

Remediation & Verification Strategy

Starbucks Unit, Sandbrook Park, Rochdale



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About Us

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As part of Lucion's group of companies, we can support you with a broader range of holistic services. Through our pool of multidisciplinary experts, we help you navigate complex regulatory frameworks, saving you time and money.

Being part of your sustainable supply chain is a key goal for our team. As a member of the UN Global Compact and a commitment to sustainability, we are the partner of choice for businesses looking to make informed decisions and mitigate risks across your portfolio.

Lucion is carbon neutral. We annually measure and report our Scope 1, Scope 2 and specified Scope 3 carbon emissions, and offset 100% of residual emissions through verified carbon credits, supporting carbon reduction and prevention projects overseas. We are taking steps to reduce our carbon emissions and have committed to setting and achieving near-term and Net Zero Science-Based carbon reduction targets in line with the goals of the Paris Agreement to limit global warming to 1.5°C above pre-industrial levels. Lucion is a signatory of Pledge to Net Zero and Members of the United Nations Global Compact.

If you would like support in understanding your carbon emissions, or those of your supply chain, please get in touch with your Lucion contact above who will be happy to help.

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1.0 Introduction

1.1 Appointment

Lucion Delta-Simons Limited (“Lucion”) was instructed by AKN Build Ltd, on behalf of Design Engineering Workshop (the “Client”) to undertake the preparation of a Remediation and Verification Strategy (RVS) for the Starbucks Unit, Sandbrook Park, Sandbrook Road, Rochdale, OL11 1RY (the “Site”). The Site is subject to outline Planning Permission, Rochdale Borough Council reference 23/00119/FUL.

1.2 Context & Purpose

The purpose of this document is to:

- Present a summary of remediation requirements;
- Contribute to a sustainable development “*which meets the needs of the present without compromising the ability of future generations to meet their own needs*” as advocated by, for example, GPLC2¹
- Provide a formal statement for the likely scope of remediation requirements to facilitate the proposed development at the Site; and
- Support the discharge of planning conditions relating to land contamination.

For information on the Site setting, and full details of intrusive investigations undertaken at the Site, this Remediation and Verification Strategy should be read in conjunction with Lucion’s previous reports as follows:

- ‘Geo-Environmental Assessment: Proposed Starbucks Unit, Sandbrook Park, Rochdale’ by Lucion for Molyneux Rose LLP on behalf of AIG Holdings Ltd, reference 94776.604690, dated February 2024; and
- ‘Preliminary Geo-Environmental Risk Assessment for Proposed Starbucks Unit, Sandbrook Park, Rochdale’ by Delta Simons for Molyneux Rose LLP on behalf of AIG Holdings Ltd dated April 2023.

1.3 Scope of Works

The scope of works undertaken for this assessment was to:

- Summarise the site setting and confirmed contaminant linkages;
- Establish the remediation objectives and metrics;
- Complete an initial remediation screening exercise;
- Select a preferred remediation approach; and,
- Present the remediation and verification strategy.

1.4 Limitations

This document sets out the measures that will be carried out during the construction to mitigate potentially significant risks as identified by the ground 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. In addition, there are the following specific limitations that apply to this assessment:

This document is a strategy document and more detailed documentation in terms of a Contractor’s Remediation Method Statement may need to be prepared.

<https://assets.publishing.service.gov.uk/GPLC2>

2.0 Site Context

2.1 Site Information

Site Overview			
			
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Co-ordinates	Centred approximately at National Grid Reference 389250, 411760	Elevation (approx..)	131-132 m AOD
		Area	0.18 Ha
Site Address and Location	Land at Sandbrook Park, Sandbrook Road, Rochdale, OL11 1RY. The Site is located within a retail park known as Sandbrook Park, approximately 1.68 km south-west of Rochdale town centre and 310 m north of the A627(M). A Site location plan is included as Figure 1. Google Maps Link [Imagery©2025 Google, Imagery©2025 Airbus, Inforterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2025]		
Site Description	The Site is 0.18 Ha in size and comprises an asphalt car park with small areas (islands) of soft landscaping and lighting within the western area of Sandbrook Park Shopping Centre. The Site is bound on all sides by asphalt car parking spaces associated with the shopping centre. The Site topography is generally level. The land to the west of the Site is marginally higher than to the east.		
Site History	Potentially contaminative on-Site land uses have comprised a cotton/fabric mills, crane works, and the subsequent redevelopment of the Site. In the surrounding area, potentially contaminative land uses have comprised the potential infill of land associated with ground workings, the possible diversion of a brook, and general redevelopment of the area.		
Proposed Development Description	The Site is understood to be subject to redevelopment into a Starbucks “drive-thru”. The proposed development will comprise the construction of a kiosk unit, with the balance of		

	the Site anticipated to remain as hardstanding, either as the route around the building or as car parking. The proposed development will be single storey.
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2.2 Planning

