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Date: March 2026

REMEDIATION STRATEGY
for land off
WATERFOLD LANE, HEYWOOD, BURY,
LANCASHIRE



Prepared for
JHA Pulmann Ltd

Prepared by
G&M Consulting Ltd, The Chestnuts, Brackenhill Road, Haxey, Doncaster DN9 2LR





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REMEDIATION STRATEGY
for land off
WATERFOLD LANE, HEYWOOD, BURY, LANCASHIRE

1 INTRODUCTION.

G&M Consulting Ltd (G&M) was commissioned by JHA Pulmann Ltd to prepare a Remediation Strategy for land off Waterfold Lane, Heywood, Bury, Lancashire

The development comprises five detached residential dwellings, with associated areas of hardstand parking and private gardens, the layout of which is shown on Drawing No M20-12-14 Rev 02, dated January 2020, prepared by Pulmann Associates, a copy of which is presented in Appendix A of this report.

The location of the site is shown on Drawing No C795/RS/1, presented in Appendix A of this report.

The site has been subject to previous intrusive investigation work, refer to Section 3.1 of this report. This Strategy document incorporates findings and recommendations of this work and provides details of the requirements to remediate the site. This Strategy is intended to detail the approach to be taken to ensure that the risks to sensitive receptors are suitably mitigated, potential risks associated with proven contamination, during the preparatory works are controlled, and that any potential contamination not previously revealed during the recent investigation work is dealt with in an appropriate manner.

The main aims of this strategy are to:

- Satisfy the Local Authority Environmental Protection Department that the remediated site will provide a site ready for development and that it is suitable for its proposed residential with areas of gardens/soft landscaping end use, whilst ensuring that environmental receptors are not put at an unacceptable short-term risk during the development work.
- Ensure construction workers are not put at an unacceptable short-term risk during the development of the site.
- In the interests of sustainability, to promote the use of site-won materials where possible, providing they are suitable for the proposed end use.

It is assumed, in the preparation of this Strategy, that the findings and recommendations of the previous investigation work, on which this strategy document is primarily based, have been submitted to, and approved by, the local authority.

Based on the findings of the previous investigation works, it is proposed to incorporate a clean capping layer of 0.60 m thickness, of subsoils and topsoil, into areas of soft landscaping.

Should changes or amendments to the proposed layout, development levels, and / or end use be made, then these should be confirmed by JHA Pulmann Ltd and if necessary, amendments made to this Strategy document as appropriate.

No work should be undertaken until the Strategy is approved by the relevant regulators.

2 THE SITE.

The site description is taken from the investigation report, referenced below;

The site is located off Junction 2 of the M66, approx. 3km west and 1.7km east of the towns of Heywood and Bury, Greater Manchester. Figures 1 and 2 in Appendix A show the location of the site.

The site is currently vacant, having historically been allotment gardens. In recent years, all previous allotment buildings have been removed / demolished.

The area shown within the red site boundary on Figure A below, will be referred to throughout this document as 'the site'.

The site is located east of Waterfold Lane, to the rear of terraced housing dated from the 1860s. Waterfold Lane is accessed from the A58 Bury New Rd to the north.



Figure A: Site Location Plan. Red is approximate site boundary and pink are 50m and 100m buffers.
Extract from Envirocheck report (Appendix C).

3 BACKGROUND INFORMATION.

3.1 Introduction.

The principal sources of information used in the preparation of this Strategy document are as follows;

- 'Land off Waterfold Lane, Heywood, Bury, BL9 7JY. Phase I / II Contaminated Land Site Assessment', Report Ref 24/1516A.1, dated 25.04.24, prepared by Geo2 Remediation Ltd.

Details of the environmental aspects, hydrogeology, geology and regulatory issues associated with the site and subsequent intrusive investigation fieldwork are presented in the above referenced reports.

For completeness, a copy of the text of the above referenced report is presented in Appendix B of

this strategy.

3.2 Proven Ground Conditions

The findings of the above referenced report is presented below;

Ground conditions encountered across the site comprised 0.10-0.30m thick silty topsoil over granular made ground. Made ground soils were described as sand or gravel and included sandstone, concrete, brick, coal, clinker and some glass and ceramics. While only 0.30m thickness of made ground was encountered in TP7 located in the southeastern corner, the trial pits typically recorded made ground soils to depths of 1.50-2.40m bgl.

Natural soils were indicative of Alluvium superficial soils and included soft to firm clay with peat or organic horizons or pockets in TP01 to TP06. TP07 in the southeastern boundary recorded sand underlain by stiff clay.

No groundwater was encountered during the shallow investigation.

All trial pits were backfilled with the arisings upon completion.

6.2.1 Obstructions

No obstructions were encountered during the ground investigation.

6.2.2 Observed Potential Contamination

Anthropogenic material was observed within the granular made ground, including concrete, brick, coal, clinker and some glass and ceramics.

Fragments of suspected asbestos cement were identified within the made ground in TP05, with a photo included in Appendix B for reference. No other visual or olfactory evidence of contamination was observed by the engineer.

As detailed within the exploratory hole logs included in Appendix D, no elevated PID readings were recorded within site soils during the investigation which would indicate volatile contamination being present. Slightly elevated readings (maximum 4.5ppm) were record

3.3 Summary of Identified Pollutant Linkages

The conceptual site model detailed within the geoenvironmental appraisal identified the following complete pollutant linkages which could result in an unacceptable risk to the proposed end-user/s and construction workers (Human Health) and the built development, on the site.

Source(s)	Pathway(s)	Receptor(s)	Comments	Risk	Requires Further Work
Elevated concentrations of arsenic, lead and zinc above Residential with plant uptake GAC thresholds in made ground soil samples only. Possible asbestos fragments identified in TP05, with Chrysotile asbestos fibres <0.001% w/w recorded in TP02.	Leaching to groundwater, lateral and vertical flow, followed by migration within the aquifer	River Roch located 27m west with river quality C. (controlled waters)	Low permeable superficial deposits but taking into account the proximity of the nearest surface water receptor.	Low (Low Likelihood x Mild)	No
		Alluvium and Coal Measures bedrock are Secondary A Aquifer. Other superficial deposits are Undifferentiated Aquifer. No SPZ or potable water abstraction within 1km (controlled waters)	No groundwater encountered to a depth of 3.0m bgl, with lab analysis of soil samples recording significantly lower concentrations of contaminants within the underlying natural soils	Low (Unlikely x Medium)	No
	Direct contact and ingestion of contaminants and inhalation of asbestos in soils and dust	Proposed residential site end users with private gardens. (human health)	Made ground soils currently present a risk to Residential end users if left at surface level in new gardens	Moderate (Likely x Medium)	Yes
		Construction workers. (human health)	Made ground soils currently present a risk to construction workers, however it is assumed suitable welfare facilities and PPE will be available during groundworks. The presence of fragments of asbestos containing across the surface of the site or within made ground soils cannot be discounted.	Moderate / Low (Low Likelihood x Medium)	Yes

Source(s)	Pathway(s)	Receptor(s)	Comments	Risk	Requires Further Work
Potential for noxious ground gases arising from peat and organic clay deposits identified underlying the site	Inhalation within enclosed spaces	Proposed residential site end users, principally within enclosed areas. (human health)	Encountered organic natural soils and a deep water table indicate these soils may be a source of noxious ground gases.	Moderate (Likely x Medium)	Yes

Table 8. Summary of Qualitative Risk Assessment

4 REMEDIATION STRATEGY.

4.1 Summary.

The Remediation Strategy follows the principles of Land Contamination Risk Management (LCRM) - Environment Agency, July 2023.

The LCRM recommends that remedial action proposed for the site should be justified. Remedial action has been justified due to the pollution linkages identified within this report. The remediation options have been developed to meet the technical objectives for the development with the major drivers behind the recommendations being:

- To achieve successful remediation within a particular timescale and budget;
- Familiarity with the methodology by the developer/ground worker;
- Confidence that the remediation can be carried out by good technical practices; and,
- Likely success of the proposed method of remediation.

It has been assumed, in the preparation of this Strategy, that the proposed end use is a residential development, with areas of private garden and that development ground levels will not change significantly from those encountered during the fieldwork. If either of these assumptions are incorrect, then amendments to the suggested options within this report may be required.

4.2 Options Appraisal

The driver for remediation of the site is the presence of made ground soils, with elevated levels of contaminants, detailed in section 3.3 of this Strategy.

The methods chosen for remediation must be achievable by the groundworker, using techniques that they are familiar with. It is therefore considered that the remediation proposals should comprise the provision of a cover system to sever the contaminant pathways in the proposed areas of garden, where the end users may reasonably be expected to come into contact with the soils and where soil dust may be derived.

The approach is considered to be straightforward and would be an effective approach to reducing risk to the end users of the site to an acceptable level.

Where made ground is left beneath areas of proposed hardstand (building footprints and car parking etc), it is considered to pose a **negligible** risk to end users, as pathways are severed due to capping by the hardstanding.

5 STRATEGY DETAIL.

5.1 General.

The main requirements of the remediation and preparatory works are given below in the approximate sequence of works. Pertinent elements of the works are discussed in greater detail in subsequent sections of this document:

- Site strip and clearance of all vegetation and any surface debris materials present on site;
- Removal and disposal from site to a suitably licenced facility, of unsuitable made ground soils identified in the previous site investigation works in areas of gardens / soft landscaping or encountered as part of the site strip or foundation construction. The contractor undertaking the preparatory works shall be responsible for this and for ensuring that all relevant regulations, permits/licences and recording keeping are met.
- A watching brief to identify any previously unidentified sources of contamination. If any grossly contaminated soils, liquid or dumped wastes, materials suspected to contain asbestos or similar are encountered during the preparatory/development works, then advice should be sought from a suitably qualified geoenvironmental engineer; see section 5.4
- Undertaking of further intrusive ground investigation work; see section 5.5
- Placement of 'clean cover soil capping layers to areas of proposed private gardens which fall within areas identified within the Phase 2 investigation, using clean soils to achieve a minimum 600mm thick clean cover layer incorporating a minimum thickness of at least 150mm topsoil; see section 6.0
- Construction of clean cover soil capping layer to be validated on completion by a suitably qualified geoenvironmental engineer. Thickness of the capping layer should be validated physically on site, and a programme of laboratory testing will be implemented to confirm chemical suitability; see Section 6.0
- A validation report will be produced by a suitably qualified geoenvironmental engineer on completion of the works. This report will serve to provide a record of the remediation works including the results of the chemical testing to confirm the works were undertaken in accordance with the relevant legislation, this Strategy and planning conditions; see section 7.0

Should areas of significant contamination be encountered during the development works, such as noxious, odorous, fibrous or liquid etc., then works should stop immediately and further advice sought from a suitably experienced and qualified consultant.

5.2 Excavation and Disposal of Materials from Site

It is proposed that where made ground materials are present within areas of proposed gardens, these materials will require capping in order to construct a clean capping soil system, refer to Section 6 of this report. Made ground soils from these areas may require disposal from site.

The previous investigation work identified that the made ground soils encountered on site were texturally unsuitable to support healthy plant growth.

In order to minimise the potential for dust emissions, the following measures may be employed during the remediation works;

- Excavation and stockpiling works to be undertaken in a controlled systematic manner;
- Damping down during the excavation works as required;
- Stockpiles to be sealed or covered where necessary;
- Any vehicles used for disposal of materials from site to be sheeted to prevent fugitive dust emissions.

Waste Management Strategy

Any unsuitable materials which are to be exported from site, should be dispatched to a suitably licenced landfill facility, in accordance with the requirements of the Duty of Care (DoC) Regulations, April 2006 and where appropriate, the HWR, 2005 or any superseding legislation.

