



SOLUTIONS LIMITED

REMEDIATION STRATEGY
FOR
LAND ADJACENT TO NO. 7, TOWN GATE,
SCHOLES
FOR
MR D. BLACKBURN

Report Reference: GES 2371-22 RS

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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
SPT	Standard Penetration Test
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

Following a Phase II Ground Investigation and Updated Risk Assessment undertaken by GeoEnviro Solutions Ltd, elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and Total Petroleum Hydrocarbon (TPH) fractions were identified within the reworked topsoil present across the site. The Phase II report recommended that a Remediation Strategy be prepared to set out the measures required to mitigate the identified risks and render the site suitable for the proposed residential development.

GeoEnviro Solutions Ltd (GES) were instructed by Mr D. Blackburn (the Client) to prepare a Remediation Strategy for land adjacent to Number 7, "Fieldhead", Town Gate, Scholes, BD19 6ET.

A site location plan is presented as Drawing No. GES 2371-22/01 in **Appendix 1**.

1.2 PROPOSED DEVELOPMENT

It is proposed to construct a new two-storey, three-bedroom residential property at the site, which currently forms part of the garden of the adjoining residential property. Planning permission has been granted by Kirklees Metropolitan District Council under application reference 2017/60/90589/E.

The risk assessment undertaken, and subsequent Remediation Strategy proposed in this report is therefore based on the proposed development as outlined here. Any variation from this may require a re-assessment and the Conceptual Site Model updating accordingly.

1.3 PREVIOUS INVESTIGATIONS

Previous assessments conducted at the site comprise the following:

- Desk Study
- Phase II

It is recommended that the above reports are read in conjunction with this report and that the appointed Remediation Contractor familiarise themselves with the reports and comply with all relevant recommendations contained therein.

2. SITE SETTING

2.1 SITE INFORMATION

Location

The site is located adjacent to Number 7, “Fieldhead”, Town Gate, Scholes, at approximate National Grid Reference NGR: 416865, 425910.

Topography

The site slopes gently from north to south. The northern site boundary appears to retain approximately 0.5 m of the neighbouring garden and the southern boundary appears to retain approximately 0.5 m to 1.0 m of the site. The surrounding area gently slopes to the southeast.

Access

Access to the site is via the driveway for No. 7, “Fieldhead”. No restrictions were encountered during the Phase II ground investigation.

Site Description

The site comprises a residential garden associated with No. 7, “Fieldhead”. Mature planting is present along the northern boundary, additional planting is present within the centre and east of the site, and mature trees are present along the southern boundary. The remaining site area is grassed, with a small garden shed located in the northwest of the site.

2.2 SITE HISTORY

The Phase I assessment identified potential on-site Made Ground associated with recent construction activities and the possible presence of ground gas associated with underground coal workings. Off-site sources were also considered to include ground gas associated with underground coal workings. The site was understood to have been used for the storage of building materials, although no visual or olfactory evidence of contamination was recorded during the Phase II investigation.

2.3 RECORDED GEOLOGY

Published geological mapping indicates that the site is underlain by the Pennine Lower Coal Measures Formation, including an unnamed sandstone unit. No superficial deposits are recorded beneath the site. An inferred northwest-southeast trending fault is recorded to pass through the south of the site. The Phase II investigation encountered reworked topsoil/Made Ground over residual Pennine Lower Coal Measures strata and bedrock, with intact coal considered representative of the Linfit Lousey Coal seam encountered at depths of approximately 7.80 m to 8.00 m below ground level.

2.4 HYDROLOGY AND HYDROGEOLOGY

There are no major surface watercourses within 250 m of the site. The bedrock is classified as a Secondary A aquifer and the site lies within an area where groundwater is considered to have medium vulnerability to mobile pollutants. Groundwater was generally not encountered during the intrusive investigation, although monitoring recorded standing water in SN01 at depths between approximately 2.92 m and 3.75 m below ground level, with WS01 and WS02 remaining dry during the reported monitoring visits.

3. GROUND CONDITIONS

3.1 PREVIOUS GROUND INVESTIGATION

GES undertook intrusive ground investigation works between 30 June and 8 July 2022. The works included rotary boreholes, window sample boreholes and a sonic borehole to allow assessment of ground conditions, coal seam risk, contamination, groundwater and ground gas. Combined gas and groundwater monitoring standpipes were installed in WS01, WS02 and SN01, followed by gas and groundwater monitoring.

3.2 PROVEN GROUND CONDITIONS

The investigation encountered reworked topsoil/Made Ground from ground level to depths of approximately 0.30 m to 0.40 m below ground level. This was underlain by residual Pennine Lower Coal Measures strata, generally comprising firm to stiff slightly sandy gravelly clay, followed by Pennine Lower Coal Measures bedrock comprising very weak sandstone and mudstone. Intact coal was encountered in RO01 and RO02 at depths of approximately 7.80 m to 8.30 m below ground level and was considered to pose a very low to negligible risk to surface stability. No visual or olfactory evidence of contamination was encountered during the investigation.

Chemical testing identified elevated concentrations of PAH congeners and TPH fractions within the reworked topsoil across the site. Exceedances were recorded for benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, naphthalene, aliphatic >C8-C10 and aromatic >C16-C21 fractions in shallow samples from WS01, WS02 and SN01. No asbestos fibres were recorded in the samples tested, and the natural residual PLCM soils did not record exceedances of the screening criteria adopted in the Phase II report.

Gas monitoring classified the site as Characteristic Situation 1 with respect to methane and carbon dioxide; however, carbon monoxide was recorded at a maximum concentration above the eight-hour trigger concentration referenced in the Phase II report. Protection against carbon monoxide is therefore required as part of the development design.

