzene	<0.001	<0.001	<0.002	<0.01	-
Trichloroethene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Dibromomethane	<0.001	<0.001	<0.002	<0.01	-
Bromodichloromethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Toluene	<0.001	<0.001	<0.002	<0.01	-
Trans-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
1,1,2-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Tetrachloroethene	<0.001	<0.001	<0.002	<0.01	-
Dibromochloromethane	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromoethane	<0.001	<0.001	<0.002	<0.01	-
Chlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,1,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
Ethylbenzene	<0.001	<0.001	<0.002	<0.01	-
p/m-Xylene	<0.001	<0.001	<0.002	<0.01	-
o-Xylene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.49

Conductivity (µS/cm) 285.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.308

Volume of Eluate VE1 (Litres)

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Location: Haig Close, Cannock
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Order Number: SOL13MIJ009
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Case

SDG 130223-6

Lab Sample Number(s) 6967205

Sampled Date 19-Feb-2013

Customer Sample Ref. HP103

Depth (m) 0.40

Solid Waste Analysis

Total Organic Carbon (%) 1.57

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

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Mineral Oil (mg/kg) -

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ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Styrene	<0.001	<0.001	<0.002	<0.01	-
Bromoform	<0.001	<0.001	<0.002	<0.01	-
Isopropylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,2,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromobenzene	<0.001	<0.001	<0.002	<0.01	-
Propylbenzene	<0.001	<0.001	<0.002	<0.01	-
2-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
Tert-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
Sec-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Isopropyltoluene	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,4-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
n-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromo-3-Chloropropane	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
Hexachlorobutadiene	<0.001	<0.001	<0.002	<0.01	-
Tert-amyl methyl ether	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared 01-Mar-2013

pH (pH Units) 8.49

Conductivity (µS/cm) 285.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.308

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
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Order Number: SOL13MIJ009
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CEN 2:1 STAGE BATCH TEST

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Case

SDG	130223-6
Lab Sample Number(s)	6967205
Sampled Date	19-Feb-2013
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Depth (m)	0.40

Solid Waste Analysis

Total Organic Carbon (%)	1.57
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Sum of BTEX (mg/kg)	-
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Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	7.86
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Naphthalene	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	01-Mar-2013
pH (pH Units)	8.49
Conductivity (µS/cm)	285.00
Temperature (°C)	20.30
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Volume of Eluate VE1 (Litres)	

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SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case

SDG 130223-6

Lab Sample Number(s) 6967210

Sampled Date 19-Feb-2013

Customer Sample Ref. HP106

Depth (m) 0.70

Solid Waste Analysis

Total Organic Carbon (%) 11.6

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.02

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00781	<0.00012	0.0156	<0.0012	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	0.000321	<0.0001	0.000642	<0.001	0.04	1	5
Chromium	<0.003	<0.003	<0.006	<0.03	0.5	10	70
Copper	0.0123	<0.00085	0.0246	<0.0085	2	50	100
Mercury Dissolved (CVAf)	0.0000547	<0.00001	0.000109	<0.0001	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00562	<0.00015	0.0112	<0.0015	0.4	10	40
Lead	0.0255	<0.00002	0.051	<0.0002	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	-	-	-	-	0.1	0.5	7
Zinc	0.0982	<0.00041	0.196	<0.0041	4	50	200
Chloride	-	-	-	-	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	-	-	-	-	500	800	1000

Leach Test Information

Date Prepared 26-Feb-2013

pH (pH Units) 8.25

Conductivity (µS/cm) 368.00

Temperature (°C) 19.90

Volume Leachant (Litres) 0.310

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013

CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference	Site Location	Haig Close, Cannock	
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.02
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.03	-
Boron	0.0888	<0.0094	0.178	<0.094	-
Vanadium	0.00738	<0.00024	0.0148	<0.0024	-
PAH Spec MS - Aqueous (W)					
Naphthalene by GCMS	<0.0001	<0.0001	<0.0002	<0.001	-
Acenaphthene by GCMS	<0.000015	<0.000015	<0.00003	<0.00015	-
Acenaphthylene by GCMS	<0.000011	<0.000011	<0.000022	<0.00011	-
Fluoranthene by GCMS	0.0000184	<0.000017	0.0000368	<0.00017	-
Anthracene by GCMS	<0.000015	<0.000015	<0.00003	<0.00015	-
Phenanthrene by GCMS	<0.000022	<0.000022	<0.000044	<0.00022	-
Fluorene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
Chrysene by GCMS	<0.000013	<0.000013	<0.000026	<0.00013	-
Pyrene by GCMS	0.000018	<0.000015	0.000036	<0.00015	-
Benz(a)anthracene by GCMS	<0.000017	<0.000017	<0.000034	<0.00017	-
Benzo(b)fluoranthene by GCMS	<0.000023	<0.000023	<0.000046	<0.00023	-
Benzo(k)fluoranthene by GCMS	<0.000027	<0.000027	<0.000054	<0.00027	-
Benzo(a)pyrene by GCMS	<0.000009	<0.000009	<0.000018	<0.00009	-
Dibenzo(ah)anthracene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Benzo(ghi)perylene by GCMS	<0.000016	<0.000016	<0.000032	<0.00016	-
Indeno(123cd)pyrene by GCMS	<0.000014	<0.000014	<0.000028	<0.00014	-
PAH 16 EPA Total by GCMS	<0.000247	<0.000247	<0.000494	<0.00247	-
TPH CWG (W)					
Surrogate Recovery	-	-	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.5	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case

SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.02
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
Aliphatics C5-C6	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C6-C8	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C8-C10	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C10-C12	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C12-C16	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C16-C21	<0.01	<0.01	<0.02	<0.1	-
Aliphatics >C21-C35	<0.01	<0.01	<0.02	<0.1	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.02	<0.1	-
Aromatics C6-C7	<0.01	<0.01	<0.02	<0.1	-
Aromatics >C7-C8	<0.01	<0.01	<0.02	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.03	-
Aromatics >EC8-EC10	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.02	<0.1	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.02	<0.1	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.02	<0.1	-
Benzene by GC	<0.007	<0.007	<0.014	<0.07	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.02	<0.1	-
Toluene by GC	<0.004	<0.004	<0.008	<0.04	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.05	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.08	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.02
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
TPH CWG (W)					
o Xylene by GC	<0.003	<0.003	<0.006	<0.03	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.11	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.28	-
VOC MS (W)					
Dibromofluoromethane	-	-	-	-	-
Toluene-d8	-	-	-	-	-
4-Bromofluorobenzene	-	-	-	-	-
Dichlorodifluoromethane	<0.001	<0.001	<0.002	<0.01	-
Chloromethane	<0.001	<0.001	<0.002	<0.01	-
Vinyl Chloride	<0.001	<0.001	<0.002	<0.01	-
Bromomethane	<0.001	<0.001	<0.002	<0.01	-
Chloroethane	<0.001	<0.001	<0.002	<0.01	-
Trichlorofluoromethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethene	<0.001	<0.001	<0.002	<0.01	-
Carbon Disulphide	<0.001	<0.001	<0.002	<0.01	-
Dichloromethane	<0.003	<0.003	<0.006	<0.03	-
Tert-butyl methyl ether	<0.001	<0.001	<0.002	<0.01	-
Trans-1,2-Dichloroethene	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,2-Dichloroethene	<0.001	<0.001	<0.002	<0.01	-
2,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromochloromethane	<0.001	<0.001	<0.002	<0.01	-
Chloroform	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

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CERTIFICATE OF ANALYSIS

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 Job: H_GRONTMIJ_SOL-49
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Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
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REF : BS EN 12457/1

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Case

SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.02
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
1,1,1-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,1-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Carbon tetrachloride	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloroethane	<0.001	<0.001	<0.002	<0.01	-
Benzene	<0.001	<0.001	<0.002	<0.01	-
Trichloroethene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Dibromomethane	<0.001	<0.001	<0.002	<0.01	-
Bromodichloromethane	<0.001	<0.001	<0.002	<0.01	-
Cis-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
Toluene	<0.001	<0.001	<0.002	<0.01	-
Trans-1,3-Dichloropropene	<0.001	<0.001	<0.002	<0.01	-
1,1,2-Trichloroethane	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichloropropane	<0.001	<0.001	<0.002	<0.01	-
Tetrachloroethene	<0.001	<0.001	<0.002	<0.01	-
Dibromochloromethane	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromoethane	<0.001	<0.001	<0.002	<0.01	-
Chlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,1,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
Ethylbenzene	<0.001	<0.001	<0.002	<0.01	-
p/m-Xylene	<0.001	<0.001	<0.002	<0.01	-
o-Xylene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_GRONTMIJ_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	8.02	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Styrene	<0.001	<0.001	<0.002	<0.01	-
Bromoform	<0.001	<0.001	<0.002	<0.01	-
Isopropylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,1,2,2-Tetrachloroethane	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichloropropane	<0.001	<0.001	<0.002	<0.01	-
Bromobenzene	<0.001	<0.001	<0.002	<0.01	-
Propylbenzene	<0.001	<0.001	<0.002	<0.01	-
2-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Chlorotoluene	<0.001	<0.001	<0.002	<0.01	-
Tert-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trimethylbenzene	<0.001	<0.001	<0.002	<0.01	-
Sec-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
4-Isopropyltoluene	<0.001	<0.001	<0.002	<0.01	-
1,3-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,4-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
n-Butylbenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,2-Dibromo-3-Chloropropane	<0.001	<0.001	<0.002	<0.01	-
1,2,4-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
Hexachlorobutadiene	<0.001	<0.001	<0.002	<0.01	-
Tert-amyl methyl ether	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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SDG: 130223-6	Location: Haig Close, Cannock	Order Number: SOL13MIJ009
Job: H_GRONTMIJ_SOL-49	Customer: Grontmij	Report Number: 215910
Client Reference: 106270-007	Attention: Michael Lawson	Superseded Report:

CEN 2:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Haig Close, Cannock
Mass Sample taken (kg)	0.215	Moisture Content Ratio (%)	22.8
Mass of dry sample (kg)	0.175	Dry Matter Content Ratio (%)	81.5
Particle Size <4mm	>95%		

Case	
SDG	130223-6
Lab Sample Number(s)	6967210
Sampled Date	19-Feb-2013
Customer Sample Ref.	HP106
Depth (m)	0.70

Solid Waste Analysis

Total Organic Carbon (%)	11.6	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	8.02	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
VOC MS (W)					
Naphthalene	<0.001	<0.001	<0.002	<0.01	-
1,2,3-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-
1,3,5-Trichlorobenzene	<0.001	<0.001	<0.002	<0.01	-

Leach Test Information

Date Prepared	26-Feb-2013
pH (pH Units)	8.25
Conductivity (µS/cm)	368.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.310
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

14/03/2013 16:41:11

16:40:51 14/03/2013



CERTIFICATE OF ANALYSIS

Validated

SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Notification of NDPs (No determination possible)

Date Received : 23/02/2013 08:12:28

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
6967208	HP105	0.50	Total Organic Carbon	Unsuitable for analysis due to potential Asbestos
6967205	HP103	0.40	Total Organic Carbon	Unsuitable for analysis due to potential Asbestos



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Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
ASB_PREP				
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM114		Leaching Procedure for CEN Two Stage Batch Test 2:1/8:1 Cumulative		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS		
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		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM157	HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).	Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser		
TM245	By GC-FID	Determination of GRO by Headspace in waters		
TM321		Organic matter Content of Soil By Titration		

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



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Location: Haig Close, Cannock
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Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Test Completion Dates

Lab Sample No(s)	6967202	6967204	6967205	6967207	6967208	6967210	6967211	6967197	6967199	6967200
Customer Sample Ref.	HP101	HP102	HP103	HP104	HP105	HP106	HP107	WS101	WS102	WS103
AGS Ref.										
Depth	0.60	0.40	0.40	0.30	0.50	0.70	0.40	0.70	0.40	0.30
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Asbestos Identification (Soil)	12-Mar-2013	12-Mar-2013	13-Mar-2013	12-Mar-2013		14-Mar-2013	12-Mar-2013		12-Mar-2013	12-Mar-2013
Boron Water Soluble	07-Mar-2013	07-Mar-2013	06-Mar-2013	07-Mar-2013	04-Mar-2013	07-Mar-2013	06-Mar-2013	05-Mar-2013	07-Mar-2013	07-Mar-2013
CEN 2:1 Leachate (1 Stage)	01-Mar-2013		01-Mar-2013			26-Feb-2013		01-Mar-2013	01-Mar-2013	
CEN Readings	05-Mar-2013		05-Mar-2013			28-Feb-2013		05-Mar-2013	06-Mar-2013	
Dissolved Metals by ICP-MS	06-Mar-2013		06-Mar-2013			01-Mar-2013		06-Mar-2013	06-Mar-2013	
EPH CWG (Aliphatic) Aqueous GC (W)	06-Mar-2013		07-Mar-2013			06-Mar-2013		07-Mar-2013	06-Mar-2013	
EPH CWG (Aliphatic) GC (S)	07-Mar-2013	07-Mar-2013				07-Mar-2013		06-Mar-2013	07-Mar-2013	07-Mar-2013
EPH CWG (Aromatic) Aqueous GC (W)	06-Mar-2013		07-Mar-2013			06-Mar-2013		07-Mar-2013	06-Mar-2013	
EPH CWG (Aromatic) GC (S)	07-Mar-2013	07-Mar-2013				07-Mar-2013		06-Mar-2013	07-Mar-2013	07-Mar-2013
GRO by GC-FID (S)	06-Mar-2013	06-Mar-2013				06-Mar-2013		06-Mar-2013	06-Mar-2013	06-Mar-2013
GRO by GC-FID (W)	05-Mar-2013		06-Mar-2013			05-Mar-2013		06-Mar-2013	05-Mar-2013	
Hexavalent Chromium (s)	06-Mar-2013	06-Mar-2013	05-Mar-2013	06-Mar-2013	01-Mar-2013	06-Mar-2013	05-Mar-2013	01-Mar-2013	06-Mar-2013	06-Mar-2013
Hexavalent Chromium (w)	05-Mar-2013		05-Mar-2013			28-Feb-2013		05-Mar-2013	05-Mar-2013	
Mercury Dissolved	05-Mar-2013		05-Mar-2013			28-Feb-2013		05-Mar-2013	05-Mar-2013	
Metals by iCap-OES (Soil)	06-Mar-2013	06-Mar-2013	06-Mar-2013	06-Mar-2013	04-Mar-2013	06-Mar-2013	06-Mar-2013	05-Mar-2013	06-Mar-2013	06-Mar-2013
PAH Spec MS - Aqueous (W)	06-Mar-2013		07-Mar-2013			05-Mar-2013		07-Mar-2013	06-Mar-2013	
PAH Value of soil	06-Mar-2013	06-Mar-2013		06-Mar-2013		06-Mar-2013	06-Mar-2013	05-Mar-2013	06-Mar-2013	06-Mar-2013
pH	05-Mar-2013	05-Mar-2013	06-Mar-2013	05-Mar-2013	01-Mar-2013	05-Mar-2013	05-Mar-2013	06-Mar-2013	05-Mar-2013	05-Mar-2013
Sample description	03-Mar-2013	03-Mar-2013	03-Mar-2013	03-Mar-2013	28-Feb-2013	26-Feb-2013	03-Mar-2013	26-Feb-2013	03-Mar-2013	03-Mar-2013
Semi Volatile Organic Compounds	07-Mar-2013		07-Mar-2013		01-Mar-2013			01-Mar-2013	07-Mar-2013	
Total Metals by ICP-MS	06-Mar-2013		06-Mar-2013			01-Mar-2013		06-Mar-2013	06-Mar-2013	
Total Organic Carbon	13-Mar-2013	13-Mar-2013		13-Mar-2013	07-Mar-2013	14-Mar-2013	13-Mar-2013	05-Mar-2013	13-Mar-2013	13-Mar-2013
Total Organic Carbon (Asb)			13-Mar-2013							
Total Sulphate	07-Mar-2013	07-Mar-2013	05-Mar-2013	07-Mar-2013	04-Mar-2013		05-Mar-2013		07-Mar-2013	07-Mar-2013
TPH CWG (W)	06-Mar-2013		07-Mar-2013			06-Mar-2013		07-Mar-2013	06-Mar-2013	
TPH CWG GC (S)	07-Mar-2013	07-Mar-2013				07-Mar-2013		06-Mar-2013	07-Mar-2013	07-Mar-2013
VOC MS (S)	05-Mar-2013		07-Mar-2013		05-Mar-2013			07-Mar-2013	05-Mar-2013	
VOC MS (W)	06-Mar-2013		05-Mar-2013			05-Mar-2013		05-Mar-2013	06-Mar-2013	



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
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Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

ASSOCIATED AQC DATA

Boron Water Soluble

Component	Method Code	QC 76	QC 73	QC 76	QC 74	QC 73
Water Soluble Boron	TM222	96.0 81.65 : 108.65	90.0 81.65 : 108.65	91.5 81.65 : 108.65	83.5 81.65 : 108.65	84.5 81.65 : 108.65

Dissolved Metals by ICP-MS

Component	Method Code	QC 61	QC 73
Aluminium	TM152	99.47 87.65 : 115.02	101.73 84.88 : 118.17
Antimony	TM152	100.27 85.93 : 114.02	98.4 81.04 : 115.95
Arsenic	TM152	102.0 90.54 : 111.83	97.47 87.80 : 113.86
Barium	TM152	102.27 91.76 : 113.26	104.67 90.28 : 114.53
Beryllium	TM152	99.73 83.38 : 117.85	95.6 81.33 : 122.30
Boron	TM152	97.47 77.94 : 122.57	95.33 78.31 : 124.49
Cadmium	TM152	98.8 89.40 : 112.58	101.2 88.41 : 115.40
Chromium	TM152	99.33 91.38 : 112.32	99.47 89.44 : 114.33
Cobalt	TM152	97.07 91.06 : 113.39	99.33 89.31 : 115.17
Copper	TM152	97.2 89.28 : 113.01	98.53 87.81 : 115.97
Lead	TM152	101.07 92.61 : 108.98	102.53 90.95 : 113.13
Lithium	TM152	97.73 83.75 : 118.70	106.4 77.66 : 125.96
Manganese	TM152	101.73 91.97 : 111.68	103.33 90.41 : 113.03
Molybdenum	TM152	100.27 86.81 : 113.52	102.4 87.58 : 112.36
Nickel	TM152	96.0 89.87 : 112.52	99.2 88.11 : 114.65
Phosphorus	TM152	99.33 86.57 : 115.67	101.33 87.73 : 115.35
Selenium	TM152	102.0 90.78 : 112.05	103.2 88.20 : 114.46
Strontium	TM152	102.8 91.79 : 113.74	102.93 90.87 : 114.31
Tellurium	TM152	100.67 87.64 : 115.38	102.67 85.47 : 117.54
Thallium	TM152	100.93 91.72 : 111.90	100.93 90.17 : 113.15
Tin	TM152	97.07 88.38 : 106.83	102.8 87.92 : 113.64



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
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Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

Dissolved Metals by ICP-MS

		QC 61	QC 73
Titanium	TM152	101.2 91.80 : 108.47	100.93 89.34 : 112.93
Uranium	TM152	97.33 90.95 : 107.99	98.67 89.44 : 112.65
Vanadium	TM152	101.33 90.81 : 113.67	99.73 88.92 : 115.00
Zinc	TM152	100.27 90.00 : 112.54	97.47 88.35 : 115.11

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 70	QC 70	QC 71
Total Aliphatics >C12-C35	TM174	89.58 74.16 : 102.40	90.63 77.01 : 102.75	95.83 77.01 : 102.75

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 78	QC 70
Total Aliphatics >C12-C35	TM173	82.29 70.80 : 104.50	80.42 72.37 : 107.25

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 73	QC 76	QC 72
Total Aromatics >EC12-EC35	TM174	93.33 77.73 : 108.59	100.67 79.28 : 109.64	95.33 79.28 : 109.64

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 78	QC 70
Total Aromatics >EC12-EC35	TM173	95.33 74.25 : 118.35	96.67 73.70 : 120.82

GRO by GC-FID (S)



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

GRO by GC-FID (S)

Component	Method Code	QC 71	QC 70	QC 72
Benzene by GC (Moisture Corrected)	TM089	100.0 80.02 : 117.27	96.5 80.15 : 118.91	92.0 80.15 : 118.91
Ethylbenzene by GC (Moisture Corrected)	TM089	98.5 84.04 : 116.69	97.0 79.83 : 118.16	92.0 79.83 : 118.16
m & p Xylene by GC (Moisture Corrected)	TM089	98.75 84.58 : 114.27	97.0 78.35 : 120.05	92.0 78.35 : 120.05
MTBE GC-FID (Moisture Corrected)	TM089	101.0 79.00 : 121.00	98.0 80.54 : 120.94	95.0 80.54 : 120.94
o Xylene by GC (Moisture Corrected)	TM089	99.5 84.97 : 115.07	98.5 80.90 : 117.77	93.5 80.90 : 117.77
QC	TM089	109.17 83.21 : 120.45	111.82 85.99 : 125.08	106.7 85.99 : 125.08
Toluene by GC (Moisture Corrected)	TM089	100.5 84.65 : 117.24	97.5 81.82 : 117.25	93.0 81.82 : 117.25

GRO by GC-FID (W)

Component	Method Code	QC 76	QC 76	QC 74
Benzene by GC	TM245	97.0 80.84 : 115.93	94.0 80.84 : 115.93	102.5 80.84 : 115.93
Ethylbenzene by GC	TM245	97.0 79.81 : 116.18	93.5 79.81 : 116.18	105.0 79.81 : 116.18
m & p Xylene by GC	TM245	97.25 79.42 : 117.01	93.75 79.42 : 117.01	104.75 79.42 : 117.01
MTBE GC-FID	TM245	99.0 80.59 : 117.01	96.0 80.59 : 117.01	104.0 80.59 : 117.01
o Xylene by GC	TM245	98.0 79.72 : 114.71	95.0 79.72 : 114.71	106.5 79.72 : 114.71
QC	TM245	107.34 67.00 : 133.00	104.94 67.00 : 133.00	107.43 67.00 : 133.00
Toluene by GC	TM245	98.5 80.35 : 115.51	95.0 80.35 : 115.51	104.5 80.35 : 115.51

Hexavalent Chromium (s)

Component	Method Code	QC 60	QC 68	QC 75	QC 73
Hexavalent Chromium	TM151	104.0 95.64 : 109.88	100.0 95.64 : 109.88	102.0 95.64 : 109.88	102.0 95.64 : 109.88

Hexavalent Chromium (w)

Component	Method Code	QC 61	QC 79
Hexavalent Chromium	TM241	98.4 94.95 : 104.66	101.2 94.95 : 104.66

Mercury Dissolved



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
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Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

Mercury Dissolved

Component	Method Code	QC 65	QC 73
Mercury Dissolved (CVAF)	TM183	96.5 85.87 : 123.88	115.0 85.87 : 123.88

Metals by iCap-OES (Soil)

