GEOENVIRO

SOLUTIONS LIMITED

GROUND INVESTIGATION AND UPDATED RISK ASSESSMENT REPORT

AT

OUR LADY'S RC HIGH SCHOOL, ALWORTH ROAD, MANCHESTER

FOR

OUR LADY'S RC HIGH SCHOOL

Report Reference: 44665-23 PII

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UPDATE STATUS

Issue	Date	Description	Prepared	Reviewed	Approved
1	January 2024	First Issue	-	-	-

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LIST OF ACRONYMS

Acronym	Meaning
BGS	British Geological Survey
BH	Borehole
CDM	Construction Design and Management
CL:AIRE	Contaminated Land: Applications In Real Environments
CLR	Contaminated Land Report
COSHH	Control Of Substances Hazardous to Health
CSM	Conceptual Site Model
DCP	Dynamic Cone Penetrometer
DEFRA	Department for Environment Foods and Rural Affairs
DoE	Department of Environment
DP	Dynamic Probe
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	Generic Acceptance Criteria
HA	Hand Auger
HP	Hand Pit
LPA	Local Planning Authority
LQM	Land Quality Management
mbgl	Metres Below Ground Level
MP	Mackintosh Probe
NGR	National Grid Reference
NPPF	National Planning Policy Framework
OS	Ordnance Survey
SGV	Soil Guideline Value
SPOSH	Significant Possibility of Significant Harm
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SSV	Soil Screening Value
TP	Trial Pit
TT	Trial Trench
WS	Windowless Sample / Window Sample
WSV	Water Screening Value

1. INTRODUCTION

1.1 BACKGROUND AND INSTRUCTION

GeoEnviro Solutions Ltd (GES) were instructed by Our Lady's RC High School (the Client) to conduct a Phase II environmental investigation at the site located at Our Lady's RC High School, Alworth Road, |Manchester, M9 0RP.

A site location plan is presented as Drawing 4465-23 / 01 in **Appendix 1**.

This report is written in accordance with the guidance set out in Land Contamination Risk Management (LCRM), Guiding Principles for Land Contamination (GPLC) 1 – 3, and the National Planning Policy Framework (NPPF).

The ground investigation was undertaken in the area encompassing the spoil pile along the western boundary of the site for the purpose of determining the suitability of that material for re-use on site.

1.2 PROPOSED DEVELOPMENT

It is currently proposed to construct a new all-weather sports pitch.

A proposed development plan, as provided to GES, drawn by Hemstock Design Ltd, referenced 369-Our Lady's RC High School and dated November 2023 is provided within **Appendix 1**.

This proposed development plan has been utilised in the preparation of this risk assessment, based upon a 'Public Open Space - Parks' end-use. If an alternative development is subsequently proposed this assessment may need revising and should not be relied upon in its present outcome.

1.3 OBJECTIVES

The objectives of this Ground Investigation report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater, and ecological receptors based on the findings of the preliminary CSM.
- Assess by quantitative means the potential nature and extent of contamination from those uses and the environmental risk and liabilities which may affect the site redevelopment.
- Refine the prevalent source-pathway-receptor linkages present on site by means of a Tier 2 contamination risk assessment which incorporates the formulation of an Updated Conceptual Site Model.

1.4 SCOPE

The ground investigation undertaken was specified by the GES as a result of recommendations made in the previous report .

Prior to commencing the site works the proposed scope of investigation was as follows:

- One day's trial pitting using hand tools at eight locations to a depth of 0.5 mbgl.
- Collection and subsequent environmental laboratory testing of samples.
- Interpretation and risk assessment of the data in respect of potential contamination and subsequent updating of the preliminary CSM.

However, the proposed scope may be subject to change dependent upon site conditions, access, restrictions and obstructions.

1.5 PREVIOUS INVESTIGATIONS

GES have previously undertaken a Phase I: Desktop Study & Risk Assessment Report for the site (Report Reference: 4465-23 PI, issued in December 2023), which this report should be read in conjunction with.

2. PHYSICAL SETTING

2.1 SITE INFORMATION

Location

The site is located within the larger school site, at approximate National Grid Reference (NGR): 385350:404540 (centre of the site).

Topography

The topography of the site is generally flat with a raised mound of spoil created from the construction of the adjacent new building along the western boundary of the playing fields.

Access

The site was accessible via the school main gate on Alworth Road in the southeast of the premises.

Site Description

A site reconnaissance was carried out on the 3rd January 2024. All details from the site reconnaissance are included in the site description below.

The site is an irregular shaped piece of land with an approximate area of 2.03 Ha.

At the time of the investigation the site was occupied by stockpiled demolition rubble which has become overgrown with grass.

An approximate distribution of the surface covering is given below in Table 2.1.

Table 2.1: Site Surface Covering

Type of Surface Cover	Distribution (%)
Soft Ground (grassed and landscaped areas)	100
Hardstanding	0
Roadways	0
Buildings	0
Water (ponds, streams)	0

2.2 GEOLOGY

The British Geological Survey shows the site to be underlain by the geological succession outlined below in Table 2.2.

Table 2.2: Published Geology

Geology	Description /strata
Artificial	None Recorded
Superficial	Till (Diamicton)
Bedrock	Manchester Marl Formation

There are no known artificial deposits recorded underlying the site.

The superficial ground deposits underlying the study site comprise of Till (Diamicton), generally described as '*Till is unsorted and unstratified drift, generally overconsolidated, deposited directly by and underneath a glacier without subsequent reworking by water from*

the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton)' (BGS Lexicon Description).

The bedrock geology beneath the site is shown to be the Manchester Marl Formation, generally described as *'Red marl (calcareous mudstone and siltstone) with thin beds of fossiliferous marine limestone and dolomite; locally green; sandy in places especially in top part; local breccias and pebbly beds'* (BGS Lexicon Description).

Hydrogeology

The Environment Agency designate aquifers in accordance with the Water Framework Directive. These designations reflect not only the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetlands ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

Groundwater Vulnerability

The site is recorded to be located within an area where the EA considers the groundwater to have a low vulnerability to mobile pollutants, as summarised in Table 2.3 below.

Table 2.3: Groundwater Vulnerability Definitions

Definition	Description
High Vulnerability	Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
Medium Vulnerability	Intermediate between high and low vulnerability.
Low Vulnerability	Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Superficial Deposits

The Environment Agency aquifer classification scheme indicates that the superficial aquifer designation for the site is classed as Secondary Undifferentiated aquifer which are generally described as having been '*assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.'* (EA general description).

Bedrock

The Environment Agency aquifer classification scheme indicates that the bedrock aquifer designation for the site is classed as Secondary B aquifer which are generally described as *'predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers*'.

The groundwater vulnerability in the vicinity of the site is classified as Low.

2.3 HYDROLOGY

The nearest surface watercourse to the site is an unnamed inland river located approximately 73 m to the northeast.

The nearest river quality record station is located approximately 378 m north of the site, for the river Irk, A river quality rating of 'E' was attributed to this associated stretch of river in 2000.

2.4 CONTAMINANT SOURCES

On-Site Sources

The following possible on-site sources have been identified from the historical study and previous desktop:

- Historical Made Ground from the stockpiling of material generated by the construction of the school.

Offsite Sources

No off-site sources of contamination have been identified in the previous investigations.

3. FIELDWORKS

3.1 GROUND INVESTIGATION

All ground investigation works were completed on the 3rd of January 2024 under the supervision of a Geoenvironmental Engineer from GES.

The ground investigation has been carried out in accordance with BS5930: 2015+A1:2020 and the UK Specification for Ground Investigation Second Edition 2012.

All strata descriptions were undertaken in accordance with BS5930: 2015+A1:2020; EN ISO 14688-1&2:2018; and EN ISO 14689:2018.

The ground investigation undertaken was in line with the scope as described in Section 1.4.

The positions of the exploratory holes in relation to the existing site layout can be reviewed on drawing number GES 4465-23 / 02 within **Appendix 1**.

3.2 RESTRICTIONS

No restrictions were encountered during this ground investigation.

4. GEOLOGY AND GROUND CONDITIONS

The following ground conditions were encountered during the ground investigation.

4.1 GENERAL

A generalised summary of the ground conditions encountered, depths to base, and thickness recorded from the exploratory hole records is presented below in Table 4.1, below.