4. RISK ASSESSMENT AND TARGET CONCENTRATIONS

4.1 CONTAMINATED SOIL

Contamination requiring consideration within this remediation strategy comprises elevated PAH and TPH concentrations within the shallow reworked topsoil/Made Ground across the site. The principal contaminants of concern are benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, naphthalene, aliphatic >C8-C10 and aromatic >C16-C21 petroleum hydrocarbon fractions.

- Elevated PAH and TPH concentrations recorded within reworked topsoil/Made Ground at shallow depths of 0.00 m to 0.30 m below ground level in WS01, WS02 and SN01.

The identified contamination is present within the shallow reworked topsoil across the site. As investigations are undertaken using a point-specific approach, there remains the potential to encounter further localised, previously unidentified contamination during groundworks.

The shallow impacted reworked topsoil is not considered suitable for unrestricted re-use within proposed soft landscaped areas unless it can be demonstrated by appropriate testing and assessment to be suitable for the intended end use. Impacted soils requiring removal should either be disposed of off-site to a suitably licensed facility or managed under an agreed Materials Management Plan where suitable for re-use in appropriate locations.

The screening values adopted in the Phase II report were based on a residential with homegrown produce end use. The remediation strategy has therefore been prepared on the basis that the final development includes residential garden and soft landscaped areas where direct contact, ingestion and inhalation pathways could otherwise remain active.

4.2 HAZARDOUS GROUND GASES

Ground gas monitoring undertaken as part of the Phase II investigation classified the site as Characteristic Situation 1 with respect to methane and carbon dioxide, and therefore gas protection measures for methane and carbon dioxide are not required on that basis. However, carbon monoxide was recorded at a maximum concentration of 20 ppm and the Phase II report identified a moderate risk from carbon monoxide. Protection against carbon monoxide is therefore required within the building design.

The design of any carbon monoxide protection measures should be undertaken by a suitably qualified designer and agreed with the Local Planning Authority, Building Control and warranty provider as appropriate.

4.3 UPDATED CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

The Conceptual Site Model has been re-formulated based upon the results from the site 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 4.1, overleaf.

A summary of the risk assessment protocols, and subsequent risk assessment matrix is provided in [Appendix 4 and 5](#).

Table 4.1: Updated Conceptual Site Model.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Classification of Probability	Classification of Consequence	Level of Risk	Justification
On Site: Made Ground soils on site possibly containing elevated metals, other organics such as TPH, PAH or phenols.	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Considered inactive	-	-	Very Low Risk ●	Because no pollutant linkage has been identified, the risk is considered to be very low.
		Construction Workers	Considered potentially active	Likely	Mild	Moderate / Low Risk ●	Elevated concentrations of PAH congeners and TPH bands have been encountered within the reworked topsoil across the site. Construction workers are more likely to encounter potentially impacted soils that future users and visitors. The risk to construction workers can be mitigated through the use of appropriate PPE.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Considered potentially active	Low Likelihood	Mild	Low Risk ●	A low-risk rating has been assessed due to the possible presence of potentially contaminative sources on site, the presence of a Secondary (A) Aquifer within the bedrock underlying the site and an inferred fault being recorded in the southwest of the site.
	Permeation of water pipes	Construction materials, future end users and site visitors	Considered potentially active	Likely	Mild	Moderate / Low Risk ●	Hydrocarbons, especially aromatics are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary "barrier pipe" materials (e.g. polyethylene-aluminium-polyethylene) may be required by the water supply company.
	Uptake	Plant and Wildlife	Considered inactive	-	-	Very Low Risk ●	Because no pollutant linkage has been identified, the risk is considered to be very low.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Classification of Probability	Classification of Consequence	Level of Risk	Justification
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 Risk ●	Because no pollutant linkage has been identified, the risk is considered to be very low.
		Construction Workers	Considered potentially active	Unlikely	Mild	Very Low Risk ●	A low-risk rating has been assessed due to the previous construction / demolition works undertaken adjacent to the site and the site likely being used as a site compound. Construction workers are more likely to encountered potentially impacted soils that future users and visitors. The risk to construction workers can be mitigated through the use of appropriate PPE.
On-site / Offsite: Ground Gases (CH ₄ , CO ₂ , H ₂ S) from underground coal workings.	Gas migration and build up within buildings (explosion/asphyxiation risk)	Future end users and building structures.	Considered potentially active	Unlikely	Mild	Very Low Risk ●	Based on the gas monitoring undertaken, the site has been designated as CS1.
On-site / Offsite: Ground Gases (CO) from underground coal workings.	Gas migration and build up within buildings (poisoning)	Future end users and building structures.	Considered potentially active	Likely	Medium	Moderate ●	Protection against Carbon monoxide is required.

5. REMEDIATION STRATEGY (GENERAL)

The objectives of this remediation strategy are:

- Resolve any identified and potential contamination issues in order to protect environmental receptors and render the site suitable for the proposed development with respect to the National Planning Policy Framework (NPPF).
- To satisfy the Local Planning Authority (LPA), principally the Environmental Health and Highways Departments, and the National House Building Council (NHBC) that the remedial works provide a site suitable for the proposed development
- Render the site as unlikely to be defined as Contaminated Land as defined under Part 2A of the EPA.
- To minimise the impact to the environment and human health whilst undertaking the works.
- To discharge the relevant planning condition relating to contaminated land.
- In the interests of sustainability, to reduce requirements for excavation, offsite disposal and promote the use of existing site-won materials, providing they are suitable for the proposed end use.
- Outline the proposed verification strategy for agreement by the Local Planning Authority (LPA).

Where site-won materials are to be re-used, this should be undertaken in accordance with a Materials Management Plan prepared under the CL:AIRE Definition of Waste: Development Industry Code of Practice, where applicable. The Materials Management Plan should document how excavated materials will be assessed, segregated, re-used, placed or disposed of.

6. OPTIONS APPRAISAL

The Phase II report identified elevated PAH and TPH concentrations within shallow reworked topsoil/Made Ground across the site. The underlying natural residual PLCM soils did not record exceedances of the adopted screening criteria and no asbestos fibres were detected in the samples tested.