Component	Method Code	QC 70	QC 70	QC 74	QC 72	QC 75
Aluminium	TM181	100.65 76.69 : 112.80	93.51 78.20 : 121.80	94.16 78.20 : 121.80	92.86 78.20 : 121.80	91.56 78.20 : 121.80
Antimony	TM181	102.27 91.13 : 108.87	94.32 91.13 : 108.87	98.11 91.13 : 108.87	99.62 91.13 : 108.87	97.73 91.13 : 108.87
Arsenic	TM181	100.0 90.02 : 107.15	94.12 88.28 : 108.70	95.8 88.28 : 108.70	99.16 88.28 : 108.70	97.48 88.28 : 108.70
Barium	TM181	101.39 82.28 : 108.61	93.75 84.14 : 105.67	93.06 84.14 : 105.67	95.83 84.14 : 105.67	93.75 84.14 : 105.67
Beryllium	TM181	101.78 86.72 : 106.22	94.66 87.95 : 107.68	96.8 87.95 : 107.68	100.71 87.95 : 107.68	98.58 87.95 : 107.68
Boron	TM181	107.69 70.00 : 130.00	104.49 86.36 : 138.69	103.21 86.36 : 138.69	94.87 86.36 : 138.69	95.51 86.36 : 138.69
Cadmium	TM181	98.46 89.45 : 105.88	94.23 89.46 : 107.18	95.0 89.46 : 107.18	97.69 89.46 : 107.18	96.15 89.46 : 107.18
Chromium	TM181	100.73 87.35 : 112.65	92.73 85.62 : 109.36	93.09 85.62 : 109.36	92.73 85.62 : 109.36	95.27 85.62 : 109.36
Cobalt	TM181	99.68 89.79 : 106.03	93.91 88.79 : 105.80	94.55 88.79 : 105.80	98.4 88.79 : 105.80	97.44 88.79 : 105.80
Copper	TM181	103.0 88.95 : 106.85	99.05 88.21 : 111.79	99.32 88.21 : 111.79	104.09 88.21 : 111.79	101.36 88.21 : 111.79
Iron	TM181	101.3 82.98 : 109.77	94.16 83.48 : 107.61	96.1 83.48 : 107.61	99.35 83.48 : 107.61	94.16 83.48 : 107.61
Lead	TM181	99.17 89.58 : 110.42	94.83 89.58 : 110.42	95.87 89.58 : 110.42	99.79 89.58 : 110.42	98.14 89.58 : 110.42
Manganese	TM181	100.2 87.39 : 105.26	91.97 87.18 : 105.32	93.37 87.18 : 105.32	96.39 87.18 : 105.32	99.6 87.18 : 105.32
Mercury	TM181	101.18 91.69 : 106.71	97.04 90.29 : 108.65	97.04 90.29 : 108.65	100.59 90.29 : 108.65	102.96 90.29 : 108.65
Molybdenum	TM181	100.81 83.10 : 116.90	93.52 83.10 : 116.90	93.93 83.10 : 116.90	97.57 83.10 : 116.90	96.36 83.10 : 116.90
Nickel	TM181	100.56 88.61 : 104.90	95.48 89.84 : 110.16	96.05 89.84 : 110.16	99.44 89.84 : 110.16	98.87 89.84 : 110.16
Phosphorus	TM181	103.74 84.26 : 109.17	93.11 82.61 : 108.80	96.26 82.61 : 108.80	100.3 82.61 : 108.80	96.11 82.61 : 108.80
Selenium	TM181	100.0 90.13 : 106.39	96.3 88.98 : 111.02	100.74 88.98 : 111.02	102.22 88.98 : 111.02	101.85 88.98 : 111.02
Strontium	TM181	100.73 84.04 : 115.96	93.8 84.04 : 115.96	93.07 84.04 : 115.96	93.8 84.04 : 115.96	91.97 84.04 : 115.96
Thallium	TM181	102.92 86.74 : 113.26	98.75 86.74 : 113.26	97.08 86.74 : 113.26	100.0 86.74 : 113.26	99.58 86.74 : 113.26
Tin	TM181	98.56 91.15 : 108.85	94.24 91.15 : 108.85	94.24 91.15 : 108.85	105.4 91.15 : 108.85	108.27 91.15 : 108.85
Titanium	TM181	102.13 51.77 : 120.45	87.94 53.59 : 124.12	92.91 53.59 : 124.12	85.82 53.59 : 124.12	70.92 53.59 : 124.12



SDG: 130223-6
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Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Metals by iCap-OES (Soil)

		QC 70	QC 70	QC 74	QC 72	QC 75
Vanadium	TM181	104.05 86.39 : 113.61	92.16 84.17 : 107.45	92.7 84.17 : 107.45	94.05 84.17 : 107.45	92.97 84.17 : 107.45
Zinc	TM181	101.76 90.07 : 109.93	98.94 90.07 : 109.93	98.59 90.07 : 109.93	101.58 90.07 : 109.93	101.58 90.07 : 109.93

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 79	QC 74	QC 75
Acenaphthene by GCMS	TM178	98.5 81.10 : 114.10	103.0 88.75 : 111.25	99.0 88.75 : 111.25
Acenaphthylene by GCMS	TM178	93.5 79.45 : 111.85	105.0 83.00 : 113.00	100.5 83.00 : 113.00
Anthracene by GCMS	TM178	94.5 83.69 : 106.27	104.0 81.50 : 111.50	99.5 81.50 : 111.50
Benz(a)anthracene by GCMS	TM178	92.5 76.69 : 110.97	105.5 80.00 : 113.00	101.0 80.00 : 113.00
Benzo(a)pyrene by GCMS	TM178	100.5 82.57 : 113.60	109.0 86.63 : 118.58	103.5 86.63 : 118.58
Benzo(b)fluoranthene by GCMS	TM178	107.0 87.25 : 114.25	110.5 90.00 : 117.00	108.0 90.00 : 117.00
Benzo(ghi)perylene by GCMS	TM178	100.0 81.58 : 107.32	99.5 82.05 : 112.05	90.5 82.05 : 112.05
Benzo(k)fluoranthene by GCMS	TM178	113.5 87.20 : 122.40	117.5 87.20 : 122.40	107.0 87.20 : 122.40
Chrysene by GCMS	TM178	104.0 87.92 : 108.35	108.5 88.25 : 115.25	103.5 88.25 : 115.25
Dibenzo(ah)anthracene by GCMS	TM178	102.0 75.97 : 112.60	101.0 72.40 : 118.55	91.0 72.40 : 118.55
Fluoranthene by GCMS	TM178	97.5 81.15 : 116.55	108.5 81.00 : 117.30	102.0 81.00 : 117.30
Fluorene by GCMS	TM178	102.0 82.30 : 114.10	109.5 83.80 : 116.50	105.0 83.80 : 116.50
Indeno(123cd)pyrene by GCMS	TM178	103.0 82.25 : 114.75	103.0 82.25 : 114.75	95.5 82.25 : 114.75
Naphthalene by GCMS	TM178	99.5 83.45 : 112.25	106.0 83.80 : 111.40	103.0 83.80 : 111.40
Phenanthrene by GCMS	TM178	103.0 88.74 : 112.07	109.5 90.95 : 109.75	100.0 90.95 : 109.75
Pyrene by GCMS	TM178	97.0 82.25 : 116.15	108.0 83.60 : 118.10	102.0 83.60 : 118.10

PAH Value of soil

Component	Method Code	QC 77	QC 76
PAH Total 17 (inc Coronene)	TM213	114.12 94.91 : 121.34	112.94 82.58 : 131.97

pH



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

pH

Component	Method Code	QC 76	QC 74	QC 74	QC 79	QC 72
pH	TM133	100.74 96.83 : 103.00	100.62 96.83 : 103.00	99.75 96.83 : 103.00	100.99 96.83 : 103.00	100.74 96.83 : 103.00

Semi Volatile Organic Compounds

Component	Method Code	QC 67	QC 71	QC 74
4-Bromophenylphenylether (Soil)	TM157	86.0 61.72 : 116.07	93.5 61.72 : 116.07	97.0 61.72 : 116.07
Benzo(a)anthracene (Soil)	TM157	99.0 60.41 : 125.98	95.0 60.41 : 125.98	98.0 60.41 : 125.98
Hexachlorobutadiene (Soil)	TM157	81.0 66.69 : 115.46	92.5 66.69 : 115.46	96.5 66.69 : 115.46
Naphthalene (Soil)	TM157	90.0 66.96 : 117.88	95.5 66.96 : 117.88	99.0 66.96 : 117.88
Nitrobenzene (Soil)	TM157	90.5 67.54 : 113.96	93.0 67.54 : 113.96	95.0 67.54 : 113.96
Phenol (Soil)	TM157	86.5 72.46 : 110.83	96.0 72.46 : 110.83	98.0 72.46 : 110.83

Total Metals by ICP-MS

Component	Method Code	QC 63	QC 77
Aluminium	TM191	99.2 87.97 : 115.21	100.67 87.97 : 115.21
Antimony	TM191	102.4 84.24 : 115.35	99.87 84.24 : 115.35
Arsenic	TM191	92.0 78.55 : 107.58	91.87 78.55 : 107.58
Barium	TM191	98.93 90.41 : 113.63	98.8 90.41 : 113.63
Beryllium	TM191	101.6 91.72 : 109.79	100.27 91.72 : 109.79
Bismuth	TM191	96.13 88.58 : 103.08	98.27 88.58 : 103.08
Boron	TM191	91.07 84.33 : 103.22	95.87 84.33 : 103.22
Cadmium	TM191	98.13 81.80 : 103.96	96.53 81.80 : 103.96
Chromium	TM191	103.2 89.42 : 113.35	102.67 89.42 : 113.35
Cobalt	TM191	98.27 90.09 : 112.68	97.87 90.09 : 112.68
Copper	TM191	102.4 88.50 : 113.27	98.8 88.50 : 113.27
Lead	TM191	97.6 90.67 : 105.93	98.4 90.67 : 105.93
Lithium	TM191	106.53 84.73 : 119.59	110.0 84.73 : 119.59
Manganese	TM191	97.73 88.38 : 113.72	97.47 88.38 : 113.72



SDG: 130223-6
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 Client Reference: 106270-007

Location: Haig Close, Cannock
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Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

Total Metals by ICP-MS

		QC 63	QC 77
Molybdenum	TM191	98.93 82.26 : 114.68	98.27 82.26 : 114.68
Nickel	TM191	102.13 88.78 : 113.23	100.93 88.78 : 113.23
Phosphorus	TM191	107.6 89.29 : 117.54	112.67 89.29 : 117.54
Selenium	TM191	92.67 78.14 : 104.69	96.0 78.14 : 104.69
Strontium	TM191	93.87 89.63 : 115.32	95.07 89.63 : 115.32
Thallium	TM191	98.27 89.99 : 106.93	1.95 89.99 : 106.93
Tin	TM191	96.53 84.99 : 115.43	95.73 84.99 : 115.43
Titanium	TM191	96.0 84.44 : 105.82	96.93 84.44 : 105.82
Vanadium	TM191	107.2 98.03 : 116.38	107.33 98.03 : 116.38
Zinc	TM191	98.0 74.11 : 120.01	99.2 74.11 : 120.01

Total Organic Carbon

Component	Method Code	QC 77	QC 73	QC 76	QC 77
Total Organic Carbon	TM132	95.41 86.66 : 109.87	92.66 86.66 : 109.87	89.45 86.66 : 109.87	96.79 86.66 : 109.87

Total Sulphate

Component	Method Code	QC 74	QC 71	QC 73
Total Sulphate	TM221	90.2 72.87 : 95.37	85.95 72.87 : 95.37	92.81 72.87 : 95.37

VOC MS (S)

Component	Method Code	QC 70	QC 74	QC 76	QC 74	QC 77
1,1,1,2-tetrachloroethane	TM116	98.0 77.50 : 124.09	97.2 86.16 : 121.72	101.6 77.50 : 124.09	92.4 77.50 : 124.09	94.0 77.50 : 124.09
1,1,1-Trichloroethane	TM116	105.4 86.36 : 114.14	94.8 85.09 : 125.10	115.2 86.36 : 114.14	90.0 86.36 : 114.14	94.6 86.36 : 114.14
1,1,2-Trichloroethane	TM116	112.8 93.86 : 131.61	105.0 98.00 : 135.46	113.0 93.86 : 131.61	101.2 93.86 : 131.61	107.6 93.86 : 131.61
1,1-Dichloroethane	TM116	107.4 83.96 : 125.03	98.0 85.89 : 132.78	122.6 83.96 : 125.03	98.0 83.96 : 125.03	103.2 83.96 : 125.03
1,2-Dichloroethane	TM116	104.8 88.93 : 122.77	99.6 82.61 : 140.85	113.2 88.93 : 122.77	96.2 88.93 : 122.77	103.2 88.93 : 122.77
1,4-Dichlorobenzene	TM116	108.0 81.63 : 112.11	92.2 86.85 : 121.85	118.2 81.63 : 112.11	90.0 81.63 : 112.11	91.2 81.63 : 112.11



SDG: 130223-6
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number: SOL13MIJ009
 Report Number: 215910
 Superseded Report:

VOC MS (S)

		QC 70	QC 74	QC 76	QC 74	QC 77
2-Chlorotoluene	TM116	129.2 84.31 : 147.35	114.0 89.30 : 154.24	140.6 84.31 : 147.35	107.2 84.31 : 147.35	106.4 84.31 : 147.35
4-Chlorotoluene	TM116	118.4 90.00 : 138.66	106.0 89.25 : 148.67	136.6 90.00 : 138.66	110.2 90.00 : 138.66	109.2 90.00 : 138.66
Benzene	TM116	100.8 86.95 : 110.62	98.0 90.00 : 123.49	112.8 86.95 : 110.62	97.2 86.95 : 110.62	99.2 86.95 : 110.62
Carbon Disulphide	TM116	100.6 76.98 : 118.83	97.4 70.58 : 125.46	113.4 76.98 : 118.83	93.6 76.98 : 118.83	100.6 76.98 : 118.83
Carbontetrachloride	TM116	106.8 71.94 : 132.65	90.6 85.17 : 120.25	114.6 71.94 : 132.65	90.4 71.94 : 132.65	95.6 71.94 : 132.65
Chlorobenzene	TM116	95.2 78.33 : 118.74	98.4 89.06 : 121.18	104.6 78.33 : 118.74	96.4 78.33 : 118.74	96.2 78.33 : 118.74
Chloroform	TM116	106.2 69.66 : 148.03	95.0 87.09 : 129.96	115.0 69.66 : 148.03	94.8 69.66 : 148.03	97.4 69.66 : 148.03
Chloromethane	TM116	116.6 49.71 : 146.30	104.6 45.90 : 176.07	146.0 49.71 : 146.30	68.2 49.71 : 146.30	79.6 49.71 : 146.30
Cis-1,2-Dichloroethene	TM116	105.4 87.09 : 113.71	98.6 83.06 : 120.53	113.4 87.09 : 113.71	93.0 87.09 : 113.71	98.0 87.09 : 113.71
Dibromomethane	TM116	97.0 65.13 : 138.40	85.8 79.31 : 116.60	98.4 65.13 : 138.40	94.4 65.13 : 138.40	95.2 65.13 : 138.40
Dichloromethane	TM116	102.8 70.67 : 150.15	100.4 85.23 : 135.44	114.8 70.67 : 150.15	100.0 70.67 : 150.15	107.2 70.67 : 150.15
Ethylbenzene	TM116	94.8 84.09 : 110.87	97.8 86.48 : 124.49	103.8 84.09 : 110.87	88.6 84.09 : 110.87	90.6 84.09 : 110.87
Hexachlorobutadiene	TM116	175.8 62.74 : 176.60	113.2 49.32 : 166.67	116.0 62.74 : 176.60	145.8 62.74 : 176.60	134.8 62.74 : 176.60
Isopropylbenzene	TM116	91.0 76.65 : 122.20	92.4 85.00 : 115.00	94.0 76.65 : 122.20	77.0 76.65 : 122.20	81.2 76.65 : 122.20
Naphthalene	TM116	105.0 80.72 : 132.86	98.6 83.77 : 127.25	108.0 80.72 : 132.86	98.8 80.72 : 132.86	99.4 80.72 : 132.86
o-Xylene	TM116	92.2 76.04 : 111.23	95.2 81.14 : 117.94	103.6 76.04 : 111.23	84.8 76.04 : 111.23	88.4 76.04 : 111.23
p/m-Xylene	TM116	95.5 79.03 : 115.32	97.8 87.70 : 116.30	106.0 79.03 : 115.32	88.0 79.03 : 115.32	90.8 79.03 : 115.32
Sec-Butylbenzene	TM116	118.4 63.44 : 118.15	93.6 65.03 : 126.69	109.2 63.44 : 118.15	90.6 63.44 : 118.15	91.0 63.44 : 118.15
Tetrachloroethene	TM116	100.0 87.31 : 123.54	101.0 78.08 : 139.93	106.8 87.31 : 123.54	96.8 87.31 : 123.54	98.8 87.31 : 123.54
Toluene	TM116	98.6 83.48 : 106.73	92.6 81.89 : 118.84	108.6 83.48 : 106.73	87.4 83.48 : 106.73	92.8 83.48 : 106.73
Trichloroethene	TM116	100.4 86.48 : 110.46	97.8 88.19 : 119.96	111.0 86.48 : 110.46	92.6 86.48 : 110.46	94.8 86.48 : 110.46
Trichlorofluoromethane	TM116	102.8 82.57 : 120.95	94.2 86.00 : 127.38	116.2 82.57 : 120.95	89.8 82.57 : 120.95	97.8 82.57 : 120.95
Vinyl Chloride	TM116	112.0 62.58 : 154.52	101.2 92.90 : 132.77	135.6 62.58 : 154.52	103.2 62.58 : 154.52	105.2 62.58 : 154.52

VOC MS (W)



SDG: 130223-6
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

VOC MS (W)

Component	Method Code	QC 70	QC 71	QC 70
1,1,1,2-Tetrachloroethane	TM208	100.5 83.54 : 132.23	100.5 86.68 : 114.58	103.0 83.54 : 132.23
1,1,1-Trichloroethane	TM208	101.0 82.96 : 136.07	96.5 84.58 : 123.50	105.0 82.96 : 136.07
1,1-Dichloroethane	TM208	103.5 80.52 : 149.86	100.0 85.03 : 127.99	112.5 80.52 : 149.86
1,2-Dichloroethane	TM208	107.5 81.85 : 127.21	107.0 77.53 : 124.64	112.0 81.85 : 127.21
2-Chlorotoluene	TM208	97.5 83.27 : 124.81	95.0 82.85 : 112.21	104.0 83.27 : 124.81
4-Chlorotoluene	TM208	96.5 84.77 : 123.68	96.0 82.56 : 113.12	104.5 84.77 : 123.68
Benzene	TM208	104.0 86.22 : 124.75	101.0 86.11 : 127.43	112.0 86.22 : 124.75
Bromomethane	TM208	101.5 79.29 : 124.56	101.0 75.41 : 126.08	118.0 79.29 : 124.56
Carbontetrachloride	TM208	102.0 89.01 : 128.83	104.0 90.92 : 116.49	105.5 89.01 : 128.83
Chlorobenzene	TM208	100.5 84.68 : 121.68	100.0 86.80 : 114.07	104.5 84.68 : 121.68
Chloroform	TM208	107.0 86.13 : 126.38	107.0 91.29 : 116.69	111.0 86.13 : 126.38
Chloromethane	TM208	105.0 71.66 : 139.34	105.0 78.59 : 131.47	124.5 71.66 : 139.34
Cis-1,2-Dichloroethene	TM208	106.0 83.33 : 123.51	102.0 82.98 : 124.07	111.0 83.33 : 123.51
Dichloromethane	TM208	107.5 83.04 : 124.60	104.5 81.74 : 127.88	115.5 83.04 : 124.60
Ethylbenzene	TM208	95.5 80.53 : 119.00	92.5 83.34 : 108.65	101.0 80.53 : 119.00
Hexachlorobutadiene	TM208	93.0 80.23 : 142.99	86.5 74.78 : 134.63	103.5 80.23 : 142.99
o-Xylene	TM208	97.5 83.08 : 123.04	91.5 84.01 : 110.04	102.5 83.08 : 123.04
p/m-Xylene	TM208	95.5 80.99 : 119.48	92.75 84.32 : 109.96	102.0 80.99 : 119.48
Tert-butyl methyl ether	TM208	97.5 64.23 : 136.92	78.5 72.01 : 124.40	105.0 64.23 : 136.92
Tetrachloroethene	TM208	99.5 85.85 : 127.65	99.5 87.34 : 116.12	103.5 85.85 : 127.65
Toluene	TM208	98.5 85.39 : 119.69	97.5 85.17 : 114.15	105.0 85.39 : 119.69
Trichloroethene	TM208	99.5 88.07 : 123.21	99.0 88.14 : 113.77	104.0 88.07 : 123.21
Vinyl Chloride	TM208	104.0 82.50 : 135.67	101.5 87.33 : 125.67	118.5 82.50 : 135.67

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

SDG: 130223-6
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 215910
Superseded Report:

Appendix General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC 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 all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples 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 analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

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. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

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 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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 C5-C12 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.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
§	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk 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).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has 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).

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

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 HSG 264.

The identification of asbestos containing materials and soils 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.



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

Attention: Michael Lawson

CERTIFICATE OF ANALYSIS

Date: 24 March 2013
Customer: H_GRONTMIJ_SOL
Sample Delivery Group (SDG): 130223-16
Your Reference: 106270-007
Location: Haig Close, Cannock
Report No: 217106

This report has been revised and directly supersedes 213989 in its entirety.

We received 5 samples on Thursday February 21, 2013 and 5 of these samples were scheduled for analysis which was completed on Sunday March 24, 2013. 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.

Approved By:

Sonia McWhan

Operations Manager





SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6967568	TW101			19/02/2013
6967569	TW102			19/02/2013
6967571	TW103			19/02/2013
6967572	TW104			19/02/2013
6967573	TW105			19/02/2013

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



SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

LIQUID Results Legend Test No Determination Possible	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
		6967568	TW101			Vial (AL E297) 1l plastic (AL E221) 1l green glass bottle
		6967569	TW102			Vial (AL E297) 1l plastic (AL E221) 1l green glass bottle
		6967571	TW103			Vial (AL E297) 1l plastic (AL E221) 1l green glass bottle
		6967572	TW104			Vial (AL E297) 1l plastic (AL E221) 1l green glass bottle
		6967573	TW105			Vial (AL E297) 1l plastic (AL E221) 1l green glass bottle
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5				
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 5				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 5				
Mercury Dissolved	All	NDPs: 0 Tests: 5				
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 5				
VOC MS (W)	All	NDPs: 0 Tests: 5				



CERTIFICATE OF ANALYSIS

SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

GRO by GC-FID (W)

Table with columns: Results Legend, Customer Sample Ref., TW101, TW102, TW103, TW104, TW105. Rows include component names like GRO >C5-C12, Methyl tertiary butyl ether (MTBE), Benzene, Toluene, Ethylbenzene, m,p-Xylene, o-Xylene, Sum of detected Xylenes, Sum of detected BTEX, and GRO >C8-C10.



CERTIFICATE OF ANALYSIS

SDG: 130223-16
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

PAH Spec MS - Aqueous (W)

Results Legend		Customer Sample Ref.	TW101	TW102	TW103	TW104	TW105
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference					
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 individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4&*\$@	Sample deviation (see appendix)						
Component	LOD/Units		Method				
Naphthalene (aq)	<0.1 µg/l	TM178	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
Acenaphthene (aq)	<0.015 µg/l	TM178	<0.015 #	<0.015 #	<0.015 #	<0.015 #	<0.015 #
Acenaphthylene (aq)	<0.011 µg/l	TM178	<0.011 #	<0.011 #	<0.011 #	<0.011 #	<0.011 #
Fluoranthene (aq)	<0.017 µg/l	TM178	<0.017 #	<0.017 #	<0.017 #	<0.017 #	<0.017 #
Anthracene (aq)	<0.015 µg/l	TM178	<0.015 #	<0.015 #	<0.015 #	<0.015 #	<0.015 #
Phenanthrene (aq)	<0.022 µg/l	TM178	<0.022 #	<0.022 #	<0.022 #	<0.022 #	<0.022 #
Fluorene (aq)	<0.014 µg/l	TM178	<0.014 #	<0.014 #	<0.014 #	<0.014 #	<0.014 #
Chrysene (aq)	<0.013 µg/l	TM178	<0.013 #	<0.013 #	<0.013 #	<0.013 #	<0.013 #
Pyrene (aq)	<0.015 µg/l	TM178	<0.015 #	<0.015 #	<0.015 #	<0.015 #	<0.015 #
Benzo(a)anthracene (aq)	<0.017 µg/l	TM178	<0.017 #	<0.017 #	<0.017 #	<0.017 #	<0.017 #
Benzo(b)fluoranthene (aq)	<0.023 µg/l	TM178	<0.023 #	<0.023 #	<0.023 #	<0.023 #	<0.023 #
Benzo(k)fluoranthene (aq)	<0.027 µg/l	TM178	<0.027 #	<0.027 #	<0.027 #	<0.027 #	<0.027 #
Benzo(a)pyrene (aq)	<0.009 µg/l	TM178	<0.009 #	<0.009 #	<0.009 #	<0.009 #	<0.009 #
Dibenzo(a,h)anthracene (aq)	<0.016 µg/l	TM178	<0.016 #	<0.016 #	<0.016 #	<0.016 #	<0.016 #
Benzo(g,h,i)perylene (aq)	<0.016 µg/l	TM178	<0.016 #	<0.016 #	<0.016 #	<0.016 #	<0.016 #
Indeno(1,2,3-cd)pyrene (aq)	<0.014 µg/l	TM178	<0.014 #	<0.014 #	<0.014 #	<0.014 #	<0.014 #
PAH, Total Detected USEPA 16 (aq)	<0.247 µg/l	TM178	<0.247	<0.247	<0.247	<0.247	<0.247



SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

VOC MS (W)

Results Legend		Customer Sample Ref.	TW101	TW102	TW103	TW104	TW105	
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.		Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	
diss.filt	Dissolved / filtered sample.		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed		21/02/2013	21/02/2013	21/02/2013	21/02/2013	21/02/2013	
1-4&\$@	Sample deviation (see appendix)		130223-16	130223-16	130223-16	130223-16	130223-16	
			6967568	6967569	6967571	6967572	6967573	
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM208	115	113	113	110	112	
Toluene-d8**	%	TM208	100	100	101	101	99.4	
4-Bromofluorobenzene**	%	TM208	99.8	99.9	99.8	101	102	
Dichlorodifluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Chloromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Vinyl chloride	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Bromomethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Chloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Trichlorofluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,1-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Carbon disulphide	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Dichloromethane	<3 µg/l	TM208	<3	<3	<3	<3	<3	#
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,1-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Bromochloromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Chloroform	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,1-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Carbontetrachloride	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,2-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Benzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Trichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Dibromomethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Bromodichloromethane	<1 µg/l	TM208	1.61	1.5	1.33	1.25	1.26	#
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
Toluene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	#
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	#



CERTIFICATE OF ANALYSIS

SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

VOC MS (W)

Results Legend		Customer Sample Ref.	TW101	TW102	TW103	TW104	TW105	
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.		Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	
aq	Aqueous / settled sample.		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	
diss.filt	Dissolved / filtered sample.		21/02/2013	21/02/2013	21/02/2013	21/02/2013	21/02/2013	
tot.unfilt	Total / unfiltered sample.		130223-16	130223-16	130223-16	130223-16	130223-16	
*	Subcontracted test.		6967568	6967569	6967571	6967572	6967573	
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&5@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
1,3-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Tetrachloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Dibromochloromethane	<1 µg/l	TM208	6.37	6.38	5.91	5.77	6.21	
1,2-Dibromoethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Chlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Ethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
m,p-Xylene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
o-Xylene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Styrene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Bromoform	<1 µg/l	TM208	12.3	13.5	12.9	13	13	
Isopropylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Bromobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Propylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
2-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
4-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
tert-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
sec-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
4-iso-Propyltoluene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,4-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
n-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Hexachlorobutadiene	<1 µg/l	TM208	<1	<1	<1	<1	<1	
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	<1	<1	<1	<1	
Naphthalene	<1 µg/l	TM208	<1	<1	<1	<1	<1	



SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

VOC MS (W)

Table with columns for Results Legend, Customer Sample Ref., TW101, TW102, TW103, TW104, TW105, Component, LOD/Units, Method, and data rows for 1,2,3-Trichlorobenzene and 1,3,5-Trichlorobenzene.



