EAL

Eccles Associates Limited

E: chris@ecclesassociates.co.uk

M: 07784 669127

Web: ecclesassociates.co.uk

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Read Construction Holdings Limited
Enterprise Centre
Blast Road
Brymbo
Wrexham
LL11 5BT

FAO: Darren Brimble **By email only: Darren.Brimble@readconstruction.co.uk**

Dear Sirs,

Remediation Strategy - Extension and Alteration Work to Ysgol I.D. Hooson, Wrexham

1. Introduction

Eccles Associates Ltd (EAL) have been requested to produce a Remediation Strategy for this school redevelopment. EAL have previously carried out both Phase I desk study and Phase II intrusive investigations for the development:

- EAL Report: Phase I Geoenvironmental Assessment Including Phase 1 Coal Mining Risk Assessment at Ysgol I D Hooson, Heol Caradoc, Rhosllanerchrugog, Wrexham LL14 2DS. Dated 16th October 2024
- Phase II Site Investigation Including Coal Mining Risk Assessment at Ysgol I D Hooson, Heol Caradoc, Rhosllanerchrugog, Wrexham LL14 2DS. Dated 26th November 2024

The Phase 2 site investigation concluded that no remediation strategy was required because the existing Made Ground has either a covering of 'clean' topsoil or would be below hard standing or the proposed buildings. These break the potential contaminant pathways from the elevated concentrations of contaminants in the Made Ground. However, with the proposed design there will be cut slopes into the Made Ground so these will need to be capped and the local authority will require a Remediation Strategy. This report sets out the Remediation Strategy and the Verification Requirements.

2. Summary of Relevant Findings of Phase 2 Site Investigation

The Phase 1 desk study has shown that this site is in an area where there has been historic coal mining below and around the site. Historic railway embankments were also potentially present, and an historic brickworks is adjacent to the site.

The site investigation encountered either hardstanding or topsoil over Made Ground of either an ashy clay or reworked natural clays. The Made Ground was 6.7 to 12.8 m thick. Below this there was glacial clay in most locations although it was locally absent above Coal Measures Bedrock.

The contamination assessment showed that:

- The topsoil had low concentrations of contaminants.
- The ashy clay Made Ground had elevated metal concentrations (arsenic, lead & zinc).
- The reworked clay Made Ground had low concentrations of contaminants.

In relation to the risk from contaminants to human health, the results of the risk assessments indicated that no remediation was required as it was thought at that stage the areas being developed would all have hard standing and hence the topsoil would provide a suitable cap to the metals contaminants in the ashy clay preventing contaminant linkages and ensuring a suitable low risk.

3. Update Development Proposals

The Updated Development proposals are presented in Appendix 1. This includes cutting into the Made Ground to produce a suitable development platform (see Figure 1). Also an attenuation tank which is to be located under the sports pitches. This means that the Made Ground will be exposed as part of the works in areas which are not proposed to be hard standing. The resultant cut slopes and the reinstated sports pitch both need to have a layer of clean cover placed on top of the Made Ground and placement of clean cover is a remedial activity.