The Contractor is responsible for arranging laboratory analysis for waste classification and (if necessary) waste acceptance criteria (WAC) purposes and shall be submitted to the operator of the point of disposal to make a preliminary assessment

The waste disposal routes for excavated soils and other materials to landfill, recycling or treatment facilities will be determined by the Contractor and will follow relevant guidance and legislation.

The Contractor will provide all relevant documentation on completion of the work, including:

- methods used to classify the waste and the results of the classification;
- results of WAC analysis (if required);
- the place of disposal;
- waste volumes; and
- waste transfer notes and other Duty of Care information. (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 above information/documentation shall be included within the verification report detailed in Section 7 of this strategy.

5.3 Health and Safety.

On the basis of the results obtained, the conceptual site model confirms a potential moderate/high risk to construction workers from contaminants in the made ground soils. However, risks can be readily adequately mitigated by appropriate PPE and hygiene precautions and good working and soil

management practices.

Contamination may pose a short-term (acute) or long-term (chronic) risk to workers during construction and maintenance. The potential risks must be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation.

During the site development it will be necessary to protect 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.

- All ground workers should be issued with protective clothing, hard hats, footwear and gloves;
- All personnel shall wear hard hats, high visibility clothing and protective footwear at all times;
- Hand washing facilities shall be provided;
- No smoking except in designated areas; and,
- Good practices relating to personal hygiene shall be adopted.

Specific Risk Assessments and Method Statements may need to be prepared by the contractor responsible for the development works, to take into account potential issues detailed above.

Where appropriate work shall be carried out in accordance with the requirements of the Control of Asbestos Regulations 2012.

This Strategy document should be forwarded to any organisation undertaking groundworks in order for them to assess the risk to their own personnel.

5.4 Unforeseen Contamination Protocol (Watching Brief).

There is a possibility that contamination or structures are encountered that were not identified by past intrusive investigation.

Should areas of significant previously unidentified contamination be encountered during the development works, then works should stop immediately and advice sought from a suitably qualified geoenvironmental engineer. Site staff will be made aware of the history of the site and will be expected to report suspected contamination based on;

- Unusual appearance such as colour
- Unusual texture such as fibrous or glassy
- Presence of liquids or sludges
- Aromatic, stringent or pungent odour
- Eye or throat irritation

Dependent on the advice of the geoenvironmental engineer, the suspected contamination will be dealt with using existing procedures or details may be submitted to the local authority and a remediation procedure agreed.

5.5 Further Investigation Work.

The previously referenced Geo2 geoenvironmental report identified the following;

‘Based on the above, further intrusive ground investigation should be undertaken, which will comprise the drilling of four window sample boreholes, across the site, with the installation of combined ground gas/groundwater wells, in each of the holes, to a minimum depth of 3 m below ground level’.

In accordance with CIRIA C665:2007, monitoring of the installations shall be undertaken of six occasions, over a nominal three month period.

The findings of the investigation and monitoring work shall be reported to the local authority and details, should the need arise, of any proposed gas protection measures, should also be submitted, prior to any development work taking place.

Or

In lieu of further investigation works, gas protection measures should be fitted to the properties on site. BS8485 requires a gas protection score to be identified for the proposed development (which are categorised as ‘building types’), with gas protection measures selected to meet the required gas protection score. In accordance with the guidance, the future residential development would be classed as a ‘Type A’ building (Table 3). A ‘Type A’ development situated on a site with a Characteristic Situation 2 (CS2) gas regime would be required to achieve a ground gas solution score of 3.5 points.

It is understood that for one of the proposed plots the client wishes to install a membrane in lieu of testing. The basis for assessing the site as Characteristic Situation 2 is given below;

- There are no active or historic landfills within 500m of the site
- The site is not shown to be underlain by shallow coal workings which can both generate a create preferential pathways for migration of ground gases
- Previous intrusive investigation of the site, shows it to be underlain by made ground, with no evidence of putrescible materials.
- Previous intrusive investigation does not indicate any elevated concentrations of volatile PAHs or TPHs across the site.
- The driver for possible gas generation is identified as alluvial soils. Investigation has shown these soils to be primarily cohesive in nature. Consequently, it is considered that gas flows through these low permeability soils is likely to be negligible.
- Table 2.1 presented in CIRIA C665:2007 indicates ‘typical range of concentrations’ for CO₂ within alluvial soils, of between 0% and 10%; well within the range of the CS2 gas regime.

Gas protection solutions for buildings are typically based on a combination of the following three elements, which are used to achieve the required gas protection score for the type of building:

- structural barrier (floor slab);
- ventilation measures; and
- gas resistant membrane.

BS8485 indicates the gas protection system should consist of at least two different elements from the list above, for example a barrier element (e.g. floor slab) with either a membrane or a ventilation or dilution element (or both). The single elements work independently and collaboratively, and a

single element should not be used as there would be no redundancy to allow for defects in the component. Tables 5, 6 and 7 of the standard provide details of the various elements required to achieve the above.

The drawing presented in Appendix C of this report, details the foundation/gas protection measures for the proposed single plot. It is proposed that a gas membrane is installed across a vented subvoid floor slab with a minimum clearance of 150mm, in this instance a Rhinoplast Super Gas Barrier. In accordance with Table 6(b) and Table 7 of the standard, this achieves a gas protection score of 3.5. The technical data sheet for the gas membrane product is presented in Appendix C of this report

Validation of the membrane shall be in accordance with the following best practice guidance;

- Verification Requirements for Gas Protection Systems – Version 1.1, December 2016 (Yorkshire and Lincolnshire Pollution Advisory Group).

Validation shall be undertaken by a suitably qualified and experienced person. In this instance Mr Howard Shaw of Geonation20. A letter of competency is presented in Appendix C of this report. Following on from the validation, details shall be submitted to the authority for approval.

6 COVER MATERIALS.

6.1 General.

Due to the presence of made ground and the textural unsuitability of this material as a growing medium, it is recommended within any areas of proposed soft landscaping, a suitable thickness of clean capping soils are placed.

The design of the capping layer is subject to regulatory consultation.

Where made ground is left beneath the area of the footprint of the dwelling and other areas of proposed hardstand (driveways, paths and car parking etc), it is considered to pose a **negligible** risk to end users, as pathways are severed due to capping by the hardstanding.

Where soft landscaping is proposed, the clean capping soils should be increased, as detailed below;

Table- 1 Clean Cover Layer Thickness.

	Subsoil (mm)	Topsoil (mm)	Total (mm)
Soft landscaped/ garden areas	450	150	600

A marker layer comprising a geotextile material should be incorporated at the base of the clean capping layer.

The clean capping thickness shall conform to the requirements of BRE 465:2004 'Cover Systems for Land Regeneration'

6.2 Topsoil.

Shall be placed by the contractor responsible for the development works. It shall be ensured that topsoil is of an appropriate quality, naturally derived, and that concentrations of contaminants do not

exceed the maximum concentrations stipulated in Table 2 presented in Section 6.4 of this Strategy, see below.

Any imported topsoil shall conform to the requirements of BS3882:2015.

6.3 Subsoil.

Subsoil materials for the use in the 'clean' cover layer shall be a naturally derived product and shall be clean and free of foreign debris, building waste materials, timber or other deleterious matter.

Materials to be imported to site shall be sampled at source and the test results made available to the local authority prior to any material being delivered to site.

It shall be ensured that the subsoil is of an appropriate quality and that concentrations of contaminants do not exceed the maximum concentrations stipulated in Table 2 presented in Section 6.4 of this Strategy, see below.

6.4 Chemical Suitability.

All materials for use in the 'clean' cover layer shall be analysed at a UKAS and MCERTS accredited laboratory for testing in accordance with the following schedule.

For this site, measured values shall be compared to the GACs derived for a residential with plant uptake end use. The threshold guideline values are given in the table below;

Table 2. Clean Capping - Guidance Values.

Determinand	GAC (1% SOM) (mg/kg, unless otherwise stated)
Arsenic	37 ⁽²⁾
Cadmium	11 ⁽¹⁾
Chromium (Hexavalent)	21 ⁽²⁾
Lead	200 ⁽²⁾
Mercury	40 ⁽¹⁾
Selenium	250 ⁽¹⁾
Copper	2400 ⁽¹⁾
Nickel	180 ⁽¹⁾
Zinc	3700 ⁽¹⁾
pH	<5
Water Soluble Sulphate	0.5 g/l ⁽⁴⁾
PAH	
Acenaphthene	210 ⁽¹⁾
Anthracene	2400 ⁽¹⁾
Acenaphthylene	170 ⁽¹⁾
Benzo(a)anthracene	7.2 ⁽¹⁾
Benzo(b)fluoranthene	2.6 ⁽¹⁾
Benzo(k)fluoranthene	77 ⁽¹⁾
Benzo(g,h,i)perylene	320 ⁽¹⁾
Benzo(a)pyrene	5.0 ⁽²⁾
Chrysene	15 ⁽¹⁾
Dibenz(a,h)anthracene	0.24 ⁽¹⁾
Fluoranthene	280 ⁽¹⁾
Fluorene	170 ⁽¹⁾

Determinand	GAC (1% SOM) (mg/kg, unless otherwise stated)
Indeno(1,2,3-cd)pyrene	27 ⁽¹⁾
Naphthalene	2.3 ⁽¹⁾
Pyrene	620 ⁽¹⁾
Phenanthrene	95 ⁽¹⁾
TPH	
Aliphatic EC 5-6	42 ⁽¹⁾
Aliphatic EC >6-8	100 ⁽¹⁾
Aliphatic EC >8-10	27 ⁽¹⁾
Aliphatic EC >10-12	130 ⁽¹⁾
Aliphatic EC >12-16	1100 ⁽¹⁾
Aliphatic EC >16-35	65,000 ⁽¹⁾
Aromatic EC 5-7	70 ⁽¹⁾
Aromatic EC >7-8	130 ⁽¹⁾
Aromatic EC >8-10	34 ⁽¹⁾
Aromatic EC >10-12	74 ⁽¹⁾
Aromatic EC >12-16	140 ⁽¹⁾
Aromatic EC >16-21	260 ⁽¹⁾
Aromatic EC >21-35	1100 ⁽²⁾
Other	
Monohydric Phenol	120 ⁽¹⁾
Asbestos	Fibres Present

¹ LQM/CIEH (2015) S4UL's for Human Health Risk Assessment. 2nd Ed. (for a sandy soil with 1% SOM and pH 7.0)

² DEFRA C4SL's, DEFRA 2015

³ BRE (2005) Special Digest 1, 3rd Edition, Concrete in aggressive ground. Upper limits for DS-1 Design Sulphate Class concrete.

6.5 Placement.

The contractor undertaking the development works shall be responsible for the placement of the clean cover materials.

The thickness and quality of the capping layer shall be validated in accordance with the following best practice guidance;

- Validation Requirements for Cover Systems – Version 4.1, June 2021. (Yorkshire and Lincolnshire Pollution Advisory Group),

For completeness, a copy of this guidance is presented in Appendix D of this strategy.

Following placement of the clean cover layer, care will be taken to prevent cross contamination of the capping layer with underlying materials.

7 POST RECLAMATION REQUIREMENTS.

Following the development works a validation report shall be prepared and submitted to the local authority for approval.