SDG: 130223-16
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Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM245	By GC-FID	Determination of GRO by Headspace in waters		

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



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Test Completion Dates

Lab Sample No(s)	6967568	6967569	6967571	6967572	6967573
Customer Sample Ref.	TW101	TW102	TW103	TW104	TW105
AGS Ref.					
Depth					
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Dissolved Metals by ICP-MS	27-Feb-2013	28-Feb-2013	27-Feb-2013	27-Feb-2013	27-Feb-2013
EPH (DRO) (C10-C40) Aqueous (W)	22-Mar-2013	22-Mar-2013	22-Mar-2013	24-Mar-2013	22-Mar-2013
GRO by GC-FID (W)	01-Mar-2013	01-Mar-2013	01-Mar-2013	01-Mar-2013	01-Mar-2013
Mercury Dissolved	28-Feb-2013	28-Feb-2013	28-Feb-2013	28-Feb-2013	28-Feb-2013
PAH Spec MS - Aqueous (W)	01-Mar-2013	01-Mar-2013	28-Feb-2013	01-Mar-2013	01-Mar-2013
VOC MS (W)	01-Mar-2013	01-Mar-2013	01-Mar-2013	01-Mar-2013	01-Mar-2013



SDG: 130223-16
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217106
Superseded Report: 213989

ASSOCIATED AQC DATA

Dissolved Metals by ICP-MS

Component	Method Code	QC 66	QC 64	QC 66
Aluminium	TM152	100.27 87.65 : 115.02	99.07 87.65 : 115.02	101.2 87.65 : 115.02
Antimony	TM152	97.73 85.93 : 114.02	98.13 85.93 : 114.02	94.4 85.93 : 114.02
Arsenic	TM152	104.53 90.54 : 111.83	102.67 90.54 : 111.83	104.67 90.54 : 111.83
Barium	TM152	100.67 91.76 : 113.26	100.93 91.76 : 113.26	101.33 91.76 : 113.26
Beryllium	TM152	104.8 83.38 : 117.85	104.27 83.38 : 117.85	105.87 83.38 : 117.85
Boron	TM152	95.87 77.94 : 122.57	95.73 77.94 : 122.57	97.2 77.94 : 122.57
Cadmium	TM152	102.53 89.40 : 112.58	103.6 89.40 : 112.58	101.73 89.40 : 112.58
Chromium	TM152	99.73 91.38 : 112.32	98.4 91.38 : 112.32	105.2 91.38 : 112.32
Cobalt	TM152	100.67 91.06 : 113.39	103.07 91.06 : 113.39	101.47 91.06 : 113.39
Copper	TM152	102.8 89.28 : 113.01	98.93 89.28 : 113.01	103.73 89.28 : 113.01
Lead	TM152	100.13 92.61 : 108.98	102.27 92.61 : 108.98	101.07 92.61 : 108.98
Lithium	TM152	98.0 83.75 : 118.70	96.93 83.75 : 118.70	102.67 83.75 : 118.70
Manganese	TM152	103.07 91.97 : 111.68	100.8 91.97 : 111.68	103.47 91.97 : 111.68
Molybdenum	TM152	100.8 86.81 : 113.52	100.27 86.81 : 113.52	100.13 86.81 : 113.52
Nickel	TM152	102.53 89.87 : 112.52	98.93 89.87 : 112.52	103.73 89.87 : 112.52
Phosphorus	TM152	100.53 86.57 : 115.67	99.87 86.57 : 115.67	102.0 86.57 : 115.67
Selenium	TM152	100.67 90.78 : 112.05	100.53 90.78 : 112.05	101.73 90.78 : 112.05
Strontium	TM152	100.0 91.79 : 113.74	99.87 91.79 : 113.74	102.27 91.79 : 113.74
Tellurium	TM152	100.0 87.64 : 115.38	99.47 87.64 : 115.38	98.8 87.64 : 115.38
Thallium	TM152	98.93 91.72 : 111.90	100.53 91.72 : 111.90	100.27 91.72 : 111.90
Tin	TM152	96.93 88.38 : 106.83	98.53 88.38 : 106.83	94.0 88.38 : 106.83
Titanium	TM152	100.4 91.80 : 108.47	98.8 91.80 : 108.47	100.8 91.80 : 108.47
Uranium	TM152	99.47 90.95 : 107.99	98.8 90.95 : 107.99	100.53 90.95 : 107.99
Vanadium	TM152	99.73 90.81 : 113.67	98.8 90.81 : 113.67	105.47 90.81 : 113.67
Zinc	TM152	103.6 90.00 : 112.54	101.07 90.00 : 112.54	103.6 90.00 : 112.54



SDG: 130223-16
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EPH (DRO) (C10-C40) Aqueous (W)

Component	Method Code	QC 68
EPH (DRO) (C10-C40)	TM172	91.0 55.00 : 115.00

GRO by GC-FID (W)

Component	Method Code	QC 69
Benzene by GC	TM245	97.5 79.13 : 118.84
Ethylbenzene by GC	TM245	97.5 79.54 : 115.99
m & p Xylene by GC	TM245	98.25 64.75 : 122.51
MTBE GC-FID	TM245	98.0 76.45 : 114.88
o Xylene by GC	TM245	98.5 70.06 : 120.53
QC	TM245	113.02 83.55 : 127.22
Toluene by GC	TM245	98.0 73.44 : 116.60

Mercury Dissolved

Component	Method Code	QC 66
Mercury Dissolved (CVAf)	TM183	95.8 85.87 : 123.88

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 65	QC 62	QC 60
Acenaphthene by GCMS	TM178	96.5 80.35 : 109.75	99.0 80.35 : 109.75	98.0 84.75 : 110.25
Acenaphthylene by GCMS	TM178	91.5 79.24 : 110.76	96.0 79.24 : 110.76	95.5 81.56 : 108.55
Anthracene by GCMS	TM178	95.0 81.10 : 112.90	93.5 81.10 : 112.90	96.0 78.20 : 109.40
Benz(a)anthracene by GCMS	TM178	93.5 78.50 : 107.21	99.0 78.50 : 107.21	99.0 80.74 : 112.30
Benzo(a)pyrene by GCMS	TM178	98.5 83.62 : 111.69	104.5 83.62 : 111.69	104.0 86.69 : 118.58
Benzo(b)fluoranthene by GCMS	TM178	98.5 87.25 : 114.25	108.0 87.25 : 114.25	105.5 92.99 : 117.35
Benzo(ghi)perylene by GCMS	TM178	96.0 84.65 : 105.94	97.0 84.65 : 105.94	105.5 82.05 : 112.05
Benzo(k)fluoranthene by GCMS	TM178	103.5 89.98 : 118.53	110.0 89.98 : 118.53	108.5 87.20 : 122.40



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PAH Spec MS - Aqueous (W)

		QC 65	QC 62	QC 60
Chrysene by GCMS	TM178	102.5 85.32 : 108.58	104.5 85.32 : 108.58	104.0 89.26 : 112.17
Dibenzo(ah)anthracene by GCMS	TM178	95.0 73.19 : 110.02	98.5 73.19 : 110.02	106.0 72.40 : 118.55
Fluoranthene by GCMS	TM178	97.0 82.30 : 116.50	100.0 82.30 : 116.50	99.5 81.00 : 117.30
Fluorene by GCMS	TM178	98.5 79.95 : 110.55	101.5 79.95 : 110.55	101.0 81.70 : 114.40
Indeno(123cd)pyrene by GCMS	TM178	97.5 76.86 : 114.15	101.5 76.86 : 114.15	107.5 82.25 : 114.75
Naphthalene by GCMS	TM178	101.5 87.01 : 108.30	101.5 87.01 : 108.30	100.0 83.80 : 111.40
Phenanthrene by GCMS	TM178	102.5 82.30 : 113.50	102.5 82.30 : 113.50	99.5 83.90 : 114.50
Pyrene by GCMS	TM178	98.5 79.85 : 117.05	100.5 79.85 : 117.05	100.0 81.30 : 115.80

VOC MS (W)

Component	Method Code	QC 73
1,1,1,2-Tetrachloroethane	TM208	110.5 88.25 : 118.28
1,1,1-Trichloroethane	TM208	113.0 83.85 : 123.10
1,1-Dichloroethane	TM208	116.0 82.87 : 126.33
1,2-Dichloroethane	TM208	118.5 77.68 : 127.05
2-Chlorotoluene	TM208	112.0 83.14 : 115.73
4-Chlorotoluene	TM208	111.0 84.24 : 116.31
Benzene	TM208	117.0 86.76 : 117.52
Bromomethane	TM208	120.0 75.34 : 122.65
Carbontetrachloride	TM208	111.5 84.57 : 127.22
Chlorobenzene	TM208	110.5 84.79 : 115.59
Chloroform	TM208	116.0 84.84 : 119.97
Chloromethane	TM208	123.0 53.01 : 144.16
Cis-1,2-Dichloroethene	TM208	118.0 81.65 : 120.44
Dichloromethane	TM208	117.0 79.31 : 122.56
Ethylbenzene	TM208	107.5 82.91 : 114.00
Hexachlorobutadiene	TM208	111.5 76.59 : 123.95
o-Xylene	TM208	108.0 80.82 : 113.33



SDG: 130223-16
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Report Number: 217106
Superseded Report: 213989

VOC MS (W)

		QC 73
p/m-Xylene	TM208	107.5 83.73 : 113.41
Tert-butyl methyl ether	TM208	116.5 69.07 : 119.88
Tetrachloroethene	TM208	111.0 88.02 : 123.47
Toluene	TM208	110.5 84.73 : 115.19
Trichloroethene	TM208	112.5 90.16 : 114.11
Vinyl Chloride	TM208	119.0 85.58 : 129.54

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

SDG: 130223-16
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Client Reference: 106270-007

Location: Haig Close, Cannock
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Report Number: 217106
Superseded Report: 213989

Appendix General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC 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 all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples 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/MCERES Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERES 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 analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

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. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

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 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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 MCERES 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 C5-C12 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.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
§	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk 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).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has 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).

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

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 HSG 264.

The identification of asbestos containing materials and soils 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.



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

Attention: Michael Lawson

CERTIFICATE OF ANALYSIS

Date: 13 March 2013
Customer: H_GRONTMIJ_SOL
Sample Delivery Group (SDG): 130301-141
Your Reference: 106270-007
Location: Haig Close, Cannock
Report No: 215602

We received 4 samples on Friday March 01, 2013 and 4 of these samples were scheduled for analysis which was completed on Wednesday March 13, 2013. 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.

Approved By:

Sonia McWhan

Operations Manager





SDG: 130301-141
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7007808	WS01			28/02/2013
7007809	WS02			28/02/2013
7007810	WS03			28/02/2013
7007811	WS04			28/02/2013

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



SDG: 130301-141
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number:
 Report Number: 215602
 Superseded Report:

LIQUID Results Legend X Test N No Determination Possible	Lab Sample No(s)	7007808	7007809	7007810	7007811	
	Customer Sample Reference	WS01	WS02	WS03	WS04	
	AGS Reference					
	Depth (m)					
	Container	1l green glass bottle	1l green glass bottle	1l plastic (AL E221)	1l plastic (AL E221)	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4	X	X	X	X
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 4	X	X	X	X
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 4	X	X	X	X
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4	X	X	X	X
Mercury Dissolved	All	NDPs: 0 Tests: 4	X	X	X	X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 4	X	X	X	X
TPH CWG (W)	All	NDPs: 0 Tests: 4	X	X	X	X
VOC MS (W)	All	NDPs: 0 Tests: 4	X	X	X	X



CERTIFICATE OF ANALYSIS

SDG: 130301-141
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

Table with columns: Results Legend, Customer Sample R, WS01, WS02, WS03, WS04. Rows include Component, LOD/Units, Method, and various chemical concentrations like Arsenic, Boron, Cadmium, etc.



CERTIFICATE OF ANALYSIS

SDG: 130301-141
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

PAH Spec MS - Aqueous (W)

Table with columns: Results Legend, Customer Sample R, WS01, WS02, WS03, WS04. Rows include various PAH components like Naphthalene, Acenaphthene, etc., with LOD/Units, Method, and concentration values.



CERTIFICATE OF ANALYSIS

SDG: 130301-141
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

TPH CWG (W)

Results Legend		Customer Sample R	WS01	WS02	WS03	WS04		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)		
M	mCERTS accredited.		28/02/2013	28/02/2013	28/02/2013	28/02/2013		
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM245	111 1	108 2	109 2	76 2		
GRO >C5-C12	<50 µg/l	TM245	257 1 #	92 2 #	1250 2 #	613 2 #		
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3 1 #	<3 2 #	<3 2 #	<3 2 #		
Benzene	<7 µg/l	TM245	<7 1 #	<7 2 #	<7 2 #	<7 2 #		
Toluene	<4 µg/l	TM245	<4 1 #	<4 2 #	<4 2 #	<4 2 #		
Ethylbenzene	<5 µg/l	TM245	<5 1 #	<5 2 #	<5 2 #	<5 2 #		
m,p-Xylene	<8 µg/l	TM245	<8 1 #	<8 2 #	<8 2 #	<8 2 #		
o-Xylene	<3 µg/l	TM245	<3 1 #	<3 2 #	<3 2 #	<3 2 #		
Sum of detected Xylenes	<11 µg/l	TM245	<11 1	<11 2	<11 2	<11 2		
Sum of detected BTEX	<28 µg/l	TM245	<28 1	<28 2	<28 2	<28 2		
Aliphatics >C5-C6	<10 µg/l	TM245	<10 1	<10 2	<10 2	<10 2		
Aliphatics >C6-C8	<10 µg/l	TM245	<10 1	<10 2	14 2	13 2		
Aliphatics >C8-C10	<10 µg/l	TM245	89 1	28 2	478 2	217 2		
Aliphatics >C10-C12	<10 µg/l	TM245	61 1	24 2	261 2	141 2		
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10	<10	<10		
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	12	<10	<10	70		
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	144	180	<10	422		
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	156	180	<10	492		
Aromatics >EC5-EC7	<10 µg/l	TM245	<10 1	<10 2	<10 2	<10 2		
Aromatics >EC7-EC8	<10 µg/l	TM245	<10 1	<10 2	<10 2	<10 2		
Aromatics >EC8-EC10	<10 µg/l	TM245	59 1	19 2	321 2	146 2		
Aromatics >EC10-EC12	<10 µg/l	TM245	41 1	16 2	174 2	94 2		
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10	<10	<10		
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10	<10	<10		
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10	33		
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10	33		
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	413	272	1250	1140		



CERTIFICATE OF ANALYSIS

SDG: 130301-141
 Job: H_Grontmij_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number:
 Report Number: 215602
 Superseded Report:

VOC MS (W)

Results Legend		Customer Sample R	WS01	WS02	WS03	WS04		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Water(GW/SW) 28/02/2013	Water(GW/SW) 28/02/2013	Water(GW/SW) 28/02/2013	Water(GW/SW) 28/02/2013		
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
Dibromofluoromethane**	%	TM208	114 2	121 2	117 2	121 1		
Toluene-d8**	%	TM208	101 2	101 2	98.4 2	102 1		
4-Bromofluorobenzene**	%	TM208	98.7 2	97.9 2	98.8 2	100 1		
Dichlorodifluoromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Chloromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Vinyl chloride	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Bromomethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Chloroethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Trichlorofluoromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,1-Dichloroethene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Carbon disulphide	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Dichloromethane	<3 µg/l	TM208	<3 2 #	<3 2 #	<3 2 #	<3 1 #		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,1-Dichloroethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
2,2-Dichloropropane	<1 µg/l	TM208	<1 2	<1 2	<1 2	<1 1 #		
Bromochloromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Chloroform	<1 µg/l	TM208	<1 2 #	1.63 2 #	<1 2 #	<1 1 #		
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,1-Dichloropropene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Carbontetrachloride	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,2-Dichloroethane	<1 µg/l	TM208	<1 2	<1 2	<1 2	<1 1		
Benzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Trichloroethene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,2-Dichloropropane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Dibromomethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Bromodichloromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
Toluene	<1 µg/l	TM208	<1 2 #	<1 2 #	1.89 2 #	<1 1 #		
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #		



CERTIFICATE OF ANALYSIS

SDG: 130301-141
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

VOC MS (W)

Results Legend			Customer Sample R			
#	ISO17025 accredited.		WS01	WS02	WS03	WS04
M	mCERTS accredited.					
aq	Aqueous / settled sample.					
dis.s.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 individual compounds within samples aren't corrected for the recovery					
(F)	Trigger breach confirmed					
1-4&5@	Sample deviation (see appendix)					
		Depth (m)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
		Sample Type	28/02/2013	28/02/2013	28/02/2013	28/02/2013
		Date Sampled				
		Sample Time				
		Date Received	01/03/2013	01/03/2013	01/03/2013	01/03/2013
		SDG Ref	130301-141	130301-141	130301-141	130301-141
		Lab Sample No.(s)	7007808	7007809	7007810	7007811
		AGS Reference				
Component	LOD/Units	Method				
1,3-Dichloropropane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Tetrachloroethene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Dibromochloromethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Chlorobenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Ethylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
m,p-Xylene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
o-Xylene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Styrene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Bromoform	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Isopropylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 2	<1 2	<1 2	<1 1
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Bromobenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Propylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	1.71 2 #	1.2 1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
n-Butylbenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 2	<1 2	<1 2	<1 1
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1 2	<1 2	<1 2	<1 1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #
Naphthalene	<1 µg/l	TM208	<1 2 #	<1 2 #	<1 2 #	<1 1 #



CERTIFICATE OF ANALYSIS

Validated

SDG: 130301-141
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

VOC MS (W)

Table with columns: Results Legend, Customer Sample R, WS01, WS02, WS03, WS04, Component, LOD/Units, Method. Rows include 1,2,3-Trichlorobenzene and 1,3,5-Trichlorobenzene.



SDG: 130301-141
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM245	By GC-FID	Determination of GRO by Headspace in waters		

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



SDG: 130301-141
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

Test Completion Dates

Lab Sample No(s)	7007808	7007809	7007810	7007811
Customer Sample Ref.	WS01	WS02	WS03	WS04
AGS Ref.				
Depth				
Type	LIQUID	LIQUID	LIQUID	LIQUID
Dissolved Metals by ICP-MS	12-Mar-2013	12-Mar-2013	12-Mar-2013	12-Mar-2013
EPH CWG (Aliphatic) Aqueous GC (W)	11-Mar-2013	11-Mar-2013	11-Mar-2013	11-Mar-2013
EPH CWG (Aromatic) Aqueous GC (W)	11-Mar-2013	11-Mar-2013	11-Mar-2013	11-Mar-2013
GRO by GC-FID (W)	12-Mar-2013	12-Mar-2013	12-Mar-2013	12-Mar-2013
Mercury Dissolved	08-Mar-2013	08-Mar-2013	08-Mar-2013	08-Mar-2013
PAH Spec MS - Aqueous (W)	11-Mar-2013	11-Mar-2013	11-Mar-2013	11-Mar-2013
TPH CWG (W)	12-Mar-2013	12-Mar-2013	12-Mar-2013	12-Mar-2013
VOC MS (W)	13-Mar-2013	13-Mar-2013	13-Mar-2013	13-Mar-2013



SDG: 130301-141
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number:
 Report Number: 215602
 Superseded Report:

ASSOCIATED AQC DATA

Dissolved Metals by ICP-MS

Component	Method Code	QC 79
Aluminium	TM152	106.8 90.98 : 113.72
Antimony	TM152	98.8 88.27 : 113.24
Arsenic	TM152	106.0 90.72 : 111.56
Barium	TM152	109.33 92.03 : 112.53
Beryllium	TM152	108.27 85.47 : 117.88
Boron	TM152	96.4 87.32 : 117.20
Cadmium	TM152	101.33 90.20 : 111.78
Chromium	TM152	104.53 92.38 : 111.62
Cobalt	TM152	108.27 90.77 : 113.92
Copper	TM152	105.87 91.68 : 111.54
Lead	TM152	99.87 92.34 : 111.95
Lithium	TM152	106.0 86.32 : 118.59
Manganese	TM152	105.07 92.35 : 111.85
Molybdenum	TM152	104.4 85.84 : 113.64
Nickel	TM152	107.07 91.45 : 111.66
Phosphorus	TM152	105.6 90.31 : 114.78
Selenium	TM152	101.6 90.16 : 113.62
Strontium	TM152	105.07 91.61 : 114.25
Tellurium	TM152	101.47 87.74 : 116.14
Thallium	TM152	115.33 91.17 : 112.42
Tin	TM152	100.27 89.94 : 113.24
Titanium	TM152	108.4 92.72 : 111.62
Uranium	TM152	113.6 90.84 : 110.39
Vanadium	TM152	105.33 91.08 : 112.34
Zinc	TM152	104.13 90.63 : 112.35



SDG: 130301-141
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number:
 Report Number: 215602
 Superseded Report:

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 79
Total Aliphatics >C12-C35	TM174	92.08 77.01 : 102.75

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 73
Total Aromatics >EC12-EC35	TM174	84.67 79.28 : 109.64

GRO by GC-FID (W)

Component	Method Code	QC 72
Benzene by GC	TM245	96.0 79.13 : 118.84
Ethylbenzene by GC	TM245	91.0 79.54 : 115.99
m & p Xylene by GC	TM245	89.5 64.75 : 122.51
MTBE GC-FID	TM245	103.0 76.45 : 114.88
o Xylene by GC	TM245	93.5 70.06 : 120.53
QC	TM245	115.55 83.55 : 127.22
Toluene by GC	TM245	94.5 73.44 : 116.60

Mercury Dissolved

Component	Method Code	QC 74	QC 72
Mercury Dissolved (CVAf)	TM183	97.1 85.87 : 123.88	101.0 85.87 : 123.88

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 74
Acenaphthene by GCMS	TM178	104.0 80.35 : 109.75
Acenaphthylene by GCMS	TM178	104.0 79.24 : 110.76
Anthracene by GCMS	TM178	101.5 81.10 : 112.90
Benz(a)anthracene by GCMS	TM178	107.0 78.50 : 107.21



SDG: 130301-141
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

Location: Haig Close, Cannock
 Customer: Grontmij
 Attention: Michael Lawson

Order Number:
 Report Number: 215602
 Superseded Report:

PAH Spec MS - Aqueous (W)

		QC 74
Benzo(a)pyrene by GCMS	TM178	107.5 83.62 : 111.69
Benzo(b)fluoranthene by GCMS	TM178	112.0 87.25 : 114.25
Benzo(ghi)perylene by GCMS	TM178	105.5 84.65 : 105.94
Benzo(k)fluoranthene by GCMS	TM178	105.0 89.98 : 118.53
Chrysene by GCMS	TM178	107.5 85.32 : 108.58
Dibenzo(ah)anthracene by GCMS	TM178	106.0 73.19 : 110.02
Fluoranthene by GCMS	TM178	110.0 82.30 : 116.50
Fluorene by GCMS	TM178	108.5 79.95 : 110.55
Indeno(123cd)pyrene by GCMS	TM178	107.5 76.86 : 114.15
Naphthalene by GCMS	TM178	102.5 87.01 : 108.30
Phenanthrene by GCMS	TM178	106.0 82.30 : 113.50
Pyrene by GCMS	TM178	110.0 79.85 : 117.05

VOC MS (W)

Component	Method Code	QC 77
1,1,1,2-Tetrachloroethane	TM208	104.0 88.25 : 118.28
1,1,1-Trichloroethane	TM208	109.5 83.85 : 123.10
1,1-Dichloroethane	TM208	108.5 82.87 : 126.33
1,2-Dichloroethane	TM208	107.0 77.68 : 127.05
2-Chlorotoluene	TM208	101.5 83.14 : 115.73
4-Chlorotoluene	TM208	102.0 84.24 : 116.31
Benzene	TM208	104.0 86.76 : 117.52
Bromomethane	TM208	103.0 75.34 : 122.65
Carbontetrachloride	TM208	109.5 84.57 : 127.22
Chlorobenzene	TM208	103.5 84.79 : 115.59
Chloroform	TM208	110.0 84.84 : 119.97
Chloromethane	TM208	107.0 53.01 : 144.16
Cis-1,2-Dichloroethene	TM208	100.0 81.65 : 120.44



SDG: 130301-141
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

VOC MS (W)

		QC 77
Dichloromethane	TM208	104.0 79.31 : 122.56
Ethylbenzene	TM208	101.0 82.91 : 114.00
Hexachlorobutadiene	TM208	108.5 76.59 : 123.95
o-Xylene	TM208	101.0 80.82 : 113.33
p/m-Xylene	TM208	100.75 83.73 : 113.41
Tert-butyl methyl ether	TM208	104.5 69.07 : 119.88
Tetrachloroethene	TM208	103.0 88.02 : 123.47
Toluene	TM208	101.0 84.73 : 115.19
Trichloroethene	TM208	101.0 90.16 : 114.11
Vinyl Chloride	TM208	118.5 85.58 : 129.54

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

SDG: 130301-141
Job: H_Grontmij_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number:
Report Number: 215602
Superseded Report:

Appendix General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICS and SVOC 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 all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples 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/MCERES Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERES 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 analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

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. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

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 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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 MCERES 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 C5-C12 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.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
§	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk 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).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has 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).

