

Remediation Strategy & Validation Proposal Sheets **– Rev A**

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Section A - Site Investigation Works

This Remediation Statement should be read in conjunction with the following reports produced for the site:

- Phase 1: Desk Top Study and Coal Mining Risk Assessment Report, Ref. 22-512, Arc Environmental Ltd., August 2022
- Phase 2: Ground Investigation Report, Ref. 24-596, Arc Environmental Ltd., October 2024

Section B - Summary of Site Investigation & Risk Assessments

Ground Conditions

From the investigation works completed, made ground deposits were encountered to depths of between c.0.20m and c.0.35m below current ground levels (bgcl). The deposits encountered typically comprised grass overlying silty gravelly sand. Gravel is brick, ceramic, sandstone and concrete.

Natural deposits were recorded immediately beneath the made ground typically comprising silty sandy CLAY to depths of c.0.70m to c.0.80m bgcl, underlain by medium dense very gravelly SAND, recorded to depths of between c.1.20m to c.1.50m bgcl. The solid geological deposits recorded below the natural drift deposits comprised very weak, highly weathered clayey SANDSTONE, recorded to a depth of at least c.2.05m bgcl.

From the Phase 1 Desk Top Study & Coal Mining Risk Assessment carried out, the site is not deemed to be at risk from unrecorded shallow workings and therefore, no further works or mitigation measures were required in this regard. In addition, the site was not felt to be at risk from hazardous ground gas migration.

Ground Contamination Risk Assessment

From the results of the contamination screening and the risk assessments completed for the site, elevated levels of Lead and PAH species have been recorded within the made ground soils on the site which represent a potential future risk to end users (residents).

Section C - Remediation Strategy

Options Appraisal

When considering the maximum recorded thickness of the made ground materials i.e. c.0.35m, it is recommended that as part of the initial site preparatory works, the made ground is carefully stripped and removed from all areas of proposed soft landscaping and gardens. Following removal of the made ground, samples of the exposed natural soils will be screened to confirm that all impacted material has been removed and the remaining exposed soils do not represent a potential risk to the proposed end users. A remediation mark-up plan highlighting the areas where made ground is to be removed is attached.

Removal of Made Ground Materials

Where made ground is present, this should be removed from within areas of gardens / soft landscaping thus removing the contamination *sources* and future dermal contact, ingestion or migration *pathways*, and the risk posed to end users will in turn be negated. The excavated made ground will require either removal from site to an appropriate waste disposal facility or re-used as general fill below areas of permanent hardcover, provided this material meets any geotechnical requirements for reuse on the site.

Remediation Strategy & Validation Proposal Sheets **– Rev A**

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Section C - Remediation Strategy (Cont'd)

Re-use of Site Won Materials

Where spoil comprising uncontaminated natural strata is generated from foundation / drainage excavations, etc., these materials can be considered suitable for use within any areas of soft landscaping, providing these materials are inspected and are free of any anthropogenic debris and visual & olfactory evidence of fuel, oils and ash. However, confirmatory contamination screening in accordance with the validation requirements detailed in the following sections will also be required to confirm the suitability of these materials prior to re-use.

Unforeseen Contamination

If during the remediation / groundworks phase, visual and / or olfactory evidence of unidentified grossly contaminated materials or 'hot spots' are identified then site works in the affected area should cease and site should notify ARC and the Local Authority as soon as it is possible. A reassessment of the ground contamination risk assessment will need to be made, and the requirement for any further sampling and screening to be undertaken should be determined. Details of the appropriate course of action undertaken to deal with these materials should be provided to and agreed with the Local Authority prior to carrying out any remediation. Further remediation and validation works may then be necessary.

Section D - Implementation of Remediation Strategy

Prior to the commencement of the site works and in conjunction with the Main Contractor, the appointed groundworks subcontractor should prepare and submit a suitable Methodology for implementation of all the remediation elements detailed in this RS. This should be submitted to ARC for approval before commencing with the remediation works to ensure that the methodology will meet the requirements of the RS and to allow for any amendments to be made that might be required.