The validation report shall include the following:

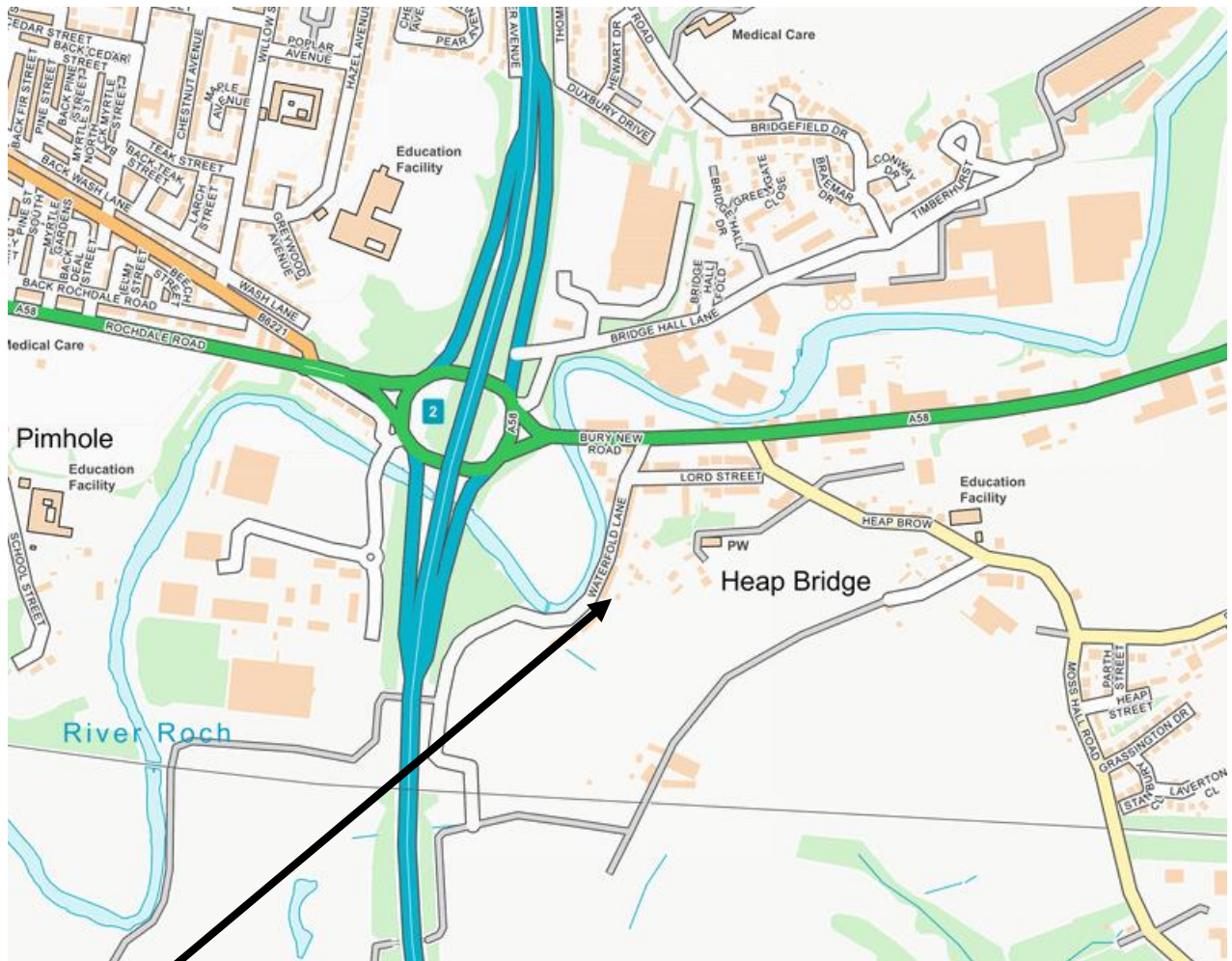
- Description of the works undertaken.
- Waste Transfer Notes, including any made ground materials disposed of from site. (including ACMs)

- Details of further intrusive ground investigation work
- Details of gas protection measures, should the need arise.
- Clean capping chemical validation report, where clean cap soils are placed to areas of proposed gardens/soft landscaping.
- Chemical validation test results.
- Statement that the works have been carried out in accordance with the agreed Strategy.



APPENDIX A

DRAWINGS



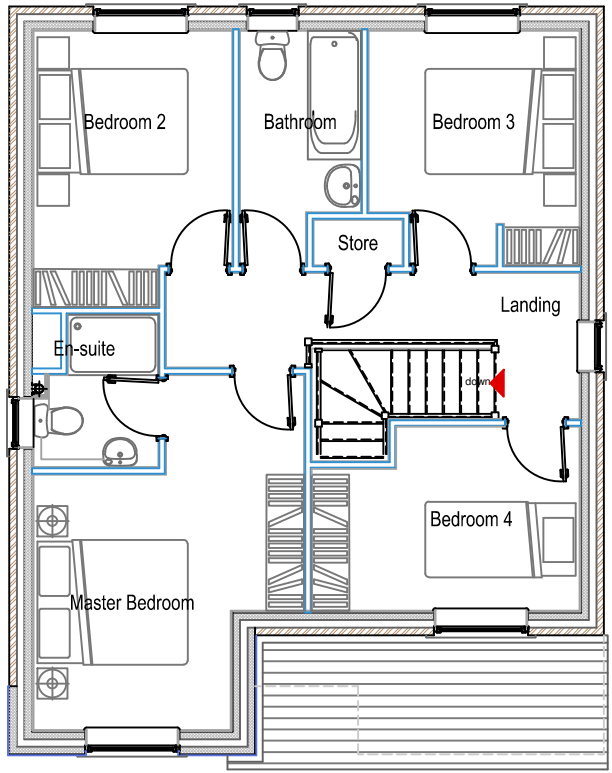
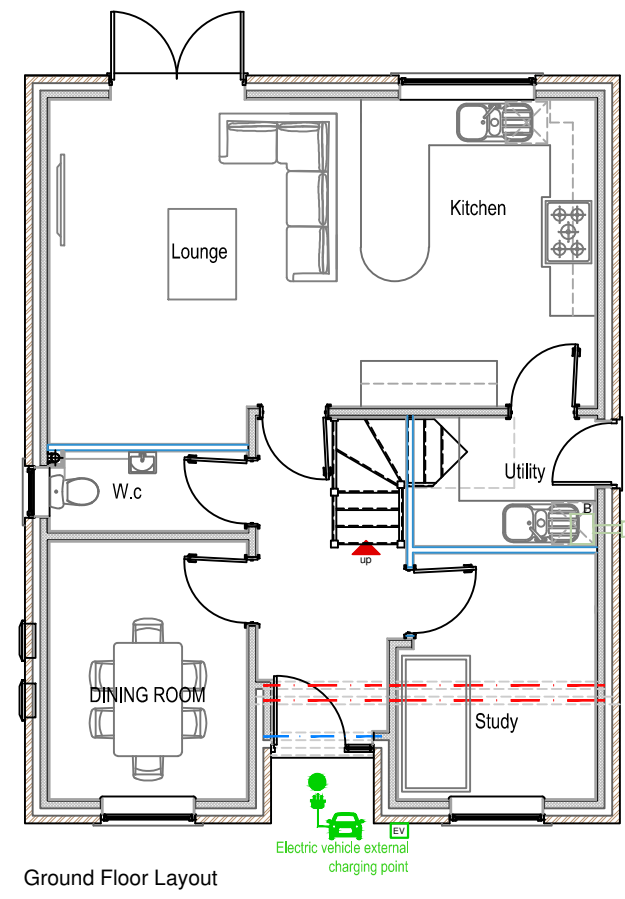
Site

Site Location Plan

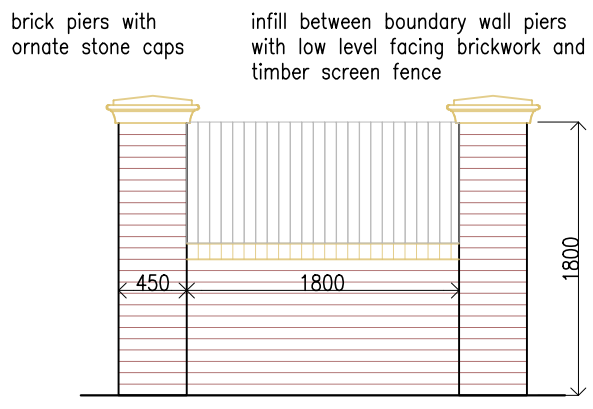
Drawing No C795/1

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PROPOSED 4 BED HOUSE TYPE INDICATIVE PLANS 1:100



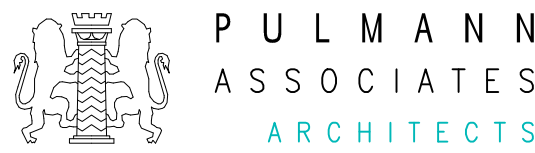
INDICATIVE BOUNDARY TREATMENT 1:50

PROPOSED SITE LAYOUT 1:200



PROPOSED SITE SECTION (INDICATIVE) 1:100

02	Boundary treatment added. Elevations amended.	Jul 21
01	Bin locations added.	May 21
Rev	Description	Date



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Planning

Project: **Residential Development**
Client: **Mr J Birch**
Site: **Land at Waterfold Lane
Bury,
BL9 7JY**

Drawing: **Proposed Site Layout**
Drg No: **M20-12-14** Rev: **02**

Scale: **Varies** Paper: **A1** Date: **Jan 2020**



NOT TO SCALE

Geo² Remediation Limited, The Coniston, Louisa Street, Idle, West Yorkshire, BD10 8NE
Tel: (0113) 2575397 www.geo2.co.uk



APPENDIX B

PREVIOUS INVESTIGATION REPORT



**Intelligent
Ground
Solutions**



Phase I / II Contaminated Land Site Assessment

Land off Waterfold Lane
Heywood,
Bury,
BL9 7JY

For JHA Pulmann

25 April 2024

Report ref. 24/1516A.1

Report ref. 24/1516A.1**Revision log**

Issue No.	Date	Description
1	25 April 2024	Issue of report to Client

Report Prepared By	Signature	Date
Siobhán Hyde Project Manager		25 April 2024
Reviewed and Authorised By	Signature	Date
Steven Jackson Operations Manager		25 April 2024

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1.0 Introduction

Geo² Remediation Limited were commissioned by JHA Pulmann to conduct a Phase I / II Contaminated Land Site Assessment of a site:

Land off Waterfold Lane,
Heywood,
Bury,
BL9 7JY

The site is approximately 0.25 hectares in area and located at grid reference 382320, 410350.

The study was undertaken prior to proposed redevelopment of the site for residential end use, with outline planning permission obtained for the site (ref. 21/01345/OUT). Existing and current proposed plans for the site can be referred to within Appendix A.

1.1 Scope of Works

The Preliminary Risk Assessment, consisting of desk study and site walkover, was conducted in order to assess the potential for contaminant sources to be present on site, resulting from the past use of the site and current land use.

The desk study was also undertaken to identify possible sensitive environmental receptors that may be at risk from sources, if present on site, within the locality of the site.

The scope of the Preliminary Risk Assessment has given consideration to guidance on Land Contamination: Risk Management pages of the GOV.UK web pages, the relevant requirements of the National Planning Policy Framework (NPPF) (as revised 2023) (paragraphs 180 & 189-191) and the Planning Practice Guidance (Land Affected by Contamination).

2.0 Description of the Site and Surroundings

2.1 Site Description

The site is located off Junction 2 of the M66, approx. 3km west and 1.7km east of the towns of Heywood and Bury, Greater Manchester. Figures 1 and 2 in Appendix A show the location of the site.