The principal remediation requirement is therefore to mitigate potential direct contact, ingestion and inhalation exposure pathways within proposed soft landscaped and garden areas, and to ensure that any shallow impacted soils are appropriately managed during construction.

Within areas of proposed buildings, hardstanding or other permanent cover, the pollutant linkage to future end users will be broken by the development construction, subject to suitable management of arisings and protection of construction workers during the works.

Within proposed soft landscaped areas, garden areas or any other areas where direct contact with soil could occur, a clean cover system is considered the most appropriate remedial approach. This should comprise removal of shallow reworked topsoil/Made Ground as necessary and replacement with clean, chemically suitable imported topsoil/subsoil, or placement of an approved clean cover system above a suitable marker layer.

The Phase II report also identified that protection against carbon monoxide is required. Carbon monoxide protection should be incorporated into the development design by others and verified during construction, where required by the Local Planning Authority, Building Control or warranty provider.

Whilst this option could be considered further, it is probable that removal to landfill will prove to offer the best cost vs time benefit in this instance.

Removal to landfill will:

- remove the primary source of any on-site organic contamination, having the secondary benefit of reducing the loading on the groundwater,
- reduce the production of hazardous ground gases and vapours by removing the source of biodegradation of the hydrocarbons.
- not resolve the presence of hydrocarbon contamination in the groundwater and its subsequent impact on the volatilising hydrocarbons.

On the basis of the Phase II recommendations, the proposed remediation should comprise:

- A watching brief during groundworks, including procedures for stopping works, notifying GES and the Local Planning Authority, and sampling any previously unidentified contamination.
- Management of shallow reworked topsoil/Made Ground impacted by PAH and TPH within soft landscaped and garden areas by removal and replacement with clean imported material, or by installation of an agreed clean cover system.
- Appropriate stockpiling, sampling, waste classification and off-site disposal of unsuitable or surplus impacted soils in accordance with Duty of Care requirements and waste classification guidance.

- Use of suitable potable water supply pipework, potentially including barrier pipe, subject to confirmation by the local water supply company.
- Incorporation of carbon monoxide protection measures within the building design, with design and verification undertaken by suitably qualified parties.
- Avoidance of soakaways within Made Ground, potentially contaminative ground or ground identified as contaminated, unless specifically agreed with the relevant regulators.
- Preparation of a validation report documenting the remediation works, imported material testing, cover thickness validation, waste documentation and verification of gas/carbon monoxide protection measures where installed.

7. REMEDIATION STRATEGY (DETAILED)

7.1 CONSTRUCTION ACTIVITIES

All site personnel shall undergo a site-specific health and safety induction prior to commencement of work on site.

Site cabins and welfare facilities are to be established at a location to be agreed with the Engineer. All welfare facilities must be established in accordance with the relevant health & safety statutory requirements. Provision shall be provided on site for car parking for all employees.

All visitors to site must enter and register at the main Site Office.

During the construction works, especially the groundworks, construction workers will be subject to an elevated level of risk.

As such, all personnel on site will comply with guidance provided in the Health and Safety Executive (HSE) document "Protection of Workers and the general public during the redevelopment of potentially Contaminated Land". In summary, the following should be provided by the appointed contractor:

- All staff to be suitably trained and competent.
- Protective clothing, footwear, glasses, suitable dust masks and gloves. (Personnel should be instructed in why and how they are to be used).
- Hand washing, eye washing and boot washing facilities.
- Damp down all exposed soils on site.
- Smoking shall be limited to designated areas.

If at any time during the works personnel begin to feel unwell, they are to inform the Engineer, who will determine appropriate action.

Access into excavations etc. must be controlled and undertaken in accordance with the CDM Regulations 2015, most notably Regulation 22, to mitigate risk of collapse or asphyxiation.

7.2 MANAGEMENT OF WATER

Groundwater shall be controlled in accordance with CIRIA report 113 "Control of Groundwater for Temporary Works".

Arrangements shall be made to prevent ponding in any excavation "hollows" ; the Contractor shall ensure that ground levels are of sufficient gradient to enable the collection of surface water run-off in sumps or grips.

The Contractor shall make all necessary arrangements to prevent off-site migration of contaminated sediment via surface water run-off, or through redundant drainage channels.

A Silt Management Plan shall be prepared by the Contractor, describing the mitigation measures that will be put in place to intercept direct run-off from any disturbed areas, stockpiles etc, thereby preventing any potential impact of adjacent land and nearby watercourses. Surface water run-off will probably require treatment (as a minimum to allow settlement of fines) prior to consented discharge.

7.3 REMOVAL OF BELOW GROUND OBSTRUCTIONS

Obstructions in the form of relic foundations and infrastructure may be found on site during groundworks.

Suitable materials derived from the grubbing-up shall be stored in a location on site, to be agreed with the engineer, prior to crushing. Any unsuitable materials shall be removed to a suitable licensed landfill site as stipulated within the Materials Management Plan.

7.4 CONTAMINATED SOILS

The proposed development comprises a new two-storey, three-bedroom residential property with associated garden and landscaped areas. Shallow reworked topsoil/Made Ground across the site has recorded PAH and TPH exceedances and is therefore not considered suitable to remain at the surface within proposed soft landscaped or garden areas without mitigation.

In areas of proposed building footprint, hardstanding, paths, drives or other permanent cover, the proposed development will break direct contact pathways to future end users. Impacted soils generated from excavations in these areas should nevertheless be appropriately managed, segregated, assessed and either re-used in suitable locations under an agreed Materials Management Plan or disposed of off-site.

Within proposed soft landscaped and garden areas, a clean cover system should be provided. As a minimum, this should comprise a clean cover thickness appropriate for residential gardens, subject to agreement with the Local Planning Authority. Unless otherwise agreed, a 600 mm clean cover system should be adopted in garden and landscaped areas, comprising suitable subsoil and topsoil over a marker layer.

