Remediation Statement & Validation Proposal Sheets

To be approved by Durham County Council

Project Reference: 22-699

Site: Proposed Residential Development – Dale Road, Shildon, DL4 2JP

Carried out by: Phillip Brown

Section A – Site Investigation Works

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

FWS Ltd; Phase 1 Desk Study Investigation: Ref. 3604OR01, March 2019.
Geoinvestigate Ltd; Phase 2 Intrusive Site Investigation Report: Ref G19416, December 2019.
Geoinvestigate Ltd; Gas Monitoring Addendum Report: Ref G19416, March 2020

Summary of Site Investigation & Risk Assessments:

The reports detailed above, were carried out for an area of land situated between Redworth Road and Dale Road, Shildon, Co. Durham, where proposals had been made to construct two new retail units at the front of the site and four detached bungalows in the northeast of the site.

This Remediation Statement summaries the ground conditions and remedial requirements for the proposed detached bungalows only, as shown on the attached Proposed Layout Plan.

Ground conditions across this area of the site consisted of made ground recorded to depths of between c.0.25m to c.1.10m below current ground level (bcgl), generally comprising grass surfacing on loose grey sandy gravel of sandstone, brick and coal and possible localised ash, in turn overlying a reworked sandy gravelly clay with coal, sandstone and occasional brick, glass and metal. Underlying the made ground, superficial deposits were fairly variable comprising interbedded sandy gravelly clay and clayey gravelly sand strata with some silty horizons. Sandy gravel or gravelly sand was found at the base of a number of the boreholes, being clayey or slightly clayey in places.

From the results of the contamination screening, elevated levels of Lead and locally PAH species have been recorded within the made ground soils on the site. Therefore, the made ground materials are considered to pose a risk to Human Health where exposure pathways are available. The Geoinvestigate report concluded that the most appropriate remedial option would be to utilise a clean cover system (minimum 600mm thickness), emplaced within all areas of future gardens and soft landscaped areas.

Where buildings and areas of hardstanding are proposed then the *source-pathway-receptor* model will not exist and there is not considered to be a health risk to the future end users and no clean cover system is required in these areas.

When considering the risks to any future maintenance or construction workforce, appropriate PPE should be provided to protect against the levels of potential contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations. For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40/2005 (2nd Edition, 2011) Workplace exposure limits.

The Geoinvestigate Gas Monitoring Addendum Report concluded that the site falls into "Characteristic Situation 1" or "Green" of the NHBC Traffic Light System for low rise housing with a ventilated under-floor void (min 150mm) (CIRIA C665.) and therefore, no special gas protection measures will be required in the new structure(s).

Section B - Remediation Strategy

Construction / Installation of Artificial Grass

It is understood that as part of the development (assisted living housing), proposed gardens are to utilise artificial grass which comprises a geotextile membrane underlain by at least 100mm of compact Type 1 stone with a further geotextile membrane at the base (see Fig. 1 attached for typical design).

Section B - Remediation Strategy (Cont'd)

Construction / Installation of Artificial Grass (Cont'd)

With such a design (as with buildings / hardstanding) the *source-pathway-receptor* model will not exist and there is not considered to be a health risk to the future end users and therefore no clean cover system would be required in these areas.

The client should provide detailed design drawings showing the proposed installation / construction of the artificial grass to be adopted including relevant specifications of the materials i.e., geotextile membrane, Type 1 stone etc. These should be discussed and agreed with the Local Authority prior to the commencement of any construction works.

Emplacement of a Suitable Clean Cover System (if required)

Outwith the garden areas (comprising artificial grass construction) noted previously, if any localised areas of soft landscaping are proposed, then in order to remove 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 a clean cover system should be installed. The cover system should be a minimum 600mm thick, (minimum of 150mm topsoil and 450mm sub-soil).

The use of cover systems reduces the hazards posed towards human health from ground contamination and provides a suitable medium for plant growth.

Section C: Validation of Remediation Strategy:

To ensure that all elements of this Remediation Statement are correctly implemented, Validation works resulting in a final Validation Report will be prepared by Arc Environmental Ltd, verifying that the remediation works have been completed. The validation works will comprise the following:

Site visits verifying the construction details of the artificial grass within proposed gardens, including photographic evidence and site visit logs.