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

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 HSG 264.

The identification of asbestos containing materials and soils 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.



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

Attention: Michael Lawson

CERTIFICATE OF ANALYSIS

Date: 25 March 2013
Customer: H_GRONTMIJ_SOL
Sample Delivery Group (SDG): 130315-20
Your Reference: 106270-007
Location: Haig Close, Cannock
Report No: 217260

We received 4 samples on Thursday March 14, 2013 and 4 of these samples were scheduled for analysis which was completed on Monday March 25, 2013. 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.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7075276	WS101	GW	0.00	13/03/2013
7075277	WS102	GW	0.00	13/03/2013
7075281	WS103	GW	0.00	13/03/2013
7075282	WS104	GW	0.00	13/03/2013



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



SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

LIQUID Results Legend  Test  No Determination Possible	Lab Sample No(s)	7075276	7075277	7075281	7075282	
	Customer Sample Reference	WS101	WS102	WS103	WS104	
	AGS Reference	GW	GW	GW	GW	
	Depth (m)	0.00	0.00	0.00	0.00	
	Container	1l plastic (ALE221) 1l green glass bottle	1l plastic (ALE221) 1l green glass bottle	1l plastic (ALE221) 1l green glass bottle	1l plastic (ALE221) 1l green glass bottle	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4				
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 4				
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 4				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4				
Mercury Dissolved	All	NDPs: 0 Tests: 4				
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 4				
TPH CWG (W)	All	NDPs: 0 Tests: 4				
VOC MS (W)	All	NDPs: 0 Tests: 4				



SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

TPH CWG (W)

Results Legend		Customer Sample R	WS101	WS102	WS103	WS104		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	WS101	WS102	WS103	WS104		
M	mCERTS accredited.		0.00	0.00	0.00	0.00		
aq	Aqueous / settled sample.		Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)		
diss.filt	Dissolved / filtered sample.		13/03/2013	13/03/2013	13/03/2013	13/03/2013		
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4&\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
GRO Surrogate % recovery**	%	TM245	83	88	84	77		
GRO >C5-C12	<50 µg/l	TM245	271	<50	1370	411	#	#
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	<3	<3	<3	#	#
Benzene	<7 µg/l	TM245	<7	<7	<7	<7	#	#
Toluene	<4 µg/l	TM245	<4	<4	<4	<4	#	#
Ethylbenzene	<5 µg/l	TM245	<5	<5	<5	<5	#	#
m,p-Xylene	<8 µg/l	TM245	<8	<8	<8	<8	#	#
o-Xylene	<3 µg/l	TM245	<3	<3	3	<3	#	#
Sum of detected Xylenes	<11 µg/l	TM245	<11	<11	<11	<11		
Sum of detected BTEX	<28 µg/l	TM245	<28	<28	<28	<28		
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10	<10	<10		
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10	15	<10		
Aliphatics >C8-C10	<10 µg/l	TM245	113	<10	575	161		
Aliphatics >C10-C12	<10 µg/l	TM245	47	<10	235	80		
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10	100	<10		
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	35	146	907	133		
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	297	1150	5060	962		
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	332	1290	6070	1100		
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10	<10	<10		
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10	<10	<10		
Aromatics >EC8-EC10	<10 µg/l	TM245	76	<10	386	108		
Aromatics >EC10-EC12	<10 µg/l	TM245	31	<10	157	54		
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10	32	24		
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	11	120	21		
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	41	159	584	123		
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	41	170	736	168		
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	644	1470	8170	1670		



CERTIFICATE OF ANALYSIS

SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample R	WS101	WS102	WS103	WS104		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00	0.00	0.00	0.00		
M	mCERTS accredited.		Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)		
aq	Aqueous / settled sample.		13/03/2013	13/03/2013	13/03/2013	13/03/2013		
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 individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4 	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM208	119	118	119	117		
Toluene-d8**	%	TM208	99.8	99.9	97	98.7		
4-Bromofluorobenzene**	%	TM208	96.8	96.1	96.7	98.2		
Dichlorodifluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Chloromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Vinyl chloride	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Bromomethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Chloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Trichlorofluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Carbon disulphide	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Dichloromethane	<3 µg/l	TM208	<3	<3	<3	<3	#	#
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	<1	<1	<1	#	#
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Bromochloromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Chloroform	<1 µg/l	TM208	<1	<1	<1	1.14	#	#
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Carbontetrachloride	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Benzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Trichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Dibromomethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Bromodichloromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Toluene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#



CERTIFICATE OF ANALYSIS

SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample R	WS101	WS102	WS103	WS104		
#	ISO17025 accredited.		0.00	0.00	0.00	0.00		
M	mCERTS accredited.	Depth (m)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)		
aq	Aqueous / settled sample.	Sample Type	13/03/2013	13/03/2013	13/03/2013	13/03/2013		
dis.filt	Dissolved / filtered sample.	Date Sampled						
tot.unfilt	Total / unfiltered sample.	Sample Time						
*	Subcontracted test.	Date Received	14/03/2013	14/03/2013	14/03/2013	14/03/2013		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	SDG Ref	130315-20	130315-20	130315-20	130315-20		
(F)	Trigger breach confirmed	Lab Sample No.(s)	7075276	7075277	7075281	7075282		
1-4&5@	Sample deviation (see appendix)	AGS Reference	GW	GW	GW	GW		
Component	LOD/Units	Method						
1,3-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Tetrachloroethene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Dibromochloromethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2-Dibromoethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Chlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Ethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
m,p-Xylene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
o-Xylene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Styrene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Bromoform	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Isopropylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Bromobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Propylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
2-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
4-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
tert-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
sec-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
4-iso-Propyltoluene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,4-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
n-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1	<1	<1	#	#
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Hexachlorobutadiene	<1 µg/l	TM208	<1	<1	<1	<1	#	#
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	<1	<1	<1	#	#
Naphthalene	<1 µg/l	TM208	<1	<1	<1	<1	#	#



CERTIFICATE OF ANALYSIS

SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

VOC MS (W)

Table with columns: Results Legend, Customer Sample R, WS101, WS102, WS103, WS104, Component, LOD/Units, Method. Includes data for 1,2,3-Trichlorobenzene and 1,3,5-Trichlorobenzene.



SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM245	By GC-FID	Determination of GRO by Headspace in waters		

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



SDG: 130315-20
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Location: Haig Close, Cannock
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Report Number: 217260
Superseded Report:

Test Completion Dates

Lab Sample No(s)	7075276	7075277	7075281	7075282
Customer Sample Ref.	WS101	WS102	WS103	WS104
AGS Ref.	GW	GW	GW	GW
Depth	0.00	0.00	0.00	0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID
Dissolved Metals by ICP-MS	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
EPH CWG (Aliphatic) Aqueous GC (W)	22-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
EPH CWG (Aromatic) Aqueous GC (W)	22-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
GRO by GC-FID (W)	22-Mar-2013	22-Mar-2013	22-Mar-2013	22-Mar-2013
Mercury Dissolved	22-Mar-2013	21-Mar-2013	21-Mar-2013	21-Mar-2013
PAH Spec MS - Aqueous (W)	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
TPH CWG (W)	22-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
VOC MS (W)	22-Mar-2013	22-Mar-2013	22-Mar-2013	22-Mar-2013



SDG: 130315-20
 Job: H_GRONTMIJ_SOL-49
 Client Reference: 106270-007

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 Attention: Michael Lawson

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 Report Number: 217260
 Superseded Report:

ASSOCIATED AQC DATA

Dissolved Metals by ICP-MS

Component	Method Code	QC 72
Aluminium	TM152	104.13 87.65 : 115.02
Antimony	TM152	104.27 85.93 : 114.02
Arsenic	TM152	104.53 90.54 : 111.83
Barium	TM152	105.2 91.76 : 113.26
Beryllium	TM152	108.8 83.38 : 117.85
Boron	TM152	101.2 77.94 : 122.57
Cadmium	TM152	102.4 89.40 : 112.58
Chromium	TM152	106.4 91.38 : 112.32
Cobalt	TM152	104.0 91.06 : 113.39
Copper	TM152	99.87 89.28 : 113.01
Lead	TM152	105.87 92.61 : 108.98
Lithium	TM152	104.53 83.75 : 118.70
Manganese	TM152	108.4 91.97 : 111.68
Molybdenum	TM152	104.67 86.81 : 113.52
Nickel	TM152	99.6 89.87 : 112.52
Phosphorus	TM152	103.2 86.57 : 115.67
Selenium	TM152	102.13 90.78 : 112.05
Strontium	TM152	106.67 91.79 : 113.74
Tellurium	TM152	100.8 87.64 : 115.38
Thallium	TM152	105.07 91.72 : 111.90
Tin	TM152	103.07 88.38 : 106.83
Titanium	TM152	103.07 91.80 : 108.47
Uranium	TM152	104.53 90.95 : 107.99
Vanadium	TM152	106.27 90.81 : 113.67
Zinc	TM152	103.6 90.00 : 112.54



SDG: 130315-20
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Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 73	QC 79
Total Aliphatics >C12-C35	TM174	92.71 77.01 : 102.75	90.42 77.43 : 102.04

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 79	QC 73
Total Aromatics >EC12-EC35	TM174	102.67 79.28 : 109.64	99.33 81.38 : 107.30

GRO by GC-FID (W)

Component	Method Code	QC 70
Benzene by GC	TM245	93.5 71.13 : 126.23
Ethylbenzene by GC	TM245	97.0 69.26 : 125.64
m & p Xylene by GC	TM245	98.25 68.13 : 125.17
MTBE GC-FID	TM245	93.0 72.11 : 125.43
o Xylene by GC	TM245	97.0 70.52 : 120.41
QC	TM245	110.54 78.16 : 123.83
Toluene by GC	TM245	96.0 72.37 : 125.80

Mercury Dissolved

Component	Method Code	QC 73	QC 71
Mercury Dissolved (CVAF)	TM183	91.2 85.87 : 123.88	109.0 85.87 : 123.88

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 76
Acenaphthene by GCMS	TM178	96.0 80.35 : 109.75
Acenaphthylene by GCMS	TM178	93.5 79.24 : 110.76
Anthracene by GCMS	TM178	93.0 81.10 : 112.90
Benz(a)anthracene by GCMS	TM178	96.5 78.50 : 107.21



SDG: 130315-20
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Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

PAH Spec MS - Aqueous (W)

		QC 76
Benzo(a)pyrene by GCMS	TM178	100.5 83.62 : 111.69
Benzo(b)fluoranthene by GCMS	TM178	101.5 87.25 : 114.25
Benzo(ghi)perylene by GCMS	TM178	101.0 84.65 : 105.94
Benzo(k)fluoranthene by GCMS	TM178	100.5 89.98 : 118.53
Chrysene by GCMS	TM178	100.0 85.32 : 108.58
Dibenzo(ah)anthracene by GCMS	TM178	103.0 73.19 : 110.02
Fluoranthene by GCMS	TM178	98.5 82.30 : 116.50
Fluorene by GCMS	TM178	99.5 79.95 : 110.55
Indeno(123cd)pyrene by GCMS	TM178	104.0 76.86 : 114.15
Naphthalene by GCMS	TM178	99.5 87.01 : 108.30
Phenanthrene by GCMS	TM178	96.0 82.30 : 113.50
Pyrene by GCMS	TM178	98.5 79.85 : 117.05

VOC MS (W)

Component	Method Code	QC 72
1,1,1,2-Tetrachloroethane	TM208	109.5 83.54 : 132.23
1,1,1-Trichloroethane	TM208	108.0 82.96 : 136.07
1,1-Dichloroethane	TM208	113.0 80.52 : 149.86
1,2-Dichloroethane	TM208	114.5 81.85 : 127.21
2-Chlorotoluene	TM208	110.5 83.27 : 124.81
4-Chlorotoluene	TM208	112.0 84.77 : 123.68
Benzene	TM208	112.0 86.22 : 124.75
Bromomethane	TM208	111.5 79.29 : 124.56
Carbontetrachloride	TM208	110.0 83.97 : 126.50
Chlorobenzene	TM208	110.5 84.68 : 121.68
Chloroform	TM208	112.5 86.13 : 126.38
Chloromethane	TM208	110.5 71.66 : 139.34
Cis-1,2-Dichloroethene	TM208	111.0 83.33 : 123.51



SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

VOC MS (W)

		QC 72
Dichloromethane	TM208	112.0 83.04 : 124.60
Ethylbenzene	TM208	107.5 80.53 : 119.00
Hexachlorobutadiene	TM208	110.5 80.23 : 142.99
o-Xylene	TM208	106.5 83.08 : 123.04
p/m-Xylene	TM208	108.5 80.99 : 119.48
Tert-butyl methyl ether	TM208	111.0 64.23 : 136.92
Tetrachloroethene	TM208	107.5 85.85 : 127.65
Toluene	TM208	108.5 85.39 : 119.69
Trichloroethene	TM208	107.0 88.07 : 123.21
Vinyl Chloride	TM208	108.5 82.50 : 135.67

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

SDG: 130315-20
Job: H_GRONTMIJ_SOL-49
Client Reference: 106270-007

Location: Haig Close, Cannock
Customer: Grontmij
Attention: Michael Lawson

Order Number: SOL13MIJ009
Report Number: 217260
Superseded Report:

Appendix General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC 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 all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples 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/MCERES Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERES 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 analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

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. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

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 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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 MCERES 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 C5-C12 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.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
§	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk 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).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has 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).

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

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 HSG 264.

The identification of asbestos containing materials and soils 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.

APPENDIX F
TIER 1 SCREENING SPREADSHEETS

APPENDIX F1
SOILS

Soils: Residential Tier 1 Screening Results

Multiplier:	1 x "<	Cannock Chase Council					Haig Close (106270-007)										
Strata	Observed Contamination																
Sample Description		Sand	Sand	Sand	Sand	Loamy Sand	Loamy Sand	Silty Clay Loam	Sandy Loam	Sand	Sand	Sandy Loam	Sandy Loam	Topsoil	Sandy Loam	Sandy Loam	
Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	16/12/2010	16/12/2010	16/12/2010	16/12/2010	16/12/2010
Sample ID	-	HP101	HP102	HP103	HP104	HP105	HP106	HP107	WS101	WS102	WS103	HP01	HP02	HP02	HP04	HP05	
Depth	m	0.6	0.4	0.4	0.3	0.5	0.7	0.4	0.7	0.4	0.3	0.3	0.3	0.7	0.7	0.3	
Screening Level	Substance	Units															
-	Moisture Content @ 105C																
-	Moisture Content @ 40C																
-	Asbestos		ND	ND	TRACE	ND		ND	ND		ND	ND	ND	ND		ND	
-	pH		7.25	7.82	7.86	7.99	7.59					8.21	6.7	7.52	7.37	7.82	
-	Soil Organic Matter (SOM)	%	3.09	16.3	2.71	6.15	7.14	20	7.5	7.65	4.38	2.16	5	14.6	15.9	8.17	11.4
32	Arsenic	mg/kg	9.01	86.2	22.1	11.3	10.1	35.6	18.9	12.5	11.2	2.95	10.6	44.3	40.1	19.1	21.5
1300	Barium	mg/kg	59.1	430	132	72.8	67.9	277	125	219	104	102	160	715	312	221	142
51	Beryllium	mg/kg	1.05	12.5	1.78	1.33	1.86	4.58	2.46	3.2	1.07	0.824	1.31	2.75	4.49	3.8	3.41
291	Boron	mg/kg	<1	1.08	1.09	<1	1.9	<1	1.22	1.31	<1	<1	<1	3.32	3.28	1.69	1.87
10	Cadmium	mg/kg	0.519	4.15	1.09	0.834	1.19	3.56	2.45	1.17	0.87	0.702	1.41	3.34	3.14	2	4.45
-	Chromium (total)	mg/kg	12.5	26.1	15.9	13.6	8.51	19.3	14.7	16.1	12.9	39.5	17.3	37	24.2	14	10
627	Chromium (III)	mg/kg															
4.3	Chromium (IV)	mg/kg	<0.6	<1.2	<1.2	<3	<3	<3	<0.6	<3	<1.2	<3	<0.6	<0.6	<1.2	<0.6	<0.6
2330	Copper	mg/kg	22.7	2220	44.2	26.3	51.6	103	65.7	37.8	28.5	36.9	30.2	102	153	53.3	59.7
450	Lead	mg/kg	48.7	542	109	75.8	67.7	299	162	104	86.3	48.1	95.9	438	235	127	143
170	Mercury	mg/kg	<0.14	<0.14	0.232	<0.14	0.297	0.214	0.276	<0.14	0.164	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
130	Nickel	mg/kg	19	152	23.2	19.1	21.1	58.2	33	33	18.7	44.7	19.1	49.8	63.4	49	40.7
350	Selenium	mg/kg	<1	<1	<1	<1	<1	1.37	<1	<1	<1	<1	<1	1.92	<1	<1	1.11
75	Vanadium	mg/kg	16.7	75.4	20.2	24.7	16	35.1	26.9	32.5	17.2	86.8	22.1	32.9	52.1	34.6	26.1
3750	Zinc	mg/kg	197	1900	384	318	397	1070	721	379	279	96.2	294	1040	1900	726	987
-	Total cyanide	mg/kg															
-	Total sulphate	mg/kg	317	2870	596	404	380		447		445	328					
290000	Phenol	ug/kg	<100		<100		<100				<100	<100					
480000	Acenaphthene	ug/kg	<100		<100		<100			528	<100		29.5	101	37.9	56.7	11.4
400000	Acenaphthylene	ug/kg	<100		<100		<100			<100	<100		87.6	127	180	196	32.6
4900000	Anthracene	ug/kg	<100		<100		<100			847	<100		171	510	376	436	125
4700	Benzo(a)anthracene	ug/kg	250		<100		<100			2980	465		710	1720	1650	1610	433
940	Benzo(a)pyrene	ug/kg	275		<100		<100			3240	544		957	1530	1730	1440	300
6500	Benzo(b)fluoranthene	ug/kg	207		<100		<100			1960	390		1050	2160	2650	2100	413
46000	Benzo(ghi)perylene	ug/kg	169		<100		<100			1680	339		966	1330	1380	1210	354
9600	Benzo(k)fluoranthene	ug/kg	175		<100		<100			2180	393		406	996	916	836	175
8000	Chrysene	ug/kg	276		<100		<100			2890	499		714	1540	1640	1450	481
860	Dibenzo(ah)anthracene	ug/kg	<100		<100		<100			313	<100		173	287	314	277	63.4
460000	Fluoranthene	ug/kg	493		<100		<100			5240	908		1200	3960	3370	2950	859
380000	Fluorene	ug/kg	<100		<100		<100			346	<100		30.1	114	67.6	90.4	25.5
3900	Indeno(1,2,3cd)pyrene	ug/kg	149		<100		<100			1570	300		714	961	1070	901	174
3700	Naphthalene	ug/kg	<100		<100		<100			451	<100		197	1370	345	136	139
200000	Phenanthrene	ug/kg	287		<100		<100			3690	468		677	3440	2060	2040	1360
1000000	Pyrene	ug/kg	443		<100		<100			5040	822		1030	2970	2740	2190	560
-	Polyaromatic Hydrocarbons (Total)	mg/kg	<10	<10		11.7		<10	12.7	44.5	<10	<10	9.12	23.1	20.5	17.9	5.51
-																	
55000	TPH Aliphatics >C5-C6	ug/kg	<10	<10				<10		<10	<10	<10					
160000	TPH Aliphatics >C6-C8	ug/kg	<10	<10				<10		12.9	<10	<10					
46000	TPH Aliphatics >C8-C10	ug/kg	<10	<10				<10		18.7	10.2	<10					
118000	TPH Aliphatics >C10-C12	ug/kg	<10	<10				<10		18.7	<10	<10					
59000	TPH Aliphatics >C12-C16	ug/kg	<100	2430				2950		6570	1680	1100					
21000	TPH Aliphatics >C16-C21	ug/kg	<100	3880				5530		6720	4840	1120					
21000	TPH Aliphatics >C21-C35	ug/kg	3690	18200				26400		22300	16300	9270					
21000	TPH Aliphatics >C16-C35	ug/kg															
21000	TPH Aliphatics >C35-C44	ug/kg	<100	1970				4890		2190	3690	6580					
-	TPH Total Aliphatics (C5-C44)	ug/kg															
130000	TPH Aromatics >C6-C7	ug/kg	<10	<10				<10		<10	<10	<10					
270000	TPH Aromatics >C7-C8	ug/kg	<10	<10				<10		<10	<10	<10					

