



Remediation Strategy

25a High Street, Gosberton

Presented to Mr and Mrs Dennis c/o J. H. Walter

Issued: July 2021

Delta-Simons Project No. 21-1321.01



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Report Details

Client	Mr and Mrs Dennis c/o J. H. Walter
Report Title	Remediation Strategy
Site Address	25a High Street, Gosberton, Spalding PE11 4NW
Project No.	21-1321.01
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About us

Delta-Simons is a trusted, multidisciplinary environmental consultancy, focused on delivering the best possible project outcomes for customers.

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 across the UK we employ over 120 environmental professionals, bringing experience from across the private consultancy and public sector markets.

Delta-Simons is proud to be a founder member of the Inogen Environmental Alliance, enabling us to efficiently deliver customer projects worldwide by calling upon over 5000 resources in our global network of consultants, each committed to providing superior EH&S and sustainability consulting expertise to our customers. Inogen Environmental Alliance offers its clients more consultants, with more services in more countries than the traditional multinational consultancy.



Delta-Simons is a '**Beyond Net-Zero**' company. We have set a Science-Based Target to reduce our Scope 1 and Scope 2 carbon emissions in line with the Paris Agreement and are committed to reducing Scope 3 emissions from our supply chain. Every year we offset our residual emissions by 150% through verified carbon removal projects linked to the UN Sustainable Development Goals.

Therefore, our consultancy services to you are carbon positive. If you would like support in calculating your carbon footprint and playing your part in tackling the global climate crisis, please get in touch with your Delta-Simons contact above who will be happy to help.

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) has been instructed by J H Walters on behalf of Mr and Mrs Daniels (the “Client”) to undertake the preparation of a Remediation Strategy (RS) for land to the rear of 25a High Street, Gosberton, Spalding, PE11 4NW (the “Site”).

1.2 Context & Purpose

Planning application for the Site (ref. H08-0678-16, South Holland District Council), comprises an outline application for a residential development comprising 46 units with associated gardens, adopted access road and footpaths.

The purpose of this document is to provide a formal statement for the likely scope of remediation requirements to facilitate the proposed development at the Site and to support the discharge of planning conditions relating to land contamination.

For information on the Site setting, this Remediation Strategy should be read in conjunction with Delta-Simons’ previous reports as follows:

- ▲ Preliminary Geo-Environmental Assessment, 25a High Street, Gosberton, Delta-Simons Project No.21-1321.01, dated July 2021.

1.3 Limitations

This document sets out the measures that will be carried out during the construction to mitigate potentially significant risks as identified by the Site investigations in the context of the proposed end-use of the Site, it does not provide a verification or completion statement for the works. The standard limitations associated with this assessment are presented in Appendix A.

2.0 Previous Report Review

The key findings of the Delta-Simons Preliminary Risk Assessment are summarised below.

2.1 Preliminary Geo-Environmental Risk Assessment Report, Delta-Simons, July 2021

Delta-Simons undertook a Preliminary Geo-environmental Risk Assessment in July 2021 to provide information regarding the potential liabilities under Part 2A associated with the Site.

The Site at the time of the walkover comprised undeveloped grassed land, with a small building in the north-western corner. Access was afforded through a narrow strip off land off High Street.

No significant current or historical sources of contamination have been identified on Site from the desktop assessment. The Site is underlain by unproductive superficial and bedrock geology (Tidal Flats and Oxford Clay Formation, respectively) and the closest surface water features are a number of land drains around the boundary of the Site.

Significant off-Site sources of contamination have not been identified and are limited to a garage located approximately 30 m south-west and an obsolete petrol filling station located approximately 100 m south-west, however given the distance and the underlying cohesive geology the risk from off-Site sources is considered very low and no further works were considered to be required.

The Ground investigation, Lincs Labs. Ref. G39367/6/MH/MT found no visual or olfactory contamination on Site and regarded the Site to be of low risk with regards to contamination to future site users.

A surface water drainage strategy for the development has been proposed and is outlined in RM Associates Flood Risk Assessment. A water course will be used to dispose of surface waters from the adoptable road and domestic curtilage roof areas. Silt traps are incorporated into roof and pavement run off systems providing an on-plot source control treatment stage for all domestic curtilage runoff prior to entering the adoptable system and a surface water detention pond provides storage and second stage treatment.

