



# Remediation Strategy

**Holland House Farm, Kirton Drove**

**Presented to Mr Christian Lomas**

Issued: July 2020

Delta-Simons Project No. 19-0923.03






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## Report Details

<b>Client</b>	Mr Christian Lomas C/o Globe Consultants Limited
<b>Report Title</b>	Remediation Strategy
<b>Site Address</b>	Holland House Farm, Kirton Drove, Boston, LN4 4QN
<b>Project No.</b>	19-0923.03
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## Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
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## About us

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Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from ten locations - Lincoln, Birmingham, Bristol, Dublin, Leeds, London, Manchester, Newcastle, Norwich and Nottingham - we employ over 100 environmental professionals, bringing experience from across the private consultancy and public sector markets.

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## 1.0 Introduction, Context and Purpose

Delta-Simons Environmental Consultants Limited (Delta-Simons) has been instructed by Globe Consultants Limited on behalf of Mr Christian Lomas (the 'Client') to prepare a Remediation Strategy prior to the commencement of development of the proposed Holland House Farm, Kirton Drove, Boston, LN4 4QN (hereafter referred to as the 'Site').

The purpose of this document is to provide a formal statement for the proposed construction phase mitigation requirements to facilitate the development following the completion of a geo-environmental investigation by Delta-Simons. For information on the Site setting, and full details of intrusive investigations completed at the Site, this Remediation Strategy (RS) should be read in conjunction with the previous reports relating to the Site:

- ▲ Preliminary Environmental Risk Assessment, Holland House Farm, Kirton Drove, Boston, Project 19-0923.01, dated July 2019; and
- ▲ Factual and Interpretive Short Format Environmental Report, Holland House Farm, Kirton Drove, Boston, Project 19-0923.02

## 2.0 Planning Requirements

The Site is proposed for the demolition of the existing barns and subsequent rebuilding to form two dwelling houses within the footprint of the existing barns, with associated garden as detailed in Boston Borough Council Planning Application Ref. B/20/0095. The Proposed Development Plan is included as Drawing 1. Planning Conditions 3, 4 and 5 relate to contamination, which are detailed below.

*Condition 3 - No further development shall take place on the site until a detailed remediation strategy to deal with land contamination and/or pollution of controlled waters affecting the site shall be submitted and approved by the Local Planning Authority. Remediation of the site shall be carried out in accordance with the approved remediation strategy and no deviation shall be made from this scheme without the express written agreement of the LPA.*

*Condition 4 - On completion of remediation, two copies of a closure report shall be submitted to the LPA. The report shall provide validation and certification that the required works regarding contamination have been carried out in accordance with the approved Method Statement(s). Post remediation sampling and monitoring results shall be included in the closure report.*

*Condition 5 - If, during development, contamination not previously considered is identified, then the LPA shall be notified immediately and no further work shall be carried out until a method statement detailing a scheme for dealing with the suspect contamination has been submitted to and agreed in writing with the LPA.*

The aim of this Report, therefore, is to assist in addressing the requirements of the planning condition. The implementation of the works outlined within this RS will be completed and reported within a separate (Verification) stage of works.

## 3.0 Previous Reports Review

### **Preliminary Environmental Risk Assessment, Holland House Farm, Kirton Drove, Boston, Project 19-0923.01, dated July 2019**

Delta Simons has previously undertaken a Preliminary Risk Assessment (PRA) for the Site in respect to a change in use of the agricultural barns to residential dwellings. The findings of the PRA are summarised below.

#### **Current Site Use**

At the time of the walkover the Site was currently used as a large agricultural barn of brick, wood and roof tile construction, with an associated small extension and lean-to in poor condition, of possible ACM construction. The barn stored general household items and a single gas tank. Two smaller agricultural barns in the south, and an open shelter and two small sheds of metal and wood construction present in the north west and the north of the Site respectively. Fragments of ACMs from the lean-to were noted across the Site surface and possible ACM sheeting was noted to be stored within the open shelter.

It was noted that the Site surfacing throughout the barns comprised concrete hardstanding in poor condition. External areas of concrete hardstanding were also present.

Additionally, four large grain silos were present in the south west of the Site, and a vehicle in poor condition was noted in the centre of the Site

Three stockpiles were also noted in the south west of the Site of which one was noted to comprise metal waste and two comprised soil and various farm debris.

#### **Environmental Setting**

The Site is indicated to be underlain by superficial Tidal Flat Deposits (Clay and Silt) and bedrock of the Ampthill Clay Formation (Mudstone). The EA classify the recorded superficial Tidal Flat Deposits and the underlying bedrock as Unproductive Strata. The Site is not located within a groundwater Source Protection Zone (SPZ) and there are no licensed groundwater abstractions from groundwater within 1km of the Site.

The nearest surface water feature is an agricultural drain which runs along the northern boundary of the Site. The Site lies within an area of land characterised by multiple agricultural drains.

#### **Historical Use of the Site**

From the earliest map edition dated 1887 the centre of the Site has been occupied by an L-shaped building, and smaller rectangular buildings. The Site remained consistent until the 1976 map edition in which additional buildings are shown within the west of the Site. The 1999 map edition shows four grain silos within the south of the Site and is consistent with the current Site layout.