The site is currently vacant, having historically been allotment gardens. In recent years, all previous allotment buildings have been removed / demolished.

The area shown within the red site boundary on Figure A below, will be referred to throughout this document as 'the site'.

The site is located east of Waterfold Lane, to the rear of terraced housing dated from the 1860s. Waterfold Lane is accessed from the A58 Bury New Rd to the north.



Figure A: Site Location Plan. Red is approximate site boundary and pink are 50m and 100m buffers.
Extract from Envirocheck report (Appendix C).

2.2 Site Walkover

An initial site walkover was undertaken on 8th November 2023 and the site investigation works undertaken on 26th March 2024, with a photographic survey included in Appendix B. Images 1-10 date from November 2023 while images 11-16 are from during the ground investigation. The site walkover findings are detailed below.

The site is located to the rear of a row of terraced houses, with other residential properties located to the north and northwest. Hardstanding in poor condition separates the site from the housing to the west. The eastern side of the site slopes upwards.

The site is currently vacant former allotment land, generally overgrown. The majority of former sheds and glasshouses have been demolished. An existing site plan is included in Appendix A which shows the location of buildings in June 2020. Only a few garages remain by late 2023/ early 2024, generally on the western boundary.

The concrete floor slabs of former sheds can be seen around the site, with glass fragments also evident where glasshouses had once stood.

Evidence of a relatively recent bonfire was seen in the northern part of the site. Suspected asbestos fragments were observed in made ground within TP5, located in the northern part of the site.

2.3 Site Surroundings

The site is located west of the town of Heywood and east of Bury, located off Junction 2 of the M66. The nearest residential properties are situated from 10m west. The surrounding land uses of the site are summarised in Table 2 on the following page.

Direction	Land Use
North	Residential housing and a field
East	Residential property and farmland
South	Farmland
West	Terraced housing, Waterfold Lane, River Roch, farmland and M66 beyond

Table 2. Land Uses in the Surrounding Area.

3.0 Desk Study

3.1 Desk Study Data

Information regarding the environmental setting of the site was obtained from the Envirocheck report, which collated information from a variety of sources. A copy of the Envirocheck report is presented in Appendix C.

Where indicated in Table 3 below, the data from the Envirocheck report has been supplemented with additional information obtained from freely available online data.

Site Geology	British Geological Survey (BGS) data indicates bedrock consists of Pennine Lower Coal Measures and the Milnrow Sandstone across the eastern and western areas of the site respectively. Superficial deposits are indicated to comprise Devensian Till, although Alluvium and River Terrace Deposits are mapped to the north and west, likely associated with the River Roch, which may encroach onto site. The Envirocheck report shows the site has the following risk ratings associated with these ground stability hazards: • Collapsible ground stability – no hazard. • Compressible ground stability – no hazard. • Ground dissolution – no hazard. • Landslide ground stability hazard – low risk. • Running sands stability hazard – very low risk. • Shrinking or swelling clay stability hazard – very low hazard. A moderate risk is identified with respect to compressible ground stability 7m northwest, potentially associated with the alluvium deposits.
Mining	There are no BGS Recorded Mineral Sites within 500m of the site. Moor Hole Sand Pit was located 606m southeast and is no longer operational. A review of the Coal Authority online interactive mapping indicates that while the site is located within a coal mining reporting area, the site is not located within a Development High Risk Area (DHRA) and the nearest recorded coal is located from 350m south. Therefore, the risk to the proposed development from shallow coal mining is considered to be Low.
Radon	The site is in low and intermediate probability radon areas. As such, no radon protective measures are necessary in the construction of new dwellings or extensions.

Site Hydrogeology	The bedrock and Alluvium to the north is classified as a Secondary A Aquifer – Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The superficial deposits across the eastern side of the site are classed as a Secondary Undifferentiated Aquifer – defined where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. The site is not located within a Source Protection Zone. There are 4no groundwater abstraction points within 1km, with the closest located 118m south at Spout Bank Farm for general agricultural use. There are no potable groundwater abstraction points within 1km. The groundwater beneath the site in the combined productive bedrock and productive superficial aquifers has been classed as low vulnerability.
Site Hydrology	The nearest surface water feature is the River Roch located 27m west, flowing westwards with a river quality C. There are no pollution incidents to water recorded within 200m of the site. The nearest discharge consent is located 78m northwest, upstream of the site and operated by United Utilities for storm sewage overflow. The nearest surface water abstraction point is located 349m northeast at Heap Bridge Weir for the production of hydroelectric power.
Waste and Infilled Land	There are no historical landfills, BGS recorded landfills or operational landfills within 500m of the site. The nearest licenced waste management facility is located 288m south at Pilsworth North Landfill. There are no areas of potentially infilled land (non-water) within 600m of the site. There are 3no areas of potentially infilled land (water) within 500m, with the closest located 252m northeast.
Unexploded Ordnance (UXO)	A review of Zetica online risk mapping for the area indicates the site is located in a Low-risk area with respect to UXO.

Table 3. Environmental Assessment of the Site.

4.0 Site History

Details regarding the development of the site, its immediate surroundings and potentially contaminative land uses were obtained from a review of historical maps.

Copies of the maps are provided in Appendix C and a detailed summary provided in Table 4 below and on the following page. All distances given are approximate and are relative to the site, unless otherwise stated.

Date	On-Site	Off-Site	Potential Contamination
1851	The site forms part of a wider undeveloped field.	The surrounding land use principally comprises undeveloped agricultural land, with Heap Bridge village located from 150m north. The River Roch is located approx. 30m west and a railway line is located 200m south, aligned east–west.	N/A
1893 – 1911	The western side of the site has been partially developed with some small buildings shown. By 1910, the entire site has been set out into smaller plots, which extend beyond the southeastern and northern boundaries.	Terraced housing has been established directly west of the site by the 1890s, as Heap Bridge village expands. Water (woollen) Mill is located from 100m west, with associated reservoirs, filter beds, tanks and tenters. A Paper Mill and Heap Bridge (woollen) Mills with a Gasometer are located from 150m northeast and north. A new railway line has been constructed from 50m southeast, joining the main line 200m south.	Potential for made ground soils associated with construction works. Potential for asbestos fragments associated with AC roof sheeting
1930 – 1939	The site remains relatively unchanged, with small buildings across the area.	Land to the east and south remains as undeveloped farmland while Heap Bridge to the north continues to expand. More terraced houses are constructed to the southwest. The Woollen Mill 100m west is mapped as disused by the 1930s, with cricket ground and tennis courts established south of the mill. Bridge Hall Dye Works is established from 150m north, on the opposite side of the River Roch.	

Date	On-Site	Off-Site	Potential Contamination
1955 – 1970	The site and land directly north are labelled as Allotment Gardens, with buildings/sheds having changed since the 1930s. A water course is shown to issue in the southeastern corner and flow into the centre of the site where it sinks.	The majority of the Woollen Mill buildings from 100m west have been demolished and the land now occupied by an unnamed Works. A pond, tank and small water course are mapped 90m south of the site, flowing towards the River Roch to the west.	Potential for contamination arising from demolition and construction of allotment sheds. Potential for asbestos fragments associated with AC roof sheeting
1980 – 2023	The site remains as allotment gardens. The water course is no longer mapped on site.	The works and cricket ground to the west have been removed, with the construction of the M66 motorway aligned north-south. The railway line 50m southeast has been dismantled.	

Table 4. Detailed Summary Review of Historical Mapping

Table 5 below provides a brief summary of the historical land use on site and local to the site.

Key Historical Activities	
On-Site	Initially mapped as undeveloped / agricultural land, later used as allotment gardens with various small buildings (sheds) mapped. A water course is shown to issue and sink across the site during the 1950s to 1970s.
Off-Site	Principally undeveloped / agricultural land use up to the late 1890s, with local industrial land use dominated by woollen and paper mills 100-200m west. A railway line is constructed 50m southeast by the 1890s, dismantled by the 1980s. Heap Bridge village expands from the 1850s, with terraced housing constructed west of the site. The M66 motorway is constructed from 150m west by the 1980s.

Table 5. Brief Summary of Historical Land Use On-Site and Off-Site.

5.0 Preliminary Risk Assessment

5.1 Source – Pathway – Receptor

UK legislation and guidance on assessing potentially contaminated land recommends the use of a risk assessment process based on a review of source/pathway/receptor relationships for various environmental media. The first stage of any risk assessment is to identify, using the desk study data and site information, the presence and extent of any hazard at the site, theoretical or demonstrable.

A key component of the overall risk assessment process is identification of “significant contaminant linkages” between contaminants and receptors. This can be accomplished through development of a site-specific conceptual model in which the potential contaminants, pathways and receptors identified on-site are described.

Each element can be defined as follows:

- **Contaminant source:** A substance either on or under the land and which has the potential to cause harm or pollution to human or environmental receptors.
- **Pathway:** A route or means by which a receptor can be exposed to or affected by a source.
- **Receptor:** A living organism or an ecological system, or controlled water, or property including buildings, crops and livestock.

The presence of all three of the above elements identifies a contamination linkage and a potentially unacceptable risk. To ensure that any risk present to, or, from the site can be appropriately managed each of these contamination linkages will be targeted by the investigation.

5.2 Hazard Identification

5.2.1 Potential On-Site Sources

Potentially contaminative on-site activities relate to the use of the site as allotment gardens from the late-19th century. It is possible that asbestos cement (AC) sheets were used as roofing for allotment sheds. Anthropogenic material such as glass, ceramics and brick may be present in shallow soils.

Due to the age of buildings on site, it is likely that asbestos materials were used in the construction of the buildings, leading to a potential for asbestos fibres in shallow Made Ground soils.

While no landfills or areas of potentially infilled land have been identified on site or within close proximity to the site, the potential presence of Alluvium and organic superficial deposits on or close to the site may be a source of noxious ground gases.

5.2.2 Potential Off-Site Sources

No off-site sources of contamination have been identified within close proximity to the site.

5.3 Initial Conceptual Site Model

Contamination linkages arise as a result of the interconnection of the contaminant source, contamination pathways and potential receptors. These contamination linkages are used to design the site investigation (if required), guiding the type of investigation, location of exploratory boreholes and the required sample analysis.

5.4 Risk Estimation

The objective of the qualitative risk assessment is to determine the significance of the risk, if any, which may occur as a result of the creation of pollutant linkages, which connect a potential receptor to an identified potential contaminant source at the site.

The perceived risk is based on a consideration of both the likelihood of an event (probability) occurring, and the severity of the potential consequence. Classification of these two factors is detailed in Appendix F.

5.5 Preliminary Qualitative Risk Assessment

A qualitative risk assessment is undertaken, detailed in Table 6 below and on the following page, in line with guidance provided in CIRIA's Contaminated Land Risk Assessment: a guide to good practice CIRIA C552, 2001. The purpose of this assessment is to determine the relative significance of the identified contamination linkages by assessing the probability of an impact occurring and by assessing the perceived severity of an impact to a receptor.

Those linkages considered of low risk or less on the basis of the available site data will not be considered any further in this assessment. Linkages considered to be more significant are identified as presenting potentially unacceptable risk to the identified receptor. In these instances, further works may be considered necessary.