Soils: Residential Tier 1 Screening Results

	Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	16/12/2010	16/12/2010	16/12/2010	16/12/2010	16/12/2010
	Sample ID	-	HP101	HP102	HP103	HP104	HP105	HP106	HP107	WS101	WS102	WS103	HP01	HP02	HP02	HP04	HP05
	Depth	m	0.6	0.4	0.4	0.3	0.5	0.7	0.4	0.7	0.4	0.3	0.3	0.3	0.7	0.7	0.3
65000	TPH Aromatics >C8-C10	ug/kg	19.6	<10				<10		36.3	61	14.2					
160000	TPH Aromatics >C10-C12	ug/kg	<10	<10				<10		12.9	<10	<10					
310000	TPH Aromatics >C12-C16	ug/kg	1550	3850				4150		7650	1880	1950					
480000	TPH Aromatics >C16-C21	ug/kg	4320	13900				16300		32500	5580	4400					
1100000	TPH Aromatics >C21-C35	ug/kg	20300	62900				62400		116000	31400	32000					
1100000	TPH Aromatics >C35-C44	ug/kg	7770	19900				23000		39500	15900	27400					
-	Total Aromatics (C6-C44)	ug/kg															
-	Total Aromatics and Aliphatics	ug/kg															
-																	
160	Benzene	ug/kg	<10	<10				<10		<10	<10	<10					
270000	Toluene	ug/kg	3.27	<2				<2		3.51	5.65	<2					
150000	Ethylbenzene	ug/kg	4.36	<3				<3		7.02	20.3	4.72					
84000	Methyl tert-Butyl Ether	ug/kg	<5	<5				<5		<5	<5	<5					
110000	Ortho-Xylene	ug/kg	3.27	<3				<3		4.68	11.3	3.54					
98000	Meta/Para-Xylene	ug/kg	6.55	<6				<6		12.9	22.6	<6					
46000	Gasoline Range Organics (GRO)	ug/kg	<44	<44				<44		109	101	<44					
-																	
2100	1,1,1,2-Tetrachloroethane	ug/kg	<10		<10			<10		<10	<10						
13000	1,1,1-Trichloroethane	ug/kg	<7		<7			<7		<7	<7						
2900	1,1,2,2-Tetrachloroethane	ug/kg	<10		<10			<10		<10	<10						
1200	1,1,2-Trichloroethane	ug/kg	<10		<10			<10		<10	<10						
3900	1,1-Dichloroethane	ug/kg	<8		<8			<8		<8	<8						
400	1,1-Dichloroethylene	ug/kg	<10		<10			<10		<10	<10						
-	1,1-Dichloro-1-propene	ug/kg	<11		<11			<11		<11	<11						
-	1,2,3-Trichloropropane	ug/kg	<6		<6			<6		<6	<6						
850	1,2,4-Trimethylbenzene	ug/kg	<9		38.3			<9		<9	<9						
-	1,2-Dibromoethane	ug/kg	<12		<12			<12		<12	<12						
39000	1,2-Dichlorobenzene	ug/kg	<12		<12			<12		<12	<12						
8	1,2-Dichloroethane	ug/kg	<5		<5			<5		<5	<5						
42	1,2-Dichloropropane	ug/kg	<12		<12			<12		<12	<12						
-	1,3,5-Trimethylbenzene	ug/kg	<8		<8			<8		<8	<8						
700	1,3-Dichlorobenzene	ug/kg	<6		<6			<6		<6	<6						
-	1,3-Dichloropropane	ug/kg	<7		<7			<7		<7	<7						
72000	1,4-Dichlorobenzene	ug/kg	<5		<5			<5		<5	<5						
-	2,2-Dichloropropane	ug/kg	<12		<12			<12		<12	<12						
-	2-Chlorotoluene	ug/kg	<9		<9			<9		<9	<9						
-	4-Chlorotoluene	ug/kg															
160	Benzene	ug/kg	<9		471			<9		134	16						
2000	Bromobenzene	ug/kg	<10		<10			<10		<10	<10						
-	Bromochloromethane	ug/kg	<14		<14			<14		<14	<14						
30	Bromodichloromethane	ug/kg	<7		<7			<7		<7	<7						
5900	Bromoform	ug/kg	<10		<10			<10		<10	<10						
-	Bromomethane	ug/kg	<13		<13			<13		<13	<13						
39	Carbon tetrachloride	ug/kg	<14		<14			<14		<14	<14						
730	Chlorobenzene	ug/kg	<5		<5			<5		<5	<5						
-	Chlorodibromomethane	ug/kg															
11000	Chloroethane	ug/kg	<14		<14			<14		<14	<14						
1300	Chloroform	ug/kg	<8		<8			<8		<8	<8						
9.8	Chloromethane	ug/kg	<7		<7			<7		<7	<7						
190	cis-1,2-Dichloroethene	ug/kg	<5		<5			<5		<5	<5						
-	cis-1,3-Dichloropropene	ug/kg	<14		<14			<14		<14	<14						
-	Dibromomethane	ug/kg	<9		<9			<9		<9	<9						
-	Dichlorodifluoromethane	ug/kg	<4		<4			<4		<4	<4						
980	Dichloromethane	ug/kg	<10		<10			<10		<10	<10						
150000	Ethylbenzene	ug/kg	<4		22.2		5.48			12.3	26.6						
27000	Isopropylbenzene	ug/kg	<5		<5		<5			<5	<5						
98000	M/p-Xylene	ug/kg	<14		124		<14			32.2	33.1						
82000	n-Propylbenzene	ug/kg															
110000	o-Xylene	ug/kg	<10		39		<10			<10	11.8						
-	p-Isopropyltoluene	ug/kg															
-	Sec-Butylbenzene	ug/kg	<10		<10		<10			<10	<10						
19000	Styrene	ug/kg	<10		<10		<10			<10	<10						
-	Tert-Butylbenzene	ug/kg	<12		<12		<12			<12	<12						
2100	Tetrachloroethylene (PCE)	ug/kg	<5		<5		<5			<5	<5						
270000	Toluene	ug/kg	5.97		14.1		<5			32.5	19.8						
340	trans-1,2-Dichloroethylene	ug/kg	<11		<11		<11			<11	<11						

Soils: Residential Tier 1 Screening Results

Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	16/12/2010	16/12/2010	16/12/2010	16/12/2010	16/12/2010
Sample ID	-	HP101	HP102	HP103	HP104	HP105	HP106	HP107	WS101	WS102	WS103	HP01	HP02	HP02	HP04	HP05	
Depth	m	0.6	0.4	0.4	0.3	0.5	0.7	0.4	0.7	0.4	0.3	0.3	0.3	0.7	0.7	0.3	
-	trans-1,3-Dichloropropene	ug/kg	<14		<14				<14	<14							
220	Trichloroethylene (TCE)	ug/kg	<9		<9				<9	<9							
-	Trichlorofluoromethane	ug/kg	<6		<6				<6	<6							
0.64	Vinyl Chloride	ug/kg	<10		<10				<10	<10							
-																	
4500	1,2,4-Trichlorobenzene	ug/kg	<100		<100				<100	<100							
39000	1,2-Dichlorobenzene	ug/kg	<100		<100				<100	<100							
700	1,3-Dichlorobenzene	ug/kg	<100		<100				<100	<100							
72000	1,4-Dichlorobenzene	ug/kg	<100		<100				<100	<100							
2000	2,4,5-Trichlorophenol	ug/kg	<100		<100				<100	<100							
2000	2,4,6-Trichlorophenol	ug/kg	<100		<100				<100	<100							
2000	2,4-Dichlorophenol	ug/kg	<100		<100				<100	<100							
43000	2,4,-Dimethylphenol	ug/kg	<100		<100				<100	<100							
-	2,4,-Dinitrophenol	ug/kg															
3200	2,4-Dinitrotoluene	ug/kg	<100		<100				<100	<100							
1700	2,6-Dinitrotoluene	ug/kg	<100		<100				<100	<100							
9200	2-Chloronaphthalene	ug/kg	<100		<100				<100	<100							
2000	2-Chlorophenol	ug/kg	<100		<100				<100	<100							
-	2-Methylphenol	ug/kg	<100		<100				<100	<100							
-	2-Methyl naphthalene	ug/kg	<100		<100				184	<100							
-	2-Nitroaniline	ug/kg	<100		<100				<100	<100							
-	2-Nitrophenol	ug/kg	<100		<100				<100	<100							
-	3-Nitroaniline	ug/kg	<100		<100				<100	<100							
-	3/4-Methylphenol	ug/kg	<100		<100				<100	<100							
-	4-Bromophenyl phenyl ether	ug/kg	<100		<100				<100	<100							
-	4-Chloro, 3-methylphenol	ug/kg	<100		<100				<100	<100							
-	4-Chloroaniline	ug/kg	<100		<100				<100	<100							
-	4-Chlorophenyl phenylether	ug/kg	<100		<100				<100	<100							
-	4-Nitroaniline	ug/kg	<100		<100				<100	<100							
-	4-Nitrophenol	ug/kg	<100		<100				<100	<100							
480000	Acenaphthene	ug/kg															
400000	Acenaphthylene	ug/kg															
4900000	Anthracene	ug/kg															
-	Azobenzene	ug/kg	<100		<100				<100	<100							
4700	Benzo(a)anthracene	ug/kg	250		<100				2980	465							
940	Benzo(a)pyrene	ug/kg															
6500	Benzo(b/k)fluoranthene	ug/kg															
46000	Benzo(ghi)perylene	ug/kg															
-	Bis(2-chloroethoxy) methane	ug/kg	<100		<100				<100	<100							
-	Bis(2-chloroethyl)ether	ug/kg	<100		<100				<100	<100							
-	Bis(2-chloroisopropyl) ether	ug/kg															
21600	Bis(2-ethylhexyl) phthalate	ug/kg	<100		<100				<100	<100							
64700	Butyl benzyl phthalate	ug/kg	<100		<100				<100	<100							
-	Carbazole	ug/kg	<100		<100				293	<100							
8000	Chrysene	ug/kg	276		<100				2890	499							
11400	Di-n-butyl phthalate	ug/kg															
81500	Di-n-octyl phthalate	ug/kg															
860	Dibenz(ah)anthracene	ug/kg															
-	Dibenzofuran	ug/kg	<100		<100				270	<100							
29100	Diethyl phthalate	ug/kg	<100		<100				<100	<100							
-	Dimethyl phthalate	ug/kg	<100		<100				<100	<100							
460000	Fluoranthene	ug/kg															
380000	Fluorene	ug/kg															
500	Hexachlorobenzene	ug/kg	<100		<100				<100	<100							
510	Hexachlorobutadiene	ug/kg	<100		<100				<100	<100							
-	Hexachlorocyclopentadiene	ug/kg	<100		<100				<100	<100							
480	Hexachloroethane	ug/kg	<100		<100				<100	<100							
3900	Indeno(1,2,3,cd)pyrene	ug/kg															
-	Isophorone	ug/kg	<100		<100				<100	<100							
3700	Naphthalene	ug/kg	<100		<100				451	<100							
-	Nitrobenzene	ug/kg	<100		<100				<100	<100							
1300	Pentachlorophenol	ug/kg	<100		<100				<100	<100							
200000	Phenanthrene	ug/kg															
290000	Phenol	ug/kg	<100		<100				<100	<100							
1000000	Pyrene	ug/kg															

Soils: Residential Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
Moisture Content @ 105C	-	-	-	-	-	-	-
Moisture Content @ 40C	-	-	-	-	-	-	-
Asbestos	-	-	-	-	-	-	-
pH	-	10	6.7	8.21	7.61	0.43	-
Soil Organic Matter (SOM)	%	15	2.16	20	8.81	5.56	-
Arsenic	mg/kg 32 Residential SGV/GAC2.5% SOM	15	2.95	86.2	23.7	21.1	4
Barium	mg/kg 1300 Residential SGV/GAC2.5% SOM	15	59.1	715	209	174	0
Beryllium	mg/kg 51 Residential SGV/GAC2.5% SOM	15	0.82	12.5	3.09	2.89	0
Boron	mg/kg 291 Residential SGV/GAC2.5% SOM	15	<1	3.32	1.52	0.79	0
Cadmium	mg/kg 10 Residential SGV/GAC2.5% SOM	15	0.52	4.45	2.06	1.35	0
Chromium (total)	mg/kg -	15	8.51	39.5	18.8	9.2	-
Chromium (III)	mg/kg 627 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
Chromium (IV)	mg/kg 4.3 Residential SGV/GAC2.5% SOM	15	<0.6	<3	1.56	1.08	0
Copper	mg/kg 2330 Residential SGV/GAC2.5% SOM	15	22.7	2220	202	559	0
Lead	mg/kg 450 Withdrawn SGV	15	48.1	542	172	147	1
Mercury	mg/kg 170 Residential SGV/GAC2.5% SOM	15	<0.14	0.3	0.17	0.055	0
Nickel	mg/kg 130 Residential SGV/GAC2.5% SOM	15	18.7	152	42.9	33.8	1
Selenium	mg/kg 350 Residential SGV/GAC2.5% SOM	15	<1	1.92	1.09	0.25	0
Vanadium	mg/kg 75 Residential SGV/GAC2.5% SOM	15	16	86.8	34.6	21.2	2
Zinc	mg/kg 3750 Residential SGV/GAC2.5% SOM	15	96.2	1900	713	574	0
Total cyanide	mg/kg -	-	-	-	-	-	-
Total sulphate	mg/kg -	8	317	2870	723	872	-
Phenol	ug/kg 290000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Acenaphthene	ug/kg 480000 Residential SGV/GAC2.5% SOM	10	11.4	528	116	149	0
Acenaphthylene	ug/kg 400000 Residential SGV/GAC2.5% SOM	10	32.8	196	112	46.6	0
Anthracene	ug/kg 490000 Residential SGV/GAC2.5% SOM	10	<100	847	287	252	0
Benzo(a)anthracene	ug/kg 4700 Residential SGV/GAC2.5% SOM	10	<100	2980	1002	949	0
Benzo(a)pyrene	ug/kg 940 Residential SGV/GAC2.5% SOM	10	<100	3240	1022	993	5
Benzo(b)fluoranthene	ug/kg 6500 Residential SGV/GAC2.5% SOM	10	<100	2650	1113	1002	0
Benzo(g)perylene	ug/kg 46000 Residential SGV/GAC2.5% SOM	10	<100	1680	763	611	0
Benzo(k)fluoranthene	ug/kg 9600 Residential SGV/GAC2.5% SOM	10	<100	2180	628	645	0
Chrysene	ug/kg 8000 Residential SGV/GAC2.5% SOM	10	<100	2890	969	895	0
Dibenz(a,h)anthracene	ug/kg 860 Residential SGV/GAC2.5% SOM	10	63.4	314	183	103	0
Fluoranthene	ug/kg 460000 Residential SGV/GAC2.5% SOM	10	<100	5240	1918	1816	0
Fluorene	ug/kg 380000 Residential SGV/GAC2.5% SOM	10	25.5	346	107	89.3	0
Indeno(1,2,3-cd)pyrene	ug/kg 3900 Residential SGV/GAC2.5% SOM	10	<100	1570	604	513	0
Naphthalene	ug/kg 3700 Residential SGV/GAC2.5% SOM	10	<100	1370	304	393	0
Phenanthrene	ug/kg 200000 Residential SGV/GAC2.5% SOM	10	<100	3690	1422	1344	0
Pyrene	ug/kg 1000000 Residential SGV/GAC2.5% SOM	10	<100	5040	1600	1606	0
Polyaromatic Hydrocarbons (Total)	mg/kg 0 #REF! #REF!	13	5.51	44.5	15	10.2	-
TPH (C8-10)	ug/kg 4600 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
TPH (C10-20)	ug/kg 59000 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
TPH (C20-30)	ug/kg 21000 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
TPH (C30-40)	ug/kg 21000 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
TPH Aliphatics >C5-C6	ug/kg 55000 Residential SGV/GAC2.5% SOM	6	<10	<10	10	0	0
TPH Aliphatics >C6-C8	ug/kg 160000 Residential SGV/GAC2.5% SOM	6	<10	12.9	10.5	1.18	0
TPH Aliphatics >C8-C10	ug/kg 46000 Residential SGV/GAC2.5% SOM	6	<10	18.7	11.5	3.54	0
TPH Aliphatics >C10-C12	ug/kg 118000 Residential SGV/GAC2.5% SOM	6	<10	18.7	11.5	3.55	0
TPH Aliphatics >C12-C16	ug/kg 59000 Residential SGV/GAC2.5% SOM	6	<100	6570	2472	2243	0
TPH Aliphatics >C16-C21	ug/kg 21000 All C16-C35 as surrogate	6	<100	6720	3698	2585	0
TPH Aliphatics >C21-C35	ug/kg 21000 All C16-C35 as surrogate	6	3690	26400	16027	8362	2
TPH Aliphatics >C16-C35	ug/kg 21000 Residential SGV/GAC2.5% SOM	-	-	-	-	-	-
TPH Aliphatics >C35-C44	ug/kg 21000 Residential SGV/GAC2.5% SOM	6	<100	6580	3237	2309	0
TPH Total Aliphatics (C5-C44)	ug/kg -	-	-	-	-	-	-
TPH Aromatics >C6-C7	ug/kg 130000 Residential SGV/GAC2.5% SOM	6	<10	<10	10	0	0
TPH Aromatics >C7-C8	ug/kg 270000 Residential SGV/GAC2.5% SOM	6	<10	<10	10	0	0
TPH Aromatics >C8-C10	ug/kg 65000 Residential SGV/GAC2.5% SOM	6	<10	61	25.2	20.1	0
TPH Aromatics >C10-C12	ug/kg 160000 Residential SGV/GAC2.5% SOM	6	<10	12.9	10.5	1.18	0
TPH Aromatics >C12-C16	ug/kg 310000 Residential SGV/GAC2.5% SOM	6	1550	7650	3505	2306	0
TPH Aromatics >C16-C21	ug/kg 480000 Residential SGV/GAC2.5% SOM	6	4320	32500	12833	10919	0
TPH Aromatics >C21-C35	ug/kg 1100000 Residential SGV/GAC2.5% SOM	6	20300	1.16E+05	54167	34997	0
TPH Aromatics >C35-C44	ug/kg 1100000 Residential SGV/GAC2.5% SOM	6	7770	39500	22245	10772	0
Total Aromatics (C6-C44)	ug/kg -	-	-	-	-	-	-
Total Aromatics and Aliphatics	ug/kg -	-	-	-	-	-	-
Benzene	ug/kg 160 Residential SGV/GAC2.5% SOM	6	<10	<10	10	0	0
Toluene	ug/kg 270000 Residential SGV/GAC2.5% SOM	6	<2	5.65	3.07	1.44	0
Ethylbenzene	ug/kg 150000 Residential SGV/GAC2.5% SOM	6	<3	20.3	7.07	6.65	0
Methyl tert-Butyl Ether	ug/kg 84000 Residential SGV/GAC2.5% SOM	6	<5	<5	5	0	0
Ortho-Xylene	ug/kg 110000 Residential SGV/GAC2.5% SOM	6	<3	11.3	4.8	3.25	0
Meta-Para-Xylene	ug/kg 98000 Residential SGV/GAC2.5% SOM	6	<6	22.6	10	6.74	0
Gasoline Range Organics (GRO)	ug/kg 46000 Residential SGV/GAC2.5% SOM	6	<44	109	64.3	31.6	0
1,1,1,2-Tetrachloroethane	ug/kg 2100 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
1,1,1-Trichloroethane	ug/kg 13000 Residential SGV/GAC2.5% SOM	5	<7	<7	7	0	0
1,1,2,2-Tetrachloroethane	ug/kg 2900 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
1,1,2-Trichloroethane	ug/kg 1200 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
1,1-Dichloroethane	ug/kg 3900 Residential SGV/GAC2.5% SOM	5	<8	<8	8	0	0
1,1-Dichloroethylene	ug/kg 400 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
1,1-Dichloro-1-propene	ug/kg -	5	<11	<11	11	0	-
1,2,3-Trichloropropane	ug/kg -	5	<6	<6	6	0	-
1,2,4-Trimethylbenzene	ug/kg 850 Residential SGV/GAC2.5% SOM	5	<9	38.3	14.9	13.1	0
1,2-Dibromoethane	ug/kg -	5	<12	<12	12	0	-
1,2-Dichlorobenzene	ug/kg 39000 Residential SGV/GAC2.5% SOM	5	<12	<12	12	0	0
1,2-Dichloroethane	ug/kg 8 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
1,2-Dichloropropane	ug/kg 42 Residential SGV/GAC2.5% SOM	5	<12	<12	12	0	0
1,3,5-Trimethylbenzene	ug/kg -	5	<8	<8	8	0	0
1,3-Dichlorobenzene	ug/kg 700 Residential SGV/GAC2.5% SOM	5	<6	<6	6	0	0
1,3-Dichloropropane	ug/kg -	5	<7	<7	7	0	-
1,4-Dichlorobenzene	ug/kg 72000 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
2,2-Dichloropropane	ug/kg -	5	<12	<12	12	0	-
2-Chlorotoluene	ug/kg -	5	<9	<9	9	0	-
4-Chlorotoluene	ug/kg -	-	-	-	-	-	-
Benzene	ug/kg 160 Residential SGV/GAC2.5% SOM	5	<9	471	128	199	1
Bromobenzene	ug/kg 2000 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
Bromochloromethane	ug/kg -	5	<14	<14	14	0	-
Bromodichloromethane	ug/kg 30 Residential SGV/GAC2.5% SOM	5	<7	<7	7	0	0
Bromofom	ug/kg 5900 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
Bromomethane	ug/kg -	5	<13	<13	13	0	-
Carbon tetrachloride	ug/kg 39 Residential SGV/GAC2.5% SOM	5	<14	<14	14	0	0
Chlorobenzene	ug/kg 730 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
Chlorodibromomethane	ug/kg -	-	-	-	-	-	-
Chloroethane	ug/kg 11000 Residential SGV/GAC2.5% SOM	5	<14	<14	14	0	0

Soils: Residential Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
Chloroform	ug/kg 1300 Residential SGV/GAC2.5% SOM	5	<8	<8	8	0	0
Chloromethane	ug/kg 9.8 Residential SGV/GAC2.5% SOM	5	<7	<7	7	0	0
cis-1,2-Dichloroethene	ug/kg 190 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
cis-1,3-Dichloropropene	ug/kg - Residential SGV/GAC2.5% SOM	5	<14	<14	14	0	-
Dibromomethane	ug/kg - Residential SGV/GAC2.5% SOM	5	<9	<9	9	0	-
Dichlorodifluoromethane	ug/kg - Residential SGV/GAC2.5% SOM	5	<4	<4	4	0	-
Dichloromethane	ug/kg 980 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
Ethylbenzene	ug/kg 150000 Residential SGV/GAC2.5% SOM	5	<4	26.6	14.1	10	0
Isopropylbenzene	ug/kg 27000 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
m,p-Xylene	ug/kg 98000 Residential SGV/GAC2.5% SOM	5	<14	124	43.5	46	0
n-Propylbenzene	ug/kg 82000 Residential SGV/GAC2.5% SOM	5					
o-Xylene	ug/kg 110000 Residential SGV/GAC2.5% SOM	5	<10	39	16.2	12.8	0
p-Isopropyltoluene	ug/kg - Residential SGV/GAC2.5% SOM	5					
Sec-Butylbenzene	ug/kg - Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	-
Styrene	ug/kg 19000 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	0
Tert-Butylbenzene	ug/kg - Residential SGV/GAC2.5% SOM	5	<12	<12	12	0	-
Tetrachloroethylene (PCE)	ug/kg 2100 Residential SGV/GAC2.5% SOM	5	<5	<5	5	0	0
Toluene	ug/kg 270000 Residential SGV/GAC2.5% SOM	5	<5	32.5	15.5	11.3	0
trans-1,2-Dichloroethylene	ug/kg 340 Residential SGV/GAC2.5% SOM	5	<11	<11	11	0	0
trans-1,3-Dichloropropene	ug/kg - Residential SGV/GAC2.5% SOM	5	<14	<14	14	0	-
Trichloroethylene (TCE)	ug/kg 220 Residential SGV/GAC2.5% SOM	5	<9	<9	9	0	0
Trichlorofluoromethane	ug/kg - Residential SGV/GAC2.5% SOM	5	<6	<6	6	0	-
Vinyl Chloride	ug/kg 0.64 Residential SGV/GAC2.5% SOM	5	<10	<10	10	0	5
1,2,4-Trichlorobenzene	ug/kg 4500 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
1,2-Dichlorobenzene	ug/kg 39000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
1,3-Dichlorobenzene	ug/kg 700 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
1,4-Dichlorobenzene	ug/kg 72000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,4,5-Trichlorophenol	ug/kg 2000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,4,6-Trichlorophenol	ug/kg 2000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,4-Dichlorophenol	ug/kg 2000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,4-Dimethylphenol	ug/kg 43000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,4-Dinitrophenol	ug/kg - Residential SGV/GAC2.5% SOM	5					
2,4-Dinitrotoluene	ug/kg 3200 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2,6-Dinitrotoluene	ug/kg 1700 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2-Chloronaphthalene	ug/kg 9200 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2-Chlorophenol	ug/kg 2000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
2-Methylphenol	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
2-Methyl naphthalene	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	184	117	37.6	-
2-Nitroaniline	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
2-Nitrophenol	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
3-Nitroaniline	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
3/4-Methylphenol	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Bromophenyl phenyl ether	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Chloro, 3-methylphenol	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Chloroaniline	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Chlorophenyl phenylether	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Nitroaniline	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
4-Nitrophenol	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Acenaphthene	ug/kg 480000 Residential SGV/GAC2.5% SOM	5					
Acenaphthylene	ug/kg 400000 Residential SGV/GAC2.5% SOM	5					
Anthracene	ug/kg 4900000 Residential SGV/GAC2.5% SOM	5					
Azobenzene	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Benzo(a)anthracene	ug/kg 4700 Residential SGV/GAC2.5% SOM	5	<100	2980	779	1239	0
Benzo(a)pyrene	ug/kg 940 Residential SGV/GAC2.5% SOM	5					
Benzo(b)fluoranthene	ug/kg 6500 Residential SGV/GAC2.5% SOM	5					
Benzo(ghi)perylene	ug/kg 46000 Residential SGV/GAC2.5% SOM	5					
Bis(2-chloroethoxy) methane	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Bis(2-chloroethyl)ether	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Bis(2-chloroisopropyl) ether	ug/kg - Residential SGV/GAC2.5% SOM	5					
Bis(2-ethylhexyl) phthalate	ug/kg 21600 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Butyl benzyl phthalate	ug/kg 64700 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Carbazole	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	293	139	86.3	-
Chrysene	ug/kg 8000 Residential SGV/GAC2.5% SOM	5	<100	2890	773	1195	0
Di-n-butyl phthalate	ug/kg 11400 Residential SGV/GAC2.5% SOM	5					
Di-n-octyl phthalate	ug/kg 81500 Residential SGV/GAC2.5% SOM	5					
Dibenz(ah)anthracene	ug/kg 860 Residential SGV/GAC2.5% SOM	5					
Dibenzofuran	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	270	134	76	-
Diethyl phthalate	ug/kg 29100 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Dimethyl phthalate	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Fluoranthene	ug/kg 460000 Residential SGV/GAC2.5% SOM	5					
Fluorene	ug/kg 380000 Residential SGV/GAC2.5% SOM	5					
Hexachlorobenzene	ug/kg 500 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Hexachlorobutadiene	ug/kg 510 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Hexachlorocyclopentadiene	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Hexachloroethane	ug/kg 480 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Indeno(1,2,3,cd)pyrene	ug/kg 3900 Residential SGV/GAC2.5% SOM	5					
Isophorone	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Naphthalene	ug/kg 3700 Residential SGV/GAC2.5% SOM	5	<100	451	170	157	0
Nitrobenzene	ug/kg - Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	-
Pentachlorophenol	ug/kg 1300 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Phenanthrene	ug/kg 200000 Residential SGV/GAC2.5% SOM	5					
Phenol	ug/kg 290000 Residential SGV/GAC2.5% SOM	5	<100	<100	100	0	0
Pyrene	ug/kg 1000000 Residential SGV/GAC2.5% SOM	5					