Potential sources of contamination within 250 m of the Site included:

- ▲ The surrounding farm use;
- ▲ A smithy located approximately 250 m north west mapped from 1889 to 1956; and
- ▲ A Poultry House located immediately north of the Site mapped from 1976 to 1995.

#### **Recommendations**

Based on the findings of the Preliminary Risk Assessment, a limited Site Investigation including ground gas risk assessment was considered appropriate at the Site.

### **Factual and Interpretive Short Format Environmental Report, Holland House Farm, Kirton Drove, Boston, Project 19-0923.02**

The assessment included the excavation of six hand dug trial pits (HDTP101 to HDTP106) to a maximum depth of 0.68 m bgl, with chemical testing of soils in each location. This investigation was undertaken for a development scheme with comprised the conversion and change in use of the agricultural barns.



The ground conditions generally comprised Topsoil and Made Ground to a maximum depth of 0.58 m bgl beneath the existing agricultural barns. The Made Ground generally comprised brown topsoil of sandy gravelly

Compound	No. of samples	Max. Concentration (mg/kg)	Guidance Value	Location, depth (m bgl) and concentration over GAC	Site Area
Arsenic	6	46	37 <sup>LQM</sup>	HDTP102 (0.20 m) – 46 mg/kg	Centre
Chrysene	6	16	15 <sup>LQM</sup>	HDTP101 (0.20 m) – 16 mg/kg	Northeast
Benzo[a]anthracene	6	22	7.2 <sup>LQM</sup>	HDTP101 (0.20 m) – 22 mg/kg HDTP103 (0.30 m) – 16 mg/kg	Northwest Northeast
Benzo[b]fluoranthene	6	26	2.6 <sup>LQM</sup>	HDTP101 (0.20 m) – 26 mg/kg HDTP103 (0.20 m) – 12 mg/kg HDTP106 (0.30 m) – 4 mg/kg	Northwest Northeast Southwest
Benzo[a]pyrene	6	21	2.2 <sup>LQM</sup>	HDTP101 (0.20 m) – 21 mg/kg HDTP103 (0.20 m) – 11 mg/kg HDTP106 (0.30 m) – 3.3 mg/kg	Northwest Northeast Southwest
Dibenz(a,h)anthracene	6	2.8	0.24 <sup>LQM</sup>	HDTP101 (0.20 m) – 2.8 mg/kg HDTP103 (0.20 m) – 1.6 mg/kg HDTP106 (0.30 m) – 0.47 mg/kg	Northwest Northeast Southwest

slightly silty clay with gravel of brick, flint, quartzite and limestone.

The underlying natural soil typically comprised soft to firm brown silty sandy gravelly clay to a maximum depth of 0.68 m bgl.

Groundwater was not encountered within the hand pits.

There was no visual or olfactory evidence of contamination (staining/odours, fibrous or bulk materials) recorded within the Made Ground or natural Clay.

Following soil sampling, significant soil contamination was not identified with respect to the most stringent GAC for a residential with plant uptake end use GAC. A limited number of individual PAH compounds were identified above their respective GAC values for the Site in shallow soils. In addition, a single marginally elevated concentration of arsenic was identified of 46 mg/kg above its applied GAC value of 37 mg/kg. Asbestos was not identified within any of the samples tested. These are summarised in the table below.

### 3.1 Delta-Simons Considerations

Given the previous PRA and Site investigation were undertaken based on the Site being proposed for a change in use only, no ground gas or groundwater monitoring was not undertaken at the Site and no further works were considered necessary.

Given the Site is now proposed for demolition and re-build, it is considered that given significant sources of contamination were not identified during the PRA and significant contamination within soils has not been identified that cannot reasonably be mitigated through the following mitigation measures detailed in Section 4.0 below, no further Site investigation is considered to be required.

Furthermore, given no volatile vapours have been identified during laboratory testing and no significant sources of ground gas have been identified from the PRA either on Site or in the wider area, there is considered to be a very low risk of volatile vapours and hazardous ground gas being present at the Site. In accordance with 'RB17 CL:AIRE A Pragmatic Approach Ground Gas Risk Assessment 2012', Sites that may not require specific ground gas monitoring would include:

1. Natural soils with a high carbonate content, e.g. Chalk, some Glacial Tills, etc;
2. Natural soils that are known to contain methane, e.g. Alluvium, Peat, etc, providing pockets of trapped gas cannot be released quickly due to changes in groundwater level (which is rare and not likely on most sites);
3. Made Ground up to 5m depth with a low organic content (i.e. predominantly soil, ash or clinker with occasional pieces of wood, etc). Where Made Ground is greater than 5m depth there is a greater risk of

unidentified degradable material with deeper deposits. One reason is because it is more difficult to investigate deeper than 5m with trial pits. If trial pits cannot reach 5m at the site under investigation, then the risk assessor will need to review the site history and variability of the Made Ground that is exposed, and decide whether borehole investigation to that depth will provide sufficiently robust information. The soil atmosphere is also more likely to be predominantly aerobic above 5m (USEPA, 2007); and

4. Areas of flooded mine workings or mine workings that were abandoned by the early 20th Century (gas emissions from these types of mine workings are not likely to pose a significant risk). The exception will be where buildings are within 20m of a mine opening (shaft or adit) or where shallow workings are very close to the surface and/or connected to deeper unflooded mines.