Based on the desktop assessment and third party assessments the risk to future Site users is considered very low and no specific further works are required. The specific remediation requirements to address potential identified pollutant linkages are detailed in Section 3.0.

3.0 Remediation Requirements

Following a review of Delta-Simons' contamination assessment, 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 (Appendix B);
- ▲ 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
- ▲ Clean cover will be provided in landscaped areas (either Site-won or imported). Clean cover material will be tested in accordance with Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): Verification Requirements for Cover Systems, included as Appendix C.

4.0 Addressing Previously Unidentified 'Hotspots' of Contamination

4.1 Background

As with any 'Brownfield' development, there is a possibility that unknown localised areas of soil contamination (a 'Hotspot') may be encountered during development works. As such, a 'hotspot' protocol is required during the construction phase of the development. The purpose of the protocol is to provide a ready reference should such an area of contamination be identified by visual or olfactory means during the works.

4.2 Protocol

Should an area of contamination be identified by visual or olfactory means during development works, the following procedure shall be followed:

- ▲ Immediately stop all works in the area where contamination is suspected;
- ▲ Immediately inform the Site Agent who should then contact the Environmental Consultant;
- ▲ The Environmental Consultant shall provide a verbal response outlining immediate actions with regard to Site Health and Safety and to limit the potential for contaminants to migrate;
- ▲ The Environmental Consultant shall judge each occurrence on merit and should it be deemed necessary the Environmental Consultant shall attend Site to oversee the removal of the 'hotspot' and collect validation samples;
- ▲ Any excavated material should be isolated from all other material at the Site, on plastic sheeting and covered with plastic sheeting until the material can be tested for contamination and an appropriate disposal route can be identified;
- ▲ Any 'hotspot' stockpiles and excavations should be fenced off, have appropriate signage and their locations recorded on a Site drawing;
- ▲ Should any excavated material be required to be disposed of at an off-Site location, the material shall be isolated from all other material at the Site prior to disposal at a suitably licensed facility. All documentation associated with the movement and disposal of any such material shall be supplied to the Environmental Consultant shall, including waste transfer documentation;
- ▲ Subject to appropriate Site Health & Safety controls (typically comprising fencing off the excavation) the excavation will remain open until the validation has been completed. Alternatively, for Site Health & Safety reasons, it may be necessary to backfill the excavation with Site derived material. In this case, the location of the excavation will be accurately recorded and the excavation reopened if required, based on the validation results; and
- ▲ The Regulatory Authorities shall be informed by the Environmental Consultant shall of any remedial activities required and associated validation testing results. Representatives of these organisations may also wish to visit the Site.

It should be noted that there is considered to be a very low risk of unexpected finds. Implementation of appropriate measures to deal with such finds remain the Contractor's responsibility.

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.

A copy of the protocol is also presented in Appendix B to be extracted and used on-Site.

5.0 Certified Clean Topsoil / Subsoil Layer

5.1 Topsoil / Subsoil - Clean Cover

Clean cover in gardens and communal areas will be provided by either Site won materials or imported materials where there may be a shortfall of any Site won material. Site won materials shall be verified as per imported soils. This should be carried out in accordance with Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): Verification Requirements for Cover Systems, included as Appendix C.

Given Made Ground or significant contamination has not been identified, the clean cover will be placed to the contractor's minimum thickness requirements, however no less than 150 mm. The topsoil depth shall be validated on a one sample per six housing plots following installation of the material to the appropriate finished levels, to be confirmed by the Client/ Clients contractor.

Photographic evidence of this (measured against a levelling staff) shall be obtained for incorporation within the Verification Report.

5.2 Cover systems and other potentially interacting site works

Careful consideration should be given to the programming of in-ground Site works with the potential to disturb the cover system once it has been placed. For example:

- ▲ Erection of fencing (where post holes are to be created and arisings generated);
- ▲ Planting of trees;
- ▲ Services installation.

Ideally, these works (or similar), which would result in made ground being brought to surface, should be programmed to occur *before* installation of the cover system to avoid disturbance/cross-contamination of the cover soils.

In the event such works occur after placement of the cover system, care should be taken to control arisings to avoid such cross-contamination. Evidencing of the absence of cross contamination may be required.

