Land Science

BILLHOOK FARM, WEST CHILTINGTON LANE, CONEYHURST, RH14 9DN

REMEDIATION METHOD STATEMENT

MR JIM SMITH

31ST OCTOBER 2024

LS7994 A

Site:	**BILLHOOK FARM, WEST CHILTINGTON LANE, CONEYHURST, RH14 9DN**
Title:	**REMEDIATION METHOD STATEMENT**
Project:	**DEMOLITION OF BARN AND REFURBISHMENT OF REMAINING BUILDINGS**
Client:	**MR JIM SMITH**
Contact:	**BATCHELLER MONKHOUSE**
Date:	**31st OCTOBER 2024**
Reference:	**LS7994 A**
Version:	**A – final for issue**

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1.0 INTRODUCTION

1.1 General

Land Science was instructed to undertake a Remediation Method Statement in relation to the proposed redevelopment of land at Billhook Farm, West Chiltington Lane, Coneyhurst, RH14 9DN. The location is shown on Figure 1, which is centred at grid reference TQ11242 25344.

1.2 Client

The Client for this appointment was Mr Jim Smith via their agent Batcheller Monkhouse. This report may only be used by this named client and their project team for the purposes set out and subject to the report conditions. It was assumed or understood that the Client already owned the property, and that this investigation was not a pre-purchase appraisal.

1.3 Area Under Investigation

The area under investigation comprised two agricultural barns, access road and associated areas of soft landscaping. The layout is indicated on Figure 2, and the area was approximately 0.27 hectares.

1.4 Proposed Development

The proposed development was understood to comprise the demolition of a storage barn, and renovation of the remaining buildings into two dwellings with associated soft landscaping and garden area. The proposed development was covered under planning application numbers DC/23/1758 and DC/23/1759, with the demolition of the existing barn covered under DC/23/1678 (Horsham District Council). Figure 3 illustrates the layout of the proposed redevelopment. The findings of this report may be not valid if the proposed development is altered.

1.5 Previous Investigations

The previous phase I investigation was carried out by Land Science:

- Combined Phase I and Phase II Contamination Assessment, Dated 31st October 2024, Reference LS7994

The Remediation Method Statement has been carried out in accordance with the recommendations of the previous report and all reports must be read in conjunction with each other. The RMS may require amendments following the review by the Contaminated Land Officer at relevant Local Authority.

1.6 Standards

Where practicable, the investigation was undertaken in accordance with the following primary standards and guidance:

- Land Contamination Risk Management (LCRM) Environment Agency 2020.
- BS10175:2011+A1:2013, Investigation of Potentially Contaminated Sites.

- National Planning Policy Framework, July 2018.
- Building Regulations Approved Document C: Site preparation and resistance to contaminants and moisture, HM Government, July 2013.
- NHBC Standards Chapter 4.1: Land Quality - Managing Ground Conditions, 2019.

Other technical sources have been cited in respect of specific aspects of the investigation, as referenced throughout the text.

2.0 REMEDIATION OBJECTIVES AND OPTIONS

2.1 Objectives

The distribution, nature and concentrations of contaminants of concern are a critical consideration for the selection of the correct remedial technology for the attainment of the remediation objectives.

The prevalence of some recalcitrant contaminants may make a specific technology expensive or unviable in terms of treatability and/or cost. The selection of the right remedial technology is further complicated by other considerations such as the geological and hydrogeological setting, extent of previous investigation/remediation works, the time available for implementation and treatment, site access and restrictions posed by ongoing development, and cost.

The primary objective of the remediation activities will be for the safe redevelopment of the site that is suitable for the proposed end-use. Considering the previous sections, the following remedial options available to manage unacceptable risks will either:

- Manage (remove, destroy, modify or immobilise) the source;
- Interrupt the pathway; or
- Modify the receptor or the behaviour of the receptor.

The preferred options will be designed to manage the source of contamination or interrupt the pathway.

Source management may involve the removal, destruction, or transformation of the source. Pathway interruption may involve either the blocking of the pathway or the destruction or removal of contaminants moving along a pathway.

This can be achieved either via the permanent reduction of contaminant concentrations to acceptable limits; source removal; pathway interruption.

2.2 Constraints

There are limited constraints at the site, proposed site levels could be raised / lowered slightly if needed, material could be reused on site and excavated natural soils could be stockpiled on site for future use as backfill.