Table 4.1: Summary of Ground Conditions

Geology / Strata	Depth (mbgl)				Thickness (m)		Locations encountered
	Top		Base		Min	Max	
	Min	Max	Min	Max			
Made Ground	0.00	-	0.5	Not proved	0.5	Not proved	All exploratory locations

Detailed strata descriptions are presented on the exploratory point logs presented in **Appendix 3**.

4.2 MADE GROUND

Cohesive Made Ground

Cohesive Made Ground materials generally comprised sandy gravelly clay with fragments of concrete and brick.

4.3 SUPERFICIAL DEPOSITS (TILL - DIAMICTON)

Superficial deposits were not encountered during this ground investigation.

4.4 BEDROCK (MANCHESTER MARL FORMATION)

Bedrock was not encountered during this ground investigation.

4.5 GROUNDWATER

Groundwater was generally not encountered during the ground investigation.

4.6 OBSTRUCTIONS

No obstructions were encountered during this ground investigation.

4.7 CONTAMINATION

No visual or olfactory evidence of contamination was encountered or observed during this ground investigation, in particular no obvious visual or olfactory evidence of mobile contamination was observed during the ground investigation.

5. LABORATORY TESTING – CONTAMINATION

5.1 SOIL TESTING

All samples were sent to a UKAS accredited chemical testing laboratory, and MCERTS were used where available. The analytical strategy focussed on a general suite of potential contaminants and the analytical suites are summarised in Table 8.1, below.

Table 8.1: Summary of Chemical Testing Suite

Testing	Comment	No. of soil samples analysed
General metals suite including Arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenol, selenium, zinc, pH, and water soluble sulphate	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8
Speciated PAH and TPH CWG	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8
Asbestos Screen	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8

All chemical testing results are presented in **Appendix 4**.

6. CONTAMINATION

6.1 SOIL TESTING

A total of eight samples have been analysed by Chemtech Ltd in their UKAS and MCERTS accredited laboratory-testing facility in accordance with laboratory protocol.

The testing completed comprised of a focused suite of heavy metals, speciated Total Petroleum Hydrocarbons (TPH CWG Aromatic/aliphatic split) and speciated Polycyclic Aromatic Hydrocarbons (PAH) including the more carcinogenic benzo(a)pyrene (BaP) and naphthalene, asbestos, soil organic matter (SOM) content, VOCs, SVOCs, MTBE & BTEX, cyanide, pH and sulphates.

The results of this laboratory testing have been compared to the Soil Guideline Values (SGVs) as well as the CIEH 'LQM' guideline values for inorganic and organic contaminants in soils. The proposed development of the site is intended to comprise of leisure and therefore screening has been made against a land use of 'Public Open Space - Park'.

A set of Screening Values are provided in **Appendix 5**.

6.2 SELECTION OF SCREENING CRITERIA

The on-site receptors for the study site are considered to be:

- Construction workers (during redevelopment of the site only).
- Future maintenance workers (following redevelopment).
- Future end users and site visitors (following redevelopment); and
- Trespassers (during redevelopment).

Risks to construction workers during the redevelopment process will be mitigated by adhering to appropriate health and safety legislation, and the wearing of appropriate personal protective equipment (PPE). During redevelopment, the site will be securely fenced to prevent trespassers from accessing the site, and good site management practices will be implemented to mitigate exposure to off-site receptors.

The potential pathways for contaminants within the soil to human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

The potential pathways for contaminants within the soil to off-site human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside if contamination within soil is able to migrate across the site boundary within.

In the first instance, the results of this laboratory testing have been compared to generic assessment criteria (GAC) for the Public Open Space - Park land use scenario. These incorporate the following pathways:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

Contaminants have been screened against revised LQM/CIEH S4UL criteria[1] where available. These GAC have been designed for use under planning, using Health Criteria Values based on minimal risk, and updated exposure parameters. The S4UL are intended to replace the previous LQM/CIEH GAC. The S4UL are based on the assumption of a sandy loam soil the 6.0% soil organic matter (SOM) criteria have been used, where available and appropriate, in the first instance. All soil samples were analysed for %SOM, the range was from <2.6-3.1%, and so this conservative approach is considered appropriate for initial screening.

Where no S4UL are available, the EIC/ AGS/ CL:AIRE/ GAC[2] have been used. The toxicological criteria within these are also based on minimal risk. It is recognised that these criteria have not recently been updated, and in particular, do not incorporate the slightly higher inhalation rates that have been used within the S4UL. However, given that they incorporate additional pathways, they are considered suitable for an initial screen. The EIC/ AGS/ CL:AIRE/ GAC are also based on a sandy loam soil and the 1% SOM criteria have been used in the first instance.

There is neither an S4UL nor an EIC/ AGS/ CL:AIRE/ GAC available for lead. In the absence of a GAC based on minimal risk, the C4SL for lead has been used. It is recognised that this is based on a “low level of toxicological concern” rather than on a minimal risk level. However, it is considered appropriate for use under planning, especially for a site where there will effectively be no pathways for inorganic metals following redevelopment.

All the GAC are based on a sandy loam soil. This is considered appropriate for use for initial screening. Although it is apparent from the laboratory soil descriptions, that the Made Ground, by its very nature is heterogeneous, and has a significant clay component.

All of the GAC assume unsaturated soils. However, the use of the GAC is considered to be conservative, because they assume a certain air-filled porosity and water-filled porosity.

The GAC also assume that no free phase product is present and are not intended for use in this instance. No free product was observed within soils during the ground investigation.

6.3 SOIL TESTING RESULTS AND SCREENING

All metals, PAHs, and TPH CWG analytes are presented in the following tables with units in mg/kg unless otherwise stated. Other potential contaminants of concern are only shown where there is at least one result exceeding the limit of detection.

Tables 10.1 – 10.3 overleaf summarize the soil testing results.

[1] Nathanail et al. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3495

[2] CL:AIRE (2010) The EIC/AGS/CL:AIRE Generic Assessment Criteria for Human Health Risk Assessment

Metalloids

Table 10.1: Metalloids Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Arsenic	4.4	7.8	170*	0	-
Cadmium	<1.6	<1.6	532	0	-
Chromium total	18.4	27.7	33,000*	0	-
Chromium (VI)	<0.04	<0.04	220*	0	-
Copper	15.2	26.9	44,000*	0	-
Lead	18.6	32.2	1,300*	0	-
Mercury	<0.7	<0.7	30*[a]	0	-
Nickel	15.7	24.8	3,400*[b]	0	-
Selenium	<3	<3	1,800*	0	-
Zinc	44.1	65.9	170,000*	0	-
Total Phenols	<0.5	<0.5	1,500*	0	-
Total Cyanide	<1	<1	34*	0	-

**LQM/CIEH GAC for Public Open Space - Park' use scenario based on a sandy loam soil and 6.0% SOM.*

a) Based on the inorganic mercury GAC as the conceptual site model does not suggest that other forms of mercury are likely to be present on site.

b) LQM issued an update to the nickel S4ULs in August 2015, and this has been taken into account.