5.3 Imported Materials and Verification

5.3.1 Pre-Importation Testing

In the event that any soils are required to be imported to the Site to be used in cover systems a detailed understanding of the provenance of such materials is to be provided to the Environmental Consultant ahead of any further investigation or import. As a minimum, this should include:

- ▲ The materials source location;
- ▲ The supplier details and proposed quantities for import; and,
- ▲ A description of how the soils have been generated (e.g. stockpiled for removal from a site or manufactured at a recognised supplier).

Soil materials being considered for importation shall be sampled at their source or manufacture location prior to import to Site. The soil samples shall be analysed at a UKAS accredited laboratory for the required laboratory chemical analyses and the results of these analyses (as detailed in Appendix D) shall be provided to the Environmental Consultant. Written approval from the Environmental Consultant shall be obtained prior to importing the soil to Site.

Some soil materials that are suitable for use on Site may also be wastes (not products). Examples of such soils may include soils stripped from other developments prior to construction, soils sourced from third party sites and some manufactured soils. Care is needed when considering these materials for import. Further understanding of the provenance of these materials, additional laboratory chemical analyses and an exemption, permit or other form of regulatory control are likely to be required to be able to utilise these materials within the

cover system. Adherence to the Duty of Care Regulations will also likely be required if waste soils are to be recovered in the scheme. The Environmental Consultant should be consulted well in advance of when these types of material are to be utilised. The Environmental Consultant will advise on the acceptability or otherwise of such materials and agree the pathway to be followed. Responsibility for the importation of suitable soils and compliance with duty of care remains with the Contractor.

If chemical data for the soil cannot be provided, then the Contractor shall procure the Environmental Consultant to undertake appropriate testing **prior to importation**:

Samples shall be analysed for a minimum suite of:

- ▲ Asbestos screening;
- ▲ pH, heavy metals;
- ▲ Total petroleum hydrocarbons; and
- ▲ Speciated Polyaromatic Hydrocarbons (16 PAH).

The samples shall be truly representative of the soil to be offered.

One composite sample shall be taken for every 250 m³ of imported soil to be used, with a minimum of 3 No. samples of each soil type shall be tested from each source/supplier.

The chemical criteria against which any imported soils shall be assessed is based on relevant Generic Assessment Criteria applicable at the time of the works for a residential end use, alternatively, Delta-Simons Human Health Generic Assessment Criteria as presented in Appendix D shall be used.

5.3.2 Testing and Verification of Placed Materials

Regardless of the pre-importation testing, in order to confirm the materials placed on Site meet the requirements of this Strategy, post placement testing to prove thickness and absence of contamination must be undertaken. The Contractor shall commission the Environmental Consultant to attend site in order to:

- ▲ Verify the depths of the placed soils meet the strategy;
- ▲ Obtain samples of the placed soils and undertake testing to confirm the placed material meets the strategy.

The topsoil depth shall be validated one sample per 6 housing plots following installation of the material to the appropriate finished levels.

Photographic evidence of this (measured against a levelling staff) shall be obtained for incorporation within the Verification Report.

Samples shall be analysed for a minimum suite of:

- ▲ Asbestos screening;
- ▲ pH, heavy metals;
- ▲ Total petroleum hydrocarbons; and
- ▲ Speciated Polyaromatic Hydrocarbons (16 PAH).

The samples shall be truly representative of the soil to be offered.

One composite sample shall be taken for every 250 m³ of imported soil to be used and/ or one sample per 6 housing plots, with a minimum of 3 No. samples of each soil type tested.

The chemical criteria against which any imported soils shall be assessed is based on relevant Generic Assessment Criteria applicable at the time of the works for a residential end use (regardless of the intended use as materials should be free from contamination), alternatively, Delta-Simons Human Health Generic Assessment Criteria as presented in Appendix D shall be used.

Any materials which fail the verification testing shall be removed from the Site and replaced with suitable materials by the Contractor.

The verification information shall be included within the verification report.

6.0 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.

7.0 Upgrading of Potable Water Supply Pipes

It is recommended that the local water undertaker is consulted by the Client prior to ordering and placement of pipes in order to specify their specific requirements. Details of any upgraded pipework should be provided to the Environmental Consultant for inclusion within the Verification Report.