**APPENDIX F2
LEACHABILITY ANALYSIS**

Soil Leachability Tier 1 Screening Results

	Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013
	Sample ID	-	HP101	HP103	HP106	WS101	WS102
	Depth	m	0.6	0.4	0.7	0.7	0.4
-	Polyaromatic Hydrocarbons (Total)	mg/l	0.00143	<0.000247	<0.000247	0.000942	0.000385
0.0001	Sum of 4No. PAHs	mg/l	0.0003727			0.0000885	
-	Sum of benzo(b) and benzo(k)fluoranthene	mg/l					
-	Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene	mg/l					
0.01	TPH (C8-10)	mg/l					
0.01	TPH (C10-20)	mg/l					
0.01	TPH (C20-30)	mg/l					
0.01	TPH (C30-40)	mg/l					
-	Total TPH (C8-40)	mg/l					
-							
0.01	TPH Aromatics >C6-C7	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C7-C8	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C8-C10	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C10-C12	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C12-C16	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C16-C21	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C21-C35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aromatics >C35-C44	mg/l					
-	TPH Total Aromatics (C6-C44)	mg/l					
0.01	TPH Aliphatics >C5-C6	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C6-C8	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C8-C10	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C10-C12	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C12-C16	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C16-C21	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C21-C35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
0.01	TPH Aliphatics >C35-C44	mg/l					
-	TPH Total Aliphatics (C5-C44)	mg/l					
-	TPH Total (Aliphatics and Aromatics)	mg/l					
-							
0.001	Benzene	mg/l	<0.007	<0.007	<0.007	<0.007	<0.007
0.3	Ethylbenzene	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005
0.7	Toluene	mg/l	<0.004	<0.004	<0.004	<0.004	<0.004
-	Meta/Para-Xylene	mg/l	<0.008	<0.008	<0.008	<0.008	<0.008
-	Ortho-Xylene	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
-	Methyl tert-Butyl Ether	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
-							
-	1,1,1,2-Tetrachloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1,1-Trichloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1,2,2-Tetrachloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1,2-Trichloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1,2-Trichloroethylene (TCE)	mg/l					
-	1,1-Dichloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1-Dichloroethylene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,1-Dichloro-1-propene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,2,3-Trichloropropane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01

Soil Leachability Tier 1 Screening Results

	Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013
	Sample ID	-	HP101	HP103	HP106	WS101	WS102
	Depth	m	0.6	0.4	0.7	0.7	0.4
-	1,2,4-Trimethylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.0004	1,2-Dibromoethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
1	1,2-Dichlorobenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.003	1,2-Dichloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.0001	1,2-Dichloropropane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,3,5-Trimethylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,3-Dichlorobenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	1,3-Dichloropropane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.08	1,4-Dichlorobenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	2,2-Dichloropropane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	2-Chlorotoluene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	4-Chlorotoluene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.001	Benzene	mg/l	<0.01	<0.001	<0.001	0.00172	<0.01
-	Bromobenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Bromochloromethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.06	Bromodichloromethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.1	Bromoform	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Bromomethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.003	Carbon tetrachloride	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.1	Chlorobenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Chlorodibromomethane	mg/l					
-	Chloroethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.3	Chloroform	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Chloromethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	cis-1,2-Dichloroethylene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.0001	cis-1,3-Dichloropropene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Dibromomethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Dichlorodifluoromethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.02	Dichloromethane	mg/l	<0.03	<0.003	<0.003	<0.003	<0.03
0.3	Ethylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Isopropylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	M/p-Xylene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	n-Propylbenzene	mg/l					
-	o-Xylene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	p-Isopropyltoluene	mg/l					
-	Sec-Butylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.02	Styrene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Tert-Butylbenzene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Tetrachloroethylene (PCE)	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.7	Toluene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	trans-1,2-Dichloroethylene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	trans-1,3-Dichloropropene	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
-	Trichlorofluoromethane	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.0005	Vinyl Chloride	mg/l	<0.01	<0.001	<0.001	<0.001	<0.01
0.01	Sum of TCE and PCE	mg/l					

Soil Leachability Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
pH	6.5-10 UK DWS	5	7.73	8.51	8.17	0.29	0
Arsenic	0.01 UK DWS	5	0.0019	0.019	0.007	0.0073	1
Boron	1 UK DWS	5	0.037	0.13	0.073	0.036	0
Cadmium	0.005 UK DWS	5	<0.0001	0.00032	0.00014	0.000099	0
Calcium	250 UK DWS						
Chromium (total)	0.05 UK DWS	5	<0.003	<0.003	0.003	0	0
Copper	2 UK DWS	5	0.0048	0.012	0.0075	0.003	0
Iron	0.2 UK DWS						
Lead	0.01 UK DWS	5	0.00028	0.026	0.0062	0.011	1
Magnesium	50 UK DWS						
Mercury	0.001 UK DWS	5	0.00001	0.000055	0.000021	0.000019	0
Nickel	0.02 UK DWS	5	0.002	0.0056	0.0031	0.0015	0
Selenium	0.01 UK DWS						
Zinc	5 UK DWS	5	0.0023	0.098	0.027	0.041	0
Sulphate	250 UK DWS						
Chloride	250 UK DWS						
Electrical Conductivity	uS/cm 2500 UK DWS	5	98.3	398	249	109	0
Ammoniacal Nitrogen as N	0.3 UK DWS						
Total Alkalinity as CaCO3							
Acenaphthene		5	<0.000015	0.000053	0.000025	0.000016	-
Acenaphthylene		5	<0.000011	0.00002	0.000013	3.94E-06	-
Anthracene		5	<0.000015	0.000027	0.000019	5.50E-06	-
Benzo(a)anthracene		5	<0.000017	0.00011	0.000036	0.000041	-
Benzo(a)pyrene	1E-05 UK DWS	5	<9.00E-06	0.00015	0.000041	0.000059	2
Benzo(b)fluoranthene		5	<0.000023	0.000092	0.000037	0.000031	-
Benzo(ghi)perylene		5	<0.000016	0.000078	0.000031	0.000027	-
Benzo(k)fluoranthene		5	<0.000027	0.00015	0.000053	0.000052	-
Chrysene		5	<0.000013	0.00016	0.000048	0.000063	-
Dibenzo(ah)anthracene		5	<0.000016	<0.000016	0.000016	0	-
Fluoranthene		5	0.000018	0.00018	0.000069	0.000064	-
Fluorene		5	<0.000014	0.000026	0.000016	5.14E-06	-
Indeno(1,2,3cd)pyrene		5	<0.000014	0.000057	0.000024	0.000019	-
Naphthalene		5	<0.0001	0.00048	0.0002	0.00016	-
Phenanthrene		5	<0.000022	0.000094	0.000064	0.000038	-
Pyrene		5	0.000018	0.00016	0.00006	0.000058	-
Polyaromatic Hydrocarbons (Total)		5	<0.00025	0.0014	0.00065	0.00052	-
Sum of 4No. PAHs	0.0001 UK DWS	2	0.000089	0.00037	0.00023	0.0002	1
Sum of benzo(b) and benzo(k)fluoranthene							
Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene							
TPH (C8-10)	0.01 UK DWS						
TPH (C10-20)	0.01 UK DWS						
TPH (C20-30)	0.01 UK DWS						
TPH (C30-40)	0.01 UK DWS						
Total TPH (C8-40)							
TPH Aromatics >C6-C7	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C7-C8	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C8-C10	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C10-C12	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C12-C16	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C16-C21	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C21-C35	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aromatics >C35-C44	0.01 UK DWS						
TPH Total Aromatics (C6-C44)							
TPH Aliphatics >C5-C6	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C6-C8	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C8-C10	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C10-C12	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C12-C16	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C16-C21	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C21-C35	0.01 UK DWS	5	<0.01	<0.01	0.01	0	0
TPH Aliphatics >C35-C44	0.01 UK DWS						
TPH Total Aliphatics (C5-C44)							
TPH Total (Aliphatics and Aromatics)							
Benzene	0.001 UK DWS	5	<0.007	<0.007	0.007	9.70E-19	5
Ethylbenzene	0.3 WHO DWS2011	5	<0.005	<0.005	0.005	0	0
Toluene	0.7 WHO DWS2011	5	<0.004	<0.004	0.004	0	0
Meta/Para-Xylene		5	<0.008	<0.008	0.008	0	-
Ortho-Xylene		5	<0.003	<0.003	0.003	0	-
Methyl tert-Butyl Ether		5	<0.003	<0.003	0.003	0	-
1,1,1,2-Tetrachloroethane		5	<0.001	<0.01	0.0046	0.0049	-
1,1,1-Trichloroethane		5	<0.001	<0.01	0.0046	0.0049	-
1,1,2,2-Tetrachloroethane		5	<0.001	<0.01	0.0046	0.0049	-
1,1,2-Trichloroethane		5	<0.001	<0.01	0.0046	0.0049	-
1,1,2-Trichloroethylene (TCE)							
1,1-Dichloroethane		5	<0.001	<0.01	0.0046	0.0049	-
1,1-Dichloroethylene		5	<0.001	<0.01	0.0046	0.0049	-
1,1-Dichloro-1-propene		5	<0.001	<0.01	0.0046	0.0049	-
1,2,3-Trichloropropane		5	<0.001	<0.01	0.0046	0.0049	-
1,2,4-Trimethylbenzene		5	<0.001	<0.01	0.0046	0.0049	-
1,2-Dibromoethane	0.0004 UK DWS	5	<0.001	<0.01	0.0046	0.0049	5
1,2-Dichlorobenzene	1 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
1,2-Dichloroethane	0.003 UK DWS	5	<0.001	<0.01	0.0046	0.0049	2
1,2-Dichloropropane	0.0001 UK DWS	5	<0.001	<0.01	0.0046	0.0049	5
1,3,5-Trimethylbenzene		5	<0.001	<0.01	0.0046	0.0049	-

Soil Leachability Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
1,3-Dichlorobenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
1,3-Dichloropropane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
1,4-Dichlorobenzene	mg/l 0.08 UK DWS	5	<0.001	<0.01	0.0046	0.0049	0
2,2-Dichloropropane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
2-Chlorotoluene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
4-Chlorotoluene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Benzene	mg/l 0.001 UK DWS	5	<0.001	<0.01	0.0047	0.0048	3
Bromobenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Bromochloromethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Bromodichloromethane	mg/l 0.06 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
Bromoform	mg/l 0.1 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
Bromomethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Carbon tetrachloride	mg/l 0.003 UK DWS	5	<0.001	<0.01	0.0046	0.0049	2
Chlorobenzene	mg/l 0.1 UK DWS	5	<0.001	<0.01	0.0046	0.0049	0
Chlorodibromomethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Chloroethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Chloroform	mg/l 0.3 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
Chloromethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
cis-1,2-Dichloroethylene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
cis-1,3-Dichloropropene	mg/l 0.0001 UK DWS	5	<0.001	<0.01	0.0046	0.0049	5
Dibromomethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Dichlorodifluoromethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Dichloromethane	mg/l 0.02 WHO DWS2011	5	<0.003	<0.03	0.014	0.015	2
Ethylbenzene	mg/l 0.3 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
Isopropylbenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
M/p-Xylene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
n-Propylbenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
o-Xylene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
p-Isopropyltoluene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Sec-Butylbenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Styrene	mg/l 0.02 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
Tert-Butylbenzene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Tetrachloroethylene (PCE)	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Toluene	mg/l 0.7 WHO DWS2011	5	<0.001	<0.01	0.0046	0.0049	0
trans-1,2-Dichloroethylene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
trans-1,3-Dichloropropene	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Trichlorofluoromethane	mg/l - -	5	<0.001	<0.01	0.0046	0.0049	-
Vinyl Chloride	mg/l 0.0005 UK DWS	5	<0.001	<0.01	0.0046	0.0049	5
Sum of TCE and PCE	mg/l 0.01 UK DWS						
	mg/l - -						-

**APPENDIX F3
GROUNDWATER**

Groundwater Tier 1 Screening Results - UKDWS/WHO

Multiplier:	1	x"<"	Cannock Chase Council		Haig Close (106270-007)						
	Strata										
	Observed Contamination										
	Sample Description										
	Date	-	28-Feb-13	28-Feb-13	28-Feb-13	28-Feb-13	13-Mar-13	13-Mar-13	13-Mar-13	13-Mar-13	
	Sample ID	-	WS101	WS102	WS103	WS104	WS101	WS102	WS103	WS104	
	Depth	m									
	Screening Level	Substance	Units								
-											
6.5-10		pH									
-											
10		Arsenic	ug/l	0.888	1.1	0.906	0.992	0.854	0.775	1.69	0.673
1000		Boron	ug/l	423	368	133	183	528	477	159	187
5		Cadmium	ug/l	0.232	<0.1	<0.1	0.2	0.337	0.112	0.101	0.155
250000		Calcium	ug/l								
50		Chromium (total)	ug/l	<0.22	<0.22	<0.22	0.613	1.7	1.23	1.21	0.857
2000		Copper	ug/l	1.68	2.99	3.46	2.98	0.901	1.54	2.69	1.66
200		Iron	ug/l								
10		Lead	ug/l	0.066	0.141	0.277	0.078	0.077	0.02	0.195	0.082
50000		Magnesium	ug/l								
1		Mercury	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20		Nickel	ug/l	9.02	2.74	11.4	8.75	7.65	3.31	8.16	6.1
10		Selenium	ug/l								
5000		Zinc	ug/l	73.5	2.04	1.93	6.97	181	4.07	1.2	13.6
-											
250		Sulphate	mg/l								
250		Chloride	mg/l								
2500		Electrical Conductivity	uS/cm								
0.3		Ammoniacal Nitrogen as N	mg/l								
-		Total Alkalinity as CaCO3	mg/l								
-											
-		Acenaphthene	ug/l	<0.015	0.0995	0.0339	0.112	<0.015	0.0219	0.024	<0.015
-		Acenaphthylene	ug/l	0.0168	0.112	0.0509	0.111	0.0283	0.0676	0.0251	<0.011
-		Anthracene	ug/l	0.0374	0.287	0.0571	0.132	0.0538	0.0984	<0.015	<0.015
-		Benzo(a)anthracene	ug/l	0.191	4.85	0.201	1.28	0.306	1	0.185	0.0263
0.01		Benzo(a)pyrene	ug/l	0.281	16.2	0.383	2.53	0.389	3.62	0.514	0.0911
-		Benzo(b)fluoranthene	ug/l	0.224	12.2	0.419	3.24	0.287	3.08	0.479	0.108
-		Benzo(ghi)perylene	ug/l	0.231	11.1	0.296	1.86	0.34	2.95	0.37	0.067
-		Benzo(k)fluoranthene	ug/l	0.227	11.9	0.301	2.67	0.343	3	0.471	0.0966
-		Chrysene	ug/l	0.207	5.38	0.291	1.75	0.397	1.19	0.301	0.0582
-		Dibenzo(ah)anthracene	ug/l	0.0681	3.4	0.0426	0.502	0.0836	0.806	0.0656	<0.016
-		Fluoranthene	ug/l	0.273	4.05	0.31	1.39	0.56	1.24	0.368	0.0314
-		Fluorene	ug/l	0.0178	0.164	0.228	0.547	0.0222	0.0341	0.164	<0.014
-		Indeno(1,2,3cd)pyrene	ug/l	0.209	9.68	0.225	1.58	0.289	2.38	0.26	0.06
-		Naphthalene	ug/l	<0.1	0.287	<0.1	0.148	<0.1	<0.1	<0.1	<0.1
-		Phenanthrene	ug/l	0.125	1.29	0.659	2.23	0.292	0.238	0.499	<0.022
-		Pyrene	ug/l	0.245	3.75	0.33	1.35	0.475	1.5	0.397	0.121
-		Polyaromatic Hydrocarbons (Total)	ug/l	2.35	84.8	3.83	21.4	3.87	21.2	4.12	0.66
0.1		Sum of 4No. PAHs	ug/l	0.891	44.88	1.241	9.35	1.259	11.41	1.58	0.3316

Groundwater Tier 1 Screening Results - UKDWS/WHO

	Date	-	28-Feb-13	28-Feb-13	28-Feb-13	28-Feb-13	13-Mar-13	13-Mar-13	13-Mar-13	13-Mar-13
	Sample ID	-	WS101	WS102	WS103	WS104	WS101	WS102	WS103	WS104
	Depth	m								
-	Sum of benzo(b) and benzo(k)fluoranthene	ug/l								
-	Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene	ug/l								
10	TPH (C8-10)	ug/l								
10	TPH (C10-20)	ug/l								
10	TPH (C20-30)	ug/l								
10	TPH (C30-40)	ug/l								
-	Total TPH (C8-40)	ug/l								
-		ug/l								
10	TPH Aromatics >C6-C7	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
10	TPH Aromatics >C7-C8	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
10	TPH Aromatics >C8-C10	ug/l	59	19	321	146	76	<10	386	108
10	TPH Aromatics >C10-C12	ug/l	41	16	174	94	31	<10	157	54
10	TPH Aromatics >C12-C16	ug/l	<10	<10	<10	<10	<10	<10	32	24
10	TPH Aromatics >C16-C21	ug/l	<10	<10	<10	<10	<10	11	120	21
10	TPH Aromatics >C21-C35	ug/l	<10	<10	<10	33	41	159	584	123
10	TPH Aromatics >C35-C44	ug/l								
-	TPH Total Aromatics (C6-C44)	ug/l								
10	TPH Aliphatics >C5-C6	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
10	TPH Aliphatics >C6-C8	ug/l	<10	<10	14	13	<10	<10	15	<10
10	TPH Aliphatics >C8-C10	ug/l	89	28	478	217	113	<10	575	161
10	TPH Aliphatics >C10-C12	ug/l	61	24	261	141	47	<10	235	80
10	TPH Aliphatics >C12-C16	ug/l	<10	<10	<10	<10	<10	<10	100	<10
10	TPH Aliphatics >C16-C21	ug/l	12	<10	<10	70	35	146	907	133
10	TPH Aliphatics >C21-C35	ug/l	144	180	<10	422	297	1150	5060	962
10	TPH Aliphatics >C35-C44	ug/l								
-	TPH Total Aliphatics (C5-C44)	ug/l								
-	TPH Total (Aliphatics and Aromatics)	ug/l								
-		ug/l								
1	Benzene	ug/l	<7	<7	<7	<7	<7	<7	<7	<7
300	Ethylbenzene	ug/l	<5	<5	<5	<5	<5	<5	<5	<5
700	Toluene	ug/l	<4	<4	<4	<4	<4	<4	<4	<4
-	Meta/Para-Xylene	ug/l	<8	<8	<8	<8	<8	<8	<8	<8
-	Ortho-Xylene	ug/l	<3	<3	<3	<3	<3	<3	<3	<3
-	Methyl tert-Butyl Ether	ug/l	<3	<3	<3	<3	<3	<3	<3	<3
-										
-	1,1,1,2-Tetrachloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1,1-Trichloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1,2,2-Tetrachloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1,2-Trichloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1,2-Trichloroethylene (TCE)	ug/l								
-	1,1-Dichloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1-Dichloroethylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,1-Dichloro-1-propene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,2,3-Trichloropropane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,2,4-Trimethylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
0.4	1,2-Dibromoethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
1000	1,2-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
3	1,2-Dichloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1

Groundwater Tier 1 Screening Results - UKDWS/WHO

	Date	-	28-Feb-13	28-Feb-13	28-Feb-13	28-Feb-13	13-Mar-13	13-Mar-13	13-Mar-13	13-Mar-13
	Sample ID	-	WS101	WS102	WS103	WS104	WS101	WS102	WS103	WS104
	Depth	m								
0.1	1,2-Dichloropropane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
12	1,3,5-Trimethylbenzene	ug/l	<1	<1	1.71	1.2	<1	<1	<1	<1
-	1,3-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	1,3-Dichloropropane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
80	1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	2,2-Dichloropropane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	2-Chlorotoluene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	4-Chlorotoluene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
1	Benzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Bromobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Bromochloromethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
60	Bromodichloromethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
100	Bromoform	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Bromomethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
3	Carbon tetrachloride	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
100	Chlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Chlorodibromomethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Chloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
300	Chloroform	ug/l	<1	1.63	<1	<1	<1	<1	<1	1.14
-	Chloromethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	cis-1,2-Dichloroethylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
0.1	cis-1,3-Dichloropropene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Dibromomethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Dichlorodifluoromethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
20	Dichloromethane	ug/l	<3	<3	<3	<3	<3	<3	<3	<3
300	Ethylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Isopropylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	M/p-Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	n-Propylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	o-Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	p-Isopropyltoluene	ug/l								
-	Sec-Butylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
20	Styrene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Tert-Butylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Tetrachloroethylene (PCE)	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
700	Toluene	ug/l	<1	<1	1.89	<1	<1	<1	<1	<1
-	trans-1,2-Dichloroethylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	trans-1,3-Dichloropropene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
-	Trichlorofluoromethane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
0.5	Vinyl Chloride	ug/l	<1	<1	<1	<1	<1	<1	<1	<1
10	Sum of TCE and PCE	ug/l								

