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PHASE 3

REMEDIATION STRATEGY REPORT

job number	C4722/25/E/7818
date	27.03.2025
site address	176 Almondbury Bank, Huddersfield, West Yorkshire, HD5 8EX
written by	S. Hale
checked by	T. Merry
issued by	S. Hale

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Phase 3: Remediation Statement

Location:	176 Almondbury Bank Huddersfield, West Yorkshire, HD5 8EX
For:	Tecni-Build (Northern) Ltd
Consultant:	Jg-d
Report No.	C4722/25/E/7818 Report date: March 2025

For and on behalf of **Rogers Geotechnical Services Ltd**

Steven Hale BSc FGS Geo-environmental Technician	**Tobias Merry** MSci (Hons), FGS Geo-environmental Engineer

1. Introduction

Further to the site-specific risk assessment provided within the geo-environmental report (C4722/24/E/7215, December 2024) and subsequent gas monitoring letter (20th December 2024), it is considered that some remediation will be required at this site. This report provides the strategy for that remediation.

From the geo-environmental investigation, it was considered that the made ground present at the site was contaminated with respect to the intended residential with plant uptake end use. Therefore, it was recommended that garden areas be 'remediated' by providing a capping layer of 500mm of inert material over a 100mm thick capillary break. In addition, Characteristic Situation Level 1 has been assumed for the site (see gas monitoring letter), thus no protective measures are required for ground gas.

2. Remediation Strategy

2.1 Remediation Objectives

Based on the site-specific risk assessment provided in the geo-environmental report and gas monitoring letter, the object of remediation at the site is as follows:

- To protect the site operatives during the construction process from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust.
- To protect the end user and neighbours from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust.
- To protect the garden plants from contaminated ground and to protect the end user from the ingestion of contaminated fruit and vegetables.
- To protect plastic services from being penetrated by, or degrading due to the presence of contamination in the soil or groundwater.
- To protect controlled waters from run off via drainage/sewers etc.
- To protect buried concrete from being affected by aggressive ground conditions.
- To protect operatives and end users from accumulation of carbon dioxide and methane.

2.2 Development Requirements.

The site is to be developed by the construction of a residential dwelling with gardens. Therefore, it is considered that the site may be classified as being a residential with plant uptake development.

3. Scope

In order to fulfil the objectives defined above the following remedial strategy will be utilised. A pragmatic approach will be undertaken, with observational techniques being employed at each stage of the work.

3.1 Groundworks

During the ground-works phase of the development, protection to the site operatives is required. The risk to site operatives is considered under the Health and Safety at Work Act 1974, together with regulations made under the act, which includes the Control of Substances Hazardous to Health (COSHH) regulations. Therefore, the risks to site personnel will be considered under the Construction Design and Management (CDM) regulations at the planning stage and be included in the contractor's Health and Safety Plan and site-specific Method Statements. These documents shall include the following main elements.

- Site operatives at all levels shall be made aware of the hazards of working with potentially contaminated soils.
- Personal hygiene facilities, including washing and messing, will be provided and site operatives will be encouraged to use them.
- Where work is undertaken in dry weather the site will be dampened down to avoid dust. In addition, dust masks will be provided to all site operatives for use in dry weather.

- Where vehicles are transferring soil to the landfill site they will be covered to prevent contamination of the surrounding area by dust.
- Any stockpiles of contaminated soil on site will be sheeted over to prevent excessive amounts of airborne dust.
- Where work is undertaken in wet weather, vehicle and wheel washing facilities will be provided to ensure that the vehicles leaving the site do not transfer contamination to surrounding areas.

On completion of the ground-works a careful site inspection of the sub-grade will take place. Should visual or olfactory evidence of contamination be revealed, then suitably qualified specialists will be consulted. Further testing and updates to the site-specific ground model, risk assessment, and remediation strategy will be undertaken where necessary

3.2 Construction

During the construction phase of the contract the following items are required to protect the end user from the potential contaminants revealed at this site.