8.0 Validation Reporting

Following completion of works detailed in Sections 4.0 to 7.0, for each phase of development, an Environmental Consultant shall prepare an Environmental Verification Report on the works for submission to the Local Authority to satisfy relevant planning conditions.

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

1. A record of any 'hotspots' found during construction and groundworks and the associated actions taken to remove them. This will include details of the chemical analysis of samples taken from these areas, verification that the entire hotspot has been removed as necessary, appropriate classification of the waste, waste transfer documentation, and details of the receiving disposal facility (Main Contractor and Delta-Simons);
2. Details of waste disposal of any material from the Site including waste transfer documentation and details of the receiving treatment/landfill facility (Client's Contractor);
3. Confirmation of the chemical results, and transfer notes detailing the place of origin of any 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);
6. Brief report containing the above. (Environmental Consultant).

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 – ‘Hotspot’ Protocol

Protocol for Addressing Previously Unidentified ‘Hotspots’ of Contamination

As with any Brownfield development, there is a possibility that an unknown area of soil contamination may be encountered during excavation works. Should an area of contamination be identified by visual or olfactory means the following procedure will be followed:

- ▲ Immediately stop all works in the area where contamination is suspected;
- ▲ Immediately inform the Site Agent who should then contact the Environmental Consultant;
- ▲ The Environmental Consultant will provide a verbal response outlining immediate actions with regard to Site Health and Safety and to limit the potential for contaminants to migrate;
- ▲ The Environmental Consultant will judge each occurrence on merit and should it be deemed necessary. The Environmental Consultant will attend Site to oversee the removal of the ‘hotspot’ and collect validation samples;
- ▲ Any excavated material should be isolated from all other material at the Site, on plastic sheeting and covered with plastic sheeting until the material can be tested for contamination and an appropriate disposal route can be identified;
- ▲ Any ‘hotspot’ stockpiles and excavations should be fenced off, have appropriate signage and their locations recorded on a Site drawing;
- ▲ Should any excavated material be required to be disposed of at an off-Site location, the material will be isolated from all other material at the Site prior to disposal at a suitably licensed facility. All documentation associated with the movement and disposal of any such material will be supplied to The Environmental Consultant, including waste transfer documentation;
- ▲ Subject to appropriate Site Health & Safety controls (typically comprising fencing off the excavation) the excavation will remain open until the validation has been completed. Alternatively, for Site Health & Safety reasons, it may be necessary to backfill the excavation with Site derived material. In this case, the location of the excavation will be accurately recorded and the excavation reopened if required, based on the validation results; and
- ▲ The Regulatory Authorities shall be informed by the Environmental Consultant of any remedial activities required and associated validation testing results. Representatives of these organisations may also wish to visit the Site.

Appendix C - 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 11¹ and the document on verification of remediation². 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.