Source	Pathway	Receptor	Preliminary Risk Assessment (Probability x Severity)
Potential contamination associated with made ground soils on site related to the use of the land as allotment gardens since the late-19 th Century.	Leaching to groundwater, lateral and vertical flow, followed by migration within the aquifer.	Surface water: River Roch located 27m west, river quality C	Low (Low Likelihood x Mild)
		Groundwater: Secondary A Aquifer within Alluvium and bedrock deposits	Moderate / Low (Low Likelihood x Medium)

Source	Pathway	Receptor	Preliminary Risk Assessment (Probability x Severity)
Potential contamination associated with made ground soils on site related to the use of the land as allotment gardens since the late-19th Century. Potential for asbestos fibres in shallow soils and for asbestos containing materials (ACM)	Direct contact and ingestion of contaminants and inhalation of asbestos in soils and dust	Human Health: Residential End Users	Moderate (Likely x Medium)
		Human Health: Construction Workers	Moderate (Likely x Medium)
Potential for noxious ground gases arising from organic and Alluvium superficial deposits	Inhalation within enclosed spaces	Human Health: Residential End Users	Moderate (Likely x Medium)

Table 6. Identified Initial Contamination Linkages

6.0 Site Investigation

In order to provide an assessment of each of the identified contamination linkages, a shallow intrusive investigation was specified to obtain further information regarding the geology of the site and the quality of the soils and groundwater.

6.1 Site Investigation

Seven machine excavated trial pits (TP01 to TP07) were advanced on 26th March 2024 to depths of up to 3.0m below ground level (m bgl). An exploratory hole location plan, showing the approximate locations of the trial pits, is included in Appendix A.

The trial pits were advanced using a JCB 3CX, with disturbed soil samples obtained by the Geo² engineer for field and laboratory analysis and for logging of ground conditions. Field analysis comprised the examination of each of the samples for visual and olfactory indications of contamination. Analysis was also conducted for volatile hydrocarbons using a photo-ionisation detector (PID).

Trial pit positions were chosen to provide a general site coverage. Exploratory holes were surveyed, with co-ordinates and ground levels for each trial pit added to the exploratory hole logs.

6.2 Ground Conditions

The logs of the trial pits, which are presented in Appendix D, detail the ground conditions with the visual and olfactory characteristics of the soils.

Ground conditions encountered across the site comprised 0.10-0.30m thick silty topsoil over granular made ground. Made ground soils were described as sand or gravel and included sandstone, concrete, brick, coal, clinker and some glass and ceramics. While only 0.30m thickness of made ground was encountered in TP7 located in the southeastern corner, the trial pits typically recorded made ground soils to depths of 1.50-2.40m bgl.

Natural soils were indicative of Alluvium superficial soils and included soft to firm clay with peat or organic horizons or pockets in TP01 to TP06. TP07 in the southeastern boundary recorded sand underlain by stiff clay.

No groundwater was encountered during the shallow investigation.

All trial pits were backfilled with the arisings upon completion.

6.2.1 Obstructions

No obstructions were encountered during the ground investigation.

6.2.2 Observed Potential Contamination

Anthropogenic material was observed within the granular made ground, including concrete, brick, coal, clinker and some glass and ceramics.

Fragments of suspected asbestos cement were identified within the made ground in TP05, with a photo included in Appendix B for reference. No other visual or olfactory evidence of contamination was observed by the engineer.

As detailed within the exploratory hole logs included in Appendix D, no elevated PID readings were recorded within site soils during the investigation which would indicate volatile contamination being present. Slightly elevated readings (maximum 4.5ppm) were recorded corresponding to peat or organic clay layers.

7.0 Laboratory Analysis

7.1 Analysis Rational

Eight soil samples were selected for laboratory analysis for a broad environmental suite reflecting the limited historical land use of the site and the proposed Residential development in line with guidance provided in CIRIA's Contaminated Land Risk Assessment: a guide to good practise (CIRIA C552, 2001).

All samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the laboratory under the laboratory's chain of custody documentation. The laboratory used for the ground investigation on this occasion was Envirolab, a UKAS and MCERTS accredited laboratory.

7.2 Soils Analysis

Six made ground and two natural clay soil samples were analysed for a broad environmental testing suite, including pH, sulphate (water sol 2:1), heavy metals, chromium III and IV, asbestos ID, PAH-16 and TPH-CWG.

The soil samples were selected from a range of depths and from across the site, to gain an understanding of site-wide ground conditions.

The analysis, conducted by a Gas Chromatography / Flame Ionisation Detector (GC/FID) and Gas Chromatography / Mass Spectrometry (GC / MS) comprised fractionation and speciation of hydrocarbons including analysis for benzene, toluene, ethylbenzene and xylenes (BTX) and MTBE compounds. Selected samples were analysed for:

- Heavy metals by IRIS emission spectroscopy.
- Volatile and semi volatile components (including PAHs), by GC/MS.
- Asbestos Containing Materials (ACMs) by Polarised light microscopy / Gravimetry.

The analytical results were analysed for contaminants associated with use of the site as a PFS and generic industrial land use. The results of soil analysis were compared using the following UK guidance:

- LQM/CIEH's Suitable for Use Levels (S4ULs)
- DEFRA Category 4 Screening Levels (C4SLs);
- EIC Soil Generic Assessment Criteria for Human Health (2010).

7.2.1 Soil Testing Results

The results of laboratory analyses on the soil samples undertaken are presented in Appendix E.

Due to the site's proposed redevelopment end use as residential housing, the soil analysis testing results have been compared against 'Residential with plant uptake' end use Generic Assessment Criteria (GACs) thresholds. GAC concentrations associated with a conservative 1% Soil Organic Matter (SOM) have been utilised.

Exceedances of the 'Residential with plant uptake' end use GACs were identified in all made ground soil samples analysed, as outlined in Table 7 below.

Exploratory Hole	Depth m bgl	Contaminant	Concentration Recorded mg/kg	Residential GAC mg/kg
TP01	0.80	Arsenic	122	32
		Lead	513	200
TP02	0.30	Arsenic	48	32
		Lead	420	200
TP04	0.80	Arsenic	35	32
		Lead	620	200
TP05	0.30	Lead	273	200
TP06	0.80	Arsenic	85	32
		Lead	609	200
TP07	0.30	Arsenic	42	32
		Lead	8310	200
		Zinc	8460	3700

Table 7. Recorded Residential GAC Exceedances in Made Ground Soil Samples

The two natural clay soil samples recorded significantly lower concentrations of contaminants, indicating that the rate of vertical migration of arsenic, lead and zinc from made ground soils into the underlying natural strata is low.

7.2.2 Asbestos Fibres in Soil

All eight soil samples were analysed to identify any asbestos fibres present. One made ground soil sample (TP2 at 0.30m bgl) positively identified Chrysotile asbestos fibres, with quantification analysis recording <0.001% ^w/_w.

8.0 Risk Estimation

8.1 Discussion of Investigation Findings

8.1.1 Site Soils

Reflecting the site's use as allotment gardens from the late-19th century, made ground soils with anthropogenic material was encountered up to 2.4m bgl and included possible asbestos cement identified in made ground soils in the northern area of the site.

The Preliminary Risk Assessment (Section 5.0) identified a potential Moderate risk to site end users from contamination within shallow site soils. The shallow investigation and subsequent environmental soil analysis has recorded Residential with plant uptake GAC exceedances with respect to arsenic, lead and zinc in made ground soil samples.

While Chrysotile asbestos fibres were positively identified in TP02, the quantification analysis recorded <0.001% w/w indicating low risk to human health from asbestos fibres in soils.

8.1.2 Controlled Waters

The Preliminary Risk Assessment (Section 5.0) identified a potential Low risk of the site having an adverse impact upon surface water and groundwater receptors respectively, due to the absence of industrial land use on site and low water quality of the neighbouring River Roch (water quality C).

The shallow site investigation undertaken in March 2024 did not identify any groundwater up to a depth of 3.0m bgl (75.99-73-53m AOD). Furthermore, the environmental chemical analysis results reported significantly lower concentrations of contaminants within the underlying natural soils, indicating contamination within the made ground soils is not migrating vertically downwards.

8.1.3 Ground Gases

The Phase 1 PRA report identified a potential Moderate risk to site end users from ground gases arising from alluvium deposits underlying or close to the site.

The investigation recorded Peat deposits in TP01 and TP02 in the southern and southwestern areas of the site, with the remainder of the exploratory holes recording clay with organic or peat pockets or horizons. This organic material could be a potential source of ground gases.

No ground gas monitoring has been undertaken to date.

8.2 Limitations and Uncertainty

It is important to note that the investigation was restricted in areas due to the presence of the historic shed floor slabs road and uneven ground.

Localised areas of deeper made ground cannot be discounted.

8.3 Qualitative Risk Assessment

Each of the identified potential contamination linkages in the preliminary conceptual site model (Section 5.5) is reviewed based upon the findings of the site investigation which allows a greater understanding of the ground conditions at the site, site observations, soil quality and chemical analysis.

The qualitative risk assessment is undertaken, detailed in Table 8 on the following page, in line with guidance provided in CIRIA's Contaminated Land Risk Assessment: a guide to good practice CIRIA C552, 2001. The purpose of this assessment is to determine the relative significance of the identified contamination linkages by assessing the probability of an impact occurring and by assessing the perceived severity of an impact to a receptor.

The perceived risk is based on a consideration of both the likelihood of an event (probability) occurring, and the severity of the potential consequence. Classification of these two factors is detailed in Appendix F.

Those linkages considered of low risk or less on the basis of the available site data will not be considered any further in this assessment. Linkages considered to be more significant are identified as presenting potentially unacceptable risk to the identified receptor. In these instances, further works may be considered necessary.

Source(s)	Pathway(s)	Receptor(s)	Comments	Risk	Requires Further Work
Elevated concentrations of arsenic, lead and zinc above Residential with plant uptake GAC thresholds in made ground soil samples only. Possible asbestos fragments identified in TP05, with Chrysotile asbestos fibres <0.001% w/w recorded in TP02.	Leaching to groundwater, lateral and vertical flow, followed by migration within the aquifer	River Roch located 27m west with river quality C. (controlled waters)	Low permeable superficial deposits but taking into account the proximity of the nearest surface water receptor.	Low (Low Likelihood x Mild)	No
		Alluvium and Coal Measures bedrock are Secondary A Aquifer. Other superficial deposits are Undifferentiated Aquifer. No SPZ or potable water abstraction within 1km (controlled waters)	No groundwater encountered to a depth of 3.0m bgl, with lab analysis of soil samples recording significantly lower concentrations of contaminants within the underlying natural soils	Low (Unlikely x Medium)	No
	Direct contact and ingestion of contaminants and inhalation of asbestos in soils and dust	Proposed residential site end users with private gardens. (human health)	Made ground soils currently present a risk to Residential end users if left at surface level in new gardens	Moderate (Likely x Medium)	Yes
		Construction workers. (human health)	Made ground soils currently present a risk to construction workers, however it is assumed suitable welfare facilities and PPE will be available during groundworks. The presence of fragments of asbestos containing across the surface of the site or within made ground soils cannot be discounted.	Moderate / Low (Low Likelihood x Medium)	Yes

Source(s)	Pathway(s)	Receptor(s)	Comments	Risk	Requires Further Work
Potential for noxious ground gases arising from peat and organic clay deposits identified underlying the site	Inhalation within enclosed spaces	Proposed residential site end users, principally within enclosed areas. (human health)	Encountered organic natural soils and a deep water table indicate these soils may be a source of noxious ground gases.	Moderate (Likely x Medium)	Yes

Table 8. Summary of Qualitative Risk Assessment

9.0 Conclusions and Recommendations

A Phase I / II Contaminated Land Site Assessment of former allotment gardens located on Land off Waterfold Lane, located at Heywood, Bury, BL9 7JY was undertaken, prior to proposed redevelopment of the site for Residential dwellings with private gardens.

