



Remediation & Verification Strategy

Proposed Media Studio, Manchester City Football Club

Presented to: City Build Manchester Limited

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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 180 environmental professionals, bringing experience from across the private consultancy and public sector markets.

As part of Lucion Services, our combined team of 500 in the UK has a range of specialist skill sets in over 50 environmental consultancy specialisms including asbestos, hazardous materials, ecology, air and water services, geo-environmental and sustainability amongst others.



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. Through Inogen we can offer our Clients more consultants, with more expertise in more countries than traditional multinational consultancy.

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by City Build Manchester Limited (the “Client”) to undertake the preparation of a Remediation and Verification Strategy (RVS) for the proposed Media Studio area at Manchester City Football Club (the “Site”). The Site is subject to Planning Permission issued by Manchester City Council, reference 131109/FO/2021.

1.2 Context & Purpose

The purpose of this document is to:

- ▲ Present a summary of remediation requirements;
- ▲ 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 (Condition 3 in planning permission reference 131109/FO/2021) 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 Delta-Simons’ previous report as follows:

- ▲ Delta-Simons (October 2021), Geo-Environmental Assessment – Media Studio Project, dated 19/10/2021, reference, 21-1914.01.

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 investigation in the context of the proposed end-use of the Site. It does not provide a verification or completion statement for the works. This document is a strategy document and more detailed documentation in terms of a Contractor’s Remediation Method Statement may need to be prepared. The standard limitations associated with this assessment are presented in Appendix A.

2.0 Site Context

2.1 Site Information

Site Overview			
Co-ordinates	Centred approximately at National Grid Reference 387537, 398049	Elevation (approx.)	62 m AOD
		Area	0.02 Ha
Site Address and Location	The Site is located off Ashton New Road at the Manchester City Football Club training ground, approximately 3.5 km east of Manchester city centre. A Site location map is provided as Figure 1.		
Site Description	The Site is 0.02 Ha in size and comprises an area of soft landscaping within the Manchester City Football Club training ground.		
Site History	Historically, the Site comprised agricultural land and was subsequently associated with Clayton Aniline Works, which included railway sidings, tanks, and chimneys within the wider site area. The wider area has included further industrial uses including engineering works, unspecified works, a colliery, a coal pit, mine shafts and a reservoir.		
Proposed Development Description	The proposed development for the Site is the construction of a new single storey media studio within the grounds of Manchester City Football Club and associated areas of soft landscaping and hardstanding for access. A proposed development plan is presented at the rear of this report as Drawing 1. It is understood that arisings from the construction of the proposed development will require off-Site disposal.		

2.2 Planning

Planning Permission has been granted for the redevelopment of the Site for the construction of a Media Studio (Manchester City Council ref. 07/13/0899/O). The Planning Decision Notice issued by Manchester City Council in July 2021 imposes several conditions on the proposed development. Condition 3 of the Permission relate to contamination risk and remediation, and is listed below:

Relevant Planning Conditions	Condition 3 – Contamination 3) a) Before the development hereby approved commences, a report (the Preliminary Risk Assessment) to identify and evaluate all potential sources and impacts of any ground contamination, groundwater contamination and/or ground gas relevant to the site shall be submitted to and approved in writing by the City Council as local planning authority. The Preliminary Risk Assessment shall conform to City Council's current guidance document (Planning Guidance in Relation to Ground Contamination). In the event of the Preliminary Risk Assessment identifying risks which in the written opinion of the Local Planning Authority require further investigation, the development shall not commence until a scheme for the investigation of the site and the identification of remediation measures (the Site Investigation Proposal) has been submitted to and approved in writing by the City Council as local planning authority. The measures for investigating the site identified in the Site Investigation Proposal shall be carried out, before the development commences and a report prepared outlining what measures, if any, are required to remediate the land (the Site Investigation Report and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.
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	b) When the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report shall be submitted to and approved in writing by the City Council as local planning authority prior to the first use of the development. In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy. Reason - To ensure that the presence of or the potential for any contaminated land and/or groundwater is detected and appropriate remedial action is taken in the interests of public safety, pursuant to policies DM1 and EN18 of the Core Strategy.
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2.3 Physical Setting