Groundwater Tier 1 Screening Summary - UKDWS/WHO

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
pH	- -						-
	6.5-10 UK DWS						-
Arsenic	ug/l 10 UK DWS	8	0.67	1.69	0.98	0.31	0
Boron	ug/l 1000 UK DWS	8	133	528	307	159	0
Cadmium	ug/l 5 UK DWS	8	<0.1	0.34	0.17	0.085	0
Calcium	ug/l 250000 UK DWS						
Chromium (total)	ug/l 50 UK DWS	8	<0.22	1.7	0.78	0.56	0
Copper	ug/l 2000 UK DWS	8	0.9	3.46	2.24	0.91	0
Iron	ug/l 200 UK DWS						
Lead	ug/l 10 UK DWS	8	0.02	0.28	0.12	0.083	0
Magnesium	ug/l 50000 UK DWS						
Mercury	ug/l 1 UK DWS	8	<0.01	<0.01	0.01	0	0
Nickel	ug/l 20 UK DWS	8	2.74	11.4	7.14	2.94	0
Selenium	ug/l 10 UK DWS						
Zinc	ug/l 5000 UK DWS	8	1.2	181	35.5	63.6	0
	- -						-
Sulphate	mg/l 250 UK DWS						
Chloride	mg/l 250 UK DWS						
Electrical Conductivity	uS/cm 2500 UK DWS						
Ammoniacal Nitrogen as N	mg/l 0.3 UK DWS						
Total Alkalinity as CaCO3	mg/l - -						-
	- -						-
Acenaphthene	ug/l - -	8	<0.015	0.11	0.042	0.04	-
Acenaphthylene	ug/l - -	8	<0.011	0.11	0.053	0.041	-
Anthracene	ug/l - -	8	<0.015	0.29	0.087	0.09	-
Benzo(a)anthracene	ug/l - -	8	0.026	4.85	1	1.62	-
Benzo(a)pyrene	ug/l 0.01 UK DWS	8	0.091	16.2	3	5.48	8
Benzo(b)fluoranthene	ug/l - -	8	0.11	12.2	2.5	4.13	-
Benzo(ghi)perylene	ug/l - -	8	0.067	11.1	2.15	3.76	-
Benzo(k)fluoranthene	ug/l - -	8	0.097	11.9	2.38	4.02	-
Chrysene	ug/l - -	8	0.058	5.38	1.2	1.79	-
Dibenzo(ah)anthracene	ug/l - -	8	<0.016	3.4	0.62	1.16	-
Fluoranthene	ug/l - -	8	0.031	4.05	1.03	1.31	-
Fluorene	ug/l - -	8	<0.014	0.55	0.15	0.18	-
Indeno(1,2,3cd)pyrene	ug/l - -	8	0.06	9.68	1.84	3.28	-
Naphthalene	ug/l - -	8	<0.1	0.29	0.13	0.066	-
Phenanthrene	ug/l - -	8	<0.022	2.23	0.67	0.75	-
Pyrene	ug/l - -	8	0.12	3.75	1.02	1.22	-
Polyaromatic Hydrocarbons (Total)	ug/l - -	8	0.66	84.8	17.8	28.3	-
Sum of 4No. PAHs	ug/l 0.1 UK DWS	8	0.33	44.9	8.87	15.2	8
Sum of benzo(b) and benzo(k)fluoranthene	ug/l - -						-
Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene	ug/l - -						-
TPH (C8-10)	ug/l 10 UK DWS						
TPH (C10-20)	ug/l 10 UK DWS						
TPH (C20-30)	ug/l 10 UK DWS						
TPH (C30-40)	ug/l 10 UK DWS						
Total TPH (C8-40)	ug/l - -						-
	- -						-
TPH Aromatics >C6-C7	ug/l 10 UK DWS	8	<10	<10	10	0	0
TPH Aromatics >C7-C8	ug/l 10 UK DWS	8	<10	<10	10	0	0
TPH Aromatics >C8-C10	ug/l 10 UK DWS	7	19	386	159	140	7
TPH Aromatics >C10-C12	ug/l 10 UK DWS	7	16	174	81	62.8	7
TPH Aromatics >C12-C16	ug/l 10 UK DWS	6	<10	32	16	9.63	2
TPH Aromatics >C16-C21	ug/l 10 UK DWS	7	<10	120	27.4	41	3
TPH Aromatics >C21-C35	ug/l 10 UK DWS	8	<10	584	121	195	5
TPH Aromatics >C35-C44	ug/l 10 UK DWS						
TPH Total Aromatics (C6-C44)	ug/l - -						-
TPH Aliphatics >C5-C6	ug/l 10 UK DWS	8	<10	<10	10	0	0
TPH Aliphatics >C6-C8	ug/l 10 UK DWS	8	<10	15	11.5	2.14	3
TPH Aliphatics >C8-C10	ug/l 10 UK DWS	8	<10	575	209	209	7
TPH Aliphatics >C10-C12	ug/l 10 UK DWS	8	<10	261	107	95.6	7
TPH Aliphatics >C12-C16	ug/l 10 UK DWS	8	<10	100	21.3	31.8	1
TPH Aliphatics >C16-C21	ug/l 10 UK DWS	8	<10	907	165	305	6
TPH Aliphatics >C21-C35	ug/l 10 UK DWS	8	<10	5060	1028	1678	7
TPH Aliphatics >C35-C44	ug/l 10 UK DWS						
TPH Total Aliphatics (C5-C44)	ug/l - -						-
TPH Total (Aliphatics and Aromatics)	ug/l - -						-
	- -						-
Benzene	ug/l 1 UK DWS	8	<7	<7	7	0	8
Ethylbenzene	ug/l 300 WHO DWS	8	<5	<5	5	0	0
Toluene	ug/l 700 WHO DWS	8	<4	<4	4	0	0
Meta/Para-Xylene	ug/l - -	8	<8	<8	8	0	-
Ortho-Xylene	ug/l - -	8	<3	<3	3	0	-
Methyl tert-Butyl Ether	ug/l - -	8	<3	<3	3	0	-
	- -						-
1,1,1,2-Tetrachloroethane	ug/l - -	8	<1	<1	1	0	-
1,1,1-Trichloroethane	ug/l - -	8	<1	<1	1	0	-
1,1,2,2-Tetrachloroethane	ug/l - -	8	<1	<1	1	0	-
1,1,2-Trichloroethane	ug/l - -	8	<1	<1	1	0	-
1,1,2-Trichloroethylene (TCE)	ug/l - -						-
1,1-Dichloroethane	ug/l - -	8	<1	<1	1	0	-
1,1-Dichloroethylene	ug/l - -	8	<1	<1	1	0	-
1,1-Dichloro-1-propene	ug/l - -	8	<1	<1	1	0	-
1,2,3-Trichloropropane	ug/l - -	8	<1	<1	1	0	-
1,2,4-Trimethylbenzene	ug/l - -	8	<1	<1	1	0	-
1,2-Dibromoethane	ug/l 0.4 UK DWS	8	<1	<1	1	0	8
1,2-Dichlorobenzene	ug/l 1000 WHO DWS	8	<1	<1	1	0	0
1,2-Dichloroethane	ug/l 3 UK DWS	8	<1	<1	1	0	0
1,2-Dichloropropane	ug/l 0.1 UK DWS	8	<1	<1	1	0	8
1,3,5-Trimethylbenzene	ug/l 12 US EPA	8	<1	1.71	1.11	0.25	0

Groundwater Tier 1 Screening Summary - UKDWS/WHO

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
1,3-Dichlorobenzene	ug/l - -	8	<1	<1	1	0	-
1,3-Dichloropropane	ug/l - -	8	<1	<1	1	0	-
1,4-Dichlorobenzene	ug/l 80 UK DWS	8	<1	<1	1	0	0
2,2-Dichloropropane	ug/l - -	8	<1	<1	1	0	-
2-Chlorotoluene	ug/l - -	8	<1	<1	1	0	-
4-Chlorotoluene	ug/l - -	8	<1	<1	1	0	-
Benzene	ug/l 1 UK DWS	8	<1	<1	1	0	0
Bromobenzene	ug/l - -	8	<1	<1	1	0	-
Bromochloromethane	ug/l - -	8	<1	<1	1	0	-
Bromodichloromethane	ug/l 60 WHO DWS	8	<1	<1	1	0	0
Bromoform	ug/l 100 WHO DWS	8	<1	<1	1	0	0
Bromomethane	ug/l - -	8	<1	<1	1	0	-
Carbon tetrachloride	ug/l 3 UK DWS	8	<1	<1	1	0	0
Chlorobenzene	ug/l 100 UK DWS	8	<1	<1	1	0	0
Chlorodibromomethane	ug/l - -	8	<1	<1	1	0	-
Chloroethane	ug/l - -	8	<1	<1	1	0	-
Chloroform	ug/l 300 WHO DWS	8	<1	1.63	1.1	0.22	0
Chloromethane	ug/l - -	8	<1	<1	1	0	-
cis-1,2-Dichloroethylene	ug/l - -	8	<1	<1	1	0	-
cis-1,3-Dichloropropene	ug/l 0.1 UK DWS	8	<1	<1	1	0	8
Dibromomethane	ug/l - -	8	<1	<1	1	0	-
Dichlorodifluoromethane	ug/l - -	8	<1	<1	1	0	-
Dichloromethane	ug/l 20 WHO DWS	8	<3	<3	3	0	0
Ethylbenzene	ug/l 300 WHO DWS	8	<1	<1	1	0	0
Isopropylbenzene	ug/l - -	8	<1	<1	1	0	-
M/p-Xylene	ug/l - -	8	<1	<1	1	0	-
n-Propylbenzene	ug/l - -	8	<1	<1	1	0	-
o-Xylene	ug/l - -	8	<1	<1	1	0	-
p-Isopropyltoluene	ug/l - -	8	<1	<1	1	0	-
Sec-Butylbenzene	ug/l - -	8	<1	<1	1	0	-
Styrene	ug/l 20 WHO DWS	8	<1	<1	1	0	0
Tert-Butylbenzene	ug/l - -	8	<1	<1	1	0	-
Tetrachloroethylene (PCE)	ug/l - -	8	<1	<1	1	0	-
Toluene	ug/l 700 WHO DWS	8	<1	1.89	1.11	0.31	0
trans-1,2-Dichloroethylene	ug/l - -	8	<1	<1	1	0	-
trans-1,3-Dichloropropene	ug/l - -	8	<1	<1	1	0	-
Trichlorofluoromethane	ug/l - -	8	<1	<1	1	0	-
Vinyl Chloride	ug/l 0.5 UK DWS	8	<1	<1	1	0	8
Sum of TCE and PCE	ug/l 10 UK DWS						

**APPENDIX F4
TAP WATER**

Tap Water Samples - Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
pH	6.5-10 UK DWS						-
Arsenic	ug/l 10 UK DWS	5	2	2.62	2.25	0.23	0
Boron	ug/l 1000 UK DWS	5	87.8	106	93.9	7.58	0
Cadmium	ug/l 5 UK DWS	5	0.11	0.2	0.15	0.04	0
Calcium	ug/l 250000 UK DWS						
Chromium (total)	ug/l 50 UK DWS	5	0.79	1.06	0.92	0.11	0
Copper	ug/l 2000 UK DWS	5	31.7	112	61.6	32.9	0
Iron	ug/l 200 UK DWS						
Lead	ug/l 10 UK DWS	5	0.17	0.28	0.22	0.049	0
Magnesium	ug/l 50000 UK DWS						
Mercury	ug/l 1 UK DWS	5	<0.01	<0.01	0.01	0	0
Nickel	ug/l 20 UK DWS	5	0.9	2.63	1.29	0.75	0
Selenium	ug/l 10 UK DWS						
Zinc	ug/l 5000 UK DWS	5	7.1	26.2	14.1	7.65	0
Sulphate	mg/l 250 UK DWS						
Chloride	mg/l 250 UK DWS						
Electrical Conductivity	uS/cm 2500 UK DWS						
Ammoniacal Nitrogen as N	mg/l 0.3 UK DWS						
Total Alkalinity as CaCO3	mg/l - -						-
Acenaphthene	ug/l - -	5	<0.015	<0.015	0.015	0	-
Acenaphthylene	ug/l - -	5	<0.011	<0.011	0.011	0	-
Anthracene	ug/l - -	5	<0.015	<0.015	0.015	0	-
Benzo(a)anthracene	ug/l - -	5	<0.017	<0.017	0.017	0	-
Benzo(a)pyrene	ug/l 0.01 UK DWS	5	<0.009	<0.009	0.009	0	0
Benzo(b)fluoranthene	ug/l - -	5	<0.023	<0.023	0.023	0	-
Benzo(ghi)perylene	ug/l - -	5	<0.016	<0.016	0.016	0	-
Benzo(k)fluoranthene	ug/l - -	5	<0.027	<0.027	0.027	3.88E-18	-
Chrysene	ug/l - -	5	<0.013	<0.013	0.013	1.94E-18	-
Dibenzo(ah)anthracene	ug/l - -	5	<0.016	<0.016	0.016	0	-
Fluoranthene	ug/l - -	5	<0.017	<0.017	0.017	0	-
Fluorene	ug/l - -	5	<0.014	<0.014	0.014	1.94E-18	-
Indeno(1,2,3cd)pyrene	ug/l - -	5	<0.014	<0.014	0.014	1.94E-18	-
Naphthalene	ug/l - -	5	<0.1	<0.1	0.1	0	-
Phenanthrene	ug/l - -	5	<0.022	<0.022	0.022	0	-
Pyrene	ug/l - -	5	<0.015	<0.015	0.015	0	-
Polyaromatic Hydrocarbons (Total)	ug/l - -	5	<0.25	<0.25	0.25	3.10E-17	-
Sum of 4No. PAHs	ug/l 0.1 UK DWS						-
Sum of benzo(b) and benzo(k)fluoranthene	ug/l - -						-
Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene	ug/l - -						-
TPH (C8-10)	ug/l 10 UK DWS						-
TPH (C10-20)	ug/l 10 UK DWS	5	<10	<10	10	0	0
TPH (C20-30)	ug/l 10 UK DWS	5	<10	<10	10	0	0
TPH (C30-40)	ug/l 10 UK DWS	5	<10	<10	10	0	0
Total TPH (C8-40)	ug/l - -						-
TPH Aromatics >C6-C7	ug/l 10 UK DWS						-
TPH Aromatics >C7-C8	ug/l 10 UK DWS						-
TPH Aromatics >C8-C10	ug/l 10 UK DWS						-
TPH Aromatics >C10-C12	ug/l 10 UK DWS						-
TPH Aromatics >C12-C16	ug/l 10 UK DWS						-
TPH Aromatics >C16-C21	ug/l 10 UK DWS						-
TPH Aromatics >C21-C35	ug/l 10 UK DWS						-
TPH Aromatics >C35-C44	ug/l 10 UK DWS						-
TPH Total Aromatics (C6-C44)	ug/l - -						-
TPH Aliphatics >C5-C6	ug/l 10 UK DWS						-
TPH Aliphatics >C6-C8	ug/l 10 UK DWS						-
TPH Aliphatics >C8-C10	ug/l 10 UK DWS						-
TPH Aliphatics >C10-C12	ug/l 10 UK DWS						-
TPH Aliphatics >C12-C16	ug/l 10 UK DWS						-
TPH Aliphatics >C16-C21	ug/l 10 UK DWS						-
TPH Aliphatics >C21-C35	ug/l 10 UK DWS						-
TPH Aliphatics >C35-C44	ug/l 10 UK DWS						-
TPH Total Aliphatics (C5-C44)	ug/l - -						-
TPH Total (Aliphatics and Aromatics)	ug/l - -						-
Benzene	ug/l 1 UK DWS	5	<7	<7	7	0	5
Ethylbenzene	ug/l 300 WHO DWS	5	<5	<5	5	0	0
Toluene	ug/l 700 WHO DWS	5	<4	<4	4	0	0
Meta/Para-Xylene	ug/l - -	5	<8	<8	8	0	-
Ortho-Xylene	ug/l - -	5	<3	<3	3	0	-
Methyl tert-Butyl Ether	ug/l - -	5	<3	<3	3	0	-
1,1,1,2-Tetrachloroethane	ug/l - -	5	<1	<1	1	0	-
1,1,1-Trichloroethane	ug/l - -	5	<1	<1	1	0	-
1,1,2,2-Tetrachloroethane	ug/l - -	5	<1	<1	1	0	-
1,1,2-Trichloroethane	ug/l - -	5	<1	<1	1	0	-
1,1,2-Trichloroethylene (TCE)	ug/l - -						-
1,1-Dichloroethane	ug/l - -	5	<1	<1	1	0	-
1,1-Dichloroethylene	ug/l - -	5	<1	<1	1	0	-
1,1-Dichloro-1-propene	ug/l - -	5	<1	<1	1	0	-
1,2,3-Trichloropropane	ug/l - -	5	<1	<1	1	0	-
1,2,4-Trimethylbenzene	ug/l - -	5	<1	<1	1	0	-
1,2-Dibromoethane	ug/l 0.4 UK DWS	5	<1	<1	1	0	5
1,2-Dichlorobenzene	ug/l 1000 WHO DWS	5	<1	<1	1	0	0
1,2-Dichloroethane	ug/l 3 UK DWS	5	<1	<1	1	0	0
1,2-Dichloropropane	ug/l 0.1 UK DWS	5	<1	<1	1	0	5
1,3,5-Trimethylbenzene	ug/l - -	5	<1	<1	1	0	-

Tap Water Samples - Tier 1 Screening Summary

Substance	Screening Criteria	Number of Analyses	Reported Minimum Value	Reported Maximum Value	Statistical Mean	Standard Deviation	Number of Exceedances
1,3-Dichlorobenzene	ug/l - -	5	<1	<1	1	0	-
1,3-Dichloropropane	ug/l - -	5	<1	<1	1	0	-
1,4-Dichlorobenzene	ug/l 80 UK DWS	5	<1	<1	1	0	0
2,2-Dichloropropane	ug/l - -	5	<1	<1	1	0	-
2-Chlorotoluene	ug/l - -	5	<1	<1	1	0	-
4-Chlorotoluene	ug/l - -	5	<1	<1	1	0	-
Benzene	ug/l 1 UK DWS	5	<1	<1	1	0	0
Bromobenzene	ug/l - -	5	<1	<1	1	0	-
Bromochloromethane	ug/l - -	5	<1	<1	1	0	-
Bromodichloromethane	ug/l 60 WHO DWS	5	1.25	1.61	1.39	0.16	0
Bromoform	ug/l 100 WHO DWS	5	12.3	13.5	12.9	0.43	0
Bromomethane	ug/l - -	5	<1	<1	1	0	-
Carbon tetrachloride	ug/l 3 UK DWS	5	<1	<1	1	0	0
Chlorobenzene	ug/l 100 UK DWS	5	<1	<1	1	0	0
Chlorodibromomethane	ug/l 60 US EPA	5	5.77	6.38	6.13	0.28	0
Chloroethane	ug/l - -	5	<1	<1	1	0	-
Chloroform	ug/l 300 WHO DWS	5	<1	<1	1	0	0
Chloromethane	ug/l - -	5	<1	<1	1	0	-
cis-1,2-Dichloroethylene	ug/l - -	5	<1	<1	1	0	-
cis-1,3-Dichloropropene	ug/l 0.1 UK DWS	5	<1	<1	1	0	5
Dibromomethane	ug/l - -	5	<1	<1	1	0	-
Dichlorodifluoromethane	ug/l - -	5	<1	<1	1	0	-
Dichloromethane	ug/l 20 WHO DWS	5	<3	<3	3	0	0
Ethylbenzene	ug/l 300 WHO DWS	5	<1	<1	1	0	0
Isopropylbenzene	ug/l - -	5	<1	<1	1	0	-
M/p-Xylene	ug/l - -	5	<1	<1	1	0	-
n-Propylbenzene	ug/l - -	5	<1	<1	1	0	-
o-Xylene	ug/l - -	5	<1	<1	1	0	-
p-Isopropyltoluene	ug/l - -	5	<1	<1	1	0	-
Sec-Butylbenzene	ug/l - -	5	<1	<1	1	0	-
Styrene	ug/l 20 WHO DWS	5	<1	<1	1	0	0
Tert-Butylbenzene	ug/l - -	5	<1	<1	1	0	-
Tetrachloroethylene (PCE)	ug/l - -	5	<1	<1	1	0	-
Toluene	ug/l 700 WHO DWS	5	<1	<1	1	0	0
trans-1,2-Dichloroethylene	ug/l - -	5	<1	<1	1	0	-
trans-1,3-Dichloropropene	ug/l - -	5	<1	<1	1	0	-
Trichlorofluoromethane	ug/l - -	5	<1	<1	1	0	-
Vinyl Chloride	ug/l 0.5 UK DWS	5	<1	<1	1	0	5
Sum of TCE and PCE	ug/l 10 UK DWS						

Tap Water Samples - Tier 1 screening Results

Multiplier:	1 x"<"	Cannock Chase Council	Haig Close (106270-007)			
	Strata					
	Observed Contamination					
	Sample Description					
	Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013
	Sample ID	-	TW101	TW102	TW103	TW104
	Depth	m				
Screening Level	Substance	Units				
-						
6.5-10	pH					
-						
10	Arsenic	ug/l	2.62	2	2.21	2.28
1000	Boron	ug/l	96.5	106	88.9	87.8
5	Cadmium	ug/l	0.172	0.195	0.106	0.106
250000	Calcium	ug/l				
50	Chromium (total)	ug/l	0.839	0.788	0.96	1.06
2000	Copper	ug/l	31.7	63.2	112	68.3
200	Iron	ug/l				
10	Lead	ug/l	0.168	0.279	0.209	0.179
50000	Magnesium	ug/l				
1	Mercury	ug/l	<0.01	<0.01	<0.01	<0.01
20	Nickel	ug/l	1	0.904	0.933	2.63
10	Selenium	ug/l				
5000	Zinc	ug/l	7.1	14	15	7.97
-						
250	Sulphate	mg/l				
250	Chloride	mg/l				
2500	Electrical Conductivity	uS/cm				
0.3	Ammoniacal Nitrogen as N	mg/l				
-	Total Alkalinity as CaCO3	mg/l				
-						
-	Acenaphthene	ug/l	<0.015	<0.015	<0.015	<0.015
-	Acenaphthylene	ug/l	<0.011	<0.011	<0.011	<0.011
-	Anthracene	ug/l	<0.015	<0.015	<0.015	<0.015
-	Benzo(a)anthracene	ug/l	<0.017	<0.017	<0.017	<0.017
0.01	Benzo(a)pyrene	ug/l	<0.009	<0.009	<0.009	<0.009
-	Benzo(b)fluoranthene	ug/l	<0.023	<0.023	<0.023	<0.023
-	Benzo(ghi)perylene	ug/l	<0.016	<0.016	<0.016	<0.016
-	Benzo(k)fluoranthene	ug/l	<0.027	<0.027	<0.027	<0.027
-	Chrysene	ug/l	<0.013	<0.013	<0.013	<0.013
-	Dibenzo(ah)anthracene	ug/l	<0.016	<0.016	<0.016	<0.016
-	Fluoranthene	ug/l	<0.017	<0.017	<0.017	<0.017
-	Fluorene	ug/l	<0.014	<0.014	<0.014	<0.014
-	Indeno(1,2,3cd)pyrene	ug/l	<0.014	<0.014	<0.014	<0.014
-	Naphthalene	ug/l	<0.1	<0.1	<0.1	<0.1
-	Phenanthrene	ug/l	<0.022	<0.022	<0.022	<0.022
-	Pyrene	ug/l	<0.015	<0.015	<0.015	<0.015
-	Polyaromatic Hydrocarbons (Total)	ug/l	<0.247	<0.247	<0.247	<0.247
0.1	Sum of 4No. PAHs	ug/l				
-	Sum of benzo(b) and benzo(k)fluoranthene	ug/l				
-	Sum of Indeno(1,2,3cd)pyrene + Benzo(ghi)perylene	ug/l				
10	TPH (C8-10)	ug/l				
10	TPH (C10-20)	ug/l	<10	<10	<10	<10
10	TPH (C20-30)	ug/l	<10	<10	<10	<10
10	TPH (C30-40)	ug/l	<10	<10	<10	<10
-	Total TPH (C8-40)	ug/l				
-		ug/l				
10	TPH Aromatics >C6-C7	ug/l				
10	TPH Aromatics >C7-C8	ug/l				
10	TPH Aromatics >C8-C10	ug/l				
10	TPH Aromatics >C10-C12	ug/l				
10	TPH Aromatics >C12-C16	ug/l				
10	TPH Aromatics >C16-C21	ug/l				
10	TPH Aromatics >C21-C35	ug/l				
10	TPH Aromatics >C35-C44	ug/l				
-	TPH Total Aromatics (C6-C44)	ug/l				
10	TPH Aliphatics >C5-C6	ug/l				
10	TPH Aliphatics >C6-C8	ug/l				
10	TPH Aliphatics >C8-C10	ug/l				
10	TPH Aliphatics >C10-C12	ug/l				
10	TPH Aliphatics >C12-C16	ug/l				
10	TPH Aliphatics >C16-C21	ug/l				
10	TPH Aliphatics >C21-C35	ug/l				
10	TPH Aliphatics >C35-C44	ug/l				
-	TPH Total Aliphatics (C5-C44)	ug/l				
-	TPH Total (Aliphatics and Aromatics)	ug/l				
-		ug/l				
1	Benzene	ug/l	<7	<7	<7	<7
300	Ethylbenzene	ug/l	<5	<5	<5	<5
700	Toluene	ug/l	<4	<4	<4	<4
-	Meta/Para-Xylene	ug/l	<8	<8	<8	<8
-	Ortho-Xylene	ug/l	<3	<3	<3	<3
-	Methyl tert-Butyl Ether	ug/l	<3	<3	<3	<3
-						
-	1,1,1,2-Tetrachloroethane	ug/l	<1	<1	<1	<1
-	1,1,1-Trichloroethane	ug/l	<1	<1	<1	<1
-	1,1,2,2-Tetrachloroethane	ug/l	<1	<1	<1	<1
-	1,1,2-Trichloroethane	ug/l	<1	<1	<1	<1
-	1,1,2-Trichloroethylene (TCE)	ug/l				
-	1,1-Dichloroethane	ug/l	<1	<1	<1	<1
-	1,1-Dichloroethylene	ug/l	<1	<1	<1	<1
-	1,1-Dichloro-1-propene	ug/l	<1	<1	<1	<1
-	1,2,3-Trichloropropane	ug/l	<1	<1	<1	<1
-	1,2,4-Trimethylbenzene	ug/l	<1	<1	<1	<1
0.4	1,2-Dibromoethane	ug/l	<1	<1	<1	<1