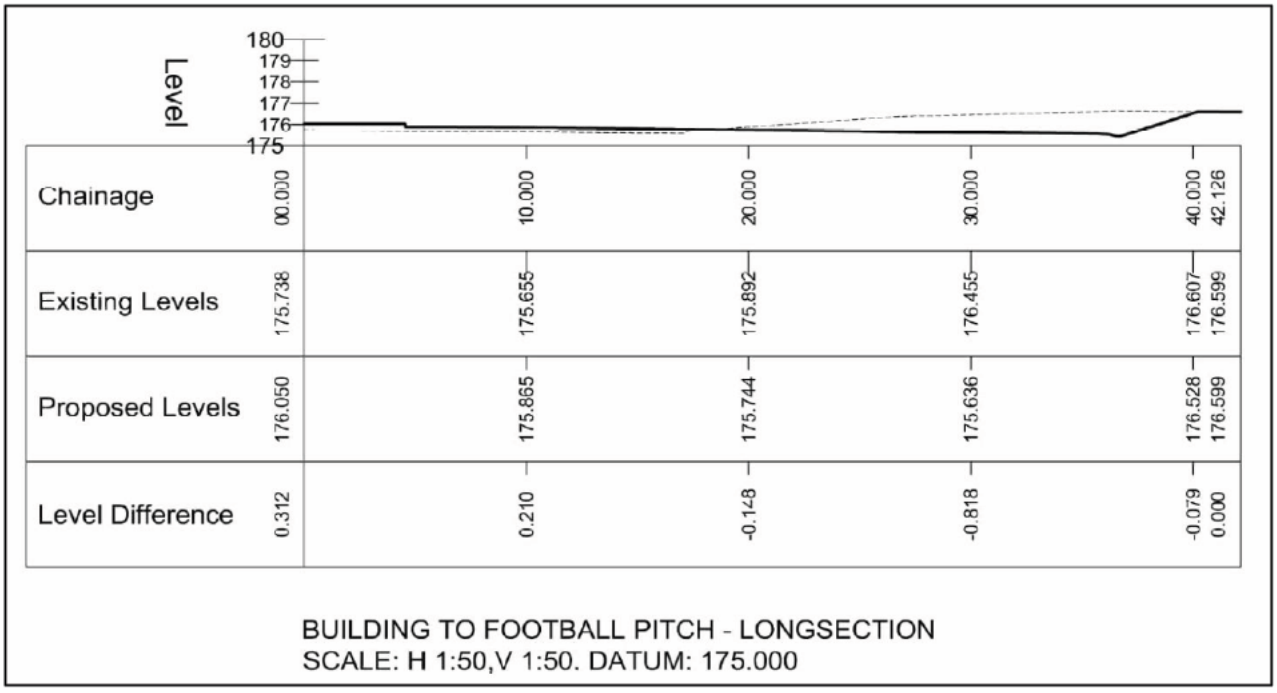


Figure 1: Cross Section Indicating Area of Cut Ground

4. Remediation Strategy

Topsoil will be stripped from the area of the development and this is suitable for reuse as capping soils. With the majority of the development area being buildings or hardstanding, there will be an excess of topsoil at the site so there will be plenty available to be reused to form the clean capping over the Made Ground.

It is proposed that the topsoil should be stripped and stockpiled on site ready for reuse. When stripping the topsoil, care should be made to avoid over excavation into the Made Ground. If this occurs, then the stripped soils may become unsuitable for reuse as capping.

The stockpiles of stripped topsoils should be inspected to ensure absence of Made Ground and then sampled and tested to ensure suitability. Given the anticipated volumes required it is proposed that three samples should be taken and tested for the full suite of analysis as set out in Appendix 2 and three samples just for metals suite. This would prove that the soils are suitable prior to reuse. Anything unsuitable could be rejected with additional testing carried out to better define what soil is suitable for reuse and which soil needs to be disposed.

All areas of the development are to have clean cover:

- This clean cover will be mainly buildings and hard standing.
- Limited areas of soft landscaping to have a suitable clean soil layer .

For the soft landscaping, the clean cover layer shall comprise:

- A geotextile separation layer (Terram 1000 or similar).
- A 400 mm thickness of topsoil.

As indicated in the Phase 2 SI report, it is recommended that a U1 exemption application is made for the re-use of the topsoils. This has a limit of up to 1,000 tonnes (about 600 m^3) which is sufficient to meet the requirements of this development. The application is quick and free via online registration on NRW's website.

During the groundworks phase of the contract the contractor needs to:

- Prevent dust from these materials and any spread of these materials from temporary stockpiling or disposal off site.
- All personnel carrying out groundworks will need a good level of hygiene.

If during the groundworks any additional previously unidentified contamination is encountered, for example, any significant quantities of asbestos, unusual, brightly coloured, or significantly oily or odorous material, then the information in Appendix 3 should be implemented.

5. Verification Works

Verification requirements comprise:

- Testing and sampling as per above.
- Survey of the ground before the cover layer is placed and re-survey after the cover layer of topsoil is placed to verify that there is a 400mm thick cover layer.
- Photographic evidence of the works.
- Comparison of the test results against the required use criteria set out in Appendix 2.
- Above information presented in a Validation Report.
- Copy of the registration of the U1 waste exemption form.