Geology	Published British Geological Survey mapping (1:50,000 Sheet Number 85, Manchester), indicates that the Site is underlain by superficial deposits of Devensian Till comprising Diamicton, in turn underlain by bedrock of the Pennine Upper Coal Measures Formation (PUCMF) comprising mudstone, siltstone and sandstone. Delta-Simons encountered Made Ground across the Site during the 2021 intrusive investigation works, noted to comprise a gravelly clayey sand or a gravelly clay, which is understood to have been engineered in place during an earthworks programme undertaken across the wider area between circa 2011 and 2013. The thickness of Made Ground was proven in one location only, with a recorded thickness of 5.7m. Devensian Till was encountered to a maximum proven depth of 9.4 m bgl, with Pennine Upper Coal Measures encountered to 15.0 m bgl (the base of which was not proven).
Aquifers and Groundwater Receptors	The Environment Agency (EA) classifies the superficial deposits of Devensian Till as a Secondary (Undifferentiated) Aquifer. The bedrock (PUCMF) is classified as a Secondary A Aquifer.
Hydrology	The nearest surface water feature is the Ashton Canal, located approximately 400 m to the north of the 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	Asbestos was identified in shallow Made Ground. Due to the variable nature of Made Ground and the history of the Site, it is possible that asbestos may be present in Made Ground deposits across the Site area.	Inhalation of soil or dust	End Users of the Site
			Construction-phase staff
Linkage 2	Site-specific ground gas monitoring has not been undertaken. Continuous gas	Indoor exposure/explosive	Human health – future Site users

	monitoring carried out in the wider site area by Ground Gas Solutions (GGS) identified residual volatile organic vapours and elevated carbon monoxide concentrations in the Central Training Facility (CTF) area, within which the subject Site is located.	hazard via enclosed space accumulation of ground gas	
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2.5 Data Gaps and Uncertainties

The following uncertainties or data gaps are noted:

- ▲ The Site-specific ground gas regime is not known; therefore, it is recommended that gas protection measures are installed in line with the requirements for the wider site area.