If any localised areas of soft landscaping are proposed then confirmation that impacted soils / made ground have either been removed from proposed areas of gardens / soft landscaping, or where they remain, the minimum 600mm of clean cover soils have been placed. Photographic evidence and site visit logs will be provided to verify this.

Waste transfer / Consignment notes (as applicable) should be supplied to confirm the correct disposal of any materials removed from site.

Any topsoil and subsoil (either site-won and / or imported), for use in any potential localised 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.

The number of samples screened will be dependent upon the final volumes (re-use or imported) and also the origin of any imported materials. It is proposed to adopt the sampling frequency within Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) 'Verification Requirements for Cover Systems', Ver 4.1 June 2021, as detailed in Table 1.

Prior to re-use / delivery, the Main Contractor will be responsible for providing screening results, to verify that they meet the criteria given in Table 2. 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.

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Section C: Validation of Remediation Strategy (Cont'd):

Table 1 - Verification Requirements for Cover Systems, Ver 4.1 June 2021 - Sampling Frequency

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, Cr (VI), Cu, Hg, Ni, Pb, Se & Zn)	The Assessment criteria needs to be UK based, e.g. LQM, S4ULs, Defra C4SLs or other similarly derived GACs.
Crushed hardcore, stone, brick (excluding asphalt)	Minimum 1 per 500m³.	Standard metals/metalloids (as above) PAH (16 USEPA specification) Asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	
Greenfield soils / manufactured soils	Minimum 3. Dependant on source and receptor, between 1 per 50m³ and 1 per 250m³ (whichever is greater).	Standard metals/metalloids (as above) PAH (16 USEPA specification) Asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).	
Brownfield soils / screened soils	Minimum 6 Dependant on source and receptor, between 1 per 50m³ and 1 per 100m³ (whichever is greater).	Standard metals/metalloids (as above) PAH (16 USEPA specification) 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).	

(Table taken from the Verification Requirements for Cover Systems –Technical Guidance for Developers and Consultants –Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) June 2021)

Table 2 - (Assessment Criteria for Cover Soils)

Analyte				Analyte	Critical Conc. (Cc) mg/kg		
Metals/Metalloids	Critical Conc. (Cc) mg/kg			**Speciated PAH's (Cont'd)**	1% SOM	2.5% SOM	6% SOM
Arsenic	37[1]			Benzo(a)anthracene	7.2[1]	11[1]	13[1]
Cadmium	11[1]			Benzo(a)pyrene	2.2[1]	2.7[1]	3.0[1]
	pH 5.0-6.0	pH 6.0–7.0	pH >7.0	Benzo(b)fluoranthene	2.6[1]	3.3[1]	3.7[1]
	3.0[5]	3.0[5]	3.0[5]	Benzo(ghi)perylene	320[1]	340[1]	350[1]
Chromium III	910[1]			Benzo(k)fluoranthene	77[1]	93[1]	100[1]
	pH 5.0-6.0	pH 6.0–7.0	pH >7.0	Chrysene	15[1]	22[1]	27[1]
	400-600[5]	400-600[5]	400-600[5]	Dibenz(ah)anthracene	0.24[1]	0.28[1]	0.3[1]
Chromium VI	6[1]			Fluoranthene	280[1]	560[1]	890[1]
Copper	2,400[1]			Fluorene	170[1]	400[1]	860[1]
	pH <6.0	pH 6.0–7.0	pH >7.0	Indeno(123cd)pyrene	27[1]	36[1]	41[1]
	<100[4]	<135[4]	<200[4]	Naphthalene	2.3[1]	5.6[1]	13[1]
Lead	200[2]			Phenanthrene	95[1]	220[1]	440[1]
Mercury	40[1]			Pyrene	620[1]	1,200[1]	2,000[1]
	pH 5.0-6.0	pH 6.0–7.0	pH >7.0	**Speciated TPH**	1% SOM	2.5% SOM	6% SOM
	1.0-1.5[5]	1.0-1.5[5]	1.0-1.5[5]	Aliphatic EC5-EC6	42[1]	78[1]	160[1]
Nickel	180[1]			Aliphatic EC6-EC8	100[1]	230[1]	530[1]
	pH <6.0	pH 6.0–7.0	pH >7.0	Aliphatic EC8-EC10	27[1]	65[1]	150[1]
	<60[4]	<75[4]	<110[4]	Aliphatic EC10-EC12	130[1]	330[1]	760[1]
Selenium	250[1]			Aliphatic EC12-EC16	1,100[1]	2,400[1]	4,300[1]
	pH 5.0-6.0	pH 6.0–7.0	pH >7.0	Aliphatic EC16-EC35	65,000[1]	92,000[1]	110,000[1]
	3.0-5.0[5]	3.0-5.0[5]	3.0-5.0[5]	Aliphatic EC35-EC44	65,000[1]	92,000[1]	110,000[1]
Zinc	3,700[1]			Aromatic EC5-EC7	70[1]	140[1]	300[1]
	pH <6.0	pH 6.0–7.0	pH >7.0	Aromatic EC7-EC8	130[1]	290[1]	660[1]
	<200[4]	<200[4]	<300[4]	Aromatic EC8-EC10	34[1]	83[1]	190[1]
Cyanide	34[3]			Aromatic EC10-EC12	74[1]	180[1]	380[1]
Asbestos	None Present			Aromatic EC12-EC16	140[1]	330[1]	660[1]
Speciated PAH's	1% SOM	2.5% SOM	6% SOM	Aromatic EC16-EC21	260[1]	540[1]	930[1]
Acenaphthene	210[1]	510[1]	1,100[1]	Aromatic EC21-EC35	1,100[1]	1,500[1]	1,700[1]
Acenaphthylene	170[1]	420[1]	920[1]	Aromatic EC35-EC44	1,100[1]	1,500[1]	1,700[1]
Anthracene	2,400[1]	5,400[1]	11,000[1]				