Tap Water Samples - Tier 1 screening Results

	Date	-	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013
	Sample ID	-	TW101	TW102	TW103	TW104	TW105
	Depth	m					
1000	1,2-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1
3	1,2-Dichloroethane	ug/l	<1	<1	<1	<1	<1
0.1	1,2-Dichloropropane	ug/l	<1	<1	<1	<1	<1
-	1,3,5-Trimethylbenzene	ug/l	<1	<1	<1	<1	<1
-	1,3-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1
-	1,3-Dichloropropane	ug/l	<1	<1	<1	<1	<1
80	1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1
-	2,2-Dichloropropane	ug/l	<1	<1	<1	<1	<1
-	2-Chlorotoluene	ug/l	<1	<1	<1	<1	<1
-	4-Chlorotoluene	ug/l	<1	<1	<1	<1	<1
1	Benzene	ug/l	<1	<1	<1	<1	<1
-	Bromobenzene	ug/l	<1	<1	<1	<1	<1
-	Bromochloromethane	ug/l	<1	<1	<1	<1	<1
60	Bromodichloromethane	ug/l	1.61	1.5	1.33	1.25	1.26
100	Bromoform	ug/l	12.3	13.5	12.9	13	13
-	Bromomethane	ug/l	<1	<1	<1	<1	<1
3	Carbon tetrachloride	ug/l	<1	<1	<1	<1	<1
100	Chlorobenzene	ug/l	<1	<1	<1	<1	<1
60	Chlorodibromomethane	ug/l	6.37	6.38	5.91	5.77	6.21
-	Chloroethane	ug/l	<1	<1	<1	<1	<1
300	Chloroform	ug/l	<1	<1	<1	<1	<1
-	Chloromethane	ug/l	<1	<1	<1	<1	<1
-	cis-1,2-Dichloroethylene	ug/l	<1	<1	<1	<1	<1
0.1	cis-1,3-Dichloropropene	ug/l	<1	<1	<1	<1	<1
-	Dibromomethane	ug/l	<1	<1	<1	<1	<1
-	Dichlorodifluoromethane	ug/l	<1	<1	<1	<1	<1
20	Dichloromethane	ug/l	<3	<3	<3	<3	<3
300	Ethylbenzene	ug/l	<1	<1	<1	<1	<1
-	Isopropylbenzene	ug/l	<1	<1	<1	<1	<1
-	M/p-Xylene	ug/l	<1	<1	<1	<1	<1
-	n-Propylbenzene	ug/l					
-	o-Xylene	ug/l	<1	<1	<1	<1	<1
-	p-Isopropyltoluene	ug/l					
-	Sec-Butylbenzene	ug/l	<1	<1	<1	<1	<1
20	Styrene	ug/l	<1	<1	<1	<1	<1
-	Tert-Butylbenzene	ug/l	<1	<1	<1	<1	<1
-	Tetrachloroethylene (PCE)	ug/l	<1	<1	<1	<1	<1
700	Toluene	ug/l	<1	<1	<1	<1	<1
-	trans-1,2-Dichloroethylene	ug/l	<1	<1	<1	<1	<1
-	trans-1,3-Dichloropropene	ug/l	<1	<1	<1	<1	<1
-	Trichlorofluoromethane	ug/l	<1	<1	<1	<1	<1
0.5	Vinyl Chloride	ug/l	<1	<1	<1	<1	<1
10	Sum of TCE and PCE	ug/l					

APPENDIX F5
Statistical Analysis

Client/client ref: Cannock Chase District Council Project ref: 106270-007 Site ref: Hag Close, Cannock Data description: Contaminant(s): Test scenario: Part 2A Date: 4.4.13		Arsenic (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Vanadium (mg/kg)	Benzo(a)pyrene (mg/kg)	TPH aliphatic C21-C35 (mg/kg)	Benzene (mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Critical concentration, C_c	32	450	130	75	0.94	21	0.16											
Notes																		
Sample size, n	15	15	15	15	10	6	8	0	0	0	0	0	0	0	0	0	0	0
Sample mean, \bar{x}	23.69733333	172.1	42.93333333	34.62	1.0216	16.0266667	0.083625	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	21.0969844	147.148026	33.8052335	21.155148	0.99251333	8.36187459	0.16237957											
Number of non-detects	0	0	0	0	2	0	5											
Set non-detect values to:	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit
Outliers?	Yes	Yes	Yes	Yes	Yes	No	Yes											
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Normal	Normal	Non-normal											
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Test scenario:	Part 2A: Is true mean higher than critical concentration ($\mu > C_c$)?		Evidence level required:		95%		Use Normal distribution to test for outliers											
t statistic, t₀ (or k₀)	-1.524203136	-7.314417355	-9.975016158	-7.39257734	0.259988304	-1.456865785	-1.330346673											
Lower confidence limit (on true mean concentration, μ)	<0	6.49036116	4.88679833	10.8106665	0.44625868	9.14785371	<0											
Evidence (upper bound) level (lower bound)	7% 0%	0% 0%	0% 0%	0% 0%	60%	10%	11% 0%											
Base decision on:	upper bound	lower bound	upper bound	lower bound	evidence level	evidence level	upper bound											
Result	$\mu \leq C_c$	$\mu \leq C_c$	$\mu \leq C_c$	$\mu \leq C_c$	$\mu > C_c$ (BoP)	$\mu \leq C_c$	$\mu \leq C_c$											
Select dataset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Back to data		Go to outlier test			Go to normality test			Show individual summary										

Benzo(a)pyrene Statistical Summary (including outlier)

Test Results

Client/client ref: Cannock Chase Site ref: Haig Close, Cannock
 Project ref: 106270-007 Data description:

Date: 4.4.13
 User details: Michael Lawson

Dataset: Benzo(a)pyrene (mg/kg) ▼	
Sample mean, \bar{x} (mg/kg)	1.0216
Sample standard deviation, s	0.9925
Sample size, n	10
Critical concentration, Cc (mg/kg)	0.94

Use Normal distribution to test for ▼

Outliers & non-detects	
Outliers present?	YES
Significance level	5% ▼
Outliers removed?	0
Non-detects	2

Normality test

Significance level: 5% ▼

Normal distribution

Use: Auto: One-sample t-test ▼

Test scenario: Part 2A: is true mean higher than critical concentration ($\mu > Cc$)? ▼

Null hypothesis: The true mean concentration is equal to or less than the critical concentration: $\mu \leq Cc$

Alternative hypothesis: The true mean concentration is greater than the critical concentration: $\mu > Cc$

Evidence against Null hypothesis: 60%

Base decision on: evidence level ▼

Evidence level required: 95%

Balance of probability? 51%

Reject Null Hypothesis? Yes, on balance

$\mu > Cc$ (balance of probability)

Back to data

Back to summary

Go to outlier test

Go to normality test

Benzo(a)pyrene Statistical Summary (excluding outlier)

Test Results

Client/client ref: Cannock Chase Site ref: Haig Close, Cannock
 Project ref: 106270-007 Data description:

Date: 4.4.13
 User details: Michael Lawson

Dataset: Benzo(a)pyrene (mg/kg) ▼

Sample mean, \bar{x} (mg/kg)	1.0216
Sample standard deviation, s	0.9925
Sample size, n	10
Critical concentration, Cc (mg/kg)	0.94

Use Normal distribution to test for ▼

Outliers & non-detects

Outliers present?	NO
Significance level	5% ▼
Outliers removed?	1
Non-detects	2

Normality test

Significance level: 5% ▼

Normal distribution

Use: Auto: One-sample t-test ▼

Test scenario: Part 2A: is true mean higher than critical concentration ($\mu > C_c$)? ▼

Null hypothesis: The true mean concentration is equal to or less than the critical concentration: $\mu \leq C_c$

Alternative hypothesis: The true mean concentration is greater than the critical concentration: $\mu > C_c$

Evidence against Null hypothesis: 23%

Base decision on: evidence level ▼

Evidence level required: 95%

Balance of probability? 51%

Reject Null Hypothesis? No

$\mu \leq C_c$

Back to data

Back to summary

Go to outlier test

Go to normality test

**APPENDIX G
PAH ASSESSMENT**

APPENDIX G

PAH Risk Assessment Approach

1. Introduction

Cannock Chase District Council (the Council) are required to make a decision about the concentration of substances including PAH / benzo(a)pyrene in soil below which it would not consider that there is significant possibility of significant harm (SPOSH) to human health.

The 2012 revised Statutory Guidance states (4.16) that;

“The decision on whether the possibility of significant harm being caused is significant is a regulatory decision to be taken by the relevant local authority. In deciding whether the possibility of significant harm being caused is significant, the authority is deciding whether the possibility of significant harm posed by contamination in, on or under the land is sufficiently high that regulatory action should be taken to reduce it, with all that would entail. In taking such decisions, the local authority should take account of the broad aims of the regime set out in Section 1 of this Guidance.”

The Statutory Guidance considers that there are four categories into which a local authority may assign land under Part 2A of the 1990 Environmental Protection Act. The description of the four categories differs for human health and controlled waters. For human health a basic description of the four categories are described below. For the full definitions reference should be made to Sections 4.19 to 4.25 of the Statutory Guidance 2012.

- **Category 1:** *“Unacceptably high probability, supported by robust science based evidence that significant harm would occur if no action taken to stop it.”*
- **Category 2:** *“A strong case for considering that the risks from the land are of sufficient concern that the land poses SPOSH”.*
- **Category 3:** *“The strong case described for Category 2 does not exist, thus the legal test for SPOSH is not met. (Note that the risk may not be low but regulatory intervention is not warranted)”.*
- **Category 4:** *“No risk or that the level of risk is low (no relevant contaminant linkage / within normal range of background concentrations / GAC¹ not exceeded).”*

The Council is required to decide which Category the site falls into based on the data available from the site inspection.

2. Rationale for Requirement to Progress Beyond GAC

With specific regard to the PAH Benzo (a) pyrene, the initial risk assessment screening criterion of 0.94 mg/kg is a GAC derived by the Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) ². Soil GAC are criteria which combine a set of generic, conservative assumptions regarding exposure with toxicological criteria (health criteria values or HCVs), which represent minimal risks to health.

¹ Generic assessment criteria, explained below.

² Statutory Guidance 2012 accepted GAC – Paragraph 3.27 to 3.30 and associated footnote of the Statutory Guidance 2012)

The 2012 revised Statutory Guidance states that:

“GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health.

- (a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.*
- (b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist.”*
- (c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (of the Statutory Guidance) (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4. (also see footnote 3 of paragraph 3.29).*
- (d) They should not be viewed as indicators as levels of contamination above which detailed risk assessment would automatically be required under Part 2A*
- (e) They should not be used as generic remediation targets under Part 2A.*

For the full details of the appropriate use of GAC reference should be made to Paragraphs 3.27 to 3.30 of the Statutory Guidance.

Based on the available data, Grontmij do not consider that there is an unacceptable high probability that significant harm would occur to humans at the site. Thus, Category 1 does not exist, and Category 4 was also discounted on the basis of the results obtained.

Therefore, given the maximum concentration recorded of 3.24 mg/kg and the number of samples which exceeded the GAC, further assessment was required to assist the Council to establish whether or not one or more properties within the site fall into **Category 2** or **Category 3** (i.e. to decide if there is a strong case that SPOSH exists or not). As discussed above, GAC cannot be used for this purpose and thus other types of assessment are needed to be considered.

The Statutory Guidance states that technical tools and or advice maybe used to aid with informing a decision. This is provided that these have been undertaken by “*government bodies, regulators of other organisations in the land contamination sector*” (Section 3.30 of the Statutory Guidance) and/or “*that they have been produced in an objective, scientifically robust and expert manner by reputable organisation* (Section 3.28 of the statutory Guidance).

Therefore, work undertaken by these bodies, or institutions of repute with regard to (for example but not limited to) toxicological properties of a substance, or bodily uptake of a contaminant could be critically assessed for its suitability (it is required under the Part 2A definition that the work is developed in a manner which is scientifically-based, authoritative, and relevant) and used as a means to more closely assess whether there is strong case that SPOSH exists at the site.

In the case of benzo(a)pyrene, the Institute of Occupational Medicine carried out a review for Brent Council on polycyclic aromatic hydrocarbons (PAHs) in 2009. This assessed the

toxicological properties of PAH to support Brent Council in making an assessment of soil concentrations above which they may constitute significant possibility of significant harm (SPOSH) at the Brent site.³

Therefore, this approach to assessing whether there is a strong case that SPOSH exists from benzo(a)pyrene was examined in relation to the circumstances at the Site.

A summary of their approach and how it relates to the Site is described in the following sections.

3. Selection of Assessment Criterion from IOM Report

Origin of Assessment Criterion

The IOM carried out a review for Brent Council on polycyclic aromatic hydrocarbons (PAHs) in 2009. The review assessed the toxicological properties of PAH to support Brent Council in making an assessment of soil concentrations of PAH above which they may constitute a significant possibility of significant harm (SPOSH) at the Brent site.

Although the report was developed specifically for one particular site in Brent, the toxicological considerations used provide a useful input into other similar sites.

Grontmij consider the IOM toxicological review to be authoritative and the lines of evidence are appropriate for the circumstances at the Site.

Following review of the IOM work it has been agreed between Grontmij and the Council that an assessment criterion of 17 mg/kg produced by IOM for Brent Council will be adopted for benzo(a)pyrene as a threshold below which SPOSH will not be considered to occur.

Derivation of IOM Assessment Criterion

The value of 17 mg/kg is the lower end of a range (for which the upper end is 36mg/kg) proposed by IOM as a concentration range at which it could be argued that, if greatly exceeded “*the potential for significant harm would be significant, unless measures are in place to prevent exposure*”⁴.

The range of 17 mg/kg to 36 mg/kg benzo(a)pyrene has been derived by considering a number of toxicological assumptions, and assumptions about exposure. Both toxicological assessment and exposure assessment are subject to considerable uncertainties. In toxicological assessment, studies on animals and/or epidemiological studies are used to determine either:

- a) the concentration of a substance at which no observable adverse effect is occurring,
- b) the lowest concentration at which an observable adverse effect is occurring,
- c) the level at which a certain percentage of animals develop a tumour.

The general term for the latter is the “Point of Departure (POD)” and to this a variety of uncertainty factors are applied. These uncertainty factors in relation to the IOM work are discussed below.

³ Toxicological Review of the Risks of Exposure to Soil Containing Polycyclic Aromatic Hydrocarbons 2009

⁴ The report also notes that “*It would clearly be inappropriate to discriminate between soils that contained PAH contents that were marginally above a discrete guideline value from those that were marginally below that value.*”

Uncertainty Factors

Point of Departure

Benzo(a)pyrene is a genotoxic carcinogen. Although there is human epidemiological data for the inhalation route, there is no human data for the ingestion route. Therefore toxicological criteria are based on rodent studies and there is considerable uncertainty in their derivation. It is therefore common practice to identify a range of PODs.

Expert toxicologists within IOM selected a POD for benzo(a)pyrene, referred to as a $BMDL_{10}^5$ of 0.5-1 mg/kg bodyweight/day from pooled studies on rat and mouse estimates based on total tumour incidence.

Toxicity Equivalency Factor and Margin of Exposure

The toxicologists took into account that there were other PAHs at the site, some more and some less potent than benzo(a)pyrene using an approach referred to as toxicity equivalency factor (TEF). In the case of the site in question, IOM determined that an appropriate TEF for the PAHs in soils was 1.6⁶.

They applied an uncertainty factor (referred to as a “margin of exposure” (MoE)⁷) of 10,000, which they based on the fact that the Committee on Carcinogenicity “have indicated that a MoE of <10,000 may be of concern, whereas a MoE of between 10,000-100,000 was unlikely to be of concern.” This resulted in an index dose for benzo(a)pyrene as a marker of total PAH exposure of 0.0312 –0.0625 µg/kg/day by ingestion.

Human type and index dose

IOM considered the exposure of “a typical toddler aged between 1 and 2 years with a body weight of 11.4 kg” with a “long term mean intake of soil and dust” of 100 mg/day and calculated a concentration in soil of benzo(a)pyrene at which the index dose would not be exceeded of 3.56-7.11 mg/kg.

Exposure by inhalation

After defining the index dose, IOM then took into account an additional allowance of a factor of two “for exposure by inhalation to re-suspended soil dust in the indoor environment” on the basis that “*Given the apparently greater potency of inhaled B[a]P over ingested B[a]P although inhalation exposures may be <10% of the ingested dose, they could potentially contribute to >50% of the potential for significant harm*”. This resulted in a range of 1.7 mg/kg to 3.6 mg/kg⁸.

Differentiation from normal urban soils

Having derived this range value, IOM noted that this was within one standard deviation of the average benzo(a)pyrene content in urban soils, (based on work by the Environment Agency), and therefore decided that, as Part 2A is meant to differentiate contaminated sites

⁵ A $BMDL_{10}$ is the 95% lower confidence limit on a dose associated with a 10% extra tumour risk level.

⁶ It is noted that the TEF for the St Raphael's site in Brent may not be representative of the total PAH profile for the Admiral Parker Drive site, and, moreover that the TEF approach is not endorsed by the HPA.

⁷ MoE is the ratio of the point of departure (in mg kg⁻¹ bw day⁻¹ for example) divided by the human exposure to the chemical (in the same units)

⁸ IOM did not consider other pathways on the grounds that “*exposure, uptake and cancer risk are dominated by inadvertent ingestion and inhalation, the contribution of other routes of exposure to cancer risk is extremely small.*”

from normal concentrations, it was appropriate to multiply this range by ten (effectively reducing the MoE (uncertainty factor) to 1,000), resulting in the range of 17 mg/kg to 36 mg/kg of benzo(a)pyrene in soil.

In justification for reducing the MoE to 1000, IOM stated that an MoE of above 1000 “*may pose a risk*” in the view of the Committee on Carcinogenicity.

Exposure During Remedial Works

Grontmij has noted that the IOM report states that:

“Given that the exposure modelling is based on reasonable worst case assumptions, soil concentrations between 7 and 17 mg/kg may be tolerable given that the removal of contaminated soils could give rise to temporary exposure of residents to B[a]P during any remediation works and that this could have a much greater impact on their lifetime exposure than if the soil had remained undisturbed.”

Consideration of the impact on health risk of remediation activities is one of the factors that the revised 2012 Statutory Guidance states that a local authority may take into account, if they consider that the line between Category 2 and Category 3 land is unclear, based on a consideration of the health risks alone.

4. Other Approaches for Derivation of an Assessment Criterion for PAHs (Sensitivity Analysis)

It is considered prudent that other potential approaches are assessed to provide robust argument to the use of the IOM report. It is acknowledged that the Health Protection Agency⁹ stated that

*“ it would seem prudent to base the index dose (ID) on the BMDL₁₀ values proposed by EFSA¹⁰ and JECFA¹¹ derived from the Culp *et al.* study [1]¹² (0.07 and 0.1 milligrams per kilogram bodyweight per day (mg/kg bodyweight/day).”*

This range is significantly lower than the range of BMDL₁₀ of 0.5mg/kg/bodyweight/day to 1 mg/kg/bodyweight/day used within the IOM report. It is noted that the Culp *et al.* mouse study was one of the studies considered within the IOM's derivation of a BMDL₁₀ but that the authors considered it more justifiable to consider a wider range of rat and mouse studies.

A full evaluation of the merits of the choice of BMDL₁₀ within the widely accepted IOM report has not been carried out . However it is noted that the EFSA report¹³ cites the JECFA choice of BMDL₁₀ of 0.1 mg/kg bodyweight/day as being the lower end of the calculated range of 0.10-0.23 mg benzo[a]pyrene/kg bodyweight per day, i.e. the most conservative choice. EFSA used the same data as JECFA but calculated BMDL₁₀ values which ranged from 0.07 to 0.20 mg/kg bodyweight per day with 0.12 mg/kg bodyweight per day representing the best fit.

⁹ HPA Contaminated Land Information Sheet Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs), Health Protection Agency v5 2010

¹⁰ European Food Safety Authority

¹¹ Joint FAO/WHO Expert Committee on Food Additives

¹² Culp, S.J., et al., *A comparison of the tumors induced by coal tar and benzo[a]pyrene in a 2-year bioassay.* Carcinogenesis, 1998. 19(1): p. 117-24.

¹³ Polycyclic Aromatic Hydrocarbons in Food Scientific Opinion of the Panel on Contaminants in the Food Chain, *The EFSA Journal* (2008) 724, 1-114

However, despite the fact that 0.12 mg/kg bodyweight per day was the best fit, the lowest value in the range of 0.07 mg/kg bodyweight per day was chosen “in order to be prudent”. There is therefore only approximately a factor of 2 between the upper end of the JECFA and EFSA ranges and the lower end of the IOM range. The IOM range is then subject to a reduction to account for the TEF of 1.6 for total PAHs, whereas the JECFA and EFSA studies use BaP as a surrogate marker (discussed below). Therefore, there is less difference between the selections of BMDL₁₀ than it would at first appear.

Based on the above, the differences between the two values (HPA and IOM) are relatively small, compared to the uncertainty factors that are subsequently applied.

Other than the approach by the HPA, Grontmij note that decisions on SPOSH have been made by other local authorities, where selecting a different POD has resulted in the threshold of SPOSH being selected at greater soil concentrations than those of IOM.

Overall the arguments presented by IOM are considered to be a robust starting point for considering the question of SPOSH at sites where PAH contamination is present.

5. Use of BaP as a Surrogate Marker Compound

It is recognised that the TEF approach that has been used within the IOM report is not endorsed for PAHs by the HPA Contaminated Land Information Sheet (CLIS). The HPA CLIS does propose the use of benzo(a)pyrene as a surrogate marker (a single substance that may be used to represent a wider group of substances) for total PAHs in soils, provided that the profile of PAHs is of sufficient similarity to the mixture used within the Culp *et al.* report, and, specifically that the ratio of seven genotoxic PAHs (benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(ah)anthracene, indeno(1,2,3 cd pyrene) and benzo(ghi)perylene) is within an order of magnitude, in either direction, of the mean ratios established by Culp *et al.*

The HPA CLIS reports a study of 52 contaminated sites across the UK and notes that:

“Categorisation of the data, according to previous industrial use, showed no substantial differences in the relative PAH profiles. Moreover, the PAH profile in contaminated land was similar to that found in industrial, urban and rural UK soil samples and in other surveys of soil within the UK.”

It would therefore appear that benzo(a)pyrene is a good surrogate marker for total PAHs in contaminated soil, and this approach is therefore considered suitable for evaluation of the total PAH concentrations at the Site. It is noted that, as the value of 17 mg/kg for benzo(a)pyrene considers a TEF of 1.6 for a variety of genotoxic PAHs, this introduces an element of conservatism into the assessment.

6. Conclusions

It is explicitly acknowledged within the Statutory Guidance within paragraph 3.32 that *“The uncertainty underlying risk assessments means there is unlikely to be any single “correct” conclusion on precisely what is the level of risk is posed by land, and it is possible that different suitably qualified people could come to different conclusions when presented with the same information. It is for the local authority to use its judgement to form a reasonable view of what it considers the risks to be on the basis of a robust assessment of available evidence in line with this Guidance.”*

The criterion of 17 mg/kg derived by IOM for benzo(a)pyrene to be used as both a value for benzo(a)pyrene and as a surrogate marker for total PAHs is considered to be a robustly derived and authoritative criterion, appropriate as a value to establish below which the site will not present a significant possibility of significant harm.

APPENDIX H
SEVERITY AND PROBABILITY OF RISK (after CIRIA 552)

Appendix G: 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:

Severity Category	Description	Examples
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
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
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)
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