This Verification Report would be submitted to the Council Environmental Health team for their approval.

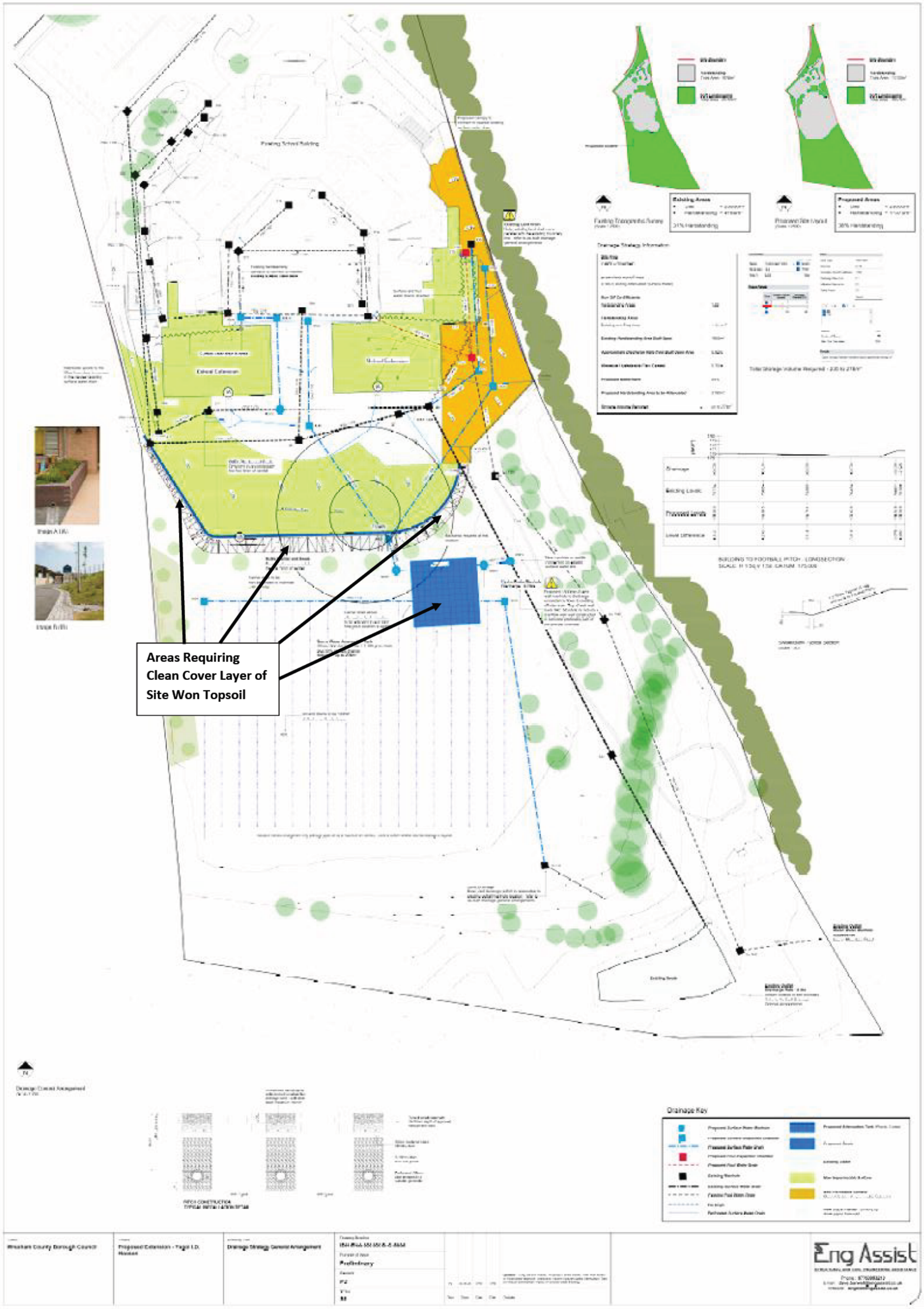
Yours sincerely

[redacted]