Organics

Table. 10.2: PAH Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Naphthalene	<0.02	0.25	3,000*	0	-
Acenaphthylene	<0.02	<0.02	30,000*	0	-
Acenaphthene	0.03	0.48	30,000*	0	-
Fluorene	0.03	0.39	20,000*	0	-
Phenanthrene	0.20	2.71	6,300*	0	-
Anthracene	0.08	0.75	15,000*	0	-
Fluoranthene	0.43	3.16	6,400*	0	-
Pyrene	0.42	2.59	15,000*	0	-
Benzo(a)anthracene	0.21	1.44	62*	0	-
Chrysene	0.17	1.31	120*	0	-
Benzo(b)fluoranthene	0.20	1.20	16*	0	-
Benzo(k)fluoranthene	0.08	0.47	440*	0	-
Benzo(a)pyrene	0.19	1.02	13*	0	-

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Indeno(1,2,3-cd)pyrene	0.12	0.64	180*	0	-
Dibenz(a,h)anthracene	<0.02	0.12	1.4*	0	-
Benzo(ghi)perylene	0.11	0.62	1,600*	0	-

**LQM/CIEH GAC for 'Public Open Space - Park' use scenario based on a sandy loam soil and 6.0% SOM.*

Table 10.3: TPH CWG Aliphatic/Aromatic Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Aromatic >C5 - C7	< 0.05	< 0.05	92,000	0	-
Aromatic >C7 - C8	< 0.05	< 0.05	100,000*	0	-
Aromatic >C8 - C10	< 0.05	< 0.05	9,300*	0	-
Aromatic >C10 - C12	< 0.5	3.0	10,000*	0	-
Aromatic >C12 - C16	< 1.0	< 1.0	10,000*	0	-
Aromatic >C16 - C21	< 2.0	11.0	7,800*	0	-
Aromatic >C21 - C35	< 5.0	45	7,900*	0	-
Aromatic >C35 – C44	< 1.5	13	7,900*	0	-
Aliphatic >C5 – C6	< 0.05	< 0.05	180,000*	0	-
Aliphatic >C6 - C8	< 0.05	< 0.05	320,000*	0	-
Aliphatic >C8 - C10	< 0.05	< 0.05	21,000*	0	-
Aliphatic >C10 - C12	< 0.5	< 0.5	24,000*	0	-
Aliphatic >C12 - C16	< 0.5	1.0	26,000*	0	-
Aliphatic >C16 – C35	< 4.5	< 4.6	490,000*	0	-
Aliphatic >C35-C44	< 1.0	1.0	490,000*	0	-

** LQM/CIEH GAC scenario based on a sandy loam soil and 6.0% SOM. It is noted that the LQM/CIEH S4UL guidance recommends an additive approach for the TPH fraction, so that a hazard index approach is used. Based on a preliminary conservative comparison of maximum concentrations to S4ULs, no forward modelling is necessary to prove that this would still result in no exceedances at the site.*

Others

The asbestos screening did not identify the presence of Asbestos in any of the samples analysed.

7. UPDATED CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

The Conceptual Site Model has been re-formulated based upon the results from the ground investigation in accordance with BS10175:2015. It aims to provide information regarding the sources of contamination and the pathways in which contamination can migrate to a vulnerable receptor, all of which need to be present for there to be a risk. This is in relation to the proposed end use being classified as 'residential with homegrown produce'. The following linkages have been identified and are presented in Table 11.1, below.

Table 11.1: Updated Conceptual Site Model.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
On-site: Made Ground soils on site possibly containing elevated metals, other organics such as TPH, PAH, phenols.	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Considered potentially active	Low Likelihood	Minor	Very Low ●	A very low, risk rating has been assessed due to the identified contaminants compared with the proposed end use.
		Construction Workers	Considered potentially active	Low Likelihood	Medium	Low ●	A low risk rating has been assessed due to the slight increase in risk from exposure to contaminants that are present, but below the site specific SGV. This can be mitigated to Very Low Risk by the appropriate use of PPE.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Considered inactive	-	-	Very Low ●	The previously carried out desktop survey identified the underlying controlled waters as low vulnerability to mobile contaminants. This investigation found no evidence to contradict this.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
	Permeation of water pipes	Construction materials, future end users and site visitors	Considered inactive	-	-	Very Low ●	The previously carried out desktop survey identified that no new potable water supply was expected, and no further evidence has been found to contradict this.
	Uptake	Plant and Wildlife	Considered potentially active	Low Likelihood	Minor	Very Low ●	The proposed future end use, compared against the detectable levels of contaminants leads to a very low risk to plants and wildlife.
On-site: Asbestos at/near ground surface in Made Ground soils.	Inhalation of fibres in airborne dust	Future end users and site visitors	Considered inactive	-	-	Very Low ●	A very low, risk rating has been assessed due to the asbestos screening returning a negative result for the presence of fibrous material from all samples analysed.
		Construction Workers	Considered inactive	-	-	Very Low ●	A very low, risk rating has been assessed due to the asbestos screening returning a negative result for the presence of fibrous material from all samples analysed.
On-site: Ground Gases (CH_4, CO_2) from on-site Made Ground.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	Considered inactive	-	-	Very Low ●	The proposed end use does not include any building construction over the tested materials, as such they will remain at ground level and able to vent any produced gas.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
Offsite: Ground Gases (CH_4, CO_2, H_2S) from off-site historical landfilling activities.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	Considered inactive	-	-	Very Low ●	The proposed development does not include the construction of any new buildings.

8. RECOMMENDATIONS

The results of the general testing undertaken across the site indicates that while contaminants were identified in some samples taken, the levels detected were all below the site-specific soil guideline value (SGV). As a result of this the soil can be considered suitable for re-use as sub-base material for the proposed sports pitch.

Any changes to the proposed development would result in the need for a new assessment to be undertaken regarding the updated development plan.

8.1 CONSULTEES

It is highly recommended that this report be forwarded to the relevant Local Authority Environmental Health and Planning Departments to seek their comments and subsequent approval, otherwise further works may be required.

8.2 WATCHING BRIEF AND DISCOVERY STRATEGY

A watching brief should be maintained by the Main Contractor at all times during the groundworks stage. Should any unforeseen contamination, such as oils or soils/groundwater with an unusual colour or odour, be encountered during groundworks then the following procedure should be implemented:

- Work to cease in that area to prevent exposure to ground workers and potential contaminants being spread around.
- Notify GES, to attend site and sample material.
- Notify the Environmental Health Department / Contaminated Land Officer(s) of the Local Planning Authority.

If the nature and extent of the contamination is unmanageable under the procedure set out above, then a suitable management, mitigation or remediation procedure will be agreed with the CLO. However, this is considered unlikely at this particular site.

8.3 PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Any suspected contaminated soil/fill found during construction works shall be placed in temporary stockpiles on hardstanding or high density Visqueen and be suitability covered to minimize the potential for dust/odour nuisance and prevent surface water runoff. Samples of arisings material will be taken to determine whether this material is suitable for re-use on site.

Once the laboratory analysis of the material is available an assessment should be undertaken to determine whether it can be retained on-site as part of the Material Management Plan or whether it should be disposed off-site.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

8.4 ASBESTOS

Although screening has revealed no asbestos to be present within the samples analysed from exploratory holes undertaken, it cannot be guaranteed that asbestos is not present within the soils across the remainder of the site.

Consequently, GES would recommend that a watching brief be adopted with regards to the site for the potential of finding any Asbestos Containing Materials (ACMs). If any ACMs are identified these need to be dealt with accordingly in relation to the Hazardous Waste Regulations 2005.

8.5 SERVICES

If new services will be installed as part of the redevelopment of the site, we would recommend the local water supply company be contacted to determine their specification for the type of pipework which should be used on this site.

All services and in particular potable water supply pipework should comprise of material that is resistant to attack and degradation to chemical attack.

Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites'*, issued in January 2011 by the UK Water Industry Research (UKWIR), this supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note – '*Laying Pipes in Contaminated Land'* which has been withdrawn.

8.6 SURFACE WATER

It should be noted that the Environment Agency does not recommend that soakaways be placed within Made Ground, potentially contaminative land or in ground previously identified as contaminated.

9. RELIANCE AND LIMITATIONS

This report has been prepared using published information and information provided by the Client and their professional advisers which has been made available to GES at the time of writing only. GES accepts no liability for any changes resulting from new information which has become available since this time.

This report is provided for the sole use of the client and their professional advisors and is confidential to them unless agreed otherwise in writing. This report may only be used and relied on once the work has been paid for in full. GES owes no duty of care and has no liability to any third party who is not authorised by GES to use this report. Any unauthorised third parties using information contained in this report do so at their own risk.

We are content that as a result of the ground investigation works and subsequent soil testing undertaken, as outlined within this report, we have characterised the ground conditions and consequently the potential for contamination to exist on site. These works and ensuing assessment have been detailed in this report.

This assessment has been carried out to determine the potential risks posed to future end users, along with other key receptors, resulting from potential contamination at the site, based on the proposed development. Should any revisions in the development proposals result in a change any assessment parameters detailed in this report, a re-assessment of the risk should be carried out.

Whilst this report may reference observations made regarding the presence of features/ issues such as invasive species, ACM, site drainage and evidence of structural abnormalities, this report does not constitute specialist surveys on these matters. Should further specialist surveys be carried out in this regard, the findings of these should be reported to GES so that we may determine if this has any impact on the findings of this report.