3.0 IMPLEMENTATION PLAN

The previous Combined Phase I and Phase II Contamination Assessment, Dated 31st October 2024, Reference LS7994 undertaken by Land Science identified some risks to receptors at the site and the following are recommended: -

- Complete removal of Made Ground from all soft landscaping areas to a depth of 0.60m and reinstating with topsoil/subsoil as required by the landscape designer (minimum 150mm).
- Upgrading of the damp proof membrane to one that would also provide protection from ingress of vapours.
- Upgrading of new water supply pipework.
- Waste Disposal considerations.
- A Discovery Strategy should also be followed during the development.

The following strategy has been prepared in order to render the site safe for residential occupation.

The following sections 3.1 and 3.2 give specific details relating to the proposed soft landscaping for the private garden.

3.1 Landscaped Area for Private Garden

Site levels are expected to remain the same as the existing site levels and the proposed soft landscaping areas will be remediated. This will comprise the removal of all existing hardstanding concrete and Made Ground in the proposed soft landscaped area to the depths discussed in the following sections and replacement with clean imported topsoil / subsoil that meets the testing criteria set out in Section 3.2.

It is understood that the proposed landscaping area is for a private gardens with grass and shrubs/ herbaceous planting. Full landscaping details have not been provided by the client, but the new soil make up in this area would be at least 600mm deep comprising the following from existing ground level:

- 300mm topsoil, over
- 300mm subsoil.

Proposed finished levels are assumed to be the same as the existing site levels.

If any Made Ground is found to be present below the reduced dig depth of 600mm, then a geotextile membrane (e.g. Terram Hi-Vis) should be placed between any Made Ground and imported soils. The data sheet for the Terram Hi-Vis Geotextile is contained within Appendix B

3.2 Imported Materials

Material used to raise site levels must be suitable for the proposed end use and chemical testing is recommended to confirm that they do not contain elevated concentrations of potential contaminants of concern that could pose a risk to end users (e.g. asbestos). Testing should meet the screening criteria appended to this document (Appendix A) and must be 'clean' and 'suitable for use' with no visual evidence of contamination (sharps or visual signs of pollution).

The soil testing requirements for any imported backfill materials should be as follows: -

Soil Type	Chemical Testing	Required Testing Frequency
Imported Topsoil	pH, Soil Organic Matter, Heavy Metals, PAH, BTEX, Asbestos Screen + BS3882:2015 physical testing for topsoil.	On site: 1no. sample per 50m^3 for each material and source. Where >10m^3 a minimum of 3no. samples.
Subsoil	pH, Soil Organic Matter, Heavy Metals, PAH, Asbestos Screen + BS8601:2013 for subsoil.	

In addition, the laboratory test results for material imported to soft landscaping areas should also meet the criteria in the following table with respect to potential phytotoxic risk to plant growth.

Element	Phytotoxicity Value (mg/kg)			Arable (grassland)
	pH <6.0	pH 6.0-7.0	pH >7.0	pH >5.2
Zinc	200	200	300	300 (300)
Copper	100	135	200	200 (330)
Nickel	60	757	110	110 (180)
Cadmium	50*			3.0 (3.0)
Arsenic	1,000*			50 (50)

If the verification tests fail screening criteria, then the material is deemed not acceptable and should be removed from site.

Records of the volume of imported materials will be kept (transfer notes / purchase records) and a summary table (with volumes, dates removed and waste classification) will be included within the Validation Report. The summary will also have a calculation to show the volume of material removed from the proposed landscaped area corresponds to the same volume of imported subsoil / topsoil this is to confirm that enough 'clean' imported material has been brought onto the site to infill any excavations and that site won materials have not been re-used.

The removal of Made Ground and the provision of chemically suitable material should be monitored and validated by a suitably qualified environmental consultant with detailed site inspection sheets compiled (confirming details of areas inspected, depths of any imported soils, samples taken and where any further work is required etc.). Photographs will be taken and included with the inspection sheets in the Remediation Validation Report.

3.3 VOC Resistant Membrane

The Combined Phase I and Phase II Contamination Assessment, Dated 31st October 2024, Reference LS7994 recommended that any damp proof membrane is upgraded to a fully resistant Organic Vapour Membrane. This could involve the following:

Floor and Sub-structure Design

- Cast in situ monolithic reinforced ground bearing raft with minimal penetrations that is well enforced to minimise cracking and have minimal penetrations cast in;

Ventilation / Dilution

- Pressure relief pathway - Low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench.