Planning Permission has been granted for the redevelopment of the Site for commercial use (Rochdale Borough Council Ref. 23/00119/FUL). The Planning Decision Notice issued by Rochdale Borough Council (Ref. 23/00119/FUL) in May 2023 imposes a number of conditions on the proposed development. Condition 3 of the Permission relates to contamination and remediation, and is outlined below:

Relevant Planning Conditions	Condition 3 – Contamination <i>“Prior to commencement of the development an investigation and risk assessment, in addition to any assessment provided with the planning application, must be completed to assess the nature and extent of any contamination on the site, whether or not it originates on the site. The investigation and risk assessment must be undertaken by competent persons and a written report of the findings must be produced and shall have been first submitted to and approved in writing by the Local Planning Authority before development commences. The report of the findings must include:</i> <i>i) a survey of the extent, scale and nature of contamination</i> <i>ii) an assessment of the potential risks to: o human health, o property (existing or proposed) including buildings, crops, livestock, pets, woodland, and service lines and pipes, o adjoining land, o groundwaters and surface waters, o ecological systems, o archaeological sites and ancient monuments;</i> <i>iii) where unacceptable risks are identified, an appraisal of remedial options and proposal of the preferred option(s) The development shall thereafter be completed in full accordance with the approved recommendations.</i> <i>Reason: To ensure the safe development of the site in the interests of the amenity of future occupiers in accordance with Policy G9 of the adopted Rochdale Core Strategy and the National Planning Policy Framework.</i> <i>Reason for pre-commencement condition: Further investigation will be necessary prior to commencement of any building or engineering works on site.”</i>
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2.3 Physical Setting

Geology	The superficial deposits beneath the northern edge of the Site comprise Alluvium (Unproductive Strata), consisting of silts, clays, sands and gravels. Glaciofluvial Deposits (Secondary A Aquifer) comprising coarse grained sediments (sand and gravel) with some lenses of finer grained material are present across the remainder of the Site. These deposits are underlain in turn by the Pennine Lower Coal Measures (Secondary A Aquifer). Encountered ground conditions comprised Made Ground to depths >3.0m below ground level (bgl), the base of the Made Ground in two Dynamic Sampler locations was not proven. Where encountered, the Made Ground was underlain by Glaciofluvial Deposits from 3.8-5.0m bgl, the base of this strata was not proven and only encountered within two of the four boreholes.
Aquifers and Groundwater Receptors	The Glaciofluvial Deposits and Pennine Lower Coal Measures are both classified as Secondary A Aquifers. The Site is not in a designated groundwater Source Protection Zone (SPZ). There are no SPZs within 1 km of the Site.

	There is one revoked groundwater abstraction borehole record 491 m to the south-west of the Site. The abstracted water was used in manufacturing. There are no other groundwater abstractions within 1 km of the Site.
Hydrology	The nearest surface water feature is a drain located approximately 55 m to the east of the Site which is connected to Sudden Brook 430m east of Site.

2.4 Conceptual Site Model

The following linkages have been previously confirmed as being relevant to the proposed development and warranting mitigation.

Confirmed Linkages	Source Descriptions	Pathway	Receptor
Linkage 1	Total Petroleum Hydrocarbons (TPH) exceedance comprising mainly medium to long chain aromatics, cadmium, copper, lead, mercury, nickel, zinc and elevated Polycyclic Aromatic Hydrocarbon (PAH) concentrations within groundwater.	Permeation of hydrocarbons through plastic pipe work.	Water supply pipes.
Linkage 2	Hazardous ground gas.	Vertical and lateral migration of ground gases and vapour	Site users & the buildings on-Site.
Linkage 3	Potentially unidentified 'hotspots' of contamination present in areas of the Site that have not been directly investigated.	All pathways	All receptors