Removal of Made Ground

- Where made ground materials are present below areas of soft landscaping / gardens, these should be fully removed down to the natural underlying sandy clay deposits and either placed onto a plastic membrane to await removal from site to landfill or reused as general fill below areas of proposed hard-standing.
- Samples from the completed excavation(s) will be taken to allow validation laboratory testing to be undertaken to confirm all impacted soils have been removed. The results should be compared to appropriate and current Level 1 Risk Assessment Values for a *Residential* end-use, and sufficient time should be allowed between samples being taken and confirmation being provided by Arc Environmental Ltd. that the remediation works have been satisfactorily completed, prior to excavations being backfilled.
- During all the remedial works, care should be taken to avoid potential cross-contamination. Consequently, plant should be cleaned following contact with impacted materials (i.e. buckets), with care taken to ensure plant does not 'track' through any areas where the impacted materials are exposed at surface.
- Validation works will comprise site attendance, photographic records and validation sampling to confirm that all contamination which potentially poses a significant risk has been removed from site, with these works and the results compiled within a Validation Report following the completion of these works.
- Any imported soils brought on to site to bring up site levels following removal of the made ground should be suitably screened and tested for human health assessment prior to delivery with these results reviewed by ARC a minimum of 1 week before delivery to site (Pre-importation results to be max. 2 months old).
- To confirm the suitability of these materials utilised as part of landscaping, validation screening will also be required as part of the remediation works following emplacement and/or importation onto site.

Remediation Strategy & Validation Proposal Sheets **– Rev A**

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Section D - Implementation of Remediation Strategy (Cont'd)

Unforeseen Contamination & Watching Brief: -

As well as site awareness by the developer, a Geo-Environmental Engineer from Arc Environmental Ltd. should carry out periodic site visits during the proposed development to provide a 'watching brief' to confirm no potential unknown or unforeseen contamination has been encountered.

Risk Assessment (Construction Workforce)

When considering the potential risks to the construction workforce, it will be necessary to ensure that the appropriate level of protection is provided and these should be detailed in the site health and safety management scheme (designed by the Main Contractor), during all construction activities. These measures should include appropriate PPE and good site practice, and the results of all the contamination screening undertaken (all results contained within all the site investigation report) can be used when assessing the required level of protection (based on the acute exposure risk). For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40/2005 (Second edition, published 2011) Workplace Exposure Limits.

Section E - Validation of Remediation Strategy

To ensure that all elements of the RS are properly implemented, the following validation works should be undertaken and documented within a final Validation Report (VR), confirming that each element of the remediation works has been completed. The validation works will comprise the following:

Removal of Made Ground

Validation works will comprise site attendance, sampling and screening of the exposed soils following removal of the made ground, to confirm that all the made ground materials which potentially pose a risk have been removed from below areas of soft landscaping and to verify that the remaining materials do not represent a potential risk to Human Health.

The screening results should be compared to appropriate and current Level 1 Risk Assessment Values for a *Residential* end use, (contained within Table 1), and the results compiled within the final Validation Report following the completion of the development, where applicable.

Validation of imported soils

It is understood that finished site levels will remain as existing therefore, it is envisaged that c.0.35m of soil will be used to bring site levels back up. Any topsoil and subsoil (either site-won and / or imported), for use in gardens and areas of soft landscaping should be suitably screened and tested for human health assessment prior to re-use / delivery, with these results sent to Arc Environmental, a minimum of 1 week before delivery to site. To confirm the suitability of these materials, validation testing will be required following emplacement and / or importation onto site in accordance with the YALPAG guidance with the volume of screening dependant on the source of material as highlighted below.

Virgin Quarried Material – The suite of screening will include standard metals and metalloids. Sampling numbers 1 or 2 to confirm the inert nature of the material.

Crushed Hardcore, Stone, Brick – The suite of screening will include standard metals and metalloids, Speciated PAH's, asbestos and leachate analysis. Sampling numbers minimum of 1 per 500m³.

Greenfield Soils – The suite of screening will include heavy metals, speciated PAH's and asbestos. Sampling numbers - minimum 3 or between 1 per 50m³ and 1 per 250m³ (whichever is the greater).