Where Made Ground/reworked topsoil is less than the required cover thickness, it should be removed to expose suitable natural material, with the cover system completed using imported chemically suitable material. Where deeper Made Ground is present, sufficient material should be removed or isolated to allow the agreed clean cover thickness to be achieved.

A watching brief should be maintained during removal and placement works to record the nature and extent of materials encountered, confirm the removal or isolation of impacted shallow soils and identify any previously unidentified contamination.

Excavations should not be left open for longer than necessary, should be safely battered back and should be securely cordoned-off using 2.00m high safety fencing, with appropriate warning signs whenever excavations works are suspended.

7.5 EXPORT TO LANDFILL

Excavation arisings that are unsuitable for retention and re-use on site shall be placed in temporary stockpiles on hardstand or polythene sheeting and be suitably covered to minimise the potential for dust/odour nuisance and prevent surface water run-off.

Given the proximity of existing housing, and in order to avoid any potential odour nuisance, stockpiles of material shall be exported from site as soon as practically possible.

Any material exported from the site to landfill should be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and the Landfill (England and Wales) Regulations 2005.

A transfer note should be completed, signed and retained by the parties involved. The transfer note shall include the volume of waste, the nature of the material and a statement of its chemical composition, details of the source and destination sites, and details of the haulier.

All hazardous waste going for disposal at landfills must be classified according to the new European Waste Catalogue (EWC).

A Hazardous Waste Assessment maybe required on any materials requiring removal and disposal from site. Waste Acceptance Criteria (WAC) testing may also be required, and the results of the Hazardous Waste Assessment and WAC testing (if appropriate) should be presented to the landfill operator for their confirmation of waste category.

In order to protect the general public from dust and vapour emissions, wagons that are to be used for the haulage of the contaminated material from the site must be sheeted. In addition, the Contractor must ensure that no fluids seep from the wagons.

7.6 DUST CONTROL

At all times during the excavation works, Best Practicable Means shall be employed to minimise dust and odour generation and their emission off site.

7.7 PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Should any suspected contaminated materials other than those detailed in this, and previous reports be encountered during the re-development, then it should be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Should any visual or olfactory evidence of limited contamination be identified during the removal of below ground obstructions and the turning over of made ground appropriate samples shall be taken by the Engineer for chemical analysis. The Engineer shall check the nature of materials excavated for visual and olfactory evidence of hydrocarbon contamination throughout the remedial works. Depending on the results, the excavated materials shall either be returned to the works beneath the proposed cover system or disposed of, off-site to a suitable licensed facility.

Should any visual or olfactory evidence of gross contamination be identified during the removal of below ground obstructions and the turning over of made ground works should be suspended and the LPA advised. A decision will be made as to whether this can be dealt with by a variation to this Remediation Strategy or a new or amended Remediation Strategy is required.

7.8 SERVICES INSTALLATION

It is recommended that statutory services are consulted at an early stage, with respect to the ground conditions within which they will lay services, in order to enable them to assess if any protection measures are required.

Underground services, comprising BT Lines, gas mains, combined and foul sewers, CCTV and possible fibre optic cables may all impact the site and the design team and Client should familiarise themselves with their presence.

All drainage installations are anticipated to encounter Made Ground. Any suitable made ground arisings from drainage trenches etc., if not returned to the original excavation must be placed beneath proposed hard end-use areas of the site, placed beneath a cover of suitable thickness in garden and landscaped areas, or disposed off-site adhering to the guidelines outlined above.

7.9 SOAKAWAY DRAINAGE

Should soakaways be utilised at the site, these should not be placed within Made Ground, thereby preventing the potential for leachate generation.

7.12 CARBON MONOXIDE PROTECTION MEASURES

The Phase II report classified the site as Characteristic Situation 1 with respect to methane and carbon dioxide; however, carbon monoxide was identified as requiring protection. The detailed design of carbon monoxide protection measures should be undertaken by a suitably qualified designer and agreed with the Local Planning Authority, Building Control and warranty provider as appropriate.

The protection system should be installed in accordance with the manufacturer's requirements and any relevant design specification. The contractor should ensure that the system is not damaged during construction and that any penetrations, service entries and interfaces are appropriately sealed.

Gas protection can be achieved via a series of options or combinations of options as defined in CIRIA C665 and BS8485: 2015.

The design of ground gas protection systems should be undertaken by a suitably qualified and experience Architect or Structural Engineer.

7.10 BOREHOLE DECOMMISSIONING

Prior to the development of the site, it is recommended that all the boreholes installed at the site by GES are decommissioned in line with EA Guidance document 'Good Practice for Decommissioning Redundant Boreholes and Wells' (October 2012).

7.11 MATERIALS MANAGEMENT PLAN

The Materials Management Plan should allow for remediation of the site soils in the landscaped areas during the appropriate phase of the works.

The Materials Management Plan should also refer to this strategy in respect to:

- Materials arising from the encountering of previously unidentified contamination.
- Materials arising from the removal of below ground obstructions.
- Control of water.
- Contamination related Health and Safety issues, including dust control.

GES does not provide advice on Materials Management Plans, as such expert advice should be sought from a suitably experienced consultant.

8. GENERAL SITE REQUIREMENTS

The contractor shall comply at all times with this Strategy, the Conditions of Contract and all relevant health and safety requirements. Site works will be supervised by a suitably qualified person appointed by the Client.

The contractor shall prepare and submit a programme for the works to the Client prior to the commencement on site.

Site cabins, stores and welfare facilities shall be established at a convenient location to be agreed between the contractor and the Client.

Prior to commencement of works, the contractor shall establish the boundaries of the site and working areas and shall make adequate provision to secure the site boundary and prevent unauthorised access to the site during the works.

No fires shall be permitted on site, unless previously agreed with the Local Authority.