It is considered that this Site falls within point 3 above and as such specific ground gas protection measures are not deemed to be required in such a low risk Site.



## 4.0 Remediation Requirements and Methodology

Following Delta-Simons contamination assessments, the following construction phase remediation mitigation measures are considered appropriate:

- ▲ Additional, unidentified localised areas of contamination may exist at the Site and an appropriate 'hotspot' protocol should be in place for groundworkers to act upon should such contamination be identified during the construction process;
- ▲ Groundworkers who are required to perform sub-surface work at the Site should be made aware of the known low-level contaminants in soil and groundwater and the possibility of encountering additional localised low levels of contamination (including Asbestos Containing Materials (ACM)). Therefore, good standards of personal hygiene should be observed and appropriate levels of personal protective equipment (PPE) and respiratory protective equipment (RPE) utilised where necessary;
- ▲ Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations; and
- ▲ A clean cover of 'suitable for use' topsoil may be appropriate in landscaped areas subject to approval with the Local Planning Authority (LPA). The cover layer thickness shall consist a minimum of 450 mm or the extent of Made Ground across the Site (whichever has the greatest depth).

## 5.0 Protocol for Addressing Previously Unidentified 'Hotspots' of Contamination

As with any brownfield development, there is a possibility that unknown area(s) of soil or groundwater contamination, including asbestos, may be encountered during excavation works. Should an area of contamination beyond that anticipated from the investigations be identified by visual or olfactory means the following procedure shall be followed:

- ▲ Immediately stop all works in the area where contamination is suspected;
- ▲ Immediately inform the Site Project Manager who should then contact Delta-Simons;
- ▲ Delta-Simons will judge each occurrence on merit and should it be deemed necessary Delta-Simons shall attend Site to oversee the excavation of the 'hotspot' and the collection of validation samples;
- ▲ Any excavated material shall be isolated from all other material at the Site and, if deemed appropriate, be disposed of to a suitably licensed facility. Delta-Simons should be supplied with consignment notes for all off-Site disposal;
- ▲ The excavation should remain open until the validation has been completed; and
- ▲ Any identified hotspot would need to be appropriately classified prior to disposal to landfill (or transferred to a treatment centre). If material is identified as hazardous then the Site needs to be registered with the Environment Agency as a producer of hazardous waste. This can be done online and requires the company's registration code and a code that relates to the industry type.

*Please note; should contamination be encountered at variance to the characteristics in the investigation reports it should be reported to the planning authority as soon as possible for further consideration. Action taken would be recorded as part of the validation.*

## 6.0 Clean Cover/Suitable Soil

As part of the development scheme new residential dwellings will be situated in the same footprint as the barns proposed for removal. Silos in the southern area of the Site are to be retained and garden areas are proposed in the southern and eastern areas of the Site. Elevated PAHs were identified within HDTP101 and HDTP106 in areas of proposed gardens/adjacent to the retained silos. Made Ground in garden areas was identified to a maximum depth of 0.50 m bgl, however the depth was not consistent and in some areas was identified to 0.2 m bgl. As such, it is recommended that a layer of clean topsoil and subsoil be imported into any proposed soft landscaped/garden areas in order to mitigate the risk of direct contact exposure and soil ingestion/inhalation by future Site users.

This should be carried out in accordance with Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): Verification Requirements for Cover Systems, included as Appendix B. The chemical composition of the imported material should not exceed the Generic Assessment Criteria for a residential with plant uptake end use. The applicable criteria are included in Appendix C.

It is, therefore, proposed that the following cover system should be adopted:

- ▲ Complete removal of Made Ground in landscaped/garden areas and the importation of clean suitable for use soil which will comprise the depth of removed Made Ground or a minimum of 450 mm (whichever has the greatest depth). Any material requiring off-Site disposal will need to be appropriately classified to determine its final treatment/ disposal destination;
- ▲ The material will be sourced by the Contractor and documentation submitted on its origin that is acceptable to Boston Borough Council, the Main Contractor and to Delta-Simons. The documentation should as a minimum comprise information on the origin of the materials and chemical testing of suitable suite of contaminants. Delivery notes should also be supplied;
- ▲ The material shall not exceed the criteria presented in Appendix C; and
- ▲ Photographic evidence of the depth and removal of Made Ground (measured against a levelling staff) shall be obtained for incorporation within the Verification Report.

## 7.0 Mitigation of Risks to Groundworkers during Development

Low levels of contamination have been identified at the Site and as with any Brownfield development there is the potential for further previously unidentified hotspots of contamination to be present at the Site.

As such, it is recommended that the Contractor provides appropriate inductions to all groundworkers who are required to perform sub-surface work at the Site in order to ensure they are made aware of the possibility of encountering contamination at the Site. In addition, good standards of personal hygiene should be observed and appropriate levels of PPE and RPE, where applicable, provided and utilised in order to mitigate the potential for direct contact.

