Remediation Strategy & Validation Proposal Sheets

To be approved by South Tyneside Council.

Project reference: 22-441

Site: Proposed Children's Centre, Seton Avenue, South Shields, NE34 9RG

Carried out by: Kristian Cowie

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. 22-441, Arc Environmental Ltd., June 2022
- Phase 2: Ground Investigation Report, Ref. 22-441, Arc Environmental Ltd., Dec 2022
- Hazardous Ground Gas Risk Assessment Addendum Letter, Ref. 22-441.02L, Arc Environmental Ltd., January 2023

Section B - Summary of Site Investigation & Risk Assessments

Ground Conditions

From the investigation works completed, made ground deposits were encountered across all the boreholes and trial pits to depths of between c.0.35m and c.0.60m below current ground levels (bgcl). The deposits encountered typically comprised grass underlain by soft to firm dark brown slightly sandy slightly gravelly clay with occasional brick, metal and plastic fragments.

Natural deposits were recorded immediately beneath the made ground typically comprising initially firm yellowish brown and grey mottled sandy gravelly CLAY to depths of between c.0.70m and c.1.00m bcgl, underlain by stiff greyish brown sandy gravelly CLAY with occasional sandstone cobbles in excess of c.4.45m bcgl.

From the investigation works undertaken, the site is not deemed to be at risk from unrecorded shallow workings and therefore, no further works or mitigation measures are required in this regard.

Ground Contamination Risk Assessment

From the results of the contamination screening and the risk assessments completed for the made ground encountered below this site, the results have recorded elevated levels of Lead which represent a potential future risk to end users (residents).

Other metals, metalloids, in-organics and speciated PAH's screened do not pose a significant risk to Human Health.

Section C - Remediation Strategy

Options Appraisal

When considering the maximum recorded thickness of the made ground materials i.e. c.0.60m, 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. A remediation mark-up plan highlighting the areas where made ground is to be removed is attached.

Section C - Remediation Strategy (Cont'd)

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.

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.

Depending on the volume of soils to be reused on site, a Materials Management Plan (MMP) may be required to control the movement of any materials which are intended for re-use on site.

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 gravelly clay deposits and either placed onto plastic membrane to await removal from site to landfill or reused as general fill below areas of proposed hard-standing.

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

Removal of Made Ground (Cont'd)

- 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 (max. 2 months old).
- If any made ground is left in-situ below or subsequently placed within gardens or soft landscaping areas, a clean cover system would be required and a reassessment of this strategy would need to be undertaken.

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 reports) 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

The made ground materials will be removed from areas of proposed soft landscaping and gardens and this should be witnessed, where possible by a suitably qualified Engineer. Following removal of these materials, they can then be either re-used as a general fill material, providing they remain below areas of proposed hard-standing (i.e. proposed access road, car-parking, building, etc.,), or alternatively they can be removed off-site and taken to an appropriate landfill. Where excavated made ground materials are to be moved around the site and placed below areas of hardstanding a materials management plan may be required.

During these works, the removal of materials off-site will need to be observed and documented. In addition, photographic evidence of these works will be required. These works should be observed by a suitably qualified Environmental Engineer, from Arc Environmental Limited, and recorded within a Validation Report.

To confirm that all the made ground has been fully removed and that no residual contamination is present, representative samples of the resultant formation should be recovered and tested for, and verified against, the determinands listed within Table 1 on the following page. If any exceedances are recorded, then additional materials should be excavated, and additional samples recovered and tested. This process should be repeated until no exceedances are recorded. The frequency of testing will be dependant upon the resultant formation area and should be discussed and agreed with Arc Environmental Ltd and the Local Authority at the time.

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

Removal of Made Ground (Cont'd)

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^{SOIL} SSV,

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 500m^3.

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

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 50m^3 and 1 per 100m^3 (whichever is the greater).

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Section F - Action Items & Persons Responsible

- 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 above – 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 Kristian Cowie, for and on behalf of Surgo Construction, JDDK Architects And South Tyneside Council.