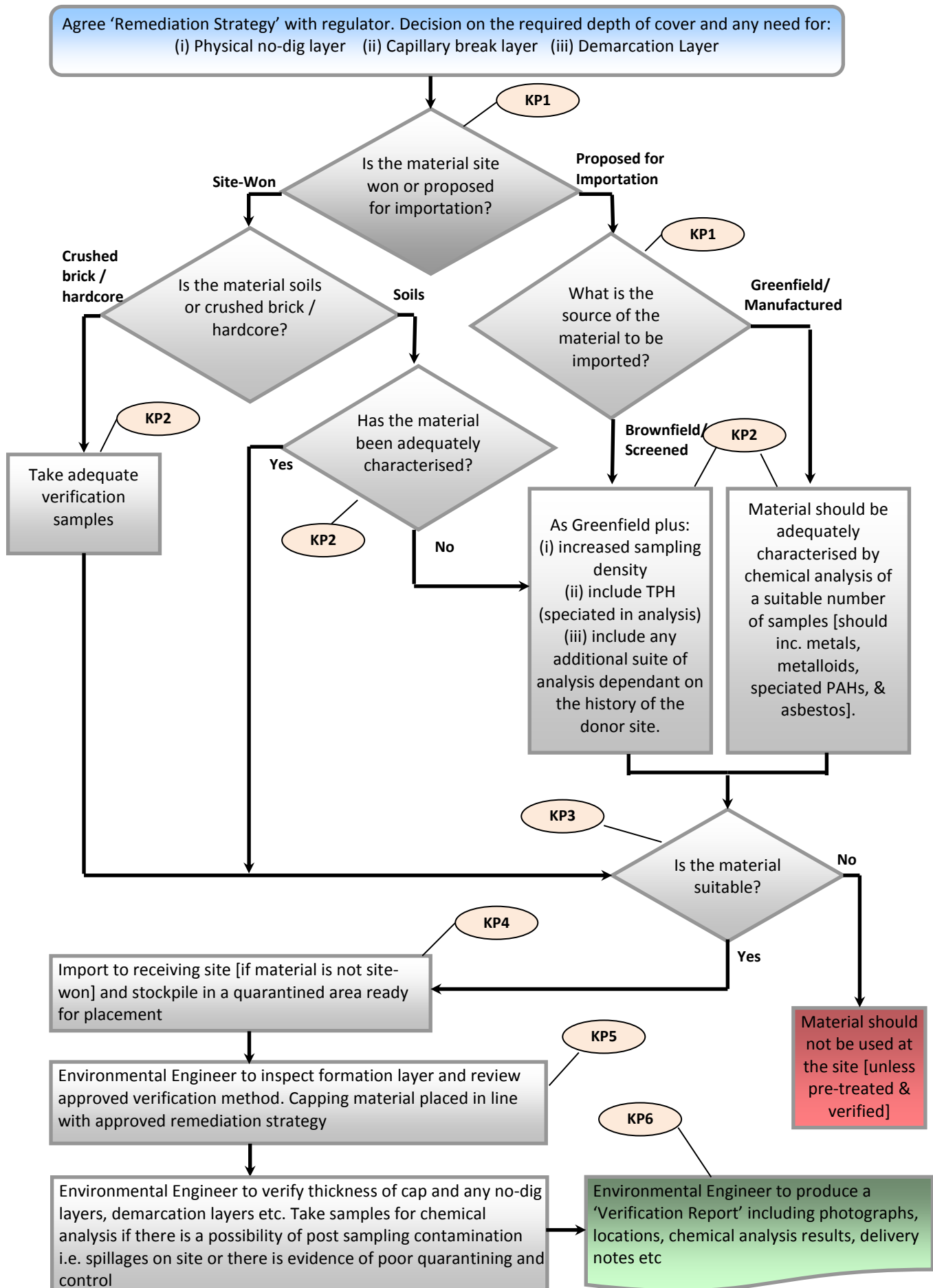
For cover and containment systems, verification will normally depend upon the provision of defensible measurements, observations and records. Critical factors to be considered are:

- 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.

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

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

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 '<u>Greenfield/Manufactured</u>' or '<u>Brownfield/Screened</u>' source. Broadly speaking material can be classified as follows: Greenfield - if it can be demonstrated that it has not been developed and that no past contaminative uses have occurred at the site. Manufactured – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost). 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 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. When Should this be Done? 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. 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, 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. <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] British Standard 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. Initial Screening A visual / olfactory inspection of the material should be carried out by an Environmental Engineer 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) • there are no visible signs of asbestos containing material (ACM's) 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 Environmental Engineer. 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.
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: <u>Depth testing in situ</u> – small trial pit excavated to allow measurement of its depth by tape measure or measuring staff. <u>Topographical surveys</u> – 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] 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 environmental engineer.
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. Therefore, 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. 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. The reporting should be carried out by a suitably qualified Environmental Engineer. 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). 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 made ground and suitable for use soils. • Proof of the method of placement and different layers if appropriate • Proof of the completed project • Inclusion of geographic 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 photographs have to prove beyond doubt that the images have been taken from the specific area stated. <u>Refer to Appendix 3 for examples of good photographic evidence.</u>
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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 ³	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Greenfield/ Manufactured Soils	Minimum 3 or 1 per 250m ³ (whichever is greater)	Standard metals/metalloids (As above) PAH (16 USEPA speciation) Asbestos	
Brownfield/ Screened Soils	Minimum 6 or 1 per 100m ³ (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 D - 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 reported 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	
Pyrene	620	LQM	
Benzene	0.2	C4SL	
Toluene	130	LQM	
Ethylbenzene	47	LQM	

Criteria for Imported Materials			
Compound	GAC	Source	Comment
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.