The assessment and interpretation of the factual data obtained as part of this ground investigation has been undertaken in accordance with standard consulting practise and with current national and international guidance.

This report presents the observations made during the ground investigation and the factual data obtained. The conclusions and recommendations in this report are limited to those which can be made based on the findings of the survey and information provided by third parties. GES assumes all third party data to be true and correct. No responsibility can be accepted by GES for inaccuracies in the information provided by any other party.

This report is written in the context of an agreed scope of works and should not be used in a different context. Furthermore, new information, improved practises, and changes in legislation may require the reinterpretation of the report in whole or in part after its original issue. GES reserve the right to alter their conclusions and recommendations in the light of further information that may become available.

Ground conditions can be variable and change rapidly, especially in areas of Made Ground, however it is assumed that the ground conditions encountered and observed are typical and representative of the site as a whole. Most specifically with regard to this limited investigation, the ground conditions have been determined from a limited number of exploratory holes formed across the site, therefore only a small percentage of the total area of the site has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced. Conclusions drawn from the ground investigation should be read in this context. GES cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

In addition, subsurface conditions including contaminant concentrations and groundwater levels may vary spatially with time. This factor should be given due consideration in the event that the information contained within this report is used after any significant period of time has elapsed.

APPENDIX 1

DRAWINGS AND PLANS

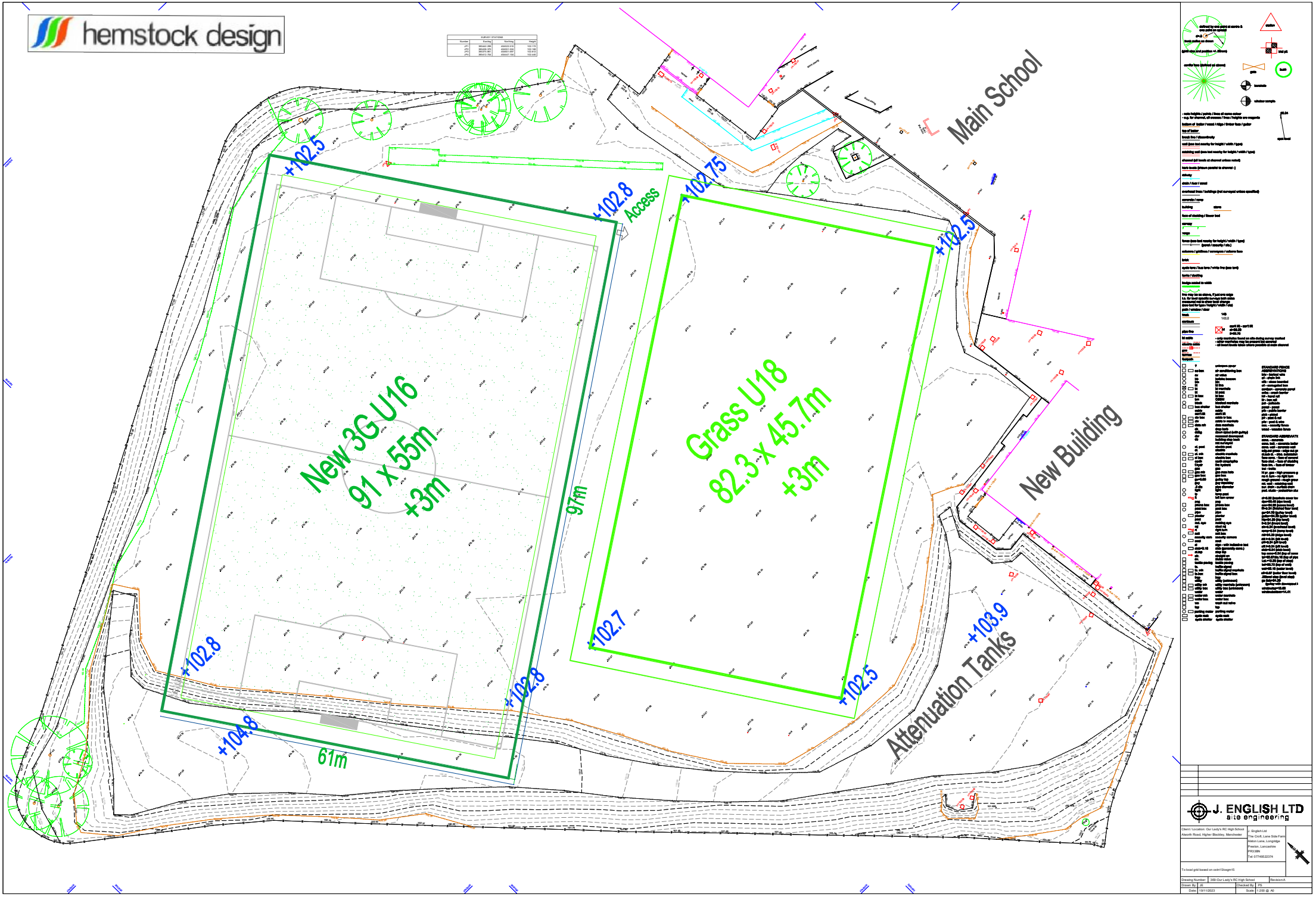
GEOENVIRO
SOLUTIONS LIMITED

GeoEnviro Solutions Ltd
Unit 7 Springvale Works
Brighouse
West Yorkshire
HD6 2RA
Tel: 01484 986010
Email: info@geoenvirosolutions.com
Web: www.geoenvirosolutions.com

N

PROJECT NAME Our Lady's RC High School **PROJECT NUMBER** 4465-23	**DRAWING NO.** 4465-23/01	**SCALE** N.T.S
TITLE Site Location Plan	**DATE** December 2023	**DRAWN BY** ADD