Signed: [redacted] Date: 1st August 2023

For and on behalf of Arc Environmental Ltd.
Kristian Cowie
Geotechnical Field Engineer

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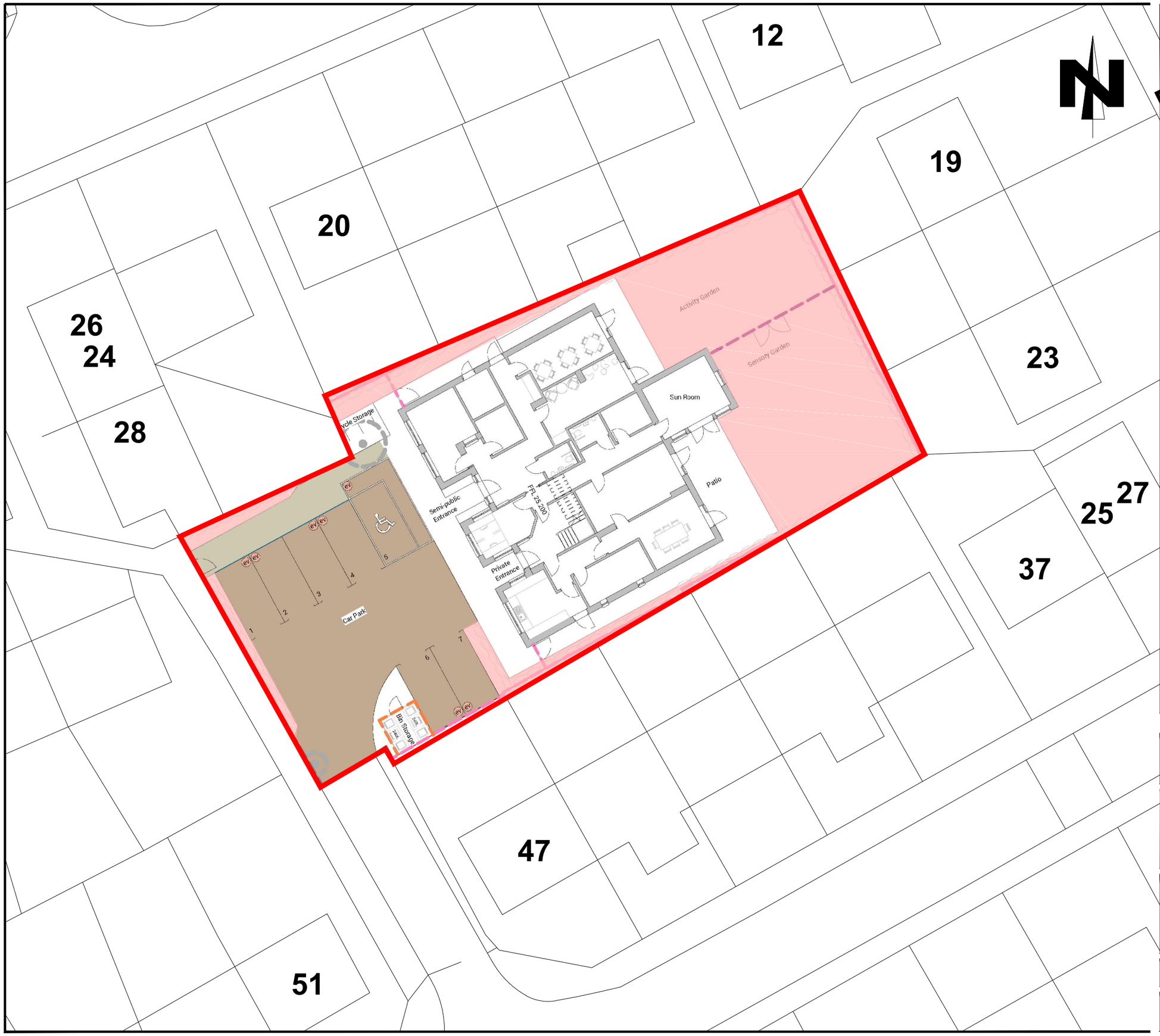
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Plan Highlighting Areas Requiring Removal of Made Ground



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The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.
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LEGEND	
	APPROXIMATE SITE BOUNDARY
	AREAS OF PROPOSED SOFT LANDSCAPING REQUIRING REMOVAL OF MADE GROUND MATERIALS

rev.	date	amendments	drawn	chckd

Client:
JDDK ARCHITECTS LTD

Project Title:
Proposed Childrens Centre
Seton Avenue
South Shields, Newcastle uopn Tyne, NE34 9RG

Drawing Title:
Made Ground Removal Plan

Scale at A3:	Date:	Drawn by:	Approved by:
NTS @ A3	01.08.23	P.D	G.H

Job Ref:	Drg no:	Rev:
22-441	–	–