Chris Eccles
BEng, MSc, DIC, CGeol, CSci, CEnv
SiLC, RoGEP Adviser, DoWCoP QP020

APPENDIX 1

DRAWING


Areas Requiring
Clean Cover Layer of
Site Won Topsoil
Drainage Key
Wrexham County Borough Council
Proposed Extension - Ysgol I.D. Hooson
Drainage Strategy General Arrangement
Preliminary
Eng Assist

APPENDIX 2

CHEMICAL ACCEPTABILITY CRITERIA FOR SUBSOIL AND TOPSOIL

APPENDIX 2 - CHEMICAL ACCEPTABILITY CRITERIA FOR SUBSOIL AND TOPSOIL

Chemical acceptability criteria for subsoil and topsoil to go in top 400mm of the ground surface in landscaped areas for the site is set out in this appendix. In deriving soil reuse criteria EAL have taken into consideration:

- The risk to human health with the relevant exposure pathways for where the material is to be used.
- The phytotoxic risk. For shallow soils where the phytotoxic screening criteria is lower than the criteria for the risk to human health the phytotoxic criteria are used.

Soft Landscaping - Topsoil & Subsoil				
Analyte	**Limit of Detection**	**SSAC POS-Park Tier 1 Screening Threshold**	**Source of Screening Criteria**	**Source of Toxicological Data**
Asbestos Screen	0.001%	Negative	-	-
Metals				
Arsenic (total)	<2 mg/kg	170	CLEA v1.071	LQM/CIEH 2014
Cadmium (total)	<0.5 mg/kg	532	CLEA v1.071	LQM/CIEH 2014
Chromium (hexavalent)	<2 mg/kg	220	CLEA v1.071	LQM/CIEH 2014
Chromium (total) (III for S4ULs)	<2 mg/kg	44000	CLEA v1.071	LQM/CIEH 2014
Copper (total)	<4 mg/kg	1400	BS3882:2015: Topsoil	-
Lead (total)	<3 mg/kg	240	CLEA v1.071	Defra 2015
Mercury (total inorganic)	<1 mg/kg	3400	CLEA v1.071	LQM/CIEH 2014
Nickel (total)	<3 mg/kg	1800	CLEA v1.071	LQM/CIEH 2014
Selenium (total)	<3 mg/kg	17000	CLEA v1.071	LQM/CIEH 2014
Zinc (total)	<3 mg/kg	170	BS3882:2015: Topsoil	-
Inorganic		-	-	-
pH Value	pH Units	>5.5	BRE SD1 for DS-2	-
Sulphate (2:1)	50 mg/l	1800	BRE SD1 for DS-2	-
Cyanide (total)	<1 mg/kg	-	-	-
Cyanide (free)	<1 mg/kg	34	ATRISK SOIL	ATRISK SOIL
Organic				
TOC	-	No Limit	-	-
Phenol (Total Monohydric)	<2 mg/kg	280	CLEA v1.071	LQM/CIEH 2014
PAH		SSAC Residential with Plant Uptake		
Naphthalene	<0.1 mg/kg	2.3	CLEA v1.071	LQM/CIEH 2014
Acenaphthylene	<0.1 mg/kg	170	CLEA v1.071	LQM/CIEH 2014
Acenaphthene	<0.1 mg/kg	210	CLEA v1.071	LQM/CIEH 2014
Fluorene	<0.1 mg/kg	170	CLEA v1.071	LQM/CIEH 2014
Phenanthrene	<0.1 mg/kg	95	CLEA v1.071	LQM/CIEH 2014
Anthracene	<0.1 mg/kg	2400	CLEA v1.071	LQM/CIEH 2014
Fluoranthene	<0.1 mg/kg	280	CLEA v1.071	LQM/CIEH 2014
Pyrene	<0.1 mg/kg	620	CLEA v1.071	LQM/CIEH 2014
Benz(a)anthracene	<0.1 mg/kg	7.2	CLEA v1.071	LQM/CIEH 2014