Remediation Strategy & Validation Proposal Sheets – Rev A

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Section E - Validation of Remediation Strategy (Cont'd)

Validation of imported soils (Cont'd)

Brownfield Source – The suite of screening will include heavy metals, speciated TPH's, speciated PAH's and asbestos and any additional analysis depending on history of donor site. Sampling numbers minimum 6 or between 1 per 50m³ and 1 per 100m³ (whichever is the greater).

- All validation screening will be assessed against appropriate Validation Screening Assessment Values, based on UK assessment criteria, i.e. SGV's, LQM or similarly derived GAC's which are given in Table 1 with the assessment values for Speciated PAH's & TPH's dependent on the SOM values (i.e. 1.0%, 2.5% or 6.0%).
- The proposed limits for concentrations of metals regarding risk to human health provided in Table 1 should also not exceed limits on phytotoxicity, based on "Sewage sludge in Agriculture: Code of Practice for England, Wales & Northern Ireland (23rd May 2018) for grassland (pH dependant).
- Recycled aggregate should be certified suitable for use and not contain any hazardous materials (i.e., coal tar, asbestos, etc).
- Confirmation of the suitability of soils should be provided prior to importation onto site.
- The limits proposed for metals such as Cadmium, Copper, Nickel and Zinc are potentially phytotoxic. Imported soils should be suitable for use otherwise the remediation could be viewed as a waste operation. All imported topsoil and subsoil materials should meet the British Standards BS3882:2015 and BS8601:2013 respectively, as well as meeting the assessment criteria for contamination and phytotoxicity.

Table 1 – (Assessment Criteria for Imported Soils)

Analyte	Target Conc. (C _T) mg/kg			Analyte	Target Conc. (C _T) mg/kg		
Metals/Metalloids				Speciated PAH's (Cont'd)	1% SOM	2.5% SOM	6% SOM
Arsenic	37 ⁽¹⁾			Fluoranthene	280 ⁽¹⁾	560 ⁽¹⁾	890 ⁽¹⁾
Cadmium	11 ⁽¹⁾			Fluorene	170 ⁽¹⁾	400 ⁽¹⁾	860 ⁽¹⁾
Chromium III	910 ⁽¹⁾			Indeno(123cd)pyrene	27 ⁽¹⁾	36 ⁽¹⁾	41 ⁽¹⁾
Chromium VI	6 ⁽¹⁾			Naphthalene	2.3 ⁽¹⁾	5.6 ⁽¹⁾	13 ⁽¹⁾
Copper	2400 ⁽¹⁾			Phenanthrene	95 ⁽¹⁾	220 ⁽¹⁾	440 ⁽¹⁾
Lead	200 ⁽²⁾			Pyrene	620 ⁽¹⁾	1200 ⁽¹⁾	2000 ⁽¹⁾
Mercury	40 ⁽¹⁾			Speciated TPH	1% SOM	2.5% SOM	6% SOM
Nickel	180 ⁽¹⁾			TPH Aliphatic (EC5-EC6)	42 ⁽¹⁾	78 ⁽¹⁾	160 ⁽¹⁾
Selenium	250 ⁽¹⁾			TPH Aliphatic (EC6-EC8)	100 ⁽¹⁾	230 ⁽¹⁾	530 ⁽¹⁾
Zinc	3700 ⁽¹⁾			TPH Aliphatic (EC8-EC10)	27 ⁽¹⁾	65 ⁽¹⁾	150 ⁽¹⁾
Cyanide	34 ⁽³⁾			TPH Aliphatic (EC10-EC12)	130 ⁽¹⁾	330 ⁽¹⁾	760 ⁽¹⁾
Asbestos	Presence of fibres			TPH Aliphatic (EC12-EC16)	1100 ⁽¹⁾	2400 ⁽¹⁾	4300 ⁽¹⁾
Speciated PAH's	1% SOM	2.5% SOM	6% SOM	TPH Aliphatic (EC16-EC35)	65000 ⁽¹⁾	92000 ⁽¹⁾	110000 ⁽¹⁾
Acenaphthene	210 ⁽¹⁾	510 ⁽¹⁾	1100 ⁽¹⁾	TPH Aliphatic (EC35-EC44)	65000 ⁽¹⁾	92000 ⁽¹⁾	110000 ⁽¹⁾
Acenaphthylene	170 ⁽¹⁾	420 ⁽¹⁾	920 ⁽¹⁾	TPH Aromatic (EC5-EC7)	70 ⁽¹⁾	140 ⁽¹⁾	300 ⁽¹⁾
Anthracene	2400 ⁽¹⁾	5400 ⁽¹⁾	11000 ⁽¹⁾	TPH Aromatic (EC7-EC8)	130 ⁽¹⁾	290 ⁽¹⁾	660 ⁽¹⁾
Benzo(a)anthracene	7.2 ⁽¹⁾	11 ⁽¹⁾	13 ⁽¹⁾	TPH Aromatic (EC8-EC10)	34 ⁽¹⁾	83 ⁽¹⁾	190 ⁽¹⁾
Benzo(a)pyrene	2.2 ⁽¹⁾	2.7 ⁽¹⁾	3.0 ⁽¹⁾	TPH Aromatic (EC10-EC12)	74 ⁽¹⁾	180 ⁽¹⁾	380 ⁽¹⁾
Benzo(b)fluoranthene	2.6 ⁽¹⁾	3.3 ⁽¹⁾	3.7 ⁽¹⁾	TPH Aromatic (EC12-EC16)	140 ⁽¹⁾	330 ⁽¹⁾	660 ⁽¹⁾
Benzo(ghi)perylene	320 ⁽¹⁾	340 ⁽¹⁾	350 ⁽¹⁾	TPH Aromatic (EC16-EC21)	260 ⁽¹⁾	540 ⁽¹⁾	930 ⁽¹⁾
Benzo(k)fluoranthene	77 ⁽¹⁾	93 ⁽¹⁾	100 ⁽¹⁾	TPH Aromatic (EC21-EC35)	1100 ⁽¹⁾	1500 ⁽¹⁾	1700 ⁽¹⁾
Chrysene	15 ⁽¹⁾	22 ⁽¹⁾	27 ⁽¹⁾	TPH Aromatic (EC35-EC44)	1100 ⁽¹⁾	1500 ⁽¹⁾	1700 ⁽¹⁾
Dibenz(ah)anthracene	0.24 ⁽¹⁾	0.28 ⁽¹⁾	0.30 ⁽¹⁾				