3.0 Remediation Strategy

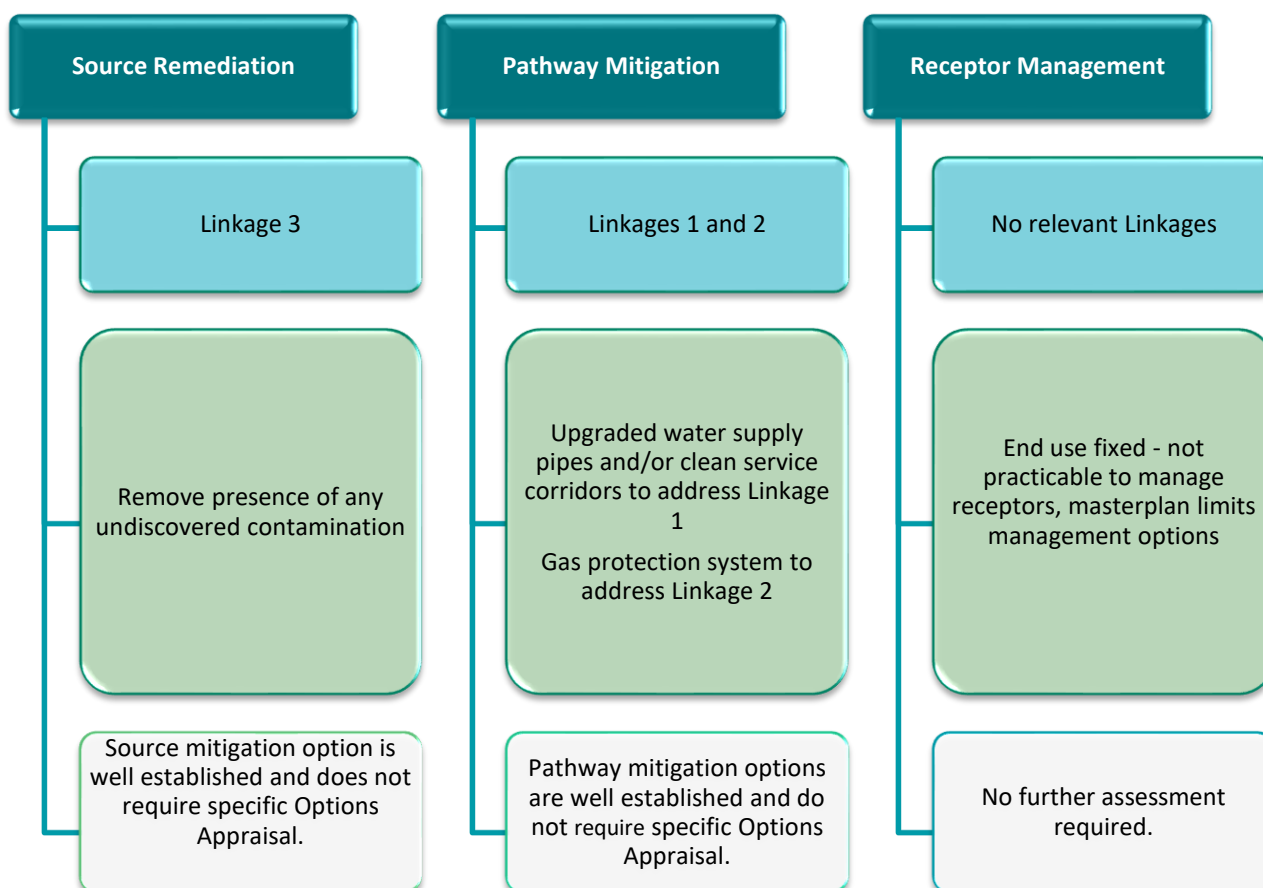
3.1 Introduction

The presence of land contamination is generally only of concern if an actual or potentially unacceptable risk exists to either the health of living organisms (i.e. humans, flora, fauna), ecological systems, property and controlled waters (i.e. rivers, aquifers etc.). Planning policy states that the Site should be 'suitable for use' and that, 'after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990'.

3.2 Remediation Options

Current UK guidance requires due consideration of sustainability indicators in the appraisal of remediation options. Reference has been made to LCRM² and the SURF UK framework³ and this strategy broadly reflects the approach in those documents at the scale appropriate for the Site, scale of issues, and proposed development. Remediation options fall into one of three categories: Undertaking remediation of the contamination source; Mitigation of migration pathways; or Receptor management.

Remediation strategies may incorporate a combination of techniques across the three categories to achieve the most effective and sustainable solution. The table below provides a high-level screen of remedial approaches to the identified linkages.