Gas Membrane

- The gas membrane (VOC resistant) should be specified in accordance with BS8458:2015,
- The membrane should come with key performance mechanical property test data that complies with Table 6.1 of CIRIA C748 Guidance on the use of plastic membranes as VOC vapour barriers. The supplier should be able to demonstrate that the properties of the chosen membrane by providing the laboratory test data for independent verification,
- The membrane should come with demonstrable and verifiable low vapour permeation against Naphthalene (as a minimum). The test data should be in accordance with CIRIA C748. The membrane supplier should be able to demonstrate the low vapour permeation of the chosen membrane by providing the laboratory test data for independent verification,
- The minimum recommended membrane thickness is 0.5mm,
- The membrane should be robust enough to withstand the installation and following construction process, including following trades. Therefore, the minimum recommended puncture resistance is 2.0kN, or alternatively appropriate protection should be used above and below the membrane,
- If installed beneath a ground slab (i.e unsupported), the membrane should be strong enough to withstand in-service stresses, including settlement (if anticipated),
- If installed beneath a ground slab, the membrane should be protected on top and bottom with a geo-fabric (or other appropriate protection) immediately following a satisfactory inspection and testing regime. Architects insulation may be laid over the membrane as an alternative to using a protective geo-fabric,
- If installed above a solid slab, protection should be installed at least on top of the membrane,
- The membrane should be sealed across wall cavities,
- The membrane should be compatible with foundations and structures i.e. suitable detail is required with respect to joining complexity,
- The membrane should be sealed to all services and any penetrations through it.

Whilst the membrane may be installed by a non-specialist, the work should be carried out to a high professional standard and inspected by the environmental consultant as part of the remediation validation, in accordance with BRE414 and CIRIA C735.

A formal design should be undertaken by a designer (architect, supplier or gas installation contractor) as part of the Construction Phase Plan.

3.4 Adjacent Land Users

The surrounding land uses were identified to comprise an agricultural field and a residential dwelling with soft landscaping, which have not been identified as at risk from ongoing pollution from site. However, measures should always be taken to prevent and control any dust, run-off and mud etc. generated during groundworks, as part of good site management.

3.5 Asbestos

The previous assessment recommended that an appropriate asbestos survey should be undertaken on site of the building prior to the proposed works, to assess the presence of asbestos within the building fabric.

Details of the survey and any certificates of completion will be contained within the validation report.

3.6 Potable Water Supply Pipework and New Service Utility Routes

Buried plastics used for potable water supplies should be upgraded to resist chemical contamination. Aluminium barrier pipework will be acceptable. No pipework should be laid where there is evidence of hydrocarbons.

Confirmation should be sought from the utility supply company as to the suitability of potable water supply pipes prior to install.

New service utility trenches should be backfilled with chemically inert material for example naturally sourced sand or pea shingle or material that has been chemically tested and meets the chemical validation specification in Appendix B.

3.4 Waste Management

3.4.1 Stockpiles

If material is excavated from the ground (e.g. site strip and service trenches) it may be stockpiled on site. If stockpiles are to be created, they should be on impermeable ground, over a geotextile membrane and managed suitably to minimise dust generation i.e. dust suppression and suitable covers. Stockpiles must be bunded to prevent possibility of contaminated surface water run-off impacting surrounding land.

Stockpiles of 'waste arising' for offsite disposal and stockpiles of imported 'clean' material for use as anti-dig / clean capping need to be clearly marked and appropriately segregated to avoid the potential for cross contamination.

Stockpiles should be regularly surveyed and records maintained to be included in the validation report.

The Contractor undertaking the remediation works is responsible for compliance with waste management legislation where issues relating to waste arise as a result of the works. As a minimum, the following is required:

- Management of material that arises during the works and is classified as waste.
- Waste streams are appropriately classified prior to offsite disposal.
- Audit process for the selection of waste management contractors to include the collection and assessment of licences, permits and registrations.

3.4.2 Soil Disposal

The Contractor should allow for a suitable regime of testing soil arisings to ensure they are being disposed of to the appropriate facility with the appropriate level of duty of care.

The results of the soil analysis recently carried out by Land Science have been classified as follows:

Soil	Waste designation	Details
Made Ground HP01 0.35m	Non-hazardous	The soil analysis was not identified as hazardous but the WAC test did not meet the requirements for Inert

Soil	Waste designation	Details
		waste. Interpretation: Non Hazardous waste. The tests failing the criteria were: Total PAH (mg/kg).
Made Ground HP02 0.20m	Inert	The soil analysis was not identified as hazardous and the WAC test met the requirements for Inert. Interpretation: Inert Waste.
Made Ground HP02 0.40m HP04 0.75m	Non-hazardous	The soil analysis was not identified as hazardous. No WA test undertaken.
Made Ground HP03 0.25m	Hazardous	The soil analysis was identified as hazardous due to elevated TPHs. No WAC test undertaken.
Made Ground HP04 0.60m	Stable non-reactive Hazardous	The soil analysis was identified as Hazardous waste, although the WAC test met the criteria for Stable Non -reactive Hazardous Waste. The tests failing the criteria were BTEX, TPHs.
Made Ground HP05 0.30m	Hazardous	The soil analysis was identified as hazardous due to elevated pH. No WAC test undertaken.