## 8.0 Upgrading of Potable Water Supply Pipes

Given the presence of PAHs within underlying soils, potable water pipes may require upgrading with 'Protectaline' water pipe, or similar. Confirmation should be sought from the Water Authority, and evidence of any upgraded pipework collected by the Contractor for inclusion within the verification report.

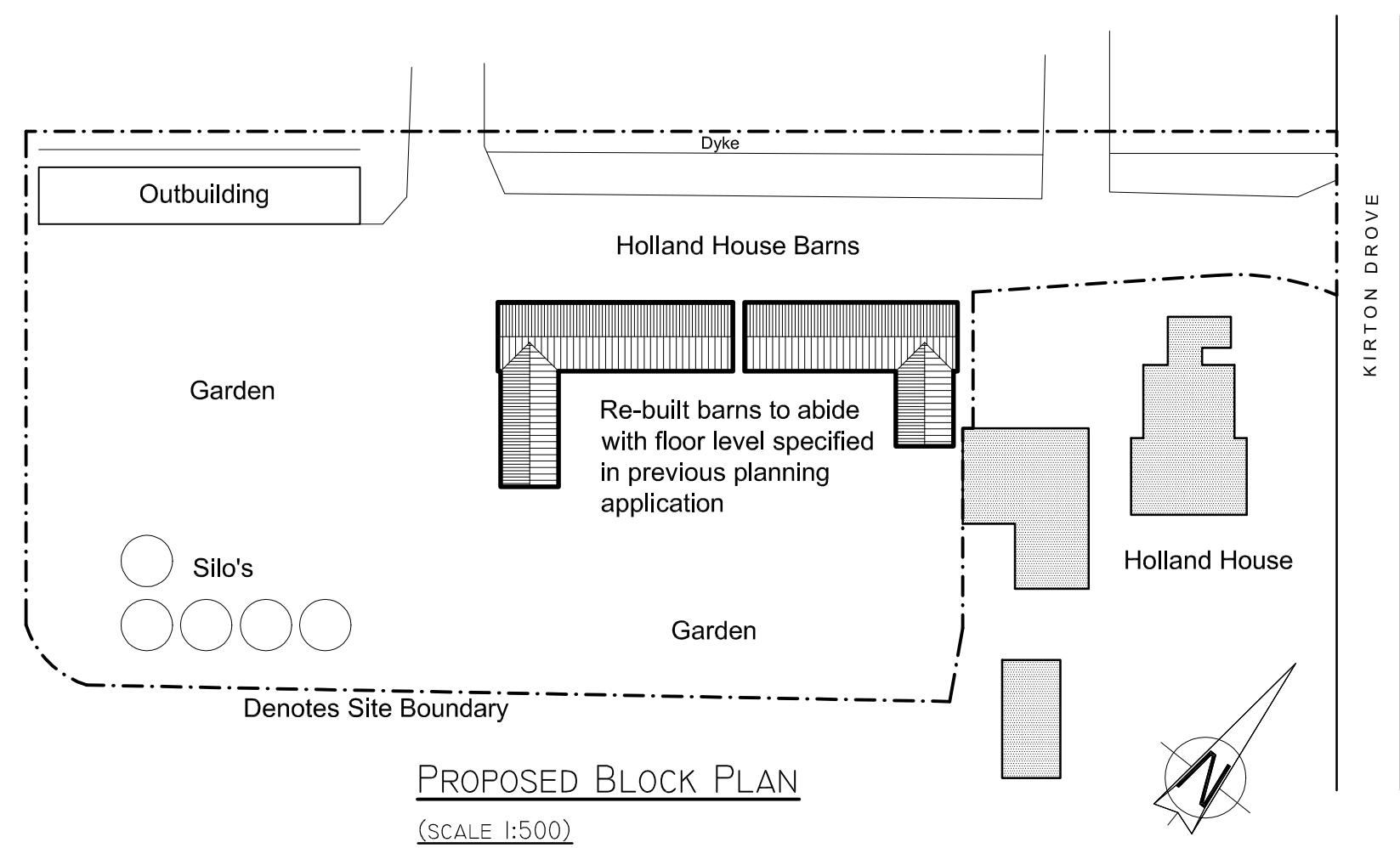
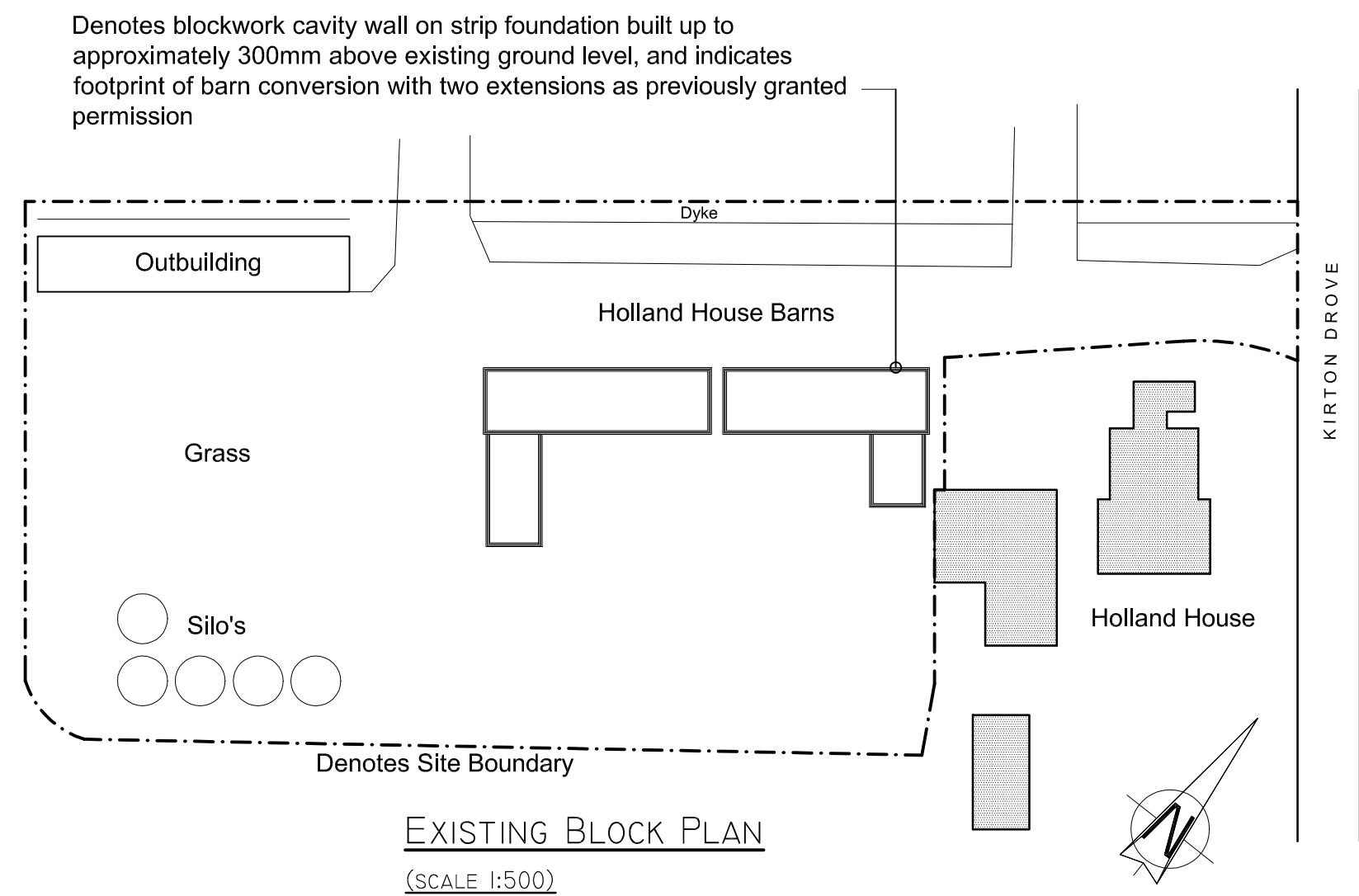
## 9.0 Validation Reporting