[1] = LQM S4UL's (2014 & 2015) – *Residential with home-grown produce*, [2] = CL:AIRE C4SL's – *Residential with home-grown produce*, [3] = ATRISK^{SOIL} SSV, [4] = Potentially Phytotoxic Elements – BS3882:2015 & BS8601:2013, [5] = Sewage sludge in agriculture: code of practise for England, Wales and Northern Ireland (May 2018) –Potentially toxic elements limits in soils for arable farming and grassland. Note the TPH total should not exceed 1000mg/kg to avoid bringing potentially Hazardous Material on to site.

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Section C: Validation of Remediation Strategy (Cont'd):

Unforeseen Contamination - it should be noted that if during the site strip / remediation works any visual and / or olfactory evidence of unidentified or unforeseen potentially contaminated materials are identified then the site should notify Arc Environmental as soon as it is possible to allow for further sampling and screening to be undertaken in order to determine the appropriate course of action to be undertaken.

Section D - Action Items & Persons Responsible

- Completion of 'watching brief' – Main Contractor.
- Construction and installation of artificial grass design within proposed garden areas – Main Contractor.
- Validation of installation of artificial grass design – Arc Environmental Ltd.
- Sourcing the any clean cover materials (if required) – Main Contractor.
- Provision of pre-delivery of any imported soil screening results – Main Contractor.
- Confirmation of suitability of any imported soils. All validation screening will be assessed against the criteria included within Table 2 (page 6) – Arc Environmental Ltd.
- Emplacement of clean cover materials within any soft landscaping areas (if required) – Main Contractor.
- Confirmation of the correct thickness, make up and suitability of any clean cover placed within any soft landscaping (if required)
-
- – Arc Environmental Ltd.
- Collection and provision of all documentation relating to any 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 Arc Environmental Ltd, for and on behalf of Oak Tree Living.

Signed

[redacted]