The purpose of the assessment was to evaluate the potential for risk to be posed to human health and controlled waters from historical and current use of the site. The investigation recorded a thin topsoil layer over granular made ground to a maximum depth of 2.4m bgl. Underlying the made ground, natural soils representative of alluvium were recorded and included soft to firm organic clay, peat and sand.

Environmental chemical analysis of six made ground soil samples identified elevated concentrations of arsenic, lead and zinc at concentrations that present a risk to residential end users and construction workers. While Chrysotile asbestos fibres were identified at <0.001% w/w, the presence of suspected ACM fragments at surface level or within shallow soils also presents a risk to human health.

Consequently, Geo² consider the risk to residential end users and construction workers from contamination within shallow site soils to be **Moderate** and **Moderate/Low** respectively.

Shallow or perched groundwater was not encountered during the investigation and environmental chemical analysis of soil samples recorded significantly reduced concentrations of contaminants with depth. This is considered by Geo² to indicate that there exists low risk of vertical migration of contamination to controlled waters.

Consequently, Geo² consider the risk to controlled waters from contamination within shallow site soils to be **Low**.

As organic natural soils included peat were identified during the shallow investigation, Geo² considers the risk to residential end users from noxious ground gases to be **Moderate**.

9.1 Recommendations

The following measures are recommended to address the identified risks and to assist in satisfying anticipated contaminated land planning conditions:

9.1.1 Ground Conditions

- A deeper ground investigation will likely be required in order to find suitable ground conditions upon which to place foundations for the proposed dwellings.
- These boreholes would also allow the installation of ground gas monitoring wells, with ground gas monitoring required to allow further assessment of this source-pathway-receptor linkage.

9.1.2 Groundworks

- Suitable welfare facilities and PPE should be provided for all construction workers and standard health & safety procedures adhered to following risk assessments by employers in accordance with Construction Design Management (CDM) Regulations, 2015 and with reference to the environmental testing results included within Appendix E.
- Due to a fragment of suspected asbestos containing material identified during the investigation, it is recommended that contractors undertaking ground works establish suitable risk assessments and undertake picking of asbestos where appropriate. Appropriate asbestos management and disposal measures may also be required, and the advice of an asbestos specialist should be obtained.
- When development works take place on site, a watching brief should be imposed to ensure that any impacts unidentified in the site investigation can be characterised and treated appropriately. Any unidentified contaminated material should be considered in the event of a redevelopment as costs for offsite disposal of these materials may be significant.

9.1.3 Construction

- Due to made ground soils recording elevated concentrations of arsenic, lead and zinc, a clean and inert capping of suitable thickness will be required in all private gardens and areas of soft landscaping.
- Ground gas protection measures, dependant on results of suitable ground gas monitoring over a period of varying atmospheric conditions.

A Remediation Strategy will be required upon completion of the ground gas monitoring, to complete a risk assessment and to outline the gas protection measures (if required) and requirements of the clean and inert capping. This Remediation Strategy would also set out a watching brief for unexpected contamination.

10.0 Report Limitations

This Report was prepared by Geo² for the sole and exclusive use of the Client and for the specific purpose for which Geo² was instructed. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Geo²'s Standard Terms and Conditions.

Geo² does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Geo² from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Geo².

The recommendations contained within this Report represent Geo²'s professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience, and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the Report and any previous works referenced within the Report.

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Coal Authority Interactive Viewer

Zetica UXO

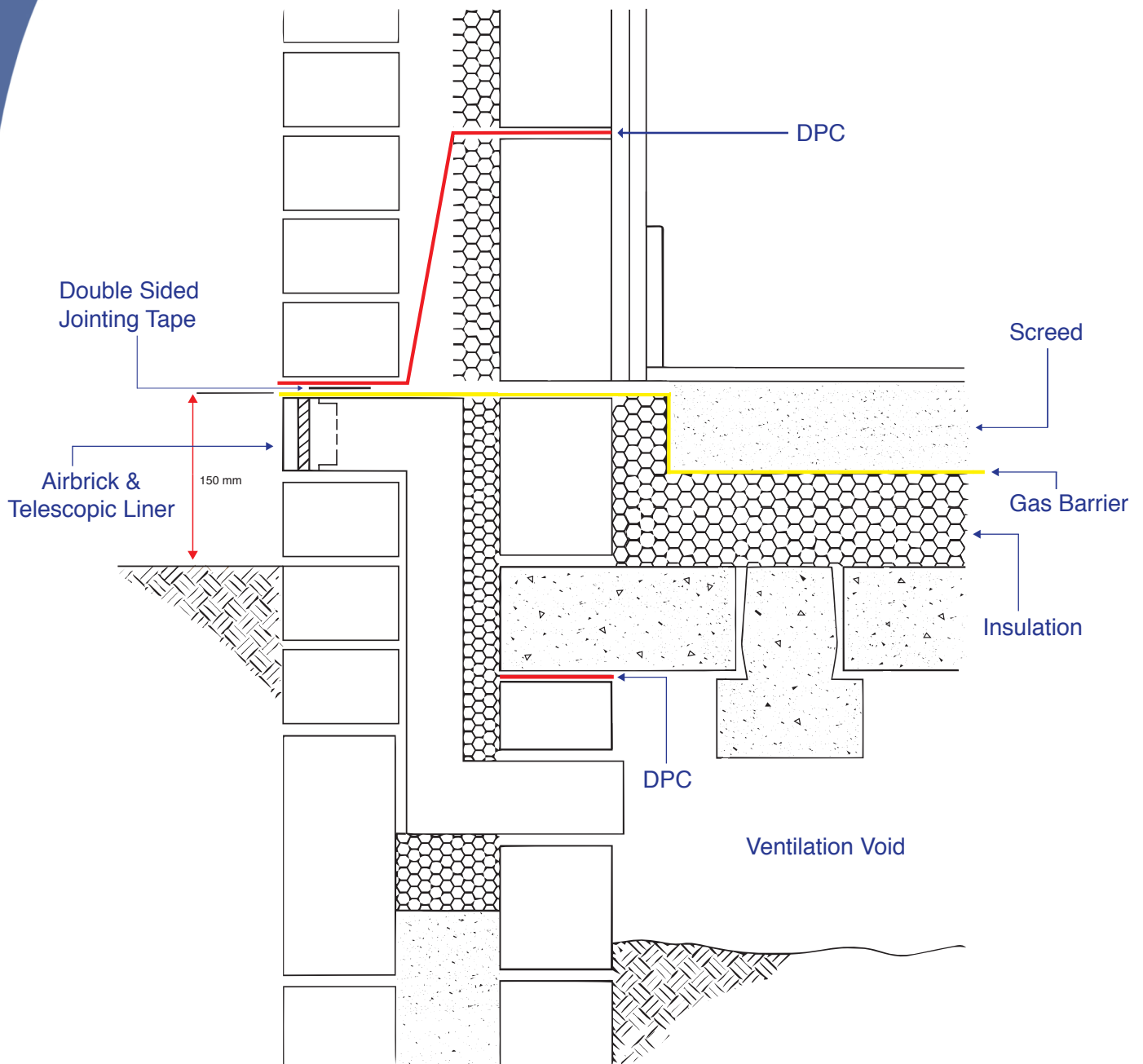
Risk Maps Viewer



APPENDIX C

GAS PROTECTION MEASURES

Principal Through-Wall Detail - No.1

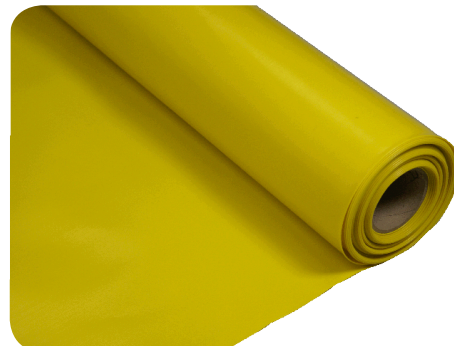


Rhinoplast Super Gas Barrier

Data Sheet

Product Description

A monolithic hybrid co-polymer barrier giving excellent performance. Fully tested for Radon, Methane and CO₂. Approved by NSAI (IAB) Exceeds the requirements of BRE211. Complies with NHBC Amber 1 Installations. CS2 dependent on construction type.



The Rhinoplast range of Gas Barrier Systems has been designed to provide a complete solution to the problems associated with construction on land associated with a range of hazardous gasses, when installed in accordance with the relevant codes of practise. The primary method of protection to the structure is by way of a complete "footprint" membrane system combined with underfloor passive venting. The key to a successful outcome is installation. The best membranes poorly installed are likely to fail. The Rhinoplast range includes pre-formed details and tapes to facilitate this. Where necessary we will provide on-site advice and training to ensure a successful outcome. We even offer a "pre pour" inspection service to ensure correct installations and detailing. These barriers are designed to protect structures and inhabitants from the effects of these gasses. They will also act as damp-proof membranes where applicable and are intended to last the life time of the building. All of our membranes can be welded. With the increase in awareness of such gasses, along with more and more stringent requirements, it is becoming more and more important for contractors to use "fit for purpose materials" in the secure knowledge that they will perform satisfactorily. As pressure mounts on the construction industry to build on "Brown Field Sites" the demand for these products is increasing daily. All Rhinoplast membranes will also function as damp-proof membranes and are CE marked to BS EN 13967 for this purpose.

Colour:

Yellow

Technical Data:

Property	Test Method	Data
Weight		356g/m ²
Thickness		375µm
Tensile Strength	MD	21.5MPa
	CD	29.4MPa
Elongation	MD & CD	>800%
Dart Impact Strength		1.012kg
Tear Resistance	MD	248N/mm
	CD	303N/mm
Low Temperature Flexibility		-25°C
Radon Permeability		4x10 ⁻¹² m ² /s
CO ₂ Transmittance		26.53cc/m ² hr
Methane Transmittance		6.43cc/m ² /hr
MVTR		0.16g/m ² /day
Standard Roll Width		4m
Standard Roll Length		20,25m
Standard Roll Weight		28.48
		35.60kg

Ancillary Components

Rhinoplast Joint Strip

A butyl modified reinforced double sided bitumen tape, 1.5mm thick, designed to form a gas tight gasket. Excellent adhesion and tolerance to damp conditions.

Colour: black.

Available in: 50mm x 15m rolls,
100mm x 15m rolls

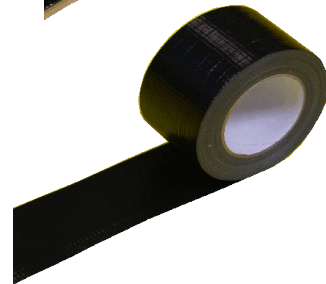


Girth Tape

A single sided girth tape used to secure and protect linear joints. Excellent adhesion, dimensionally stable and water resistant.

Colour: black.

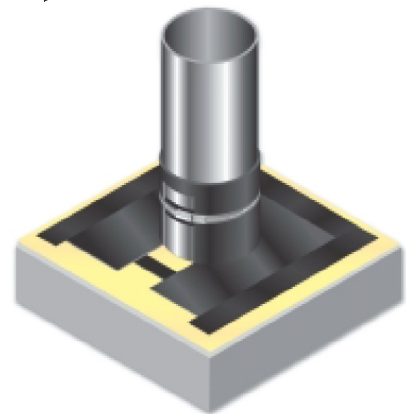
Available in: 72mm x 50m rolls.



Top Hats

A pre-formed pipe seal complete with stainless steel jubilee clip. Easily fixed and sealed on site.

Size range from 50mm to 200mm.