The validation report should comprise the following items of verification that the Remediation Strategy has been complied with:

1. Details and verification of any Hotspots encountered (Main Contractor and Delta-Simons);
2. Waste disposal tickets for any reduced level dig spoil. (Client's Contractor);
3. Chemical test data and frequency for imported topsoil/subsoil (To be supplied by Main Contractor) in accordance with the YALPAG guidance document;
4. Photographic evidence of the installation and thickness of the topsoil/subsoil (To be supplied by Main Contractor);
5. Upgraded water supply pipe delivery tickets, if required. (Client's Contractor); and
6. Brief report containing the above. (Delta-Simons).



## Drawing 1 – Proposed Development Plan



<p>WAYNE ISZATT ARCHITECTURAL DRAUGHTING SERVICE Tel: 07972 696872 email: architect@lincolnshire@gmail.com</p>	
CLIENT: MR C. LOMAS	
PROJECT: PROPOSED BARN CONVERSIONS, HOLLAND HOUSE FARM, KIRTON DROVE, LINCS	
DRG TITLE: EXISTING AND PROPOSED BLOCK PLANS	
DATE: MAR 20	SCALE: AS STATED AT A2
DRG No.: 19-0208-10	DRAWN BY: WI

## Appendix A - Limitations

## Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons 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 the Consultant.

## Appendix B - YALPAG Verification Requirements for Cover Systems



# VERIFICATION REQUIREMENTS FOR COVER SYSTEMS

Technical Guidance for  
Developers,  
Landowners and  
Consultants



**Yorkshire and Lincolnshire  
Pollution Advisory Group**

**Version 3.4 – November 2017**



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 and the North East of England 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. It is intended to review this guidance annually, 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 verification of land contamination to apply up-to-date working practices and requirements.

### **Acknowledgments**

The author, Wakefield Council [David Jackson], would like to acknowledge the assistance provided by the following organisations: City of York Council, City of Lincoln Council, Leeds City Council and City of Sheffield Council. The author 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. Given that no major changes have subsequently taken place, only Local Authorities were consulted during the production of this version [3.1] of the guidance.

## 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 material or chemical suitability that does not affect human health e.g. sulphates.

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.