3.0 Remediation Strategy

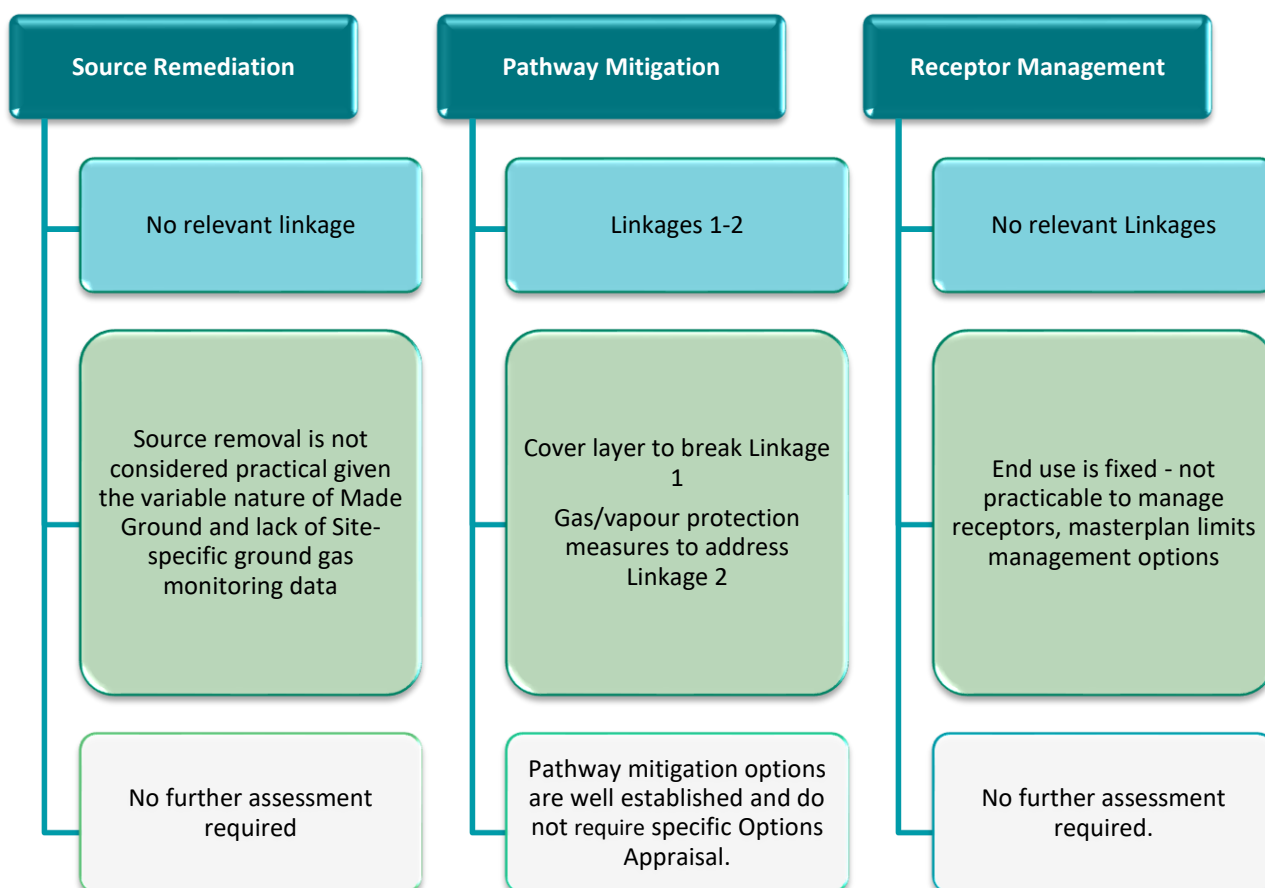
3.1 Introduction

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'. The Decision Notice issued by Manchester City Council under planning application reference 131109/FO/2021 included a condition regarding contaminated land, and as such, this Remediation Strategy is designed to support the discharge of the relevant condition.

3.2 Remediation Options

Current UK guidance requires due consideration of sustainability indicators in the appraisal of remediation options. Reference has been made to LCRM and the SURF UK framework 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.



3.3 Overview

This Remediation and Verification strategy had been devised based on the intrusive investigation undertaken by Delta-Simons in September 2021 and on existing data available within third-party reports (no reliance on the third-party reports is assumed or inferred) 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:

- ▲ Provision of ground gas protection measures in accordance with a Characteristic Situation 2 (CS2) in line with BS 8485:2015, with installation and verification undertaken 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;
- ▲ Hotspot protocol to address any unexpected contamination encountered during site enabling or construction works; 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 Construction-Phase Remediation Works

4.1 Certified Clean Topsoil / Subsoil Layer - Cover System

Delta-Simons consider that a clean cover system should be placed in landscaping areas where Made Ground is present at surface, to break the identified pollutant 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 topsoil layer soft landscaped areas. However, intrusive investigation works have identified Made Ground at surface 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 redevelopment, Delta-Simons 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 150 mm topsoil and 300 mm subsoil;
- ▲ 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 should 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 Delta-Simons Site investigation data, this is not anticipated to be the case at the Site.

4.2 Imported Materials and Verification

4.2.1 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 material 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 should 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 should 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.

The sampling frequencies recommended for imported or Site-won materials utilised for the cover layer from various sources is shown in the following table.

Table 1 – Sampling Frequencies

Type	Number of Samples	Testing Suite	Acceptance Criteria
Virgin quarried material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material	Standard metals suite (As, Cd, Cu, Cr / Cr(VI), Pb, Hg, Ni, Zn)	Verified in accordance with Delta-Simons adopted Human Health Generic Assessment Criteria which are presented in Appendix C
Crushed hardcore, brick, concrete	Minimum 1 per 1,000m ³	Standard metals suite 16 PAHs Asbestos screen	
Greenfield / manufactured topsoil (off-Site source)	Minimum 3 or 1 per 250m ³ (whichever is greater)	Standard metals suite 16 PAHs Asbestos screen TPHCWG	
Brownfield / Site-won soils	Minimum 6 or 1 per 100m ³ (whichever is greater)	Standard metals suite 16 PAHs Asbestos screen TPHCWG	

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 (regardless of the intended use as materials should be free from contamination), alternatively, Delta-Simons 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.