- Beneath buildings, pavements and hard-standings clean inert granular sub-base shall be employed.
- New plastic services will be constructed in a surround of clean inert material and a risk assessment will be carried as instructed by the statutory water authority for the area. Where necessary testing as recommended in the United Kingdom Water Industry Research (UKWIR) website under Report Ref. No. 10/WM/03/21 - 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' will be carried out.
- The redundant services revealed at this site will be de-commissioned and piped services sealed. Any existing services that are to be employed in the new development will be carefully inspected to ensure that they are serviceable and will not allow the ingress of contamination.
- Buried concrete placed at the site will conform to the guidance given in BRE Special Digest SD1 in accordance with a design sulphate class of DS-1.

3.3 Garden Areas

In view of the presence of contamination and residential end use of the site, it is considered that the garden areas will require some remediation. This will be undertaken by the provision of a clean cover system including a capping layer of 500mm of inert material, which will put the contaminated ground out of the end users' dig range. At the base of this layer, a granular capillary break of 100mm of free draining granular soil shall be placed in order to prevent mobile contamination rising upward. This expedient will also provide a suitable root barrier to isolate the plants from the underlying contaminated ground.

3.4 Fill Materials

Any materials to be used as fill at the site, will be subjected to the following assessment to determine its suitability.

Fill materials will be initially screened, by a suitably qualified engineer, for the following.

- It is a suitable growing medium where is to be employed as such, including compliance with BS3883 (2007)
- It is free from obvious contamination i.e. visual or olfactory evidence
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to be growing
- It is not a statutory nuisance, such as being odorous
- It is free from unsuitable material i.e. whole bricks, brick ties, timber or glass.

It should also be appreciated that any fill will be subjected to validation testing to assess its suitability. The following table has been taken from YALPAG[1] documentation and will be used in the first instance. Depending on the origin and nature of the material, not all fill will require the sampling frequency and testing indicated, although this will be in agreement with any regulatory bodies (such as the Local Authority).

Table 1: Validation Sampling and Testing

Fill Type	Frequency	Minimum Determinands
Virgin Quarried Material	1 or 2 depending on the type of stone (to confirm the inert nature of the material)	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)
Crushed Hardcore, Stone, Brick	Minimum 1 per 500m^3	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, Total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).
Greenfield/ Manufactured Soils	Minimum 3 Dependent on source and receptor, between 1 per 50m^3 and 1 per 250m^3	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).
Brownfield/ Screened Soils	Minimum 6 Dependent on source and receptor, between 1 per 50m^3 and 1 per 100m^3	Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).

It should be noted that screening values for the above regime have been included within Appendix 1 of this report. The screening values will need to be agreed with any regulatory bodies. It is anticipated, for example, that 1% SOM values will be employed for typical granular fill and 6% SOM for topsoil. However, organic matter testing will determine which screening values are appropriate for each material. Moreover, testing will comply with UKAS and MCERTS, where applicable, and undertaken by an accredited laboratory.

[1] *YALPAG Technical Guidance for Developers, Landowners and Consultants – Verification Requirements for Cover Systems V4.1* Appendix 1a, June 2021.

Where the material has been derived from a commercial company, certificates or other industry quality protocol compliance i.e. WRAP shall be obtained. However, it will be necessary to ensure that this documentation is specifically related to the material being imported, is no more than two months old and complies with the screening and frequency requirements given above.

Suitable fill materials will either be placed immediately or sufficiently quarantined to prevent cross-contamination. If it is necessary, the quarantined material will be placed on appropriate sheeting and covered to prevent it becoming mixed with contaminated soils or dust, or penetrated by mobile contaminants.

4. Verification Report

In order to demonstrate that the remediation has been sufficiently carried out and risks highlighted in the conceptual ground model are mitigated, a verification report will be produced and submitted to any statutory authorities.