There are some UK guidelines regarding verification, for example CLR 11<sup>1</sup> and the document on verification of remediation<sup>2</sup>. 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:

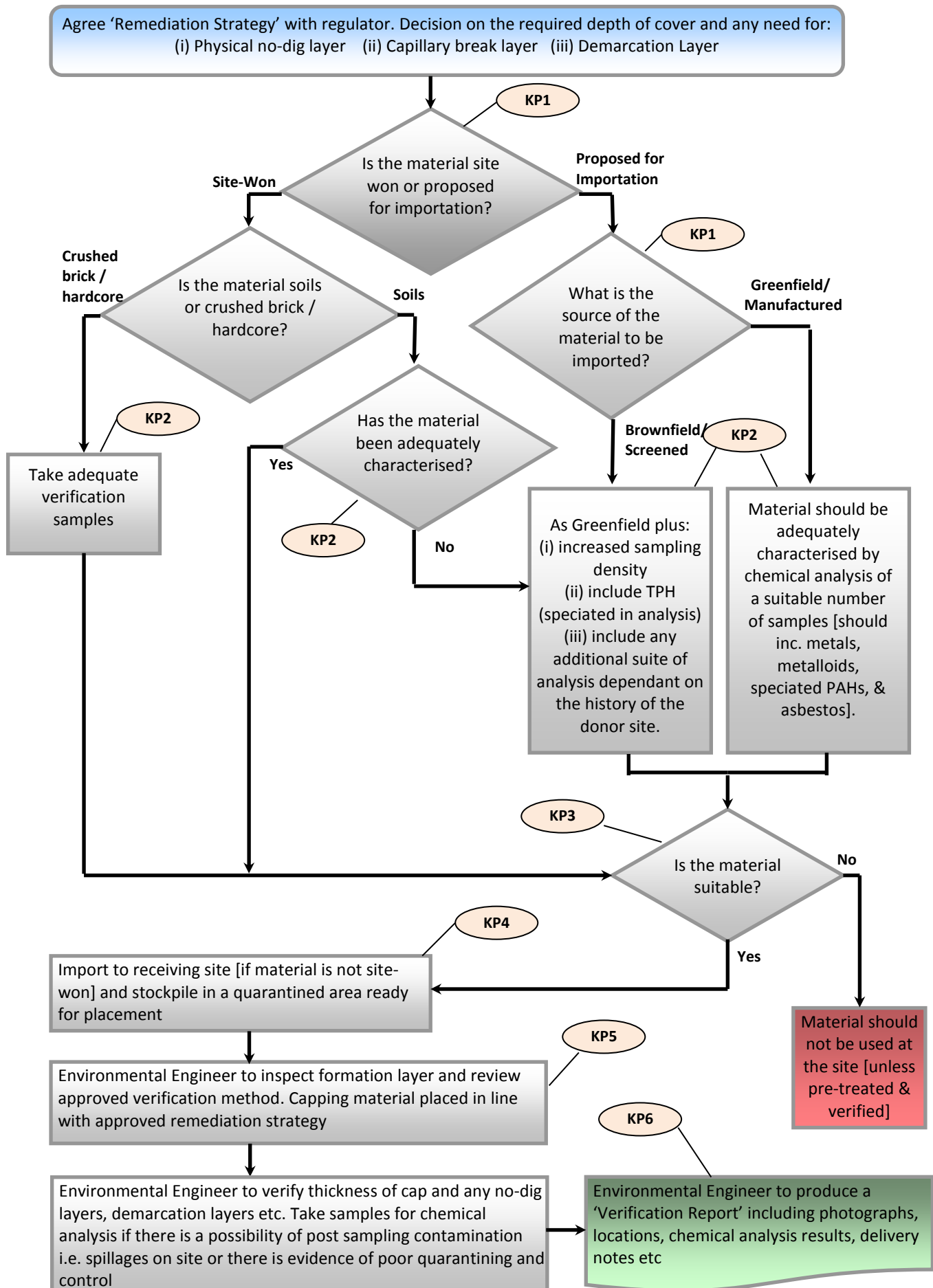
- What should be measured?
- When should they be measured?
- Where measurements need to be taken, what is the appropriate monitoring regime i.e. number and frequency of samples?
- Statistical constraints on sampling.

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<sup>1</sup> "Contaminated Land Report 11 - Model Procedures for the Management of Contaminated Land". Environment Agency, September 2004.

<sup>2</sup> "Verification of Remediation of Contaminated Land. Environment Agency, 2010 [draft report].