hemstock design



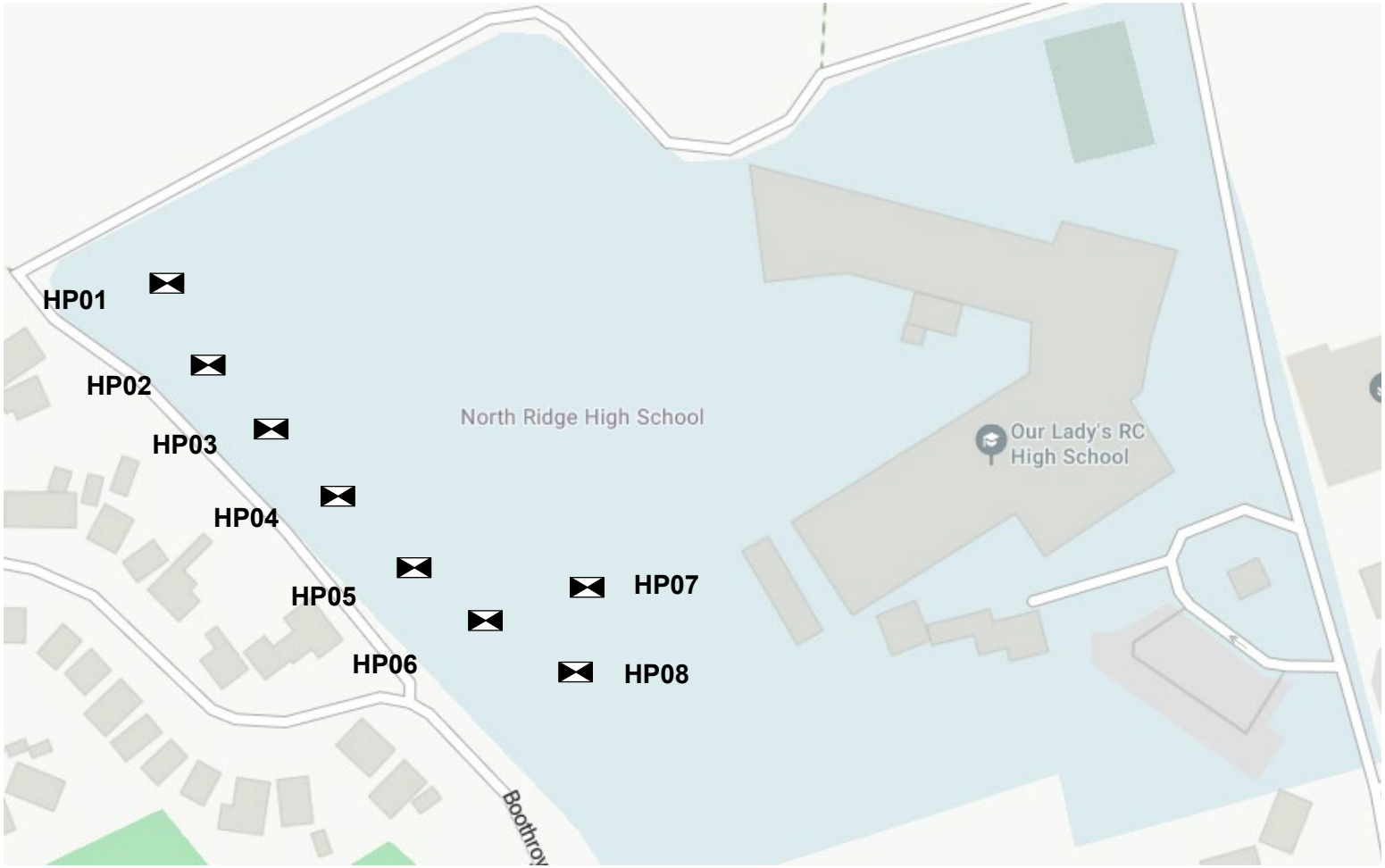
J. ENGLISH LTD
site engineering

Client / Location: Our Lady's RC High School
Alsorth Road, Higher Blackley, Manchester

J. English Ltd
The Croft, Lane Side Farm
Wakes Lane, Longridge
Preston, Lancashire
PR3 3BN
Tel: 07748223741

To local grid based on ostrn Sloagrn15

Drawing Number: 388-Our Lady's RC High School | Revision:A
Drawn By: JE | Checked By: PS
Date: 19/11/2023 | Scale: 1:200 @ A0



Trial Pit Location

GeoEnviro Solutions Ltd
Unit 7 Springvale Works
Brighouse
West Yorkshire
HD6 2RA
Tel: 01484 986010
Email: info@geoenvirosolutions.com
Web: www.geoenvirosolutions.com

PROJECT NAME Alworth Road, Manchester **PROJECT NUMBER** 4465-23	**DRAWING NO.** 4465-23/02	**SCALE** N.T.S
TITLE Hand Pit Location Plan	**DATE** January 2024	**DRAWN BY** JF

APPENDIX 2

SITE PHOTOGRAPHS

Site: Our Lady's RC High School
Client: Our Lady's RC High School
Job Reference: 4465-23

GEOENVIRO
SOLUTIONS LIMITED

A.

B.

C.

D.

A. Material risen to the surface of the spoil mound

B. General photo of the mound viewed generally northwards

C. General photo of the mound viewed generally southwards

D. Close up of the mound interacting with the larger playing field

Site: Alworth Road, Manchester
Client: Our Lady's RC High School
Job Reference: 4465-23

GEOENVIRO
SOLUTIONS LIMITED

E.

F.

G.

E. Example of the hand pits where samples were collected

F. Materials recovered from hand pitting

G. Photo representative of the base of the hand pits

APPENDIX 3

EXPLORATORY HOLE LOGS

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP01	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP02	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP03	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP04	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP05	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

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Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP06	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

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Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP07	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

Trial Pit Log

Project Name: Alworth Road, Manchester	Client: Our Lady's RC High School	Date: 03/01/2024
Location: Alworth Road, Manchester	Contractor: GeoEnviro Solutions	
Project No. : 4465-23	Crew Name: GeoEnviro Solutions	Equipment: Insulated Hand Tools

Location Number	Location Type	Level	Logged By	Scale	Page Number
HP08	TP		JF	1:10	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Soft, greyish brown sandy gravelly CLAY. Gravels are medium of concrete and red brick.
					0.50			End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. No visual or olfactory evidence of hydrocarbon contamination was noted. 2. Groundwater was not encountered. 3. The trial pit was backfilled with arisings.

APPENDIX 4

CHEMICAL TESTING RESULTS

ANALYTICAL TEST REPORT

Contract no: 129455

Contract name: Alworth Road, Manchester

Client reference: 4465-23

Clients name: GeoEnviro Solutions

Clients address: Unit 7 Springvale Works
Brookfoot Lane
Brighouse
HD2 6RA

Samples received: 05 January 2024

Analysis started: 05 January 2024

Analysis completed: 16 January 2024

Report issued: 16 January 2024

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by:

Samantha Rogerson
Reporting Manager

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
129455-1	TP01	0.50	Loamy Clay	-	-	18.6
129455-2	TP02	0.50	Loamy Clay with Gravel	-	-	12.9
129455-3	TP03	0.50	Loamy Clay with Gravel	-	-	16.1
129455-4	TP04	0.50	Loamy Clay with Gravel	-	-	14.5
129455-5	TP05	0.50	Loamy Clay with Gravel	-	-	13.9
129455-6	TP06	0.50	Loamy Clay with Gravel	-	-	14.5
129455-7	TP07	0.50	Loamy Clay with Gravel	-	-	15.8
129455-8	TP08	0.50	Loamy Clay with Gravel	-	-	16.4

Chemtech Environmental Limited

SOILS

Lab number			129455-1	129455-2	129455-3	129455-4	129455-5	129455-6
Sample id			TP01	TP02	TP03	TP04	TP05	TP06
Depth (m)			0.50	0.50	0.50	0.50	0.50	0.50
Date sampled			03/01/2024	03/01/2024	03/01/2024	03/01/2024	03/01/2024	03/01/2024
Test	**Method**	**Units**						
Arsenic (total)	CE264[M]	mg/kg As	4.6	4.4	6.5	6.5	7.8	7.0
Cadmium (total)	CE264[M]	mg/kg Cd	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Chromium (total)	CE264[U]	mg/kg Cr	18.4	20.2	26.4	27.7	26.2	26.5
Chromium (III)	CE208	mg/kg CrIII	18.4	20.2	26.4	27.7	26.2	26.5
Chromium (VI)	CE263	mg/kg CrVI	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Copper (total)	CE264[M]	mg/kg Cu	15.2	15.7	21.8	26.9	21.4	22.0
Lead (total)	CE264[U]	mg/kg Pb	18.6	19.9	30.0	30.8	30.0	32.2
Mercury (total)	CE264[U]	mg/kg Hg	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Nickel (total)	CE264[M]	mg/kg Ni	16.7	15.7	22.3	24.8	20.5	20.0
Selenium (total)	CE264	mg/kg Se	<3	<3	<3	<3	<3	<3
Zinc (total)	CE264[M]	mg/kg Zn	46.0	44.1	61.4	62.4	61.1	65.9
pH	CE004 [M]	units	8.6	8.7	8.3	8.3	8.3	8.4
Sulphate (2:1 water soluble)	CE061 [U]	mg/l SO_4	234	107	210	105	207	70
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	1.5	1.5	1.8	1.6	1.7	1.8
Estimate of OMC (calculated from TOC)	CE197	% w/w	2.5	2.6	3.1	2.8	3.0	3.0
PAH								
Naphthalene	CE087 [M]	mg/kg	0.03	0.25	<0.02	0.18	0.04	0.04
Acenaphthylene	CE087 [M]	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	CE087 [M]	mg/kg	0.03	0.47	0.03	0.48	0.05	0.08
Fluorene	CE087 [U]	mg/kg	0.03	0.39	0.03	0.39	0.06	0.06
Phenanthrene	CE087 [M]	mg/kg	0.20	1.66	0.22	2.71	1.15	0.66
Anthracene	CE087 [U]	mg/kg	0.08	0.49	0.08	0.75	0.29	0.26
Fluoranthene	CE087 [M]	mg/kg	0.46	1.27	0.43	2.82	3.16	1.51
Pyrene	CE087 [M]	mg/kg	0.42	1.07	0.39	2.59	2.59	1.34
Benzo(a)anthracene	CE087 [U]	mg/kg	0.26	0.45	0.21	1.27	1.44	0.70
Chrysene	CE087 [M]	mg/kg	0.26	0.41	0.17	1.15	1.31	0.71
Benzo(b)fluoranthene	CE087 [M]	mg/kg	0.25	0.43	0.20	1.20	1.14	0.70
Benzo(k)fluoranthene	CE087 [M]	mg/kg	0.12	0.16	0.08	0.46	0.47	0.31
Benzo(a)pyrene	CE087 [U]	mg/kg	0.22	0.35	0.19	1.02	0.97	0.62
Indeno(123cd)pyrene	CE087 [M]	mg/kg	0.14	0.22	0.12	0.64	0.57	0.40
Dibenz(ah)anthracene	CE087 [M]	mg/kg	0.03	<0.02	0.02	0.12	0.12	0.09
Benzo(ghi)perylene	CE087 [M]	mg/kg	0.13	0.24	0.11	0.62	0.53	0.41
PAH (total of USEPA 16)	CE087	mg/kg	2.66	7.87	2.28	16.4	13.9	7.89