4.2.2 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 9.1 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, for any areas where this is not the case, samples will be obtained of topsoil and subsoil 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 2 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 2: Cover Layer Requirements Summary

	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 where sampling prior to placement has not been undertaken. If the sampling frequency prior to placement meets the criteria in Table 1, <i>in-situ</i> samples may not be required
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 prior to placement of the clean cover soils to break a potential pathway to asbestos containing materials
If Made Ground is not present at surface (considered unlikely– contact Delta-Simons 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

4.2.3 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.

4.3 Ground Gas and Organic Vapour Protection

Site-specific gas monitoring has not been undertaken, however, an assessment for the wider site area undertaken by Ground Gas Solutions (GGS) in 2012 identified residual volatile organic vapours and elevated carbon monoxide concentrations within the Central Teaching Facility (CTF) area, within which the subject Site is located.

Gas protection measures were subsequently recommended in line with a Characteristic Situation 2 (CS2) classification for the wider CTF area, and therefore, gas protection measures compliant with a CS2 classification will be required within the proposed Media Studio development.

4.3.1 Installation of Ground Gas Protection Measures

Ground gas protection measures shall be installed in accordance BS8485:2015 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 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 A (private). 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').

4.3.2 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.

4.4 Water Pipes and Below Ground Utilities / Structures

4.4.1 Background

Concentrations of organic contaminants in soils 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.

It is understood that no water supply pipes will be installed within the proposed building as shown in the Proposed Plan 2024.33.301 dated 9 July 2021, included as Drawing 2. However, the relevant water supply company should be contacted at an early stage to confirm its requirements for assessment, should water pipes be required within the proposed development, and it should be noted that the water supply company requirements may not necessarily be the same as those recommended by UKWIR.

If water supply pipes are required, it is likely that a more detailed assessment based on proposed water supply routes will be needed to satisfy the requirements of the local water supplier.

4.4.2 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, if required, in order to specify their specific requirements.

Should any upgraded supply pipes be installed, details of pipework should be provided to the Environmental Consultant for inclusion within the Verification Report.

4.4.3 Clean Service Corridors

Services and utility corridors should be backfilled with clean 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.

4.4.4 Sulphate Resistant Concrete

A requirement for sulphate resistant concrete Class DS-4 and ACEC-4 has been identified and the Contractor shall review and confirm the needs for sulphate resistant concrete.

4.5 Addressing Previously Unidentified 'Hotspots' of Contamination

4.5.1 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.

4.5.2 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.

4.6 Materials Management

4.6.1 Asbestos in Soils

Asbestos has been identified in shallow soils at the Site. Subsequently, the groundworks Contractor should be made aware of the possibility of encountering potential Asbestos Containing Materials (ACM) within the Made Ground across the Site and an appropriate protocol to mitigate exposure of the workforce and general public should be in place with due respect to his duties under the Control of Asbestos Regulations 2012 and with reference to the Joint Industry Working Group Asbestos in Soil and Construction & Demolition (C&D) Materials guidance (published by CL:AIRE) titled "Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition materials: Industry Guidance" (shortened name CAR-SOILTM). The document was prepared with the support of the Health and Safety Executive and presents the definitive explanation of how the legal requirements of the CAR 2012 have been interpreted to apply to work with asbestos contaminated soil and construction & demolition materials. The guidance is underpinned by the fundamental requirements expressed in the Regulations, in relation to the protection of employees from risks related to exposure to asbestos but is set within a carefully considered framework designed specifically for soil and C&D materials contaminated with asbestos.