It is anticipated that the underlying natural soils would meet the Inert Waste Criteria.

The receiving waste facility should be consulted as they may be able to handle different wastes with higher acceptance criteria. e.g. The elevated pH may relate to building materials within the sample.

Asbestos was identified in only two of the five samples tested. In the sample from HP02 it was detected as free fibres <0.001%. The threshold of free fibres in Hazardous Waste is 0.1% and therefore the sample was classified as non-hazardous.

Asbestos Containing Materials (ACM's) were also identified in HP01 at 0.35m as sheeting / board debris (<0.001%). WM3 states that where waste contains identifiable pieces of asbestos containing material (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then these pieces must be assessed separately. HSE publication HSG264 suggests that there are no ACM's where the typical proportion of asbestos is less than 0.1%. Therefore, all soils containing ACM's are Hazardous waste (but may still be sub-classified as Stable Non-reactive).

Records of the removal and disposal of soils must be kept and included within the final validation report. The records should include details of volumes, waste codes, facility that the material is sent to and dates etc.

3.5 Discovery Strategy

During groundworks, a watching brief is required by a competent environmental consultant, site-based engineer or site manager. Should visual signs or olfactory signs of unexpected contamination be identified then the following is required:

- Stop works in the location of identified gross contamination.
- Inform the Site Manager and Environmental Consultant.

- Environmental Consultant to inform Local Planning Authority Contaminated Land Team, with no further works undertaken in the area until any new recommendations have been agreed.
- Excavate the impacted area until impacted material is visually removed.
- The excavated material can be temporarily stockpiled on site, for pre-treatment and waste classification, prior to being disposed of offsite at a suitably licensed facility in accordance with the above (as detailed in Section 3.4.2).

Unexpected contamination may include:

- Visible fragments of asbestos board / tile or fibre (lagging);
- Soil headspace readings >100 ppm (using photo-ionisation detector [PID]);
- Significant discolouration of the soil;
- Visible hydrocarbon seeps; and,
- Strong hydrocarbon odour in the hand.

4.0 SITE CONTROLS

4.1 General Controls

Site works should be undertaken in accordance with the CDM:2015 Regulations and guidelines prepared by the Health and Safety Executive [HSE, 1991 Protection of Works and the General Public during the Development of Contaminated Land and Guidance Note HS(G)66, Health and Safety Executive, HMSO, 1991].

Detailed control measures with respect to contaminated land will be required during works on the site, to include (but not limited to):

- Monitoring of actual changes to ensure mitigation of potential adverse effects.
- Education of workers to risks associated with contamination (site inductions and appropriate toolbox talks).
- Posting of appropriate warning signs.
- Provision of suitable welfare facilities; and
- Provision of suitable PPE (and RPE if required).

4.2 Odours, Noise and Vibration

Care will need to be taken during activities to minimise the impact of any odours, dusts, noise and vibration on the surrounding buildings and receptors. In all instances, best practicable means (BPM) should be employed to control noise and vibration. BPM should also be employed to control dust emissions, such as (but not limited to) damping down dusty operations throughout the earthworks.

5.0 VALIDATION REPORT REQUIREMENTS

There is a requirement that the remediation of the site is validated and documented in line with Environment Agency document: verification of remediation of land contamination report (SC030114/RI).

The previous Combined Phase I and Phase II Contamination Assessment, Dated 31st October 2024, Ref LS7994 identified some risks to receptors at the site and the following are recommended: -

- Complete removal of Made Ground from all soft landscaping areas to a depth of 0.60m and reinstating with topsoil/subsoil as required by the landscape designer (minimum 150mm).
- Upgrading of the damp proof membrane to one that would also provide protection from ingress of vapours.
- Upgrading of new water supply pipework.
- Waste Disposal considerations.
- A Discovery Strategy should also be followed during the development.