Chemtech Environmental Limited

SOILS

Lab number			129455-1	129455-2	129455-3	129455-4	129455-5	129455-6
Sample id			TP01	TP02	TP03	TP04	TP05	TP06
Depth (m)			0.50	0.50	0.50	0.50	0.50	0.50
Date sampled			03/01/2024	03/01/2024	03/01/2024	03/01/2024	03/01/2024	03/01/2024
Test	**Method**	**Units**						
BTEX & TPH								
MTBE	$	mg/kg	<1	<1	<1	<1	<1	<1
Benzene	$	mg/kg	<1	<1	<1	<1	<1	<1
Toluene	$	mg/kg	<1	<1	<1	<1	<1	<1
Ethylbenzene	$	mg/kg	<1	<1	<1	<1	<1	<1
m & p-Xylene	$	mg/kg	<1	<1	<1	<1	<1	<1
o-Xylene	$	mg/kg	<1	<1	<1	<1	<1	<1
VPH Aromatic (>EC5-EC7)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH Aromatic (>EC7-EC8)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH Aromatic (>EC8-EC10)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	3	<0.5
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<2	<2	<2	11	<2	<2
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	<5	8	<5.1	45	12	11
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	<1.5	5	3	13	4	4
VPH Aliphatic (>C5-C6)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH Aliphatic (>C6-C8)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VPH Aliphatic (>C8-C10)	$	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<0.5	<0.5	<0.5	1	<0.5	<0.5
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<4.5	<4.5	<4.6	<4.6	<4.5	<4.5
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<1	<1	<1	1	<1	<1
Subcontracted Analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			129455-7	129455-8
Sample id			TP07	TP08
Depth (m)			0.50	0.50
Date sampled			03/01/2024	03/01/2024
Test	**Method**	**Units**		
Arsenic (total)	CE264[M]	mg/kg As	6.8	7.1
Cadmium (total)	CE264[M]	mg/kg Cd	<1.6	<1.6
Chromium (total)	CE264[U]	mg/kg Cr	26.1	25.2
Chromium (III)	CE208	mg/kg CrIII	26.1	25.2
Chromium (VI)	CE263	mg/kg CrVI	<0.04	<0.04
Copper (total)	CE264[M]	mg/kg Cu	23.7	22.2
Lead (total)	CE264[U]	mg/kg Pb	31.9	33.0
Mercury (total)	CE264[U]	mg/kg Hg	<0.7	<0.7
Nickel (total)	CE264[M]	mg/kg Ni	22.2	19.5
Selenium (total)	CE264	mg/kg Se	<3	<3
Zinc (total)	CE264[M]	mg/kg Zn	67.0	62.3
pH	CE004 [M]	units	8.3	8.6
Sulphate (2:1 water soluble)	CE061 [U]	mg/l SO_4	119	89
Cyanide (total)	CE077	mg/kg CN	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	2.3	2.2
Estimate of OMC (calculated from TOC)	CE197	% w/w	3.9	3.8
PAH				
Naphthalene	CE087 [M]	mg/kg	0.11	0.07
Acenaphthylene	CE087 [M]	mg/kg	<0.02	<0.02
Acenaphthene	CE087 [M]	mg/kg	0.12	0.15
Fluorene	CE087 [U]	mg/kg	0.10	0.13
Phenanthrene	CE087 [M]	mg/kg	0.76	1.00
Anthracene	CE087 [U]	mg/kg	0.36	0.31
Fluoranthene	CE087 [M]	mg/kg	1.32	1.54
Pyrene	CE087 [M]	mg/kg	1.20	1.33
Benzo(a)anthracene	CE087 [U]	mg/kg	0.68	0.69
Chrysene	CE087 [M]	mg/kg	0.73	0.71
Benzo(b)fluoranthene	CE087 [M]	mg/kg	0.69	0.75
Benzo(k)fluoranthene	CE087 [M]	mg/kg	0.30	0.34
Benzo(a)pyrene	CE087 [U]	mg/kg	0.57	0.64
Indeno(123cd)pyrene	CE087 [M]	mg/kg	0.42	0.37
Dibenz(ah)anthracene	CE087 [M]	mg/kg	0.08	0.09
Benzo(ghi)perylene	CE087 [M]	mg/kg	0.38	0.40
PAH (total of USEPA 16)	CE087	mg/kg	7.82	8.52

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SOILS

Lab number			129455-7	129455-8
Sample id			TP07	TP08
Depth (m)			0.50	0.50
Date sampled			03/01/2024	03/01/2024
Test	**Method**	**Units**		
BTEX & TPH				
MTBE	$	mg/kg	<1	<1
Benzene	$	mg/kg	<1	<1
Toluene	$	mg/kg	<1	<1
Ethylbenzene	$	mg/kg	<1	<1
m & p-Xylene	$	mg/kg	<1	<1
o-Xylene	$	mg/kg	<1	<1
VPH Aromatic (>EC5-EC7)	$	mg/kg	<0.05	<0.05
VPH Aromatic (>EC7-EC8)	$	mg/kg	<0.05	<0.05
VPH Aromatic (>EC8-EC10)	$	mg/kg	<0.05	<0.05
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<0.5	<0.5
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<1	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	3	3
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	21	16
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	5	3
VPH Aliphatic (>C5-C6)	$	mg/kg	<0.05	<0.05
VPH Aliphatic (>C6-C8)	$	mg/kg	<0.05	<0.05
VPH Aliphatic (>C8-C10)	$	mg/kg	<0.05	<0.05
EPH Aliphatic (>C10-C12)	CE250	mg/kg	1	1
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<0.5	<0.5
EPH Aliphatic (>C16-C35)	CE250	mg/kg	7	<4.5
EPH Aliphatic (>C35-C44)	CE250	mg/kg	1	<1
Subcontracted Analysis				
Asbestos (qualitative)	$	-	NAD	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE264	Arsenic (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.8	mg/kg As
CE264	Cadmium (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cd
CE264	Chromium (total)	Aqua Regia Extraction, ICPOES	Dry	U	2	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE263	Chromium (VI)	Discrete Analyser	Dry			mg/kg CrVI
CE264	Copper (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cu
CE264	Lead (total)	Aqua Regia Extraction, ICPOES	Dry	U	2.3	mg/kg Pb
CE264	Mercury (total)	Aqua Regia Extraction, ICPOES	Dry	U	0.7	mg/kg Hg
CE264	Nickel (total)	Aqua Regia Extraction, ICPOES	Dry	M	2.1	mg/kg Ni
CE264	Selenium (total)	Aqua Regia Extraction, ICPOES	Dry	U	3	mg/kg Se
CE264	Zinc (total)	Aqua Regia Extraction, ICPOES	Dry	M	4	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE159	Sulphate (2:1 water soluble)	Rapid method, aqueous extraction, ICP-OES	Dry		10	mg/l SO_4
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		1	mg/kg
$	MTBE	Headspace GC-FID	As received	U	1	mg/kg
$	Benzene	Headspace GC-FID	As received	U	1	mg/kg
$	Toluene	Headspace GC-FID	As received	U	1	mg/kg
$	Ethylbenzene	Headspace GC-FID	As received	U	1	mg/kg
$	m & p-Xylene	Headspace GC-FID	As received	U	1	mg/kg
$	o-Xylene	Headspace GC-FID	As received	U	1	mg/kg
$	BTEX (total)	Headspace GC-FID	As received		1	mg/kg
$	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.05	mg/kg
$	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.05	mg/kg
$	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.05	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE250	EPH Aromatic (>EC10-EC12)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aromatic (>EC12-EC16)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC16-EC21)	Solvent extraction, GCxGC-FID	As received		2	mg/kg
CE250	EPH Aromatic (>EC21-EC35)	Solvent extraction, GCxGC-FID	As received		5	mg/kg
CE250	EPH Aromatic (>EC35-EC44)	Solvent extraction, GCxGC-FID	As received		1.5	mg/kg
$	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.05	mg/kg
$	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.05	mg/kg
$	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.05	mg/kg
CE250	EPH Aliphatic (>C10-C12)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aliphatic (>C12-C16)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aliphatic (>C16-C35)	Solvent extraction, GCxGC-FID	As received		4.5	mg/kg
CE250	EPH Aliphatic (>C35-C44)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
129455-1	TP01	0.50	N	
129455-2	TP02	0.50	N	
129455-3	TP03	0.50	N	
129455-4	TP04	0.50	N	
129455-5	TP05	0.50	N	
129455-6	TP06	0.50	N	
129455-7	TP07	0.50	N	
129455-8	TP08	0.50	N	