Details of all monitoring will be retained on site by the contractor and made available to the Local Authority Environmental Health Department on request.

8.1 SERVICES

The Client shall be responsible for obtaining all relevant service records for the site and undertake any consultation with the statutory undertakers in relation to identifying the location of live services, including those to any adjacent properties. The Client shall ensure the safe disconnection of all existing services entering the site, except for those which are to remain operational.

8.2 HEALTH AND SAFETY

The remediation shall be undertaken in accordance with all relevant legislation including, but not limited to:

- The Health and Safety at Work etc. Act, 1974.
- The most current Construction (Design and Management) Regulations (The CDM Regulations).
- The Control of Substances Hazardous to Health Regulations, 2002, and
- The Control of Asbestos at Work Regulations, 2012.

Contaminated materials are locally present on the site. During the remediation and construction, it will be necessary to protect the health and safety of site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document 'Protection of Workers and the General Public during the Redevelopment of Contaminated Land' (HS(G)66).

In summary, the following measures are suggested to provide a minimum level of protection where potential for exposure to contaminated materials exists:

- All ground workers should be issued with safety glasses, protective footwear and impermeable heavy-duty gloves. Personnel should be instructed in their correct use.
- Hand washing and boot cleaning facilities shall be provided.
- No smoking on site other than in designated areas if any are present on site; and,
- Good practices relating to personal hygiene shall be adopted.

Before site operations are commenced, the necessary COSHH Assessment, Method Statements and Health and Safety Plans should be completed and issued by the contractor in accordance with The CDM Regulations 2015.

All site personnel shall undergo a site-specific health and safety induction prior to commencement of work on site.

Gas monitoring of deep confined excavations, where man entry is required (including plant operators), shall be undertaken prior to commencement of work each day or after short-term suspension of works and shall be continuous throughout the working day.

Gas monitoring shall include methane, carbon dioxide and oxygen.

The results of the gas monitoring shall be recorded in the site diary. The gas monitor shall emit both audible and visual warnings.

In the event of a gas alarm sounding, all personnel shall immediately evacuate the area. No personnel shall return to the area until advised by the site manager.

The contractor shall provide details of emergency procedures. Emergency Services shall be informed of the site operations prior to commencement.

If an excavation meets the definition of a 'confined space' within the Confined Space Regulations 1997, entry must be undertaken in accordance with the requirements of the HSE's Safe Work in Confined Spaces - Confined Spaces Regulations 1997: Approved Code of Practice and Guidance (Third Edition, 2014).

8.3 OFF-SITE DISPOSAL

Materials for off-site disposal shall be sampled and analysed by the contractor at a frequency sufficient to allow the material to be adequately categorised.

Removal of any materials from the site should be undertaken in accordance with current Duty of Care requirements and EA Technical Guidance Document WM3, Guidance on the Classification and Assessment of Waste, 1st Edition, 2015. The waste may also be subject to Waste Acceptance Criteria (WAC) testing. It is recommended that discussion with landfill operators takes place at an early stage. A transfer note shall be completed, signed and retained by all parties involved. The transfer note shall state the volume of waste, the nature of the material and statement of its chemical composition. The waste transfer notes shall be kept by the contractor for a period of at least two years.

9. VALIDATION TESTING AND REPORT

9.1 SOIL VALIDATION

Validation chemical testing should be provided by the supplier of any capping material to be imported to confirm its suitability for use on site. All soil imported should be certified prior to import to be suitable for use as BS2883:2015 compliant for topsoil. Any soil test certificate must be 'in date' as approved by the LPA.

Irrespective of the above, all materials to be used within soft landscaping areas, irrespective of its source, should be independently tested for its chemical composition in terms of soil contamination.

GES has adopted the approach as identified in the YALPAG Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners and Consultants: Version 4.1 – June 2021 in its verification process. The minimum analysis to be undertaken on materials for use within the cover system is detailed in Table 8.1: below.

Table 8.1: Proposed Testing Frequency and Analysis

Soil Source	Testing Frequency	Minimum	Analysis suite
Site sourced soils	Between 1 sample per 50m ³ and 1 sample per 100m ³ .	6	Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen.
Imported soils: brownfield source	Between 1 sample per 50m ³ and 1 sample per 100m ³ .	6	Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen.
Imported soils: greenfield / manufactured soil source	Between 1 sample per 50m ³ and 1 sample per 250m ³	3	Heavy metals/metalloids, and inorganics, Speciated PAH, TPH CWG, asbestos screen.
Crushed Hardcore, Stone, Brick (excluding asphalt)	Minimum 1 per 500m ³	-	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).
Virgin Quarried Material	1 or 2 depending on the type of stone utilised	-	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)

Where any material is deemed to be unsuitable for use in the capping layer, either by GES or the Local Authority/Environment Agency, the Contractor shall make provision for the costs of sampling, testing and removal of, said unacceptable materials from excavations and shall make provisions for delays associated with material testing and classification prior to disposal.

Depth validation of the capping system will be required within landscaped areas. The validation will comprise a hand dug pits, with photographic record and insitu testing of all soil will be undertaken as part of the verification. Samples should be taken from each validation pit for subsequent testing.

9.2 GAS PROTECTION MEASURES VERIFICATION

Where carbon monoxide protection measures are incorporated, verification should be undertaken by a suitably experienced independent verifier or appropriately qualified installer. Verification should confirm that the specified materials have been used, that joints, laps, penetrations and service entries have been sealed, and that the installation is consistent with the approved design.