The Contractor will need to prepare a risk assessment which identifies a safe system of work to handle the asbestos containing soils 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 Contractor should determine the need for appropriate levels of PPE and/or RPE and any associated air monitoring as required.

The Contractor shall be responsible for providing appropriate documentation for inclusion within the Verification Report including details of any significant asbestos material encountered.

4.6.2 Management of Waste

As noted within Delta-Simons' Geo-Environmental Assessment Report, there is now a greater focus on waste re-use, treatment and recovery as organisations try and move their waste materials up the Waste Hierarchy and move to more circular models of material supply and re-use. However, where removal of material from Site is required, the following information should be confirmed and recorded to ensure duty of care and provided for inclusion within the Verification Report:

- ▲ Details of waste disposal of any material from the Site including waste transfer documentation (including, but not limited to, a copy of the Waste Carrier's Licence, transfer notes, consignment notes and weighbridge tickets); and,
- ▲ Details and documentation for the receiving treatment/landfill facility.

5.0 Verification Reporting & Regulatory Approvals

5.1 General

Following completion of works detailed in this Report, an Environmental Consultant shall prepare a Verification Report on the works for submission to the Local Authority to support the discharge of the relevant planning conditions.

5.2 Verification Documentation

The Verification Report shall be produced upon completion of the installation of a clean cover system, installation and verification of gas protection measures and on confirmation that no unforeseen contamination was identified (where applicable). This report will include as a minimum:

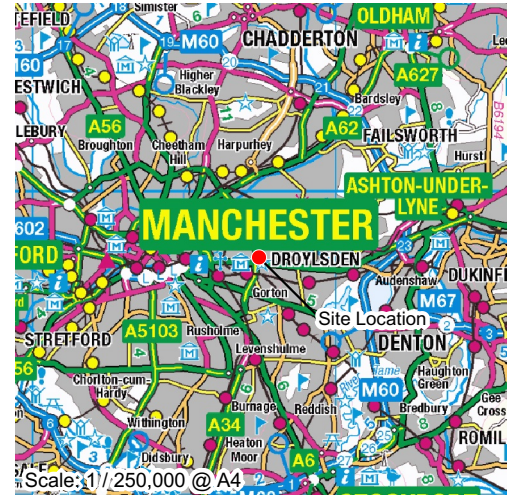
- ▲ Details of the placement of clean cover including the placement of geotextile, topsoil and subsoil through a verification record as described in this strategy;
- ▲ Confirmation of the chemical results, and transfer notes detailing the place of origin of any imported topsoil/ subsoil;
- ▲ Details of the ground gas protection measures installed along with the required verification information;
- ▲ Details of any unexpected contamination hotspots and associated risk assessment;
- ▲ Details of waste removal, transfer documentation and receiving facility documentation; and,
- ▲ Details of the final water pipe material utilised within the development (if applicable).

5.3 Regulatory Approvals and Planning Condition Discharge

It is intended that this report be submitted to Manchester City Council to support the discharge of contaminated land planning conditions (in conjunction with previous Delta-Simons and third-party reports).