In line with the above remedial aspects, the Contractor will hold as a minimum:

- Records of all excavations including:
    - Ordnance survey extents and depths;
    - Photographic record of each excavation; and
    - Plans of the site showing where remediation has been undertaken including estimated area of each discrete soft landscaping area.
    - Records of the volume of each type of material excavated and imported to each remedial excavation / soft landscaping area will also be estimated and included in the Remediation Validation Report. There should be a calculation for soft landscaped areas to confirm the volume of material removed is the same as volume of imported soils.
    - Records of any changes to proposed changes to the landscaping scheme and changes to removed volumes of materials removed and imported.
- Records of laboratory analytical and *in-situ* field test results, including:
    - Laboratory test certificate for any verification test of imported material (subsoil and topsoil).
    - Particulars of remediation monitoring on site inspection sheets (date / location / personnel), the area of soft landscaping will be inspected to confirm depth and make up of 'clean' cover;
    - Calibration data for any field measurement equipment used during the remediation supervision in accordance with manufacturers guidance;
    - Confirmation of depths and volumes of each backfill layer; subsoil and topsoil layers; and,
    - Chain of custody forms.
- Records of any previously unidentified contamination, as detailed in the **Discovery Strategy** (if encountered). If any further remedial recommendations are required following completion of the various development phases (groundworks, landscaping etc.) a signed confirmation that the Discovery Strategy has been followed (including if no unexpected contamination was encountered) from the appointed site contractor or client will be required and copies included within the Remediation Validation Report.

- Records of material movement, including:
  - Volumes, origin and placement location of soils references to field results.
  - Details and quantities of excavated and imported materials.
  - Records of earthworks excavations including, as constructed, photographs, quantities of materials and records of progress; and,
  - Waste transfer notes for any material disposed of as waste.
- Waste classification and management documentation, including:
  - Details of all parties involved in the works.
  - Records of approval and method statements.
  - Records of discussions with regulatory authorities and written approval for actions.
  - Records of license applications (including mobile treatment license or declaration under the Definition of Waste Industry Code of Practice); and,
  - Records demonstrating environmental monitoring.

All relevant information as detailed in above shall be collected during the remediation works and an independent verification report compiled on completion. The validation report shall take account of the recommendations in Land Contamination Risk Management (LCRM) Environment Agency 2020 and comprise as a minimum:

- A summary of the information contained in the risk assessment reports along with the agreed redevelopment strategy and objectives.
- Decision records covering agreement with regulators.
- Records of works undertaken and associated validation and monitoring records e.g. laboratory validation test certificates).
- Details of all parties involved in the works.
- Details and quantities of excavated soils and volumes disposed of off-site.
- Specialist contractor's validation reports for particular elements of work (if used).
- Details of the validation of installed gas protection measures.
- Details of the validation data for any imported soils used on-site (at least three sets of analyses per source) plus *in-situ* validation test results confirming depth and chemical quality.
- Waste classification and management documentation.
- Additional risks assessments / non-scheduled reactive works relating to previously unidentified contamination and all related remedial works that were undertaken; and,
- Final status of remediation and achievement remedial objectives to satisfy planning conditions.

It should be noted that consideration has not been given to the protection of groundworkers, during the construction phase of this project, as that is outside the scope of this report. Adequate protection measures should be provided within a Construction Method Statement, completed by the Principal Contractor (CDM regulations 2015) for the project.

REFERENCES

A number of technical references have been referred to in the preparation of this document, including:

- Smith, I. (2014) Smith's Elements of Sil Mechanics. Chichester. Wiley Blackwell. 9th Edition
- Highways England 2009. Interim Advice Note 73/06 revision 1: Design Guidance for Road Pavement foundations (draft HD25)
- BRE Design Guide 365. Soakaway design ("DG365")
- Radon: Guidance on protective measures for new buildings, BRE Report BR 211, 2015 2ND edition
- Groundwater protection: Principles and practice (GP3) August 2013 Version 1.1
- Revised EU Waste Framework Directive 2008 2008/98/EC [transposed into English law under The Waste (England and Wales) Regulations 2011]
- European Community (EC) Directive 1999/31/EC [transposed into English law under the Landfill (England and Wales) Regulations 2002]
- Defining Waste Recovery - Permanent Deposit of Waste on Land, EPR13 v1.0, EA 2010
- The definition of waste: Development Industry Code of Practice, v2, CL:AIRE 2011
- Guidance on the classification and assessment of waste Technical Guidance WM3 ("WM3") EA publication (1st edition 2015)

REPORT CONDITIONS

The Client

This report may also be used only by the client named in section 1 and their appointed project team for the purpose of design, obtaining planning, building regulations approval, and in connection with finance. This report must not be used by any other persons or for other purposes without express written agreement of Land Science.