Chrysene	<0.1 mg/kg	15	CLEA v1.071	LQM/CIEH 2014
Benzo(b)fluoranthene	<0.1 mg/kg	2.6	CLEA v1.071	LQM/CIEH 2014
Benzo(k)fluoranthene	<0.1 mg/kg	77	CLEA v1.071	LQM/CIEH 2014
Benzo(a)pyrene	<0.1 mg/kg	2.2	CLEA v1.071	Defra 2014
Indeno(123cd)pyrene	<0.1 mg/kg	27	CLEA v1.071	LQM/CIEH 2014
Dibenzo(ah)anthracene	<0.1 mg/kg	0.24	CLEA v1.071	LQM/CIEH 2014
Benzo(ghi)perylene	<0.1 mg/kg	320	CLEA v1.071	LQM/CIEH 2014
BTEX		**SSAC Residential with Plant Uptake**		
Benzene	<0.002 mg/kg	0.087	CLEA v1.071	Defra 2014
Toluene	<0.005 mg/kg	130	CLEA v1.071	LQM/CIEH 2014
Ethyl Benzene	<0.01 mg/kg	47	CLEA v1.071	LQM/CIEH 2014
Xylene (o)	<0.01 mg/kg	60	CLEA v1.071	LQM/CIEH 2014
Xylene (m)	<0.01 mg/kg	59	CLEA v1.071	LQM/CIEH 2014
Xylene (p)	<0.01 mg/kg	56	CLEA v1.071	LQM/CIEH 2014
Petroleum Hydrocarbons		**SSAC Residential with Plant Uptake**		
Aliphatic >C_5 - C_6	<0.01 mg/kg	42	CLEA v1.071	LQM/CIEH 2014
Aliphatic >C_6 - C_8	<0.05 mg/kg	100	CLEA v1.071	LQM/CIEH 2014
Aliphatic >C_8 - C_{10}	<1 mg/kg	27	CLEA v1.071	LQM/CIEH 2014
Aliphatic >C_{10} – C_{35}	<1 mg/kg	130	CLEA v1.071 for Aliphatic >C_{10} - C_{12}	LQM/CIEH 2014
Aromatic >C_5 - C_7	<0.01 mg/kg	70	CLEA v1.071	LQM/CIEH 2014
Aromatic >C_7 - C_8	<0.05 mg/kg	130	CLEA v1.071	LQM/CIEH 2014
Aromatic >C_8 - C_{10}	<1 mg/kg	34	CLEA v1.071	LQM/CIEH 2014
Aromatic >C_{10} – C_{35}	<1 mg/kg	74	CLEA v1.071 Aromatic >C_{10} - C_{12}	LQM/CIEH 2014

Notes

1. Generic Qualitative Assessment Criteria have been used where appropriate based on the current CLEA 1.071 Model (default values, sandy loam 1%SOM). Where no CLEA generic guideline value has been calculated no assessment has been made.

2. Cyanide (total)*, in the absence of a GQAC based on current CLEA 1.071 Model, the Atrisk Soil Value for Cyanide (free) has been used.

3. For metals, where an SGV has been published, this value has been used. Note that the published SGVs do not include the residential without plant uptake scenario. CLEA v1.071 has therefore been used to derive GACs for this scenario. For organics, CLEA v1.071 has been used (as the SGV assumes 6% SOM). Use BS3882 limits for copper and zinc because these are lower than the human health derived SSACs.

4. Assessment criteria for pH, Sulphide and Sulphate are not based on human health. Sulphate criteria assumes DS-2 ACEC classification for concrete.

5. TOC – no limit for landscaping materials.

APPENDIX 3

UNFORESEEN GROUND CONTAMINATION & ASBESTOS MANAGEMENT PLAN

APPENDIX 3 – UNFORESEEN GROUND CONTAMINATION & ASBESTOS MANAGEMENT PLAN

There is the potential for areas of previously unexpected contamination to be present, as is the case with any "brownfield" site. Any significant quantities of asbestos, unusual, brightly coloured, or significantly oily or odorous material should be considered in this category.

If unexpected contamination is found the following procedures should be adhered to:

1. All site works at the position of the suspected contamination will cease.
2. A suitably trained geo-environmental specialist should assess the visual and olfactory observations of the condition of the ground, the extent of contamination and take suitable samples so that a preliminary assessment can be made.
3. The Principal Contractor, their Client and the Local Authority contaminated