The report will be produced by a suitably qualified engineer or engineers and will include the following:

4.1 Ground Works

- The methods used for handling and final destination of any contaminated soils removed from the site.

4.2 Imported Fill and Removal of Contaminated Made Ground/Topsoil

- Characterisation of the suitability of clean imported fill employed at the site including the derivation of the material, comments from a visual screen, the tests results of chemical screening, delivery tickets where appropriate and the conditions by which the clean material has been stored and handled on site.
- Photographic and logged evidence the clean material has been handled on site and placed in a sufficient thickness over areas where made ground remains. This may be either at the time of placement or after placement by means of hand excavated trialpits. Photographs shall include visual site references or reference boards to prove the location and date taken. A measurement reference shall be visible in the photographs to substantiate the thickness of material placed. Please note that it may also be necessary to undertake a topographical survey and the requirement for which should be checked with any statutory authorities.

We trust that this information is of interest, clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

Appendix 1

Soil Screening Values

Rogers Geotechnical Services Ltd.

Atkins ATRISK Soil Screening Values (SSVs) - Residential With Plant Uptake Landuse

Tox Data Report No.	Compound	Residential with Homegrown Produce Landuse (mg/kg)				Reference
	Metals	**SOM: 1%**		**SOM: 6%**		
3	Cadmium	22.1		22.1		C
4	Chromium VI	3.62	20.5	3.63	20.5	B/C
	Copper	4730		4790		A+
7	Mercury	8.81		15.80		A/D
8	Nickel	136		136		A+
	Lead	200		200		C
	Zinc	20000		20300		A+
	Vanadium	136		138		A+
	Semi and Non Metals					
1	Arsenic	37		37		C
10	Selenium	375		375		A
	Free Cyanide	34		34		A
9	Phenols (total)	267		1200		A
	Poly Aromatic Hydrocarbons	Free product	No free product	Free product	No free product	
20	Napthalene	0.829		12.2		A+
	Acenaphthene	157	608	2760		A+
	Fluorene	735		2610		A+
	Anthracene	10200		26200		A+
	Fluoranthene	983		2980		A+
	Pyrene	668		2120		A+
	Benzo(a)anthracene	1.71	4.52			A
2	Chrysene	0.44	585			A
2	Benzo(b)fluoranthene	1.22	7.72			A
2	Benzo(k)fluoranthene	0.686	84.4			A
2	Benzo(a)pyrene	1.51	4.95	2.05	4.95	B/C
2	Dibenzo(a,h)anthracene	0.00393	0.838			A*
2	Indeno(1,2,3-cd)pyrene	0.0614	7.31			A
2	Benzo(g,h,i)perylene	0.0187	96.2			A
	Petroleum Hydrocarbons					
	Aliphatic C5-C6	42.7		369		A+
	Aliphatic C6-C8	99.3		768	1240	A+
	Aliphatic C8-C10	13.9		204		A+
	Aliphatic C10-C12	49.9	81.7	297	1180	A+
	Aliphatic C12-C16	20.9	385	125	4130	A+
	Aliphatic C16-C21	210000		210100		A+
	Aliphatic C21-C35	210000		210100		A+
	Aromatic C5-C7 (Benzene)	0.137		0.871		A+
	Aromatic C7-C8 (Toluene)	113		780		A+
	Aromatic C8-C10	20.5		232		A+
	Aromatic C10-C12	70		468		A+
	Aromatic C12-C16	155	165	830		A+
	Aromatic C16-C21	319		1040		A+
	Aromatic C21-C35	1120		1710		A+
Others						
Asbestos Not Detected						
A+ = Values update June 2017.						
A* Atrisk's SSV is lower than Chemtest's detectable limit for this compound.						
B = Health Criterion Values (available from toxicological reviews published in the C4SL project methodology report).						
C = Catergory 4 Screening Levels (C4SLs).						
D = SSV provided is for Methyl Mercury.						