General

Land Science takes all reasonable professional care in preparation of this report, using current standards and industry practice. However, the evaluation of ground conditions depends on an interpretation and extrapolation of the conditions revealed by a limited data set. The level of risk is related to the extent of investigation and no site is ever free of risk. The client should understand their risks and liabilities. We accept no liability whatsoever in respect of:

- The scope, extent or design of an investigation.
- Any conditions not directly revealed by the investigation.
- Published standards or methodologies used or adopted in this report.
- The opinion of any other party including any regulator, authority or stakeholder.
- Any dispute, claim or consequential loss arising from any findings of this report.
- Third party information and data.

This report relates solely to ground-related matters as set out in the objectives and makes no representation on other matters such as ecology, arboriculture, invasive plant species, the condition of buildings and structures, hazardous building materials such as insulation or asbestos, the locations of boundaries, unexploded ordnance, and or planning constraints etc. Further reports should be commissioned in this respect as appropriate.

Regulators and Approvals

This (and any other) report should be submitted to relevant authorities for their own assessments and to provide their approval or comments accordingly. This should be in good time before commencing on site in case additional work is to be carried out.

Standards, technical guidance and regulatory positions change over time and which may therefore affect the findings and recommendations made in this report; this should be verified by the client prior to any critical project milestones. Where this information is used in design, the designer should verify that the information is appropriate and has been used correctly.