⁽¹⁾ = LQM S4UL's (2014 & 2015) – Residential with home-grown produce, ⁽²⁾ = CL:AIRE C4SL's – Residential with home-grown produce, ⁽³⁾ = ATRISK^{SOL} SSV,

Remediation Strategy & Validation Proposal Sheets **– Rev A**

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Section E - Validation of Remediation Strategy (Cont'd)

Validation of imported soils (Cont'd)

Prior to delivery the Main Contractor will be responsible for providing screening results of any imported materials to site, to verify that they meet the criteria given in Table 1. These results should be passed onto Arc Environmental a minimum of 1 week prior to delivery and should not be more than 2 months old.

Section F - Action Items & Persons Responsible

- Confirmation of removal of made ground from below area of proposed soft landscaping – Arc Environmental Ltd
- Completion of Site wide 'Watching Brief' – Main Contractor
- Additional sampling, screening and risk assessment of any unknown / unrecorded ground contamination (if required) – Arc Environmental Ltd
- Provision of pre-delivery imported soil screening results – Main Contractor
- Validation of imported soils. All validation screening will be assessed against the Level 1 Target Concentration Values in Table 1 – Arc Environmental Ltd.
- Collection and provision of all documentation relating to waste disposal: - as a minimum, provision of total volumes excavated and removed to tip, waste consignment / transfer notes, landfill tip receipts – Main Contractor.
- Completion of final Validation Report incorporating all the above – Arc Environmental Ltd.

This document has been completed by Darren McGrath, for and on behalf of HDP Architecture and Design.

Signed:

A handwritten signature in blue ink, appearing to read 'Darren McGrath'.

Date: 10th February 2025

For and on behalf of Arc Environmental Ltd.
Darren McGrath
Director

**Remediation Strategy &
Validation Proposal Sheets**
– Rev A

To be approved by Kirklees Council.

Project reference: 24-596

Site: Proposed Residential Development, Abb Street,
Huddersfield, HD1 4PB

Carried out by: Darren McGrath



Plan Highlighting Areas Requiring Removal of Made Ground