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Soil/Solid samples will be disposed of 4 weeks from initial receipt unless otherwise agreed.

Waters and leachate samples will be disposed of 2 weeks from report issue unless otherwise agreed.

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BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.

Moisture Content Calculated on a Wet Weight basis

APPENDIX 5

CHEMICAL SCREENING CRITERIA

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Metals/metalloids																			
Arsenic	37			40			43			640			79			170			LQM (2014)
Beryllium	1.7			1.7			35			12			2.2			63			LQM (2014)
Boron	290			11000			45			240000			21000			46000			LQM (2014)
Cadmium	11			85			1.9			190			120			532			LQM (2014)
Chromium III	910			910			18000			8600			1500			33000			LQM (2014)
Chromium VI	6			6			1.8			33			7.7			220			LQM (2014)
Copper	2400			7100			520			68000			12000			44000			LQM (2014)
Lead	200			310			80			2330			630			1300			C4SL
Mercury (elemental)	1.2			1.2			21			58 (25.8)			16			30 (25.8)			LQM (2014)
Mercury (Inorganic)	40			56			19			1100			120			240			LQM (2014)
Methylmercury	11			15			6			320			40			68			LQM (2014)
Nickel	180			180			230			980			230			3400			LQM (2014)
Selenium	250			430			88			12000			1100			1800			LQM (2014)
Vanadium	410			1200			91			9000			2000			5000			LQM (2014)
Zinc	3700			40000			620			730000			81000			170000			LQM (2014)
Other																			
Total Sulphate	2,400			2,400			2,400			2,400			2,400			2,400			BRE (2005)
Water Soluble Sulphate (g/l)	0.5			0.5			0.5			0.5			0.5			0.5			BRE (2005)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
PAHs																			
Acenaphthene	210	510	1100	3000 (57)	4700(141)	6000 (336)	34	85	200	84000 (57)	97000 (141)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Acenaphthylene	170	420	920	2900 (86.1)	4600 (212)	6000 (506)	28	69	160	8300 (86.1)	97000 (212)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Anthracene	2400	5400	11000	31000 (1.17)	35000	37000	380	950	2200	520000	540000	540000	74000	74000	74000	150000	150000	150000	LQM (2014)
Benzo(a)anthracene	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	LQM (2014)
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	LQM (2014)
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	0.99	2.1	3.9	44	44	45	7.1	7.1	7.1	13	15	16	LQM (2014)
Benzo(g,h,i)perylene	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	LQM (2014)
Benzo(k)fluoranthene	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	LQM (2014)
Chrysene	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	LQM (2014)
Dibenz(a,h)anthracene	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.61	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	LQM (2014)
Fluoranthene	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	63	6300	6400	LQM (2014)
Fluorene	170	400	860	2800 (30.9)	3800 (76.5)	4500 (183)	27	67	160	63000 (30.9)	68000	71000	9900	9900	9900	20000	20000	20000	LQM (2014)
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Naphthalene	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190 (76.4)	460 (183)	1100 (432)	4900	4900	4900	1200 (76.4)	1900 (183)	3000	LQM (2014)
Phenanthrene	95	220	440	1300 (36)	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	LQM (2014)
Pyrene	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	LQM (2014)
Coal Tar (BaP as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	LQM (2014)
BTEX and TPH																			
Benzene	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	LQM (2014)
Toluene	130	290	660	880 vap (869)	1900	3900	22	51	120	56000 vap (869)	110000 vap (1920)	180000 vap (4360)	56000	56000	56000	87000 vap (869)	95000 vap (1920)	100000 vap (4360)	LQM (2014)
Ethylbenzene	47	110	260	83	190	440	16	39	91	5700 vap (518)	13000 vap (1220)	27000 vap (2840)	24000	24000	25000	17000 vap (518)	22000 vap (1220)	27000 vap (2840)	LQM (2014)
Xylene - o	60	140	330	88	210	480	28	67	160	6600 (478)	15000 (1120)	33000 (2620)	41000	42000	43000	17000 (478)	24000 (1120)	33000 (2620)	LQM (2014)
Xylene - m	59	140	320	82	190	450	31	74	170	6200 (625)	14000 (1470)	31000 (3460)	41000	42000	43000	17000 (625)	24000 (1470)	32000 (3460)	LQM (2014)
Xylene - p	56	130	310	79	180	430	29	69	160	5900 (576)	14000 (1350)	30000 (3170)	41000	42000	43000	17000 (576)	23000 (1350)	31000 (3170)	LQM (2014)
Aliphatic EC 5-6	42	78	160	42	78	160	730	1700	3900	3200 (304)	5900 (558)	12000 (1150)	570000 (304)	590000	600000	95000 (304)	130000 (558)	180000 (1150)	LQM (2014)
Aliphatic EC >6-8	100	230	530	100	230	530	2300	5600	13000	7800 (144)	17000 (322)	40000 (736)	600000	610000	620000	150000 (144)	220000 (322)	320000 (736)	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Aliphatic EC >8-10	27	65	150	27	65	150	320	770	1700	2000 (78)	4800 (190)	11000 (451)	13000	13000	13000	14000 (78)	18000 (190)	21000 (451)	LQM (2014)
Aliphatic EC >10-12	130 (48)	330 (118)	760 (283)	130 (48)	330 (118)	760 (283)	2200	4400	7300	9700 (48)	23000 (118)	47000 (283)	13000	13000	13000	21000 (48)	23000 (118)	24000(283)	LQM (2014)
Aliphatic EC >12-16	1100 (24)	2400 (59)	4300 (142)	1100 (24)	2400 (59)	4300 (142)	11000	13000	13000	59000 (24)	82000 (59)	90000 (142)	13000	13000	13000	25000 (24)	25000 (59)	26000 (142)	LQM (2014)
Aliphatic EC >16-35	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aliphatic EC >35-44	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aromatic EC 5-7	70	140	300	370	690	1400	13	27	57	26000 (1220)	46000 (2260)	86000 (4710)	56000	56000	56000	76000 (1220)	84000 (2260)	92000 (4710)	LQM (2014)
Aromatic EC >7-8	130	290	660	860	1800	3900	22	51	120	56000 (869)	110000 (1920)	180000 (4360)	56000	56000	56000	87000 (869)	95000 (1920)	100000 (4360)	LQM (2014)
Aromatic EC >8-10	34	83	190	47	110	270	8.6	21	51	3500 (613)	8100 (1500)	17000 (3580)	5000	5000	5000	7200 (613)	8500 (1500)	9300 (3580)	LQM (2014)
Aromatic EC >10-12	74	180	380	250	590	1200	13	31	74	16000 (364)	28000 (899)	34000 (2150)	5000	5000	5000	9200 (364)	9700 (899)	10000	LQM (2014)
Aromatic EC >12-16	140	330	660	1800	2300 (419)	2500	23	27	130	36000 (169)	37000	38000	5100	5100	5000	10000	10000	10000	LQM (2014)
Aromatic EC >16-21	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	LQM (2014)
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Aromatic EC >35-44	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >44-75	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
VOCs																			
1,2-dichloroethane (1,2-DCA)	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	LQM (2014)
1,1,1-trichloroethane	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000 (1425)	76000 (2915)	100000 (6392)	LQM (2014)
1,1,2,2,tetrachloroethane	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	LQM (2014)
tetrachloroethene	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	45	95	1400	1400	1400	810 (424)	1100 (951)	1500	LQM (2014)
tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	LQM (2014)
Trichloroethene	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	LQM (2014)
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	LQM (2014)
Chloroethene (Vinyl chloride)	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	LQM (2014)
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
RDX	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000 (18.7)	51000	53000	LQM (2014)
HMX	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000 (0.35)	23000 (0.39)	24000 (0.48)	LQM (2014)
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	LQM (2014)
Dieldrin	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	LQM (2014)
Atrazine	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	LQM (2014)
Dichlovos	0.032	0.066	0.014	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	LQM (2014)
Alpha-Endosulfan	7.4	18	41	160 (0.003)	280 (0.007)	410 (0.016)	1.2	2.9	6.8	5600 (0.003)	7400 (0.007)	8400 (0.016)	1200	1200	1200	2400	2400	2500	LQM (2014)
alpha-Hexachlorocyclohexane	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	LQM (2014)
beta-hexachlorocyclohexanes	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	LQM (2014)
gamma-hexachlorocyclohexanes	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	LQM (2014)
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300 (675)	2000 (1520)	2900	LQM (2014)
1,2-Dichlorobenzene	23	55	130	24	57	130	94	230	540	2000 (571)	4800 (1370)	11000 (3240)	90000	95000	98000	24000 (571)	36000 (1370)	51000 (3240)	LQM (2014)
1,3-Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
1,4-Dichlorobenzene	61	150	350	61	150	350	15	37	88	4400 (224)	10000 (540)	25000 (1280)	17000	17000	17000	36000 (224)	36000 (540)	36000 (1280)	LQM (2014)
VOCs Continued																			
1,2,3-Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770 (134)	1100 (330)	1600 (789)	LQM (2014)
1,2,4-Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700 (318)	2600 (786)	4000 (1880)	LQM (2014)
1,3,5-Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380 (36.7)	580 (90.8)	860 (217)	LQM (2014)
1,2,3,4-Tetrachlorobenzene	15	36	78	24	56	120	4.4	11	26	1700 (122)	3080 (304)	4400 (728)	830	830	830	1500 (122)	1600	1600	LQM (2014)
1,2,3,5-Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49 (39.4)	120 (98.1)	240 (235)	78	79	79	110 (39)	120	130	LQM (2014)
1,2,4,5-Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42 (19.7)	72 (49.1)	96	13	13	13	25	26	26	LQM (2014)
Pentachlorobenzene	5.8	12	22	19	30	38	1.2	3.1	7	640 (43)	770 (107)	830	100	100	100	190	190	190	LQM (2014)
Hexachlorobenzene	1.8 (0.2)	3.3 (0.5)	4.9	4.1 (0.2)	5.7 (0.5)	6.7 (1.2)	0.47	1.1	2.5	110 (0.2)	120	120	16	16	16	30	30	30	LQM (2014)
Phenol	280	550	1100	750	1300	2300	66	140	280	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Chlorophenols (excluding pentachlorophenol)	0.87 (g)	2	4.5	94	150	210	0.13 (g)	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	LQM (2014)
Pentachlorophenol	0.22	0.52	1.2	27 (16.4)	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	LQM (2014)
Carbon Disulphide	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	LQM (2014)
Hexachlorobutadiene	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	LQM (2014)