# Overview Flowchart



## Key Points

<p><b>KP1</b></p> <p><b>Source of Material</b></p>	<p>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.</p> <p>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 '<u>Greenfield/Manufactured</u>' or '<u>Brownfield/Screened</u>' source.</p> <p>Broadly speaking material can be classified as follows:</p> <p><b>Greenfield</b> - if it can be demonstrated that it has not been developed and that no past contaminative uses have occurred at the site.</p> <p><b>Manufactured</b> – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost).</p> <p><b>Brownfield</b> – material from a donor site that has previously been developed</p> <p><b>Screened</b> – material from a company who deal with skip/demolition waste which is screened for unsuitable material i.e. bricks, wood, plastic etc.</p>
<p><b>KP2</b></p> <p><b>Characterisation of Material</b></p>	<p>It is essential that material is inert and suitable for its intended use. Evidence of the source of the material should be provided to the Local Authority. What is required is a defensible method 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.</p> <p><b>When Should this be Done?</b></p> <p>Sampling of material should be undertaken as early as possible i.e. <u>prior to placement</u> [for site won material] and <u>prior to importation</u> [for imported material]. This is to avoid the costly exercise of re-excavating <u>unsuitable</u> 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 but prior to placement. Although, if it is deemed <u>unsuitable</u> it would have to be either removed off site or pre-treated at the cost and time of the developer.</p> <p><b>What about Certificates from Commercial Suppliers?</b></p> <p>Where the material is provided by a commercial company, certificates or other industry Quality Protocol compliance i.e. WRAP, will normally be accepted. This is on the proviso that it (i) relates to</p>

	<p>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.</p> <p><u>Extreme caution</u> should be given to importing material that has been recycled from demolition or skip waste as they could be 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]</p> <p><b>British Standard</b></p> <p>Imported topsoils should be as specified in BS 3882:2007 as 'suitable for their intended purpose'. BS3882:2007 relates to nutrient content of topsoil and phytotoxic contamination and <u>does not</u> 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 BS3882:2007 to ensure that they are suitable for their intended use.</p> <p><b>Initial Screening</b></p> <p>A visual / olfactory inspection of the material should be carried out by an Environmental Engineer to ensure that:</p> <ul style="list-style-type: none"> <li>• it is a suitable growing medium</li> <li>• it is free from obvious contamination i.e. staining / free product etc</li> <li>• 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.</li> <li>• it is not odorous (could be considered a statutory nuisance)</li> <li>• it is free from unsuitable material i.e. bricks, brick ties, timber and glass etc)</li> <li>• there are no visible signs of asbestos containing material (ACM's)</li> </ul> <p><b>Testing Schedule &amp; Number of Samples</b></p> <p>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 Environmental Engineer.</p> <p>Please refer to the <u>Characterisation of Material Matrix</u> in Appendix 1a which details the number of samples to be taken; the testing schedule to be utilised dependant on the nature and source of the material and the acceptance criteria to be used.</p>
<p><b>KP3</b></p> <p><b>Suitability of Material</b></p>	<p>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</p>



	imported [if not site won] and stockpiled in a suitably quarantined area [refer to KP4].
<b>KP4</b>  <b>Stockpiling &amp; Quarantining of Material</b>	<p>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.</p> <p>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.</p>
<b>KP5</b>  <b>Verification of Required Depth</b>	<p>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:</p> <p><u>Depth testing in situ</u> – small trial pit excavated to allow measurement of its depth by tape measure or measuring staff.</p> <p><u>Topographical surveys</u> – accurate survey of the base and final formation layer height to establish the depth of cover.</p> <p><b>Specific Local Authority Policy</b> Please check with the local Contaminated Land Officer to establish:</p> <ul style="list-style-type: none"> <li>• which type of method for testing depth is accepted; and</li> <li>• the number of verification areas per property, plot, landscaped area or garden area [some Local Authorities recommend at least 2 per plot]</li> </ul> <p><b>Important Note:</b> 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.</p> <p>The verification of depth and confirmation of such layers should be carried out by a suitably qualified environmental engineer.</p>
<b>KP6</b>  <b>Reporting</b>	<p>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'.</p> <p>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. Therefore, the presence of good quality photographs is essential to</p>

	<p>prove beyond doubt that the remediation has been done as specified both by method and position.</p> <p>It is also essential that other supporting documentation is included within a report e.g. laboratory analysis results, delivery tickets for material, certificates for imported material, trial pit logs etc. A checklist has been included in Appendix 2 to give an idea on what information should be recorded.</p> <p>The reporting should be carried out by a suitably qualified Environmental Engineer.</p> <p>To 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).</p> <p><b>Photographic Evidence for Validating the Depth of Cover</b></p> <p>The Local Authority ideally would recommend the following programme of photographs to be taken of the placement of inert cover:</p> <ul style="list-style-type: none"> <li>• Photographs of any stockpiles and quarantine areas</li> <li>• Proof that the depth of inert cover has been installed</li> <li>• Proof of the quality of the material to be used as inert cover</li> <li>• Proof there is a geotextile separator and visual warning membranes if used between the made ground and suitable for use soils.</li> <li>• Proof of the method of placement and different layers if appropriate</li> <li>• Proof of the completed project</li> <li>• Inclusion of geographic background features which will aid locating the photograph</li> <li>• Inclusion of site identification boards within the photos which show the date, position taken i.e. corner of plot 3 and the site name.</li> <li>• Inclusion of photographs of site stockpiles and quarantine areas.</li> </ul> <p>The photographs have to prove beyond doubt that the images have been taken from the specific area stated.</p> <p><u>Refer to Appendix 3 for examples of good photographic evidence.</u></p>
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## Appendix 1a – Sampling & Testing Matrix

Type	Number of Samples	Testing Schedule	Assessment Criteria
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)	This needs to be agreed with the Local Authority. The Assessment criteria needs to be UK based, e.g. LQM S4UL's, Defra C4SL's or other similarly derived GAC's.
Crushed Hardcore, Stone, Brick	Minimum 1 per 1000m <sup>3</sup>	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Greenfield/ Manufactured Soils	Minimum 3 or 1 per 250m <sup>3</sup> (whichever is greater)	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Brownfield/ Screened Soils	Minimum 6 or 1 per 100m <sup>3</sup> (whichever is greater)	Standard metals/ metalloids (As above) PAH (16 USEPA speciation) TPH (CWG banded) Asbestos Any additional analysis dependant on the history of the donor site.	

