

Remediation Statement & Validation Proposal Sheets

To be approved by Kirklees Council

Project reference: 16-075

Site: Proposed CAT II Sheltered Accommodation & Care Home,
Land Adjacent to Serpentine Road, Cleckheaton, BD19 3NA



Carried out by: Matt Bradford

Summary of Assessment based on the following documents:-

- Phase 1: Desk Top Study Report – Ref: 16-075, March 2016 (prepared by Arc Environmental Ltd)
 - Phase 2: Ground Investigation Report – Ref: 16-075, March 2016 (prepared by Arc Environmental Ltd)
- (The above documents should be read in conjunction with this Remediation Statement)

It has been determined that the made ground deposits present in the area of proposed CAT II Sheltered Accommodation (North western portion of site) and Care Home (Central portion of site), represent a potential risk towards human health (future site end-users) where exposure pathways will be available. It should be noted that no remedial measures are required in the area of the proposed residential townhouses on the eastern margin of the site.

Made ground has been recorded across the site to a depth of between c.0.10m and c.3.70m. The made ground comprised initial surfacing of concrete or tarmac with occasional areas of gravelly sand over a gravelly sand material which typically included ash, fragments of concrete and bricks. Locally, red shale, slag and metal were also recorded.

Elevated levels of Chromium III, Lead, Arsenic and several speciated PAH's have been identified within the made ground deposits in the area of the proposed CAT II Sheltered Accommodation and Care Home. Based on the ground contamination risk assessments undertaken, and given the industrial history of the site and that soft landscaping materials will need to be imported to site, it is felt that the most plausible remedial option is the installation of a simple clean cover system below all areas of future soft landscaped / open spaces across the area of the proposed CAT II Sheltered Accommodation and Care Home.

This option would remove several exposure pathways (*i.e. ingestion of soil and indoor dust, consumption of home grown produce and attached soil, dermal contact (indoor), dermal contact (outdoor), inhalation of dust (indoor) and inhalation of dust (outdoor)*) and break the established source-pathway-receptor pollutant linkage, therefore negating the risks posed towards the future site end-users. The use of cover systems reduces the hazards posed towards human health from ground contamination and also provides a suitable medium for plant growth.

Required Remedial Measures – Emplacement of a Suitable Clean Cover System

The following remedial works will need to be completed, in the order given below, to ensure all risks with respect to the contamination levels identified within the made ground are reduced to acceptable levels;

- Determine a source of 'clean cover' and this will need to be tested for a range of analytes to determine its suitability before being brought to site. Typically, any materials deemed appropriate for use will need to be screened prior to transportation and emplacement using the sampling and testing matrix detailed in Table 1 on the following page.
- Testing ideally should be undertaken at both the source, once established, and following emplacement.
- The emplacement of the clean cover system should be witnessed, where possible by a suitably qualified Geo-environmental Engineer. Clean cover of at least 600mm in thickness will be required and this will need to be made up of clean inert material and include a suitable growing medium.

Upon completion of the proposed development a comprehensive Validation Report will be produced by Arc Environmental Limited documenting the remedial works undertaken. The following items will be included within the report;

- Geographical location from which the imported clean cover material was sourced
- Description and chemical analysis for the clean cover material brought to site
- Confirmation of clean cover thickness – minimum of 600mm

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- Photographic evidence – photographs showing the emplacement / confirming thickness of the required clean cover. Photographic evidence should be representative and include a scale
- Plans – showing pertinent information relating to the remediation

Action Items & Persons Responsible:

- Sourcing the necessary clean cover materials (Developer)
- Confirming suitability of clean cover materials by contamination testing prior to and following emplacement on site. All validation screening will be assessed against the Level 1 Target Concentrations (C_T) values in Table 2 on the following page (Arc Environmental Limited)
- Emplacement of clean cover materials (Developer)
- Confirming the correct thickness and make up of clean cover is placed within all garden and areas of soft landscaping (Arc Environmental Limited)
- Validation Report will be required to validate removal of affected soils and implementation of clean cover materials (Arc Environmental Limited)

This document has been completed by Matt Bradford, for and on behalf of Arc Environmental Limited