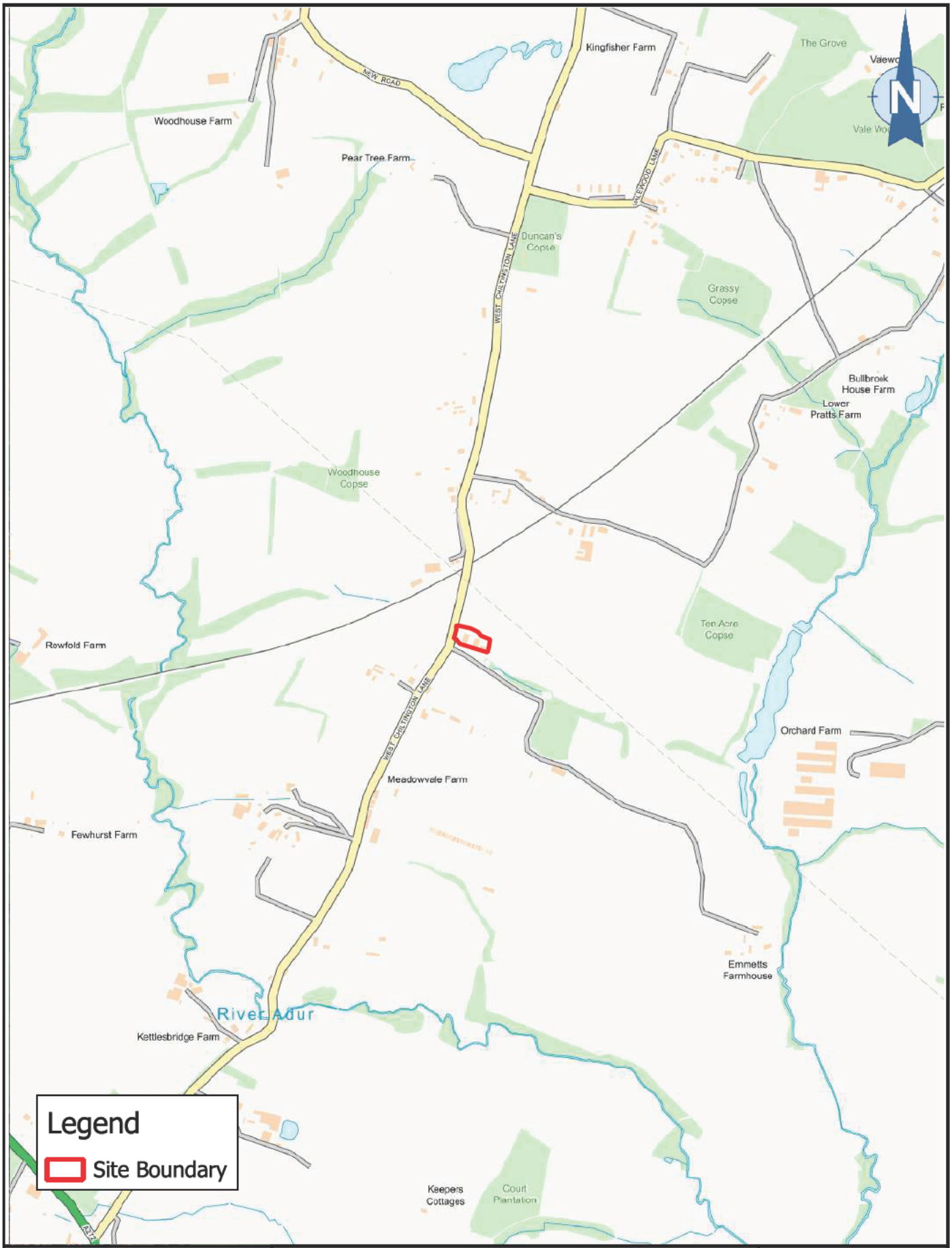
Variations with time

The report relates to conditions revealed at the time of the investigation and any monitoring visits. Some parameters may vary over time or seasonally; groundwater levels, ground gas compositions, or concentrations of contaminants are particularly variable in this respect. Further monitoring or verification should be considered as appropriate.

GLOSSARY OF TERMS

ACM	Asbestos Containing Material
BGS	British Geological Survey
BRE	Building Research Establishment
BS	British Standard
C4SL	Category 4 Screening Level
CBR	California Bearing Ratio
CDM	Construction Design and Management regulations
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLEA	Contaminated Land Exposure Assessment model
CSM	Conceptual Site Model
EA	Environment Agency
EQS	Environmental Quality Standards
FOC	Fraction of Organic Carbon
GAC	Generic Assessment Criterion
GQRA	Generic Quantitative Risk Assessment
mbgl	Meters Below Ground Level
NHBC	National House Building Council
mOD	Metres above Ordnance Datum
PAH's	Polycyclic Aromatic Hydrocarbons
PHE	Public Health England
PID	Photo-Ionisation Detector
PQRA	Preliminary Quantitative Risk Assessment
PSD	Particle Size Distribution Test
RMS	Remediation Method Statement
S4UL	Suitable for Use Level
SOM	Soil Organic Matter
SPZ	Source Protection Zone
SPT	Standard Penetration Test
SSSI	Sites of Special Scientific Interest
ST-WEL	Short Term Workplace Exposure Limit
SVOC's	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRRL / TRL	Transport Road Research Laboratory
TWA-WEL	Time Weighted Average Workplace Exposure Limit
UK HBF	United Kingdom House Building Federation
VOC's	Volatile Organic Compounds
WAC	Waste Acceptance Criteria

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Land Science	Title: Site Location		Reference: LS7994
	Project: Billhook Farm, West Chiltington Lane, RH14 9DN		Figure: 1
	Client: Mr Jim Smith		Date: 11/10/24
	Prepared by: LS	Checked by: MR	Version: 01	Sheet: 1 of 1

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Land Science	Title: Exploratory Hole Location Plan	Reference: LS7994	Prepared by: LS
	Project: Billhook Farm, West Chiltington Lane, RH14 9DN	Figure: 2	Checked by: MR
	Client: Mr Jim Smith	Date: 11/10/2024	Version: 01

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Land Science	Title: Proposed Development Layout	Reference: LS7994	Prepared by: LS
	Project: Billhook Farm, West Chiltington Lane, RH14 9DN	Figure: 3	Checked by: MR
	Client: Mr Jim Smith	Date: 11/10/2024	Version: 01

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APPENDIX A

TIER 1 SOIL SCREENING (HUMAN HEALTH)

Land Science

Project: Billhook Farm
Reference: LS7994
Assessor: MR

Soil Organic Matter (calculated): 6.66%
Soil Organic Matter (adopted): 6.00%
Scenario: Residential (with vegetation)

Lab Sample Ref.	
Location Ref.	
Depth (m)	
Sample Number	
Date sample taken	
Time sample taken	