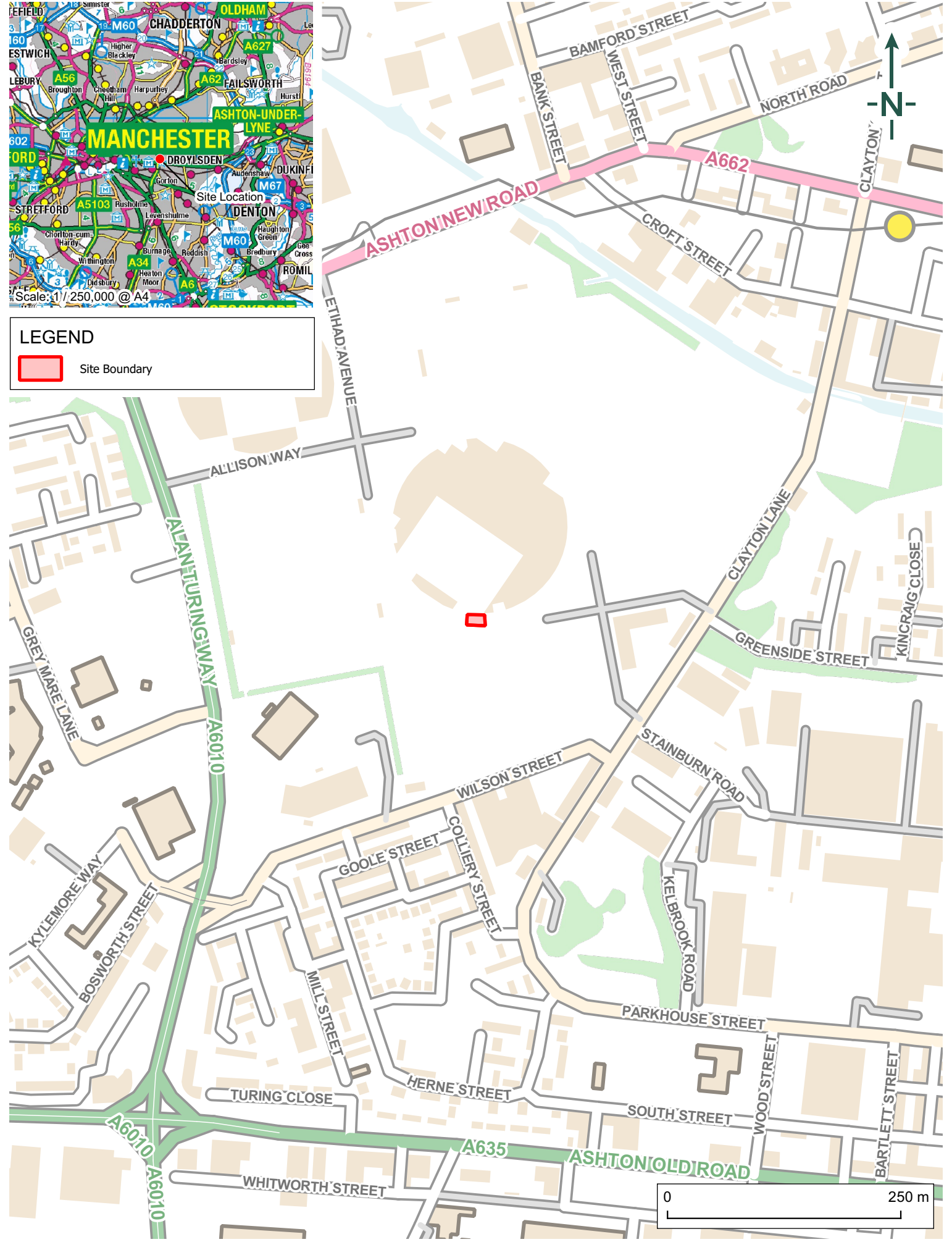
Figures

Figure 1 – Site Location Map



LEGEND

 Site Boundary



Scale: 1:5,000 @ A4

Service Layer Credits: Contains OS data @ Crown Copyright and Database Right 2019

Appendices

Appendix A – Limitations

Limitations

This Report was prepared by Delta-Simons Environmental Consultants Ltd (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. Delta-Simons 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 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 Delta-Simons. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Delta-Simons' Standard Terms and Conditions as included within our proposal to the Client.

The recommendations contained within this Report represent Delta-Simons 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 Delta-Simons has obtained, reviewed and evaluated information in preparing this Report from the Client and others and Delta-Simons conclusions, opinions and recommendations has been reasonably determined using this information, Delta-Simons does not warrant the accuracy of the third-party information provided to it and cannot 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.

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 Delta-Simons 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. Delta-Simons 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 Delta-Simons 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	
Phenanthrene	95	LQM	

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

The respective sources are:

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

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 where sampling prior to placement has not been undertaken. If the sampling frequency prior to placement meets the criteria in Table 1, <i>in-situ</i> samples may not be required
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 prior to placement of the clean cover soils to break a potential pathway to asbestos containing materials
If Made Ground is not present at surface (considered unlikely– contact Delta-Simons 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