- All site personnel will be made aware of the presence of the membrane and the importance of preventing damage post-installation. The Client and the appointed installer shall be made aware of the necessary requirement to be taken to ensure prevention of damage subsequent installation of the gas membrane. Details will be communicated to any site personnel not present at the preconstruction briefing as a toolbox talk by the site manager as and when required during construction. This is in order to reduce the potential for accidental damage to the installed membrane by follow-on trades.
- Copies of delivery notes and packaging of the proposed materials shall be retained on site by the site manager for review and inclusion in the verification report where possible.
- Visual inspection of gas protection measures including verification checklist and photographic record, to be conducted by an independent and suitably experienced verifier on 1 in every 10 plots where beam and block floors are constructed (in Zone A only), and every plot where cast insitu suspended floor slabs are utilised (in Zone A only).
- The site manager is to be responsible for contacting the independent verifier in order to make arrangements for such inspections in good time. To this effect, a chain of communication between the site manager, installation contractor and independent verifier shall be agreed during the pre-construction briefing. Such inspections are to be completed following completion of gas protection installation and before placement of overlying materials and pouring of concrete.
- The inspection by the independent verifier shall include confirmation of the use of the specified products; the integrity of joints between membranes, and between membranes and ancillary products such as Top Hats (this may include air lance testing for membranes installed beneath cast insitu suspended floor slabs); verification that the membrane fully extends to all external faces of the structure; and verification of the presence of unobstructed airbricks connected to the subfloor void (in beam and block floors only) by use of periscopic vents. Where possible, the inspection of beam and block floors, shall also confirm the presence of a minimum 200mm high subfloor void, with cross-ventilation through sleeper walls where appropriate.
- In the event of non-compliance, the defect shall be immediately reported to the site manager (and installer, where possible) and all follow-on works shall be postponed to enable action to be taken to rectify the situation. The independent verifier will explain the reason for non-compliance and offer outline advice on how this could be rectified although it is ultimately the responsibility of the installer to achieve compliance.
- Where defects are such that they cannot be immediately rectified, then a further site visit for re-inspection shall be agreed between the site manager and the independent verifier. The re-inspection and subsequent actions shall take the same form as the initial inspection.

- In no circumstance shall any follow-on works take place until the independent verifier is satisfied that the installation is sufficiently robust and conforms to the requirements of this document and has confirmed their satisfaction to the site manager.
- Preparation of a Gas Verification Report, or series of reports, in accordance with CIRIA C735, by the independent verifier.
- It is anticipated that verification of installation of the ground gas protective measures will be carried out by an independent verifier (either a competent, experienced and suitably trained consultant or suitably qualified and experienced installer).

9.3 VALIDATION REPORT

The Validation Report should include the following:

- Remediation Strategy (including copies of confirmation from regulatory authorities agreeing criteria).
- Photographic evidence of the removal of material from site.
- Detailed drawings of the excavated areas showing the extent of the material removal operation.
- Details of the provenance of the subsoil and topsoil (to be provided by contractor).
- Copy of Consignment Notes relating to the movement of wastes to a licensed waste management facility.
- Laboratory analysis of validation soil samples and assessment of suitability for use.
- Logs indicating the thickness of cover soils within each trial pit excavated.
- A drawing indicating the location of cover thickness validation trial pits.
- Photographic evidence of the validation trial pits.
- Detailed drawings showing all sampling locations for chemical testing.
- Details of the design of the gas/vapour protection measures adopted for the development.
- Details of any gas membrane installation, including confirmation of compliance with the installation specification by the installer and independent validator in accordance with CIRIA C735.
- Photographic evidence obtained during the installation process of the gas protection membrane.
- Details of any variation from the adopted strategy due to unforeseen circumstances.
- Details of any previously unidentified contamination encountered.
- Details of any potentially contaminative activity occurrences that took place.
- Production of a Validation Report.

10. 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 advisers 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 site 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 site 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 site 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



General
Site
Location



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



PROJECT NAME Land Adjacent to No. 7, Town
Gate, Scholes

PROJECT NUMBER 2371-22

TITLE
Site Location Plan

DRAWING NO.
2371-22/01

DATE
June 2022

SCALE
N.T.S

DRAWN BY
RC

-  Window Sampler Location
-  Sonic Borehole Location
-  Rotary Borehole Location



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

PROJECT NAME Field Head, Scholes

PROJECT NUMBER 2371-22

TITLE
 Proposed Exploratory Hole Location Plan

DRAWING NO.

2371-22/02

SCALE

N.T.S

DATE

July 2022

DRAWN BY

RC

A green rounded rectangle with a thin black border, centered on the page. It contains the text "APPENDIX 2" and "SITE PHOTOGRAPHS" in black, uppercase letters.

APPENDIX 2
SITE PHOTOGRAPHS

Site: Land Adjacent to No. 7, Towngate, Scholes

Client: Mr. D. Blackburn

Job Reference: GES 2371-22, Dated: June 2022



A.



B.



C.



D.



- A. Facing north, view of site access.
- B. Facing northeast, view of central site area.
- C. Facing south, view of eastern site boundary.
- D. Facing north, view of southern site boundary from Town Gate.

APPENDIX 3
CHEMICAL SCREENING CRITERIA

[illegible]

Parameter	Residential <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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(2 83)	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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
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- Hexachlorocyclohe xane	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- hexachlorocyclohe xanes	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- hexachlorocyclohe xanes	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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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-Tetrachlorobenzen e	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-Tetrachlorobenzen e	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-Tetrachlorobenzen e	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)
Pentachlorobenzen e	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)
Hexachlorobenzen e	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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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)
Hexachlorobutadie ne	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.