(g) derived based on 2,3,4,6-tetrachlorophenol; dir - based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only); (vap) calculated for vapour phase only. SOM – Soil Organic Matter; (4.5) solubility.

APPENDIX 6

RISK ASSESSMENT MATRIX

Preliminary Risk Assessment Methodology (After NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination (2008))

NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination (2008) sets out a methodology for the estimation of risk.

At Phase I the risk estimation will take the form of a qualitative risk assessment, which will be entirely based on the conceptual model for each potential end-use of the site. Comments on level of uncertainty will also need to be included for each source-pathway-target linkage to allow the confidence in the assessed risks to be understood. The results of the qualitative risk assessment will allow the risk evaluation to be concisely described in the following chapters.

The methodology for risk evaluation is a qualitative method for interpreting the output for the risk estimation stage of the assessment. It involves the classification of the:

The magnitude of probability (i.e. likelihood).
[takes into account both the presence of the hazard and receptor and the integrity of the pathway]

The magnitude of the potential consequence (i.e. severity).
[takes into account both the potential severity of the hazard and the sensitivity of the receptor]

Classification of Probability

Classification	Definition	Examples
High likelihood (Hi)	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable in the long term, or there is evidence at the receptor of harm or pollution.	*A) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden.* *B) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years*
Likely (Li)	There is a pollutant linkage, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	*A) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space.* *B) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.*
Low likelihood (Lw)	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the short term.	*A) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space.* *B) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.*
Unlikely (Ul)	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.	*A) Elevated concentrations of toxic contaminants are present below hardstanding.* *B) Light industrial unit <10 yrs old containing a double skinned UST with annual integrity testing results available.*

Preliminary Risk Assessment Methodology (After NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination (2008))

Classification of Consequence

	Definition	Examples
Severe (Sv)	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. A Category 1: Human Health risk is present. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long - term maintenance of the population. Catastrophic damage to crops, buildings or property.	*Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.* *Major fish kill in surface water from large spillage of contaminants from site.* *Highly elevated concentrations of List I and substances present in groundwater close to small potable abstraction (high sensitivity).* *Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).*
Medium (Md)	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. A Category 2: Human Health risk is present. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	*Significant harm to humans is defined in circular 01/2006 as death, disease* serious injury, genetic mutation, birth defects or the impairment of reproductive functions.* *Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability.* *Ingress of contaminants through plastic potable water pipes.*
Mild (Ml)	Exposure to human health unlikely to lead to "significant harm". A Category 3 Human Health risk is present. Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population Minor damage to crops, buildings or property.	*Exposure could lead to slight short - term effects (e.g. mild skin rash).* *Surface spalling of concrete.*
Minor (Mr)	No measurable effect on humans.A Category 4: Human Health risk is present. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.	*The presence of contaminants at such concentrations that protective equipment is required during site works.* *The loss of plants in a landscaping scheme.* *Discoloration of concrete.*

* For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned.

The classification of consequence does not take into account the probability of the consequence being realized. Therefore, there may be more than one consequence for a particular pollutant linkage. Both a severe and medium classification can result in death. Severe relates to short term (acute) risk while medium relates to long

term (chronic) risk. Mild relates to significant harm but to less sensitive receptors. Minor classification relates to harm which is not significant but could have a financial cost.

The classification gives a guide as to the severity and consequence of identified risk when compared with other risk presented on the site. It should be noted that if a risk is identified it cannot be classified as "no risk" but as "very low risk". Differing stakeholders may have a different view on the acceptability of a risk.

Risk Evaluation Matrix

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High likelihood (Hi)	Very high risk (VH)	High Risk (H)	Moderate Risk (M)	Mod/low risk (M/L)
	Likely (Li)	High risk (H)	Moderate risk (M)	Mod/low risk (M/L)	Low risk (L)
	Low likelihood (Lw)	Moderate risk (M)	Mod/low risk (M/L)	Low risk (L)	Very low risk (VL)
	Unlikely (Ul)	Mod/low risk (M/L)	Low risk (L)	Very low risk (VL)	Very low risk (VL)

Risk Categorizations

Very high risk (VH)	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realized, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk (H)	Harm is likely to arise to a designated receptor from an identified hazard. Realization of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer-term.
Moderate risk (M)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk (L)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realized, would at worst normally be mild.
Very low risk (VL)	There is a low possibility that harm could arise to a receptor. In the event of such harm being realized it is not likely to be severe.

Reference

Rudland, D J, Lancefield, R M, Mayell, P N; 2001; Contaminated land Risk Assessment. A guide to Good Practice; CIRIA Report C552.

The NHBC (National House-Building Council) the Environment Agency and the Chartered Institute of Environmental Health, 2008, Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66.