Given the size of the site and limited remedial works required, further remediation options have not been considered.

² Environment Agency(2023). LCRM: Stage 3 remediation and verification. Dated 2023

³ CL:AIRE (2020). Supplementary Report 2 of the SuRF-UK Framework: Selection of indicators/criteria for use in sustainability assessment for achieving sustainable remediation. Dated 2020

3.3 Stakeholders

Parties Anticipated to be Involved	Function / Interest / Likely Timing of Involvement
Design Engineering Workshop	Project Manager
AKN Build Ltd	Delivery of Development / Construction Environmental Management Plan (CEMP) permitting
Lucion Delta-Simons	Land quality risk assessment
Rochdale Borough Council (CLO)	Regulation relating to Human Health

Overview

The Site remediation strategy had been devised based on the intrusive investigations undertaken in February 2024 to mitigate the risks posed by the identified contaminants of concern and break potential contaminant linkages allowing the redevelopment of the Site for a commercial end use. The key features of the remedial strategy are summarised below;

Enabling Phase Works

- Excavation, breaking out and processing of below ground structures and hard materials; and
- Addressing Previously Unidentified 'Hotspots' of Contamination.

Construction Phase Works

- Provision of ground gas protection measures in accordance with BS 8585:2015 CS2 with verification by a specialist contractor;
- Provision of a clean cover system in soft landscaped areas of the Site;
- Verification of the clean cover system by an environmental consultant to confirm depth and chemical / physical suitability of the clean cover system;
- Installation of clean service corridors and upgraded water supply pipes; and
- A verification report to be produced upon completion of the remedial works to confirm that the work was undertaken in accordance with this remediation strategy, relevant legislation and planning conditions.

4.0 Pre-Construction Remedial Works

4.1 Background

It is understood that AKN Build Ltd will be Principal Contractor (Contractor) for the Site to undertake the pre-construction Site enabling and remedial works which will include earthworks to create a suitable development platform, requiring the excavation of Made Ground deposits that need to be removed from the Site.

This section of the report outlines the remedial works required prior to commencement of the construction phase of the development.

4.2 Demolition and Site Clearance

The Site should be cleared of all residual debris, any fly-tipped materials and vegetation that is required to be removed to facilitate the redevelopment of the Site. All material shall be removed to a suitably licensed landfill.

4.3 Excavation, Breaking and Processing of Sub-Surface Structures

4.3.1 Relict foundations, slabs and utilities etc.

All natural or man-made hard materials including concrete slabs, hardstanding, brick-work, foundations, utilities etc. at or below the surface shall be broken out from beneath the development platform. The location and depth of all below ground obstructions remaining during the remedial works / earthworks shall be recorded by the Contractor on the final as built drawing.

All hard materials and arisings recovered during the works which are intended for re-use shall be processed and stockpiled for chemical testing to demonstrate they are suitable for re-use within the proposed redevelopment.

For any arisings recovered that are intended to form part of the cover system for landscaping, the testing frequency should be in accordance with *'Verification Requirements for Cover Systems'*, issued by Yorkshire and Lincolnshire Pollution Advisory Group Version 4.1 June 2021. This recommends a minimum of 6 soil samples be tested from a brownfield / screened source, or 1 per 100m³ of material, whichever is the greater. Analytical results should be verified in accordance with Lucion adopted Human Health Generic Assessment Criteria which are presented in Appendix C.

4.3.2 Health and Safety

Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place.

The Contractor will need to prepare a risk assessment which identifies a safe system of work to handle any asbestos containing soils encountered, which is likely to include asbestos awareness training, a protocol for unexpected finds (should gross asbestos material be identified) as well as safe working procedures such as damping down of excavations and stockpiles in line with general dust generation mitigation. The risk assessment will need to identify the appropriate levels of PPE and/or RPE required. This recommendation should be captured in Site health and safety documentation and in maintenance plans.

4.4 Disposal of Water

Any waters encountered within the formation of earthworks excavations shall be chemically assessed and disposed of in accordance with legislation either off-site or through obtaining a discharge consent which should be issued by the appropriate authority.

Any perched water showing significant contamination should also be appropriately managed and removed from Site, potentially via localised de-watering of the Made Ground and/or superficial deposits.

4.5 Environmental Management

During the remedial works, it will be the responsibility of the Contractor to ensure that the works are managed in an appropriate way as not to further contaminate the ground and/or watercourses and pose a risk to off-site receptors.

