

2.0 BUILD PHASE REMEDIATION WORKS AND VALIDATION

2.1 Remediation and Validation Requirements

2.1.1 A summary of the remediation and validation works which were scheduled to be undertaken is presented within the table below:

Pollution Linkage being Broken	Remediation Requirements	Validation Requirements
Uptake of contaminants identified in the Made Ground (benzo(a)pyrene and lead) by direct contact, ingestion of soil, inhalation of dust and consumption of home grown produce. Inhalation of asbestos fibres from the Made Ground.	<u>Environmental Cover System</u> Considering the elevated soil concentrations encountered in the Made Ground an environmental cover system is recommended. The environmental cover system should be as follows: Gardens: 600mm thick environmental cover system comprising: Either 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 500mm comprising clean inert fill and sufficient topsoil for a growing medium. Or geotextile membrane and at least 600mm comprising clean inert fill and sufficient topsoil for a growing medium. The subsoil layer can be replaced by additional topsoil. Exposed Made Ground soils should be kept damp in dry weather to reduce the risk of contaminated dust/asbestos fibres being released into the air.	Measuring the depth of the installed environmental cover system and providing photographic evidence. Photographic evidence of the granular break layer or geotextile layer will also be collected. Chemical validation of imported soils: see Section 2.1.2 below. Determinand screening concentrations are presented in Appendix F.
Migration of ground gas into buildings via cracks in floorslabs, floorslab service penetrations etc.	<u>Gas Protection Measures</u> In accordance with CL:AIRE RB17 dated 2012, the site falls within Characteristic Situation 3 (CS3). Using the guidance within BS 8485:2015, for CS3 and the proposed development, a gas protection score of 4.5 is given. A score of 4.5 is intended to be achieved by: - A cast in-situ ground-bearing floorslab (mesh reinforced) – will give 0.5points worth of protection. - A subfloor gas dispersal layer. To comprise of a 200mm thick layer of inert rounded gravel (no fines, size =20-30mm) containing surrounding 75mm perforated plastic drainage pipes (installed no more than 3m apart) fitted to airbricks (via telescopic vents). Sub-floor gas dispersal layers can provide between 1.5-2.5points worth of protection. It is intended that this layer will provide at least 2 points of protection. - Visqueen gas barrier to be used and joined to a Visqueen gas resistant dpc which will sit on the walls. Associated Visqueen double sided tape and Visqueen gas resistant (GR) foil tape to be used to join & seal the gas barrier sheets together as well as the gas barrier to the gas resistant dpc. Only a single service penetration of each floorslab is proposed (waste water pipe). This will be sealed to the gas membrane using the Visqueen tape. Providing that it is correctly installed, the gas barrier will provide 2points worth of protection. The Visqueen gas barrier will be installed over the floorslab and will be protected by a 50mm thick layer of screed.	Validation of gas protection measures should be in line with CIRIA 735¹ and should include photographic evidence of a suitably sealed gas membrane, and how the membrane has been sealed around service penetrations.
Potable Water Supply	<u>Potable Water Pipes</u> A United Utilities potable water supply pipe risk assessment is required to determine the type of water pipe to be used.	Delivery notes of pipe material. Photographs of the installed pipe.
Other Considerations	<u>Unexpected Contamination</u> The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination including asbestos containing material) be encountered at the site, TLC and the Local Authority should be informed and further assessment of the material may be required. <u>Re-use of site won material</u> To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following: 1,000 tonnes (c. 600m³) of non-hazardous soil 5,000 tonnes (c. 3,000m³) of natural sand and gravels. 50,000 tonnes (c. 25,000m³) of bituminous material to be used in roadways. 5,000 tonnes (c. 3,000m³) of crushed concrete / stone.	

¹ CIRIA (2014). 'Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas'. CIRIA C735.

	A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. If a MMP is required this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no sham recovery'. All of the above materials would need to be tested at the rate and analytical suites presented in Section 4.1.2 below. <u>Health and Safety Considerations</u> In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance²) should be adopted by all workers involved with site enabling and construction works.
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2.1.2 Validations of Imported / Site Won Soils

2.1.2.1 Any additional imported / site won soil used onsite in gardens and soft landscaping areas will need to be chemically validated to ensure it is "suitable for use".

2.1.2.2 A summary of the sampling requirements is presented in the table below. If material is imported, then ideally the material should be sampled at source; however, where this is not possible then material imported should be segregated onsite based on source and soil type.

Material Type	Source	Suite of Analysis	Sampling Rates*
Topsoil	Greenfield	Suite A	1 sample per 50m³
	Brownfield / Unknown	Suite B	
Subsoil	Brownfield / Unknown	Suite B	1 sample per 50m³
	Site won natural material	Suite A	
		First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.
Physical Stone Break Layer	Recycled Stone (6F2 / screened)	Suite B	1 sample per 500m³

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

*Minimum sampling rate of 3 samples per source.

2.1.2.3 If site won soil is to be used then this should be stockpiled onsite ready for testing.

2.1.2.4 Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

2.1.2.5 In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882³). TLC advise this information is provided by the supplier before material is imported onto site.

2.1.3 Soil Assessment Criteria

2.1.3.1 Results of imported / site won soil testing will be screened against appropriate assessment criteria for a residential end use.

2.1.3.2 With regards to the soil risk assessment TLC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs).
- LQM Suitable 4 Use Levels (S4ULs).

² HSE (1991). 'Protection of Workers and the General Public During Development of Contaminated Land'. London HMSO.

³ BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

2.1.3.3 A summary of the generic assessment criteria used is provided in Appendix F.

2.2 Disposal

2.2.1 Any material disposed offsite should be taken to a suitably licensed recycling facility. Provision of waste tickets and details of the facility should be provided for the Completion Report.