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

- What is the source of the material (refer to KP1)?
- 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?
- 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 fail, 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



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



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





Photographs 3 & 4:  
Depth check of inert  
cover within areas of  
front gardens.







Photographs 5 and 6: Depth check of inert cover within rear gardens. Taut string line spans across excavation.



Photograph 7 shows the spatial location of the verification pit.



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.



Photographs 9 and 10: Inert crushed sandstone being delivered with remediation break layer visible in Photograph 10. The spatial area of the remediation can be observed from these photographs (old terrace housing in Photograph 9 and traffic lights in photograph 10).







Photographs 11 and 12 show 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. Photograph 11 has been stitched to form a panoramic photograph and

## Appendix C - Generic Assessment Criteria for Imported Materials

# Generic Assessment Criteria for Imported Materials

The following Generic Assessment Criteria shall apply as absolute limits for all soils imported for re-use as clean cover **regardless of the end use of the Site**.

The criteria selected are based on Residential with Plant Uptake land use scenario on the basis that imported clean cover soils should be 'clean' and not result in an increase in contaminant loading. It may be possible, in some circumstances, to agree alternative, higher criteria with the appropriate regulatory body, however, this is outside of the scope of this assessment.

Soils shall be tested for a suite of contaminants appropriate to the source land use but as a minimum for the contaminants stated below unless otherwise stated within this strategy. The below criteria assume a minimum of 1% Soil Organic Matter.

In addition to meeting the criteria below, imported materials shall be free from deleterious inclusions and shall be free from invasive weeds (Japanese Knotweed).

Any testing for asbestos must be from a UKAS accredited laboratory and the only acceptable criteria is 'Not Detected'. Any detected asbestos, even if reports as <0.001% is not acceptable. Asbestos containing soils must not be used for clean cover materials.

Criteria for Imported Materials			
Compound	GAC	Source	Comment
Arsenic	37	C4SL	
Cadmium	11	LQM	
Chromium (III)	910	LQM	
Chromium (VI)	6	LQM	
Copper	2400	LQM	
Lead	200	C4SL	
Mercury (inorganic)	40	LQM	
Nickel	130	LQM	
Selenium	250	LQM	
Zinc	3700	LQM	
Acenaphthene	210	LQM	
Acenaphthylene	170	LQM	
Anthracene	2400	LQM	
Benzo[a]anthracene	7.2	LQM	
Benzo[a]pyrene	2.2	LQM	
Benzo[b]fluoranthene	2.6	LQM	
Benzo[ghi]perylene	320	LQM	
Benzo[k]fluoranthene	77	LQM	
Chrysene	15	LQM	
Dibenz[ah]anthracene	0.24	LQM	
Fluoranthene	280	LQM	
Fluorene	170	LQM	
Indeno[123-cd]pyrene	27	LQM	
Naphthalene	2.3	LQM	
Phenanthrene	95	LQM	

Criteria for Imported Materials			
Compound	GAC	Source	Comment
Pyrene	620	LQM	
Benzene	0.2	C4SL	
Toluene	130	LQM	
Ethylbenzene	47	LQM	
Xylene – m/p	56	LQM	
Xylene - o	60	LQM	
Total Petroleum Hydrocarbons (TPH)	500		Professional judgement.
Aliphatic EC5-EC6	42	LQM	
Aliphatic >EC6-EC8	100	LQM	
Aliphatic >EC8-EC10	27	LQM	
Aliphatic >EC10-EC12	130	LQM	
Aliphatic >EC12-EC16	500	LQM	Capped at 500 - professional judgement
Aromatic >EC5-EC7	70	LQM	
Aromatic >EC7-EC8	130	LQM	
Aromatic >EC8-EC10	34	LQM	
Aromatic >EC10-EC12	74	LQM	
Aromatic >EC12-EC16	140	LQM	
Aromatic >EC16-EC21	260	LQM	
Aromatic >EC21-EC35	500	LQM	Capped at 500 - professional judgement
Asbestos	Not Detected		

The respective sources are:

- ▲ Soil Guidance Values (**SGV**) published by the EA;
- ▲ Category 4 Screening Levels (**C4SLs**) published by DEFRA;
- ▲ The 2014 Land Quality Management (**LQM**) / Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels for Human Health Risk Assessment (S4ULs);
- ▲ The guidance values produced by the Environmental Industries Commission (**EIC**), the Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Application in Real Environments (CL:AIRE) in December 2009; and
- ▲ In house Generic Screening Values (**DS-GACs**) derived by Delta-Simons.