The works will involve the disturbance of soils which may contain contaminants including asbestos. The Contractor shall prepare a Construction Environmental Management Plan (CEMP) which shall include measures to prevent the emission of contamination to air and into the wider environment to include (but not limited to):

- Damping down of dry soils/Made Ground materials;
- Use of a wheel wash or road sweeper to address mud on roads;
- Control of water including surface water run-off and water in excavations to prevent escape to adjacent properties and/or watercourses;
- Operation of works only within the times permitted under the planning permission; and
- Details of incident recording procedures.

The CEMP shall include a detailed Asbestos Management Plan (AMP) and full details of the measures to be taken which shall be communicated to staff during the Site Induction. The CEMP shall be available for inspection on Site during operating hours.

4.6 Addressing Previously Unidentified ‘Hotspots’ of Contamination

4.6.1 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.

4.6.2 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.

Implementation of appropriate measures to deal with such finds remain the Contractor’s responsibility.

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

5.0 Construction-Phase Remediation Works

5.1 Certified Clean Topsoil / Subsoil Layer - Cover System

Lucion considers that a clean cover system should be placed for landscaping areas where Made Ground is present at surface, to break the identified contaminant linkage and to facilitate the growing of flora. Where Made Ground has been removed, no remedial measures are deemed necessary aside from the provision of a minimum 150 mm thickness of topsoil in soft landscaped areas. Intrusive investigation works have identified Made Ground beneath the asphalt across the Site; therefore, it is considered that a clean cover system will be required in all landscaping areas on-Site. Should this change following the earthworks programme, Lucion should be consulted to confirm when Made Ground remains present at surface across the Site.

For areas where a clean cover system is required (anticipated to be areas of soft landscaping at the Site), the following criteria are recommended:

- A high visibility membrane or hard-dig layer should be installed on top of Made Ground upon which the cover layer will then be placed. This is to provide a physical break of a potential pathway between Made Ground and the cover system;
- Within proposed landscape areas, the clean cover layer shall be a minimum thickness of 450 mm, consisting of 300 mm subsoil and 150 mm topsoil;
- Where trees are to be planted as part of landscaping, the cover system will be deepened to accommodate the root-ball.

In accordance with BS 3882:2015, the depth of topsoil shall not exceed 300 mm but the depth of subsoil should be at least double the depth of the topsoil.

In areas where the Made Ground has been removed in its entirety, the requirement for a clean cover is negated and a suitable growing medium of at least 150 mm of topsoil should be provided. Based on the Lucion Site investigation data, this is not anticipated to be the case at the Site.

5.2 Imported Materials and Verification

5.2.1 Pre-Importation Testing

Where 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 C) 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.

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, alternatively, Lucion Human Health Generic Assessment Criteria as presented in Appendix C 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.

5.2.2 Post-Placement Verification

Following the placement of the clean cover system in soft landscaped areas, the depth of cover must be physically inspected to confirm the minimum thicknesses detailed in Section 5.1 have been achieved.

The inspection is to be undertaken by the Environmental Consultant and will comprise (at least):

- Inspection pits on a 25 m grid in soft landscaped areas.

It is anticipated that subsoil and topsoil may have been tested for chemical suitability prior to placement. However, as detailed in Section 5.2.2, for any areas where this is not the case, samples will be obtained of topsoil and subsoil on the following testing frequency (as a minimum):

- Topsoil and subsoil shall be sampled from each inspection pit within soft landscaping areas.

These will be tested to confirm compliance with the GAC.

The location of the inspection pits is to be determined by the Environmental Consultant to ensure a good spatial coverage.

The Environmental Consultant will record the overall depth of the clean cover along with the thickness of topsoil and subsoil, and the presence of a membrane or hard-dig layer. A photographic record of the excavation, with suitable scale, will be obtained for the Cover System Validation Report.

Should soils fail the applied criteria, then they shall be replaced by the Contractor with alternatively sourced soils and retested.

The inspection pit and testing frequencies required are summarised in Table 1 below. A copy is also presented in Appendix E; it is recommended that this is distributed to the Contractor for use on-Site during the groundworks.