[illegible]

Parameter	Residential <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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)

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	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
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)

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	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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(2 83)	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)

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	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			
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)

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	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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- Hexachlorocyclohe xane	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- hexachlorocyclohe xanes	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- hexachlorocyclohe xanes	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 <u>with</u> homegrown produce			Residential <u>without</u> homegrown produce			Allotment			Commercial / Industrial			Public Open Space near Residential			Public Open Space - Park			Source
	(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)			(mg/kg, unless otherwise stated)						
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-Tetrachlorobenzen e	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-Tetrachlorobenzen e	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-Tetrachlorobenzen e	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)
Pentachlorobenzen e	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)
Hexachlorobenzen e	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)

APPENDIX 4

GAS AND GROUNDWATER
MONITORING RESULTS

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: Mr D. Blackburn
Site: "Fieldhead", Towngate, Scholes
Date: 09/07/2022

Job No: 2371-22
Visit No: 1 of 6
Operator: RC **Project Manager:** RC



Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA						Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (mb)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone		
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady											
	WS01	ND	ND	NR	NR	1.0	1.0	20	ND	ND	ND	20.6	20.6	NR	NR	0.0	0.0	-0.05	NR	0.0000	0.0000	Dry	0.93			0.5-1.0	
WS02	ND	ND	NR	NR	1.3	1.3	ND	ND	ND	ND	20.3	20.3	NR	NR	0.0	0.0	0.09	NR	0.0000	0.0000	Dry	0.86			0.5-1.0		
SN01	ND	ND	NR	NR	1.5	1.5	ND	ND	ND	ND	20.1	20.1	NR	NR	-0.2	-0.2	0.17	NR	0.0002	0.0030	3.09	3.75			1.0-3.75		
Max	ND	ND	ND	ND	1.5	1.5	20	ND	ND	ND	20.6	20.6	ND	ND	0.0	0.0	0.2	NA	0.0002	0.0030	3.09	3.75	NR	NR			
Min	ND	ND	0.0	0.0	1.0	1.0	ND	ND	ND	ND	20.1	20.1	0.0	0.0	-0.2	-0.2	-0.1	0	0.0000	0.0000	DRY	0.86	0.00	0.00			

ND - Not detected

NR - Not recorded

NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
Wind: ☐ Calm ☒ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☐ Slight ☒ Cloudy ☐ Overcast
Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: 08:50 Start 09:15 End
Barometric pressure (mbar): 1009 Start 1009 End
Pressure trend (Daily): ☐ Falling ☒ Steady ☐ Rising
Source: <https://www.timeanddate.com/weather/@12265719/historic>
Air Temperature (Deg. C): 15 Before 16 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration: 31/10/2021
Date of next calibration: 01/11/2022

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: Mr D. Blackburn
Site: "Fieldhead", Towngate, Scholes
Date: 15/07/2022

Job No: 2371-22
Visit No: 2 of 6
Operator: LW

Project Manager: RC



Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA			Worst-credible GSVs		WELL AND WATER DATA						Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			Peak	Steady										
	WS01	ND	ND	NR	NR	1.0	1.0	ND	ND	ND	ND	20.3	20.3	NR	NR	0.0	0.0	NR	60	0	0	Dry	0.93			
WS02	ND	ND	NR	NR	0.7	0.7	ND	ND	ND	ND	20.6	20.6	NR	NR	-0.1	-0.1	NR	60	0.0001	0.0007	Dry	0.86			0.5-1.0	
SN01	ND	ND	NR	NR	2.5	2.5	ND	ND	ND	ND	19.2	19.2	NR	NR	-0.1	-0.1	NR	60	0.0001	0.0025	2.92	3.81			1.0-3.75	
Max	ND	ND	ND	ND	2.5	2.5	ND	ND	ND	ND	20.6	20.6	ND	ND	0.0	0.0	ND	60	0.0001	0.0025	2.92	3.81	NR	NR		
Min	ND	ND	0.0	0.0	0.7	0.7	ND	ND	ND	ND	19.2	19.2	0.0	0.0	-0.1	-0.1	0.0	60	0.0000	0.0000	DRY	0.86	0.00	0.00		

ND - Not detected

NR - Not recorded

NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☐ Dry ☒ Moist ☐ Wet ☐ Snow ☐ Frozen

Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong

Cloud cover: ☐ None ☐ Slight ☐ Cloudy ☒ Overcast

Precipitation: ☐ None ☐ Slight ☒ Moderate ☐ Heavy

Time monitoring performed: ☐ 14:00 ☐ 15:00

Barometric pressure (mbar): ☐ 1018 Start ☐ 1018 End

Pressure trend (Daily): ☐ Falling ☒ Steady ☐ Rising

Source: <https://www.timeanddate.com/weather/@12265719/historic>

Air Temperature (Deg. C): ☐ 16 Before ☐ 16 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range: +/-

Differential Pressure: +/- 500mbar

Date of last calibration: 31/10/2021

Date of next calibration: 01/11/2022

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: Mr D. Blackburn
Site: "Fieldhead", Towngate, Scholes
Date: 20/07/2022

Job No: 2371-22
Visit No: 3 of 6
Operator: JF

Project Manager: RC



Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA			Worst-credible GSVs		WELL AND WATER DATA						Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
	WS01	ND	ND	NR	NR	0.4	0.2	1	ND	ND	ND	ND	21.2	21.2	NR	NR	-0.1	0.0	0.170	60	0.0001	0	DRY	0.93		
WS02	ND	ND	NR	NR	1.6	0.2	ND	ND	ND	ND	ND	20.6	21.3	NR	NR	-0.2	0.0	0.120	60	0.0002	0	DRY	0.86			0.5-1.0
SN01	0.1	0.1	NR	NR	1.7	1.7	ND	ND	ND	ND	ND	20.6	20.6	NR	NR	-0.1	0.0	0.100	60	0.01	0	DRY	3.75			1.0-3.75
Max	0.1	0.1	ND	ND	1.7	1.7	1	ND	ND	ND	ND	21.2	21.3	ND	ND	-0.1	0.0	0.2	60	0.0100	0.0000	DRY	3.75	NR	NR	
Min	ND	ND	0.0	0.0	0.4	0.2	ND	ND	ND	ND	ND	20.6	20.6	0.0	0.0	-0.2	0.0	0.1	60	0.0001	0.0000	DRY	0.86	0.00	0.00	

ND - Not detected

NR - Not recorded

NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☐ Dry ☒ Moist ☐ Wet ☐ Snow ☐ Frozen

Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong

Cloud cover: ☐ None ☐ Slight ☒ Cloudy ☐ Overcast

Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy

Time monitoring performed: 09:00 Start 09:15 End

Barometric pressure (mbar): 1000 Start 1000 End

Pressure trend (Daily): ☒ Falling ☐ Steady ☐ Rising

Source: <https://www.timeanddate.com/weather/@12265719/historic>

Air Temperature (Deg. C): 14 Before 14 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000

Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%

Gas Flow range: +/-

Differential Pressure: +/- 500mbar

Date of last calibration: 31/10/2021

Date of next calibration: 01/11/2022

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: Mr D. Blackburn
Site: "Fieldhead", Towngate, Scholes
Date: 26/07/2022

Job No: 2371-22
Visit No: 4 of 6
Operator: JF

Project Manager: RC



Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA						Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone		
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady											
	WS01	ND	ND	NR	NR	0.4	0.4	ND	ND	ND	ND	21.2	21.2	NR	NR	-0.1	-0.1	0	NR	0.0001	0.0004	Dry	0.93			0.5-1.0	
WS02	ND	ND	NR	NR	0.2	0.2	ND	ND	ND	ND	21.3	21.3	NR	NR	-0.2	0.0	0	NR	0.0002	0	Dry	0.86			0.5-1.0		
SN01	0.1	ND	NR	NR	1.7	1.7	ND	ND	ND	ND	20.6	20.6	NR	NR	-0.1	0.0	0	NR	0.0001	0	Dry	3.75			1.0-3.75		
Max	0.1	ND	ND	ND	1.7	1.7	ND	ND	ND	ND	21.3	21.3	ND	ND	-0.1	0.0	0.2	NA	0.0002	0.0004	DRY	3.75	NR	NR			
Min	ND	ND	0.0	0.0	0.2	0.2	ND	ND	ND	ND	20.6	20.6	0.0	0.0	-0.2	-0.1	0.1	0	0.0001	0.0000	DRY	0.86	0.00	0.00			

ND - Not detected
 NR - Not recorded
 NA - Non applicable

Worst-possible GSVs	
0.0001	0.0017

MG - Made ground
 NAT - Natural
 C - Cohesive
 G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
 Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong
 Cloud cover: ☐ None ☒ Slight ☐ Cloudy ☐ Overcast
 Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
 Time monitoring performed: 09:30 Start 09:50 End
 Barometric pressure (mbar): 1000 Start 1000 End
 Pressure trend (Daily): ☐ Falling ☐ Steady ☒ Rising
 Source: <https://www.timeanddate.com/weather/@12265719/historic>
 Air Temperature (Deg. C): 13 Before 13 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration: 31/10/2021
Date of next calibration: 01/11/2022

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: Mr D. Blackburn
Site: "Fieldhead", Towngate, Scholes
Date: 12/08/2022

Job No: 2371-22
Visit No: 5 of 6
Operator: JF

Project Manager: RC



Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA			Worst-credible GSVs		WELL AND WATER DATA						Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
	WS01	0.0	0.0	ND	ND	0.3	0.3	1	1	0.0	0.0	20.9	20.9	NR	NR	-0.1	-0.1	0.79	60	0	0.0003	DRY	0.93			
WS02	0.0	0.0	ND	ND	0.8	0.3	1	1	0.0	0.0	20.9	20.9	NR	NR	-0.1	-0.1	0.79	60	0	0.0003	DRY	0.86			0.5-1.0	
SN01	0.0	0.0	ND	ND	0.9	0.4	2	1	0.0	0.0	20.4	20.4	NR	NR	0.0	0.0	0.76	60	0	0	DRY	3.75			1.0-3.75	
Max	0.0	0.0	ND	ND	0.9	0.4	2	1	0	0	20.9	20.9	ND	ND	0.0	0.0	0.8	60	0.0000	0.0003	DRY	#REF!	NR	NR		
Min	0.0	0.0	ND	ND	0.3	0.3	1	1	0	0	20.4	20.4	0.0	0.0	-0.1	-0.1	0.8	60	0.0000	0.0000	DRY	#REF!	0.00	0.00		

ND - Not detected

NR - Not recorded

NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equipment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground: ☒ Dry ☐ Moist ☐ Wet ☐ Snow ☐ Frozen
Wind: ☒ Calm ☐ Light ☐ Moderate ☐ Strong
Cloud cover: ☐ None ☒ Slight ☐ Cloudy ☐ Overcast
Precipitation: ☒ None ☐ Slight ☐ Moderate ☐ Heavy
Time monitoring performed: 08:00 Start 08:30 End
Barometric pressure (mbar): 983 Start 983 End
Pressure trend (Daily): ☒ Falling ☐ Steady ☐ Rising
Source: [Past Weather in Scholes, England, United Kingdom — Yesterday or Further Back \(timeanddate.com\)](https://www.timeanddate.com)
Air Temperature (Deg. C): 20 Before 20 After

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: CH₄ 0 - 100% CO₂ 0 - 100% O₂ 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration: 31/10/2021
Date of next calibration: 01/11/2022

APPENDIX 5

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 (UI)	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.	<i>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.</i> <i>Major fish kill in surface water from large spillage of contaminants from site.</i> <i>Highly elevated concentrations of List 1 and substances present in groundwater close to small potable abstraction (high sensitivity).</i> <i>Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).</i>
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.	<i>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.</i> <i>Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability.</i> <i>Ingress of contaminants through plastic potable water pipes.</i>
Mild (MI)	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.	<i>Exposure could lead to slight short - term effects (e.g. mild skin rash).</i> <i>Surface spalling of concrete.</i>
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.	<i>The presence of contaminants at such concentrations that protective equipment is required during site works.</i> <i>The loss of plants in a landscaping scheme.</i> <i>Discoloration of concrete.</i>

* 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

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

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 (UI)	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.