Radon Sump Units

The Radoncare Sump and Cavity Gas Vent System is manufactured by a rotational moulding process from heavy duty polyethylene. The sump is constructed with a solid roof and base and is provided with 40mm diameter holes in the walls. Spigots for 100mm pipe connections are provided at each end of the sump, but are blanked off with knock outs to allow choice of direction for extract pipe. The cavity gas vent comes with a detachable polyethylene cap, which can be easily removed if an extraction system has to be attached.



Useful References

The Building Regulations Approved Document Part C 2004, CP 102: 1973 code of practice for the protection of buildings against water from the ground.

BR211 "Radon - Guidance on protective measures for new buildings"

BRE414 "Protective measures for housing on gas-contaminated land"

CIRIA 665 Ground gas handbook 2009

CIRIA C748 Guidance on the use of plastic membranes as VOC vapour barriers

BS8485:2015 Code of Practice for the Characterization and Remediation from Ground Gas in Affected

Developments **NHBC** "Guidance on methane and carbon dioxide" and technical extra April 2016, issue 20.

The logo for GEONATION20 features the text "GEONATION20" in a bold, black, sans-serif font. The text is positioned on a background that is split diagonally from the top-left to the bottom-right. The upper-left portion of the background is green, and the lower-right portion is blue.

Howard Shaw
27 Thornbridge Close
SHEFFIELD
S12 3AD
Tel: 07878795615

Mr. Graeme Swinbourne

Soil Experts Ltd.

Dear Graeme,

Your question about qualifications is one that is currently perplexing many in our industry.

There is now a qualification, NVQ2 for installers of gas membranes, and very recently a qualification, NVQ4 for validators; however, the vast majority of people and companies delivering these services are qualified by experience.

For my part with respect to ground gas remediation I too am qualified by experience, 30 years to be precise.

I have been providing independent validation services since 2013, I have many clients ranging from one off self-build to national organisations like Avant Homes, Vistry Partnership, and Crest Nicholson and to the satisfaction of local authorities from Hampshire to Northumberland; and including Rotherham where I am currently validating installations at Waverley.

My validation method meets with the approval of NHBC and follows those prescribed by Ciria C735 and BS8485;2015. I am a supporter member of CL:Aire.

Yours Faithfully

Howard Shaw.



APPENDIX D

YALPAG: VALIDATION REQUIREMENTS FOR COVER SYSTEMS



VERIFICATION REQUIREMENTS FOR COVER SYSTEMS

Technical Guidance for
Developers,
Landowners and
Consultants



**Yorkshire and Lincolnshire
Pollution Advisory Group**

Version 4.1 – June 2021

The purpose of this guidance is to promote consistency and good practice for development on land affected by contamination. The Local Authorities in Yorkshire, Lincolnshire, the North East of England, East Anglia, Greater Manchester and St Helens who have adopted this guidance are shown below:



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Disclaimer

This guidance is intended to serve as an informative and helpful source of advice. YALPAG will review this guidance every three years, but readers must note that legislation, guidance and practical methods are inevitably subject to change and therefore should be aware of current UK policy and best practice. This note should be read in conjunction with prevailing legislation and guidance, as amended, whether mentioned here or not. Where legislation and documents are summarised this is for general advice and convenience, and must not be relied upon as a comprehensive or authoritative interpretation. Ultimately it is the responsibility of the person/company involved in the development or assessment of land to apply up-to-date working practices to determine the contamination status of a site and the remediation and verification requirements.

Acknowledgments

YALPAG would like to thank North Lincolnshire Council, Leeds City Council, City of Bradford Metropolitan District Council, Barnsley Metropolitan Borough Council, Rotherham Metropolitan Borough Council, Wakefield Council, and Tameside Metropolitan Borough Council, for producing this guidance.

YALPAG would also like to acknowledge Liverpool City Council's Contaminated Land Team, Coopers Consulting Engineers for allowing us to use their guidance document and photographs and WSP Environmental Ltd for also donating photographs.

Consultation

39 Local Authorities and 6 Environmental Consultants were consulted over a four week period in 2010 during the production of the initial guidance. At that time, consultation comments were considered by the review panel and a number of revisions were made to the guidance to reflect these comments.

49 Local Authorities and 25 Environmental Consultants were consulted in 2021, during the production of this version [4.1] of the guidance. Consultation comments were considered by the review panel and a number of revisions were made to the guidance to reflect these comments.

Introduction

This guidance has been produced to help developers ensure that they can demonstrate that material brought onto a development site for gardens or areas of soft landscaping are suitable for use and do not present harm to people, the environment and/or property. It is intended to improve the quality of reports submitted to Local Authorities on this matter and to give contractors/consultants a point of reference to obtain approval for such work from their client. This guidance does not cover the geotechnical suitability of soils or materials, chemical suitability that does not affect human health e.g. sulphates, or importing soils contaminated with invasive (or injurious) plants.

The verification of cover systems should be an integral part of the remediation project and agreed between developers and regulators at an early stage in the project.

UK guidelines for remediation verification are set out within Land Contamination Risk Management¹ (LCRM) and the document on Verification of Remediation of Land Contamination². This guidance note should be considered as supplementary advice in conjunction with these documents.

This guidance relates to the remediation of land contamination by using cover systems; however, the verification of the quality of imported material is equally important in other situations, such as raising levels for flood prevention or general landscaping works. This guidance could also be used in such instances.

The Process of Verification

Implementation plans for remedial works should always be site specific. Where a cover system and potentially, excavation, is the main remedial method or a component of an overall site remediation, specific goals will need to be set that are linked directly to the risk management strategy for the site in question.

For cover and containment systems, verification will normally depend upon the provision of defensible measurements, observations and records. Critical factors to be considered are:

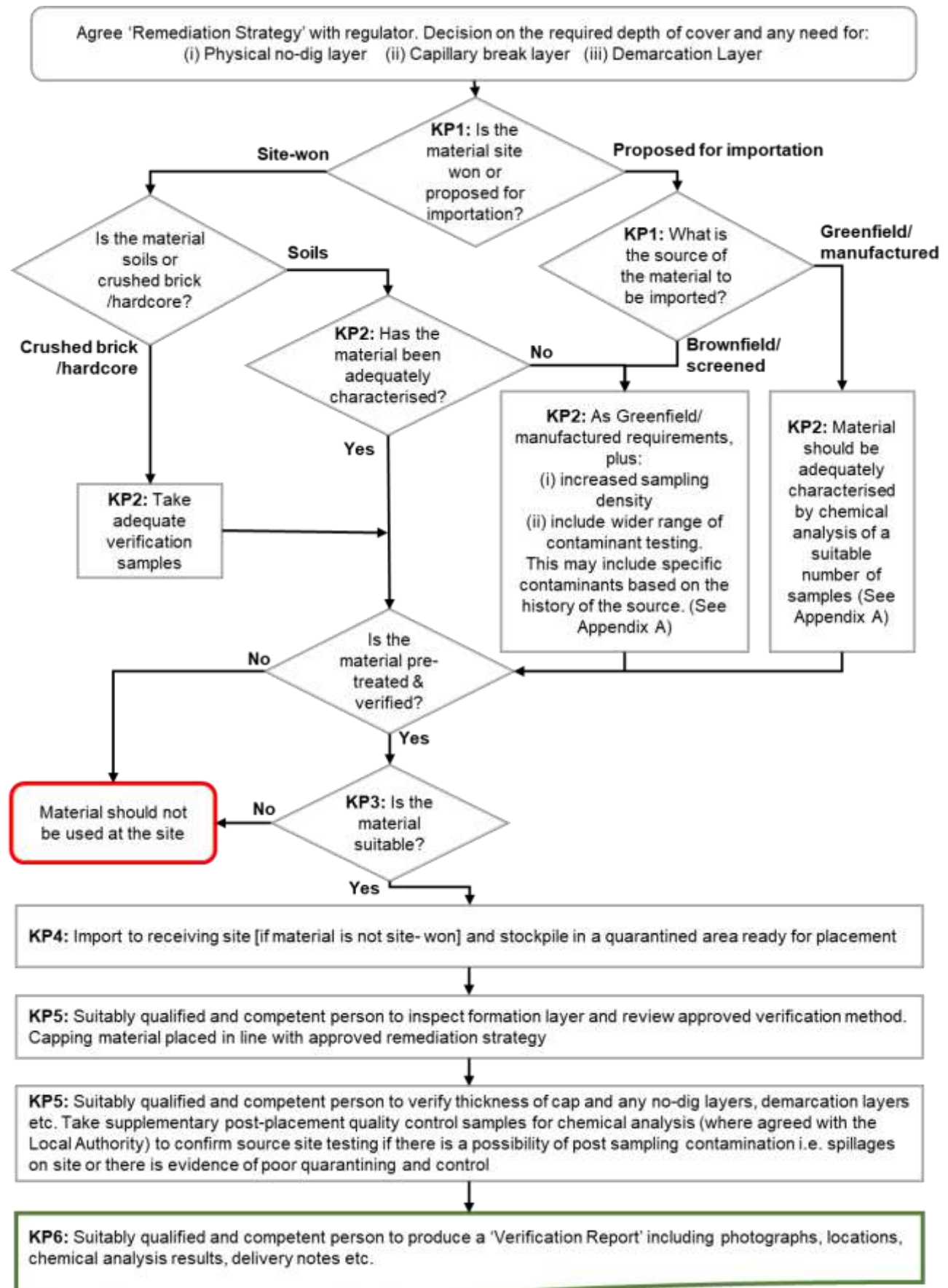
- What should be measured?
- When should they be measured?
- Where measurements need to be taken, what is the appropriate monitoring regime i.e. number and frequency of samples?
- Statistical constraints on sampling.

National Planning Policy Framework (NPPF) states that “planning policies and decisions should ensure that after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990”. The Verification Report is a key document to demonstrate compliance with NPPF, and the responsibility rests with the developer/applicant to submit the required Verification Report to complete the remediation and to discharge any planning conditions.

¹ Land Contamination Risk Management, Environment Agency, Oct 2020

² Verification of Remediation of Land Contamination. Environment Agency, Feb 2010

Overview Flowchart



Key Points

KP1: Source of Material

Material can be sourced from site won material i.e. crushed brick/hardcore or site-won soils from existing open or landscaped areas. In the interest of sustainability, Local Authorities promote the use of such site-won material providing that they are suitable for the intended end use of the site.

Alternatively, material can be sourced from other developments and commercial companies. Dependent on the source of the material it can be classified as either from a 'Greenfield/Manufactured' or 'Brownfield/Screened' source.

Broadly speaking material can be classified as follows:

Greenfield – Where documentary evidence is provided confirming that the source site has not been developed and that no past contaminative uses have occurred. Should evidence not be provided or approved by the Local Authority, please note that the source would be expected to be assessed as though it were a brownfield source.

Manufactured – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost). If other soil component sources are used, documentary evidence should be provided confirming that the source site has not been developed and that no past contaminative uses have occurred. Should documentary evidence not be provided or approved by the Local Authority, please note that the source would be expected to be assessed as though it were a brownfield source.

Brownfield – material from a donor site that has previously been developed

Screened – material from a company who deal with skip/demolition waste which is screened for unsuitable material i.e. bricks, wood, plastic etc.

KP2: Characterisation of Material

It is essential that material is suitable for its intended use. Documentary evidence of the source of the material should be provided to the Local Authority. This may include desk study or site investigation reports. A defensible method is required to ensure the verification proposals are site specific and that the level of sampling reflects the need to ensure that imported material are suitable for their intended use.

Due to the diminishing supply of suitable Greenfield topsoil sources it has been found that the chemical quality of Greenfield sources is less reliable in certain areas. As a result the recommended analytical rate for the intended use of the development may vary between Local Authorities [see **Appendix 1a**].