Table 1. Inspection pit and testing frequencies

	Soft Landscaping Requirements (required in all soft landscaping areas)
Clean cover thickness where Made Ground is present (must comprise chemically and physically validated subsoil and topsoil)	450 mm minimum cover consisting of: - 150 mm topsoil - 300 mm subsoil

Inspection Pit frequency (to confirm cover thickness and membrane depth, where required)	25 m grid: A minimum of 1 inspection pit per 25 m grid is required in soft landscaped areas
Testing frequency (coverage to be determined by Environmental Consultant)	Topsoil and subsoil: Samples required from each inspection pit on a 25 m grid in soft landscaped areas
If Made Ground is present at surface (Made Ground identified Site-wide)	Membrane required: Where Made Ground is present, a high visibility membrane or hard-dig layer should be installed to break a potential pathway to asbestos containing materials
If Made Ground is not present at surface (considered unlikely– contact Lucion if no Made Ground is considered present)	No membrane required: Where the Made Ground has been removed in its entirety, the requirement for a clean cover system is negated and a suitable growing medium of at least 150 mm of topsoil should be provided

5.2.3 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 Ground Gas Protection

5.3.1 Ground Gas Risk Summary

Given that elevated concentrations of methane (above 1%) have been recorded, attributed to the thickness of Made Ground encountered across the site, it was considered prudent to increase the Site hazardous gas classification to Characteristic Situation (CS) 2, therefore ground gas protection measures are required.

Given the significant thickness of Made Ground encountered at the Site (> 4.5m), and as methane was recorded above 1% v/v, it is anticipated that a CS2 classification for the Site is reasonable and appropriate.

5.3.2 Installation of Ground Gas Protection Measures

Ground gas protection measures shall be installed in accordance BS8485:2015 as appropriate and should be agreed with the Local Authority prior to adoption.

It is recommended that the design and installation of the gas protection measures is required be carried out by a suitably qualified and experienced subcontractor to meet the requirements of the Local Authority and BS 8485:2015.

BS:8485 provides a scoring system to determine the appropriate protection measures for a proposed development in accordance with the identified ground gas regime. Table 3 of BS:8485 summarises typical UK building types, which for this development will comprise Type 2 (commercial). Table 4 details the points required for the Characteristic Situation, which for CS2 is 3.5. This can be achieved by a combination of the following:

- Structural barriers (Table 5);
- Ventilation (Table 6); and
- Gas Membrane (Table 7).

The above should be considered in conjunction with the proposed foundation / floor slab design to achieve the minimum score required within BS:8485. It is recommended that the installer of the membranes should have the appropriate qualifications (NVQ Level 2 'Gas Membrane Installations').

5.3.3 Verification of Ground Gas and Soil Vapour Protection Measures

In order to meet the requirements of BS 8485:2015 it is recommended that the installation of the gas protection measures is verified by a suitably qualified and experienced specialist independent of the developer.

It is imperative that third party inspection of the membrane and ventilation installation is undertaken for every plot, whilst the gas membrane is visible.

Engineer's drawings confirming the inclusion of gas protection measures shall be included within the Verification Report.

The developer shall commission independent verification certification/integrity testing as outlined in BS 8485:2015 and photographs of the installed gas protection measures, copies of which should be provided for inclusion within the Verification Report. The frequency of independent inspection of gas protections should be undertaken in accordance with CIRIA C735.

5.4 Water Pipes and Below Ground Utilities / Structures

5.4.1 Background

Concentrations of TPH and PAH concentrations in soils on Site represent a potential risk to standard plastic water supply pipes. Following the 1992 Foundation for Water Research (FWR) report an update Guidance for the Selection of Water Supply Pipes used in Brownfield Land (UKWIR 2010) has been produced.

Careful selection, design and installation of water supply pipes is required on potentially contaminated sites to ensure that pipelines are satisfactorily installed.

To fully comply with the guidance a specific and detailed investigation of each pipe route is considered to be required, at the time of the investigations, no information on the specific pipe routes was available, therefore a specific investigation in compliance with the requirements of UKWIR 2010 and / or the local water supplier has not been undertaken.

5.4.2 Standard Pipe Materials / Upgraded Pipe Material Requirements

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, however, given the contamination identified on Site it is considered likely that barrier pipe material will need to be adopted for water supply pipes.

Details of upgraded pipework should be provided to the Environmental Consultant for inclusion within the Verification Report.

5.4.3 Clean Service Corridors

Services and utility corridors should be backfilled with clean site won materials. In the event that imported materials are required, all material imported to Site for this use should be tested on a ratio of 1 sample per 250 m³ for a range of contaminants appropriate to the source of the material but to include testing for the presence of asbestos as a minimum.