Determinand	Source	Value	Units	Detection Limit
Asbestos (Identification)	N/A	Not-detected	Type	N/A
Herbicide and Pesticide Screening	N/A	Absent	P/A	-
General Inorganics				
pH	NONE	-	pH Units	N/A
Total Cyanide	NONE	-	mg/kg	1
Water Soluble Sulphate (Soil Equivalent)	No health risk	-	g/l	-
Water Soluble Sulphate as SO_4 (2:1)	No health risk	-	mg/kg	-
Water Soluble Sulphate (2:1 Leachate Equivalent)	No health risk	-	g/l	0.00125
Sulphide	NONE	-	mg/kg	1
Fraction Organic Carbon (FOC)	No health risk	-	N/A	0.001
Total Organic Carbon (TOC)	No health risk	-	%	0.1
Loss on Ignition @ 450oC	NONE	-	%	0.2
Acid Neutralisation Capacity	No health risk	-	+/- mol/kg	-100
Total Phenol				
Total Phenol (monohydric)	S4UL	380	mg/kg	1
Speciated PAHs				
Naphthalene	S4UL	13	mg/kg	0.05
Acenaphthylene	S4UL	920	mg/kg	0.1
Acenaphthene	S4UL	1100	mg/kg	0.1
Fluorene	S4UL	860	mg/kg	0.1
Phenanthrene	S4UL	440	mg/kg	0.1
Anthracene	S4UL	11000	mg/kg	0.1
Fluoranthene	S4UL	860	mg/kg	0.1
Pyrene	S4UL	2000	mg/kg	0.1
Benzo(a)anthracene	S4UL	13	mg/kg	0.1
Chrysene	S4UL	27	mg/kg	0.05
Benzo(b)fluoranthene	S4UL	3.7	mg/kg	0.1
Benzo(k)fluoranthene	S4UL	100	mg/kg	0.1
Benzo(a)pyrene	S4UL	3	mg/kg	0.1
Benzo(a)pyrene (surrogate marker for genotoxic PAHs)	C4SL	5	mg/kg	0.1
Indeno(1,2,3-cd)pyrene	S4UL	41	mg/kg	0.1
Di-benzo(a,h)anthracene	S4UL	0.3	mg/kg	0.1
Benzo(ghi)perylene	S4UL	350	mg/kg	0.05
Coronene	NONE	-	mg/kg	0.05
Total PAHs				
Total WAC-17 PAHs	NONE	-	mg/kg	1.6
Heavy Metals / Metalloids				
Arsenic	S4UL	37	mg/kg	1
Barium	NONE	-	mg/kg	1
Beryllium	S4UL	1.7	mg/kg	0.06
Boron	S4UL	290	mg/kg	0.2
Cadmium	S4UL	11	mg/kg	0.2
Chromium (VI)	S4UL	6	mg/kg	-
Chromium (III)	S4UL	910	mg/kg	1
Copper	S4UL	2400	mg/kg	1
Lead	C4SL	200	mg/kg	1
Mercury (elemental)	S4UL	1.2	mg/kg	0.3
Nickel	S4UL	130	mg/kg	1
Selenium	S4UL	250	mg/kg	1
Vanadium	S4UL	410	mg/kg	1
Zinc	S4UL	3700	mg/kg	1
Monoaromatics				
Benzene	S4UL	370	µg/kg	1
Toluene	S4UL	660000	µg/kg	1
Ethylbenzene	S4UL	260000	µg/kg	1
Xylene (p & m) [note - values for p used]	S4UL	310000	µg/kg	1
Xylene (o)	S4UL	330000	µg/kg	1
MTBE (Methyl Tertiary Butyl Ether)	NONE*	1	µg/kg	1
Total BTEX	NONE		µg/kg	10
Petroleum Hydrocarbons				
Mineral Oil (C10 - C40)	NONE	-	mg/kg	10

APPENDIX B

TERRAM
Hi Vis Geotextile



TERRAM Hi Vis is a non-woven orange geotextile used for separating contaminated/uncontaminated soils.

TERRAM Hi Vis geotextiles have a dual effect: its vivid colour warns of potential danger at the point of any future excavations and it can also prevent the upward movement of contaminated soil particles.

Preventing intermixing of granular materials and soils

TERRAM Hi Vis geotextiles provide an effective solution to the problem of constructing a stable granular layer over soft foundation soils. When stone is placed directly on a soft subgrade, the imposed load often causes intermixing of two layers. This results in contamination of the stone layer and a resulting loss in bearing strength, surface rutting and deformation at the sub-base/ subgrade interface.

Preventing the ingress of fines into drainage media

Whether it's a granular drain or a geosynthetic alternative such as open geocellular units, TERRAM Hi Vis geotextiles are ideal for preventing the ingress of fines.

TERRAM filters/separators are used extensively in the construction of

- Paved and unpaved roads
- Railways
- Car parks and hardstandings
- Cycleways and footpaths
- SuDS installations
- Green roofs

Features

- Engineered to provide high strength and high elongation at break
- Manufactured from high tenacity UV stabilised virgin polypropylene fibres to provide long term durability in all soil types
- Manufactured using a randomly orientated web to provide completely isotropic properties
- Excellent uniformity with high permeability and low pore size for soil filtration

PRODUCT GRADE	T1000 Orange Geotextile
Roll Width (*) m	4.5/6
Roll Length (*) m	100

TERRAM product specifications can be downloaded from **www.terram.com**