Signed

Date 5th September 2017

Matt Bradford BSc (Hons) FGS

Associate

Table 1 – (Sampling and Testing Matrix)

Type	Number of Samples	Testing Schedule	Assessment Criteria
Virgin quarried material	1 or 2 depending on the type of stone utilised, 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)	This needs to be agreed with the Local Authority. The Assessment criteria needs to be UK based, e.g. SGV's, LQM or other similarly derived GAC's.
Crushed hardcore, stone, brick	Minimum 1 per 1000m ³ .	Standard metals/metalloids (as above) PAH (16 USEPA specification) Asbestos	
Greenfield soils / manufactured soils	Minimum 3 or 1 per 250m ³ (whichever is greater).	Standard metals/metalloids (as above) PAH (16 USEPA specification) Asbestos	
Brownfield soils / screened soils	Minimum 6 or 1 per 100m ³ (whichever is greater).	Standard metals/metalloids (as above) PAH (16 USEPA specification) TPH (CWG banded) Asbestos Any additional analysis dependant on the history of the donor site	

(Table taken from the Verification Requirements for Cover Systems – Technical Guidance for Developers and Consultants – Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) December 2016)

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Table 2 - (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)	
Arsenic	40 ⁽¹⁾	Fluoranthene	1600 ⁽¹⁾
Cadmium	85 ⁰	Fluorene	3800 ⁽¹⁾
Chromium III	910 ⁽¹⁾	Indeno(123cd)pyrene	46 ⁽¹⁾
Chromium VI	6 ⁽¹⁾	Naphthalene	5.6 ⁽¹⁾
Copper	7100 ⁽¹⁾	Phenanthrene	1500 ⁽¹⁾
Lead	310 ⁽²⁾	Pyrene	3800 ⁽¹⁾
Mercury	56 ⁽¹⁾	Speciated TPH	
Nickel	180 ⁽¹⁾	TPH Aliphatic (EC5-EC6)	160 ⁽¹⁾
Selenium	430 ⁽¹⁾	TPH Aliphatic (EC6-EC8)	530 ⁽¹⁾
Zinc	40000 ⁽¹⁾	TPH Aliphatic (EC8-EC10)	150 ⁽¹⁾
Cyanide	34 ⁽³⁾	TPH Aliphatic (EC10-EC12)	770 ⁽¹⁾
Asbestos	Presence of fibres	TPH Aliphatic (EC12-EC16)	4400 ⁽¹⁾
Speciated PAH's		TPH Aliphatic (EC16-EC35)	110000 ⁽¹⁾
Acenaphthene	6000 ⁽¹⁾	TPH Aliphatic (EC35-EC44)	110000 ⁽¹⁾
Acenaphthylene	6000 ⁽¹⁾	TPH Aromatic (EC5-EC7)	1400 ⁽¹⁾
Anthracene	3700 ⁽¹⁾	TPH Aromatic (EC7-EC8)	3900 ⁽¹⁾
Benzo(a)anthracene	14 ⁽¹⁾	TPH Aromatic (EC8-EC10)	270 ⁽¹⁾
Benzo(a)pyrene	3.2 ⁽¹⁾	TPH Aromatic (EC10-EC12)	1200 ⁽¹⁾
Benzo(b)fluoranthene	4 ⁽¹⁾	TPH Aromatic (EC12-EC16)	2500 ⁽¹⁾
Benzo(ghi)perylene	360 ⁽¹⁾	TPH Aromatic (EC16-EC21)	1900 ⁽¹⁾
Benzo(k)fluoranthene	110 ⁽¹⁾	TPH Aromatic (EC21-EC35)	1900 ⁽¹⁾
Chrysene	31 ⁽¹⁾	TPH Aromatic (EC35-EC44)	1900 ⁽¹⁾
Dibenz(ah)anthracene	0.32 ⁽¹⁾		

(1) = LQM CIEH Suitable 4 Use Levels, 6% SOM (S4UL Nov 2014) – Residential without homegrown produce, (2) = C4SL Values, 6% SOM (Residential without homegrown produce), (3) = ATRISKSOIL

SSV Note = All units are mg/kg.