The Contractor shall be responsible for providing the documentation associated with the testing of the imported service trench fill to the Environmental Consultant.

6.0 Verification Reporting & Regulatory Approvals

6.1 General

Following completion of works detailed in Sections 4.0 to 5.0 for the Site, the Environmental Consultant shall prepare a Verification Report on the works for submission to Rochdale Borough Council Planning Authority to satisfy relevant planning conditions.

6.2 Verification - Enabling Phase

The Pre-Construction Phase Verification Report shall be produced upon completion of the Site demolition, remediation and earthworks. This report will include as a minimum:

Summary of works undertaken;

- Details of waste disposal of any material from the Site including waste transfer documentation and details of the receiving treatment/landfill facility;
- Confirmation of the chemical results, and transfer notes detailing the place of origin of any imported fill including any stockpiles left for the subsequent cover system; and,
- 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.

6.3 Verification – Construction Phase

The Construction Phase Verification Report shall be produced upon completion of the Site demolition, hydrocarbon remediation and earthworks. This report will include as a minimum:

- Details of the placement of clean cover including the placement of geotextile, topsoil and subsoil through a verification record as described in this strategy;
- Confirmation of the chemical results, and transfer notes detailing the place of origin of any imported topsoil/subsoil;
- Details of the ground gas protection measures installed along with the required verification information; and,
- Details of the final water pipe material utilised within the development.

6.4 Regulatory Approvals and Planning Condition Discharge

It is intended that this report be submitted to Rochdale Borough Council to support the discharge of contaminated land planning conditions (in conjunction with earlier technical reports).