When should this be done?

Sampling of material should be undertaken as early as possible i.e. prior to placement [for site won material] and prior to importation [for imported material]. This is to avoid the costly exercise of re-excavating unsuitable material and the possibility of cross contamination. Where the assessor has confidence that the material is of sufficient quality (i.e. tested by supplier, used previously) it is acceptable to test the material on site. Although, if it is deemed unsuitable it would have to be either removed off site or pre-treated at the cost and time of the developer. It is recommended that some verification samples are also taken once this material has been delivered to site to confirm suitability for use. Soils can become contaminated during transportation or when stockpiled on site.

What about certificates from commercial suppliers?

Where the material is provided by a commercial company, certificates or other industry Quality Protocol compliance i.e. WRAP, DoWCoP, will normally be accepted. This is on the proviso that it: (i) relates to the actual material being imported to the site and the type and amount of analysis is in line with what is prescribed in Appendix 1a; and, (ii) the certificates are less than two months old.

It is recommended that some additional verification samples are taken once this material has been delivered to site. Soils can become contaminated during transportation or when stockpiled on site.

Extreme caution should be given to importing material that has been recycled from demolition or skip waste as they could easily be contaminated e.g. asbestos containing materials. Please refer to “questions you should be asking your supplier” in **Appendix 1b** and include the responses in your report.

British Standard

Imported soils should be as specified in BS 3882:2015 for topsoil and BS8601:2013 for subsoil as ‘suitable for their intended purpose’. Both British Standards relate mostly to nutrient content of topsoil and phytotoxic contamination and they do not consider contaminants that pose a risk specifically to human health. Soils should be tested for contaminants that are considered to pose a risk to human health in addition to those specified in the relevant British Standards to ensure that they are suitable for their intended use.

Initial screening

A visual / olfactory inspection of the material should be carried out by a suitably qualified and competent person to ensure that:

- It is a suitable growing medium;
- It is free from obvious contamination i.e. staining/free product etc.;
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants, as specified by the Environment Agency, are suspected to have been growing;
- It is not odorous (could be considered a statutory nuisance);
- It is free from unsuitable material i.e. bricks, brick ties, timber and glass etc.); and,
- There are no visible signs of asbestos containing material (ACMs).

Testing schedule & number of samples

Chemical testing will normally be required on any materials that are to be used as cover material, even where this includes first generation quarried material. This should be carried out by a suitably qualified and competent person.

Appendix 1a explains in detail the sampling and testing requirements for a typical residential development. These are only guidelines and it may be necessary to deviate away from them depending on local and site-specific factors. It is recommended that the developer discusses any deviation with the Local Authority.

The following criteria sets out the requirements for sampling and testing:

- **Virgin Quarried Material** sampling needs to be 1 or 2 samples depending on the type of stone utilised, to confirm the inert nature of the material. Testing to include standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn).
- **Crushed Hardcore, Stone, Brick (excluding asphalt)** a minimum of 1 sample per 500m³. Testing to include 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).
- **Greenfield/ Manufactured Soils** a minimum of 3 samples or, dependent on source and receptor, between 1 per 50m³ and 1 per 250m³. Testing to include standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).
- **Brownfield/ Screened Soils** a minimum of 6 samples or dependent on source and receptor, between 1 per 50m³ and 1 per 100m³. Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).

The assessment criteria need to be UK based, e.g. LQM S4ULs, Defra C4SLs or other similarly derived GACs.

KP3: Suitability of Material

Based on the characterisation of material above, the material should be either deemed suitable or unsuitable. Obviously unsuitable material should not be used (unless it is treated to reduce levels of contaminants below agreed target levels i.e. bioremediation – this would have to be agreed and included within the Remediation Strategy) and an alternative source of material should be sought by the developer. If the material is considered suitable it can be imported (if not site won) and stockpiled in a suitably quarantined area [refer to **KP4**].

KP4: Stockpiling & Quarantining of Material

It is essential that the 'suitable' material is either placed in its intended area straight away i.e. soft/landscaped areas or stockpiled in a suitable quarantine area to prevent on-site contamination.

In the event that an assessor finds material has been stored in an unsuitable area, samples should be taken to confirm that no cross contamination has occurred (including a visual/olfactory check of the material). The material should then be suitably quarantined or placed at its intended location immediately.

KP5: Verification of Required Depth

In line with the agreed Remediation Strategy, it is important to establish that the required depth has been achieved and is consistent across the site. There are two main ways to achieve this:

Depth testing in situ – small trial pit excavated to allow measurement of its depth by standardised tape measure or measuring staff.

Topographical surveys – accurate survey of the base and final formation layer height to establish the depth of cover.

Specific Local Authority Policy

Please check with the local Contaminated Land Officer to establish:

- Which type of method for testing depth is accepted; and,
- The number of verification areas per property, plot, landscaped area or garden area (some Local Authorities recommend at least 2 per plot for residential developments).

Important Note: Where demarcation, physical no-dig and capillary break layers exist they should be verified for their thickness and presence during the time of their installation. Details of the demarcation layer should be agreed with the Contaminated Land Officer prior to placement. This will include the design, type and strength of the geotextile separator or visual warning membrane. The verification of depth and confirmation of such layers should be carried out by a suitably qualified and competent person.

KP6: Reporting

The purpose of verification documentation is to provide transparent reasoning why the remediation was required, a methodology about how it was to be undertaken and proof that the specified works have been undertaken and to provide confirmation that the site is “suitable for its intended use”.

The document is utilised not only to satisfy conditions of planning permissions but also is to be kept on record by the Local Authority should queries be raised during the lifetime of the development and to confirm to future purchasers that the site is suitable for use.

National Planning Policy Framework (NPPF) states that “planning policies and decisions should ensure that after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990”. The Verification Report is a key document to demonstrate compliance with NPPF, and the responsibility rests with the developer/applicant to submit the required Verification Report to complete the remediation and to discharge any planning conditions.

It is also essential that other supporting documentation is included within a report carried out by a suitably qualified and competent person e.g. laboratory analysis results, delivery tickets for material, certificates for imported material (or if unavailable, documented evidence of the source of the Greenfield material), trial pit logs etc. A checklist has been included in **Appendix 2** to give an idea on what information should be recorded.

Additionally, any reporting should include details of any measures required to maintain the cover system integrity in the future e.g. successive construction phases (management plans) and longer term (restrictive covenants on title deeds).

Photographic evidence for validating the depth of cover

The Local Authority ideally would recommend the following programme of photographs to be taken of the placement of inert cover:

- Photographs of any stockpiles and quarantine areas
- Proof that the depth of inert cover has been installed
- Proof of the quality of the material to be used as inert cover
- Proof there is a geotextile separator and visual warning membranes if used between the underlying material and suitable for use soils.
- Proof of the method of placement and different layers if appropriate
- Proof of the completed project
- Inclusion of background features which will aid locating the photograph
- Inclusion of site identification boards within the photos which show the date, position taken i.e. corner of plot 3 and the site name.
- Inclusion of photographs of site stockpiles and quarantine areas.

The presence of good quality photographs is essential to prove beyond doubt that the remediation has been done as specified both by method and position, and that the images have been taken from the specific area stated.

Refer to **Appendix 3** for examples of good photographic evidence.

Appendix 1a – Sampling & Testing Matrix

Type	Number of Samples	Testing Schedule	Assessment Criteria
Please note that these guidelines apply to a typical residential development, and relaxation of the guidelines or more stringent requirements may apply dependent on local and site specific factors. Therefore, <u>all parameters need to be agreed with the Local Authority.</u>			
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material.	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)	The assessment criteria need to be UK based, e.g. LQM S4ULs, Defra C4SLs or other similarly derived GACs.
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).	
Greenfield/ Manufactured Soils	Minimum 3 Dependent on source and receptor, between 1 per 50m ³ and 1 per 250m ³	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).	
Brownfield/ Screened Soils	Minimum 6 Dependent on source and receptor, between 1 per 50m ³ and 1 per 100m ³	Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	

Appendix 1b – Questions to Ask Your Soil Supplier Relating to Soil Quality

- What is the source of the material (refer to KP1)? If the source is Greenfield, can they provide evidence of this?
- Will all of the material be coming from the same source?
- Are you satisfied that the material is a suitable growing medium for the proposed end use?
- Has the supplier used an appropriate sampling protocol to ensure a representative sample is analysed? What volume of soil is represented by the analysis and does it comply with Appendix 1a?
- Does the testing include analysis of contaminants identified in Appendix 1a?
- Does the laboratory conducting the analysis have UKAS and MCERTS accreditation for the tests they are carrying out?
- Does the material comply with relevant waste regulations?
- Can I have a copy of the whole analysts report and does it include an interpretive section?
- Will the provided certificate be dated within the last 2 months?

Appendix 2 – Checklist for Verification Reports

Example only. Not to be considered as typical minimum requirements. Additional information should be included for non-cover systems aspects of the remediation i.e. gas protection measures etc.

Site Details	
Site Name / location	
Developer name	
Development use	
Plot No / description of landscaped area (inc plan of inspection areas)	
National Grid Reference	
Inspection visit date	
Supporting Evidence	
Description of remediation (as per agreed Remediation Method Statement including depths / thickness checks, topographical readings)	
Material tracking information (including way tickets etc.)	
Name of groundwork's remediation contractor	
Name of supervising environmental consultant	
Site Specific chemical analysis results	
Verification Photographs (inc. remarks)	
Recommendations	
Pass/fail	
If material fails, how will this be managed i.e. removed, treated	
Detail any further remedial works and/or inspection	
Signed off	

Failure to provide any of the above information may prevent planning conditions from being discharged.

Appendix 3 – Examples of Good Quality Photographs



© Coopers
Consulting
Engineers

Photograph 1:
Depth check of inert
cover within area of
public open space.
Physical break layer
and topsoil visible.



© WSP

Photograph 2:
Depth check of inert
cover with Site &
Location Information
Board.



© **Coopers Consulting Engineers**

Photograph 3:
Depth check of inert cover within areas of front gardens.



© **Coopers Consulting Engineers**

Photograph 4:
Depth check of inert cover within areas of front gardens.



© **Coopers Consulting Engineers**

Photograph 5:
Depth check of inert cover within rear gardens. Taut string line spans across excavation.



© **Coopers
Consulting
Engineers**

Photograph 6:
Depth check of inert
cover within rear
gardens. Taut string
line spans across
excavation.



© **Coopers
Consulting
Engineers**

Photograph 7:
Shows the spatial
location of the
verification pit.



© Coopers
Consulting
Engineers

Photograph 8:
Excavation within
public open space
and verification pit
showing the presence
of a remediation
break layer at the
base, a crushed
sandstone inert fill
overlain by topsoil.



© Coopers
Consulting
Engineers

Photograph 9:
Inert crushed
sandstone being
delivered. The spatial
area of the
remediation can be
observed from these
photographs (old
terrace housing).



© Coopers
Consulting
Engineers

Photograph 10: Inert
crushed sandstone
being delivered with
visible remediation
break layer. The
spatial area of the
remediation can be
observed from these
photographs (traffic
lights).



© **Coopers Consulting Engineers**

Photograph 11:
Shows the remediation of the rear garden, with a significant depth (1.0m) of inert cover. This photograph has been stitched to form a panoramic photograph and hence there is slight distortion



© **Coopers Consulting Engineers**

Photograph 12:
Shows the remediation of the rear garden, with a significant depth (1.0m) of inert cover. Remediation break layer visible at the base of the excavation.