For and behalf of Arc Environmental Ltd.
Phil Brown
Associate Director

Date: 09th February 2023

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LEGEND

	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	chckd

Client:
OAK TREE LIVING

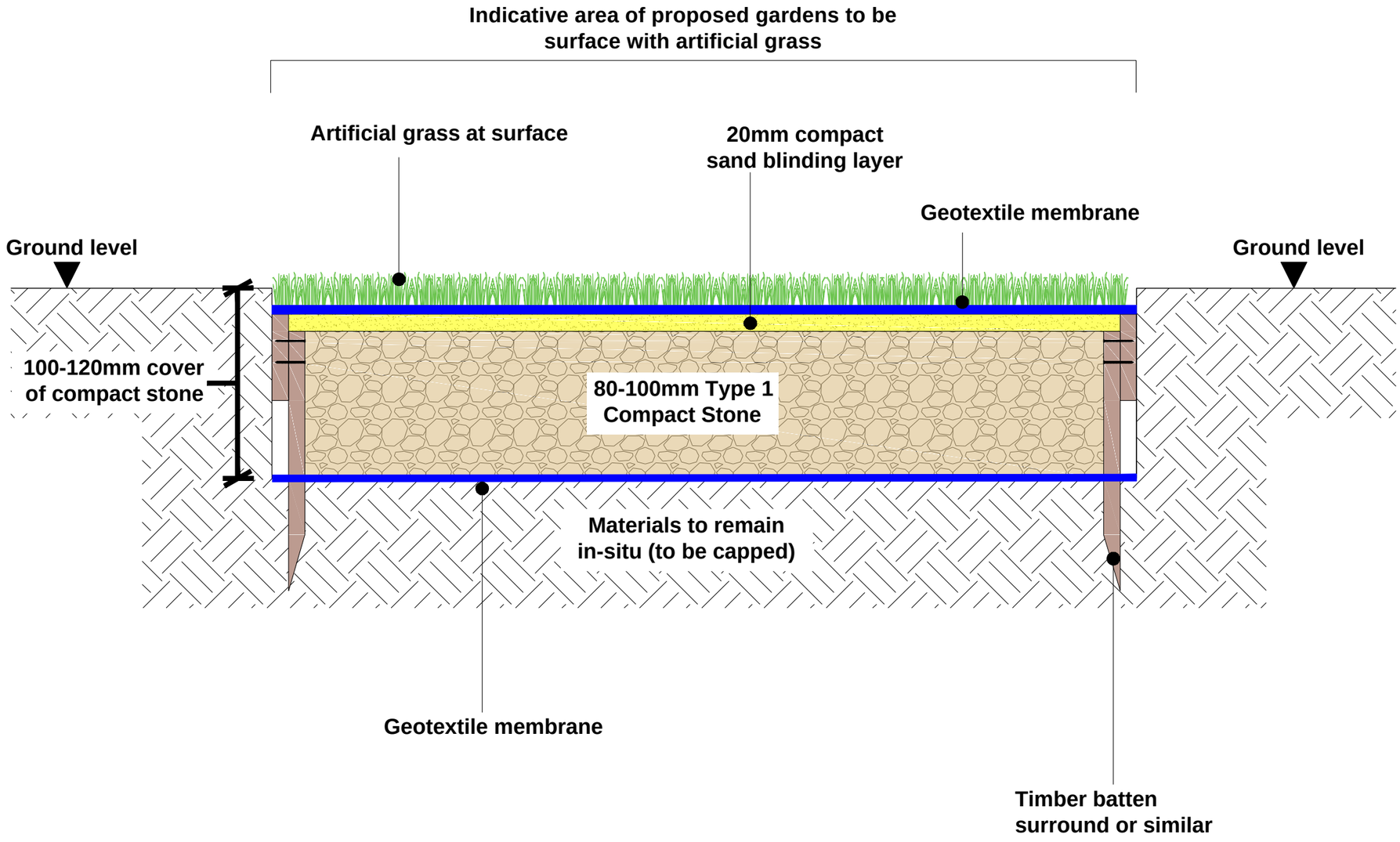
Project Title:
Proposed Residential Development
Dale Road
Shildon, DL4 2JP

Drawing Title:
Proposed Development Layout Plan

Scale at A3:	Date:	Drawn by:	Approved by:
As Shown	10.02.23	P.D	P.B

Job Ref:	Drg no:	Rev:
22-699	–	–

FIGURE 1



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rev.	date	amendments	drawn	chckd

Client:
OAK TREE LIVING

Project Title:
Proposed Residential Development
Dale Road
Shildon, DL4 2JP

Drawing Title:
Figure 1 – Typical Artificial Grass Installation Detail

Scale at A3:	Date:	Drawn by:	Approved by:
As Shown	10.02.23	P.D	P.B

Job Ref:	Drg no:	Rev:
22-699	–	–