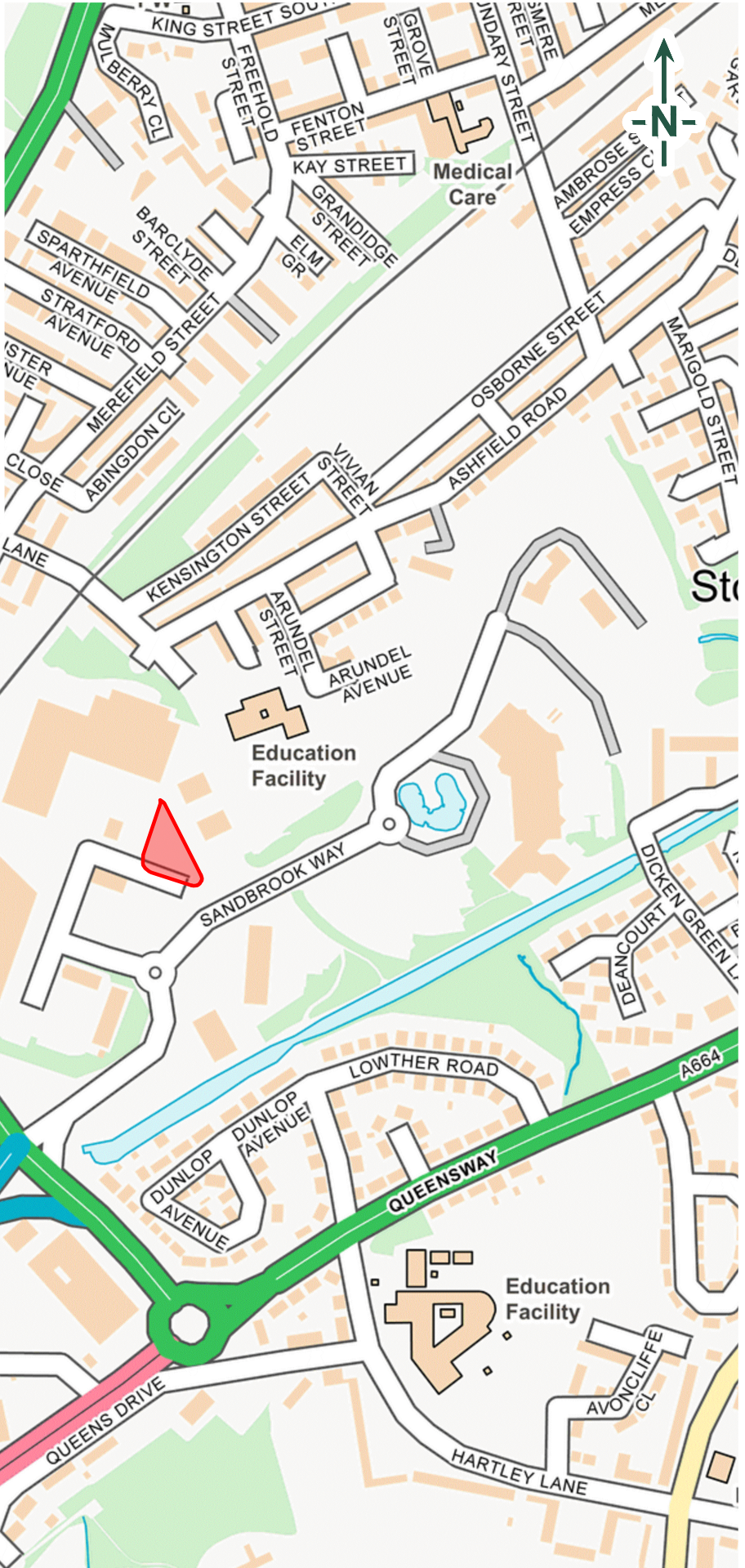
Figures

Figure 1 – Site Location Map



LEGEND

Site Boundary



Scale: 1 / 10,000 @ A4 Contains OS data © , Crown Copyright and Database Right (2025)

 Lucion Protecting people and planet	TITLE: Site Location Map Sandbrook Park Rochdale	DRAWN BY:	SCALE:	PROJECT NO:
		JM	To Scale@A4	126205.655762
		CHECKED BY:	REVISION:	FIGURE NO:
		NH	1	1
		CLIENT: Design Engineering Workshop		DATE: 25/02/2025

Appendices

Appendix A – Limitations

Limitations

This Report was prepared by Lucion Delta-Simons Limited ("Lucion") for the sole and exclusive use of the Client and for the specific purpose for which Lucion was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Lucion, 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. Lucion does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Lucion 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 Lucion. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Lucions' Standard Terms and Conditions as included within our proposal to the Client.

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

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

Site surveys document the conditions encountered at the time of survey only and conditions may change due to natural processes or human intervention. As such, surveys represent an assessment at a specific point in time and Lucion cannot be responsible for adverse conditions which arise or become apparent after the time of the survey or for conditions which sit outside the scope for which the survey or Report was commissioned.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work period and on the results of laboratory and field tests performed during the investigation. Ground conditions are inherently variable such that no investigation can be exhaustive to the extent that all adverse conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed or obtained as part of this assessment. It should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation. Lucion does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions. Where risk assessment is undertaken, this is based upon the standards, guidance and common practice at the time of the assessment and Lucion cannot be responsible for conditions which become apparent following changes in guidance or practice or advancements in scientific knowledge which change the position in relation to assessment of risk.

No aspect of this Report constitutes a design. Where this information is used in design, the designer should verify the information has been used appropriately.

Where budgets are prepared and presented within the Report, these are for information only to indicate the likely magnitude of a cost and do not represent an invitation to treat for the works. All budgets and programmes presented should be reviewed and verified by appropriately qualified and experienced independent Project Managers and Cost Consultants.

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 – Imported Soils Assessment Criteria

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 is 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	

Criteria for Imported Materials			
Compound	GAC	Source	Comment
Phenanthrene	95	LQM	
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 Lucion.

Appendix D – Inspection Pit and Testing Frequencies

Inspection pit and testing frequencies required are summarised below.

It is recommended that this is distributed to the Contractor for use on-Site during the groundworks.

	Soft Landscaping Requirements (required in all soft landscaping areas)
Clean cover thickness where Made Ground is present (must comprise chemically and physically validated subsoil and topsoil)	450 mm minimum cover consisting of: - 150 mm topsoil - 300 mm subsoil
Inspection Pit frequency (to confirm cover thickness and membrane depth, where required)	25 m grid: A minimum of 1 inspection pit per 25 m grid is required in soft landscaped areas
Testing frequency (coverage to be determined by Environmental Consultant)	Topsoil and subsoil: Samples required from each inspection pit on a 25 m grid in soft landscaped areas
If Made Ground is present at surface (Made Ground identified Site-wide)	Membrane required: Where Made Ground is present, a high visibility membrane or hard-dig layer should be installed to break a potential pathway to asbestos containing materials
If Made Ground is not present at surface (considered unlikely– contact Lucion if no Made Ground is considered present)	No membrane required: Where the Made Ground has been removed in its entirety, the requirement for a clean cover system is negated and a suitable growing medium of at least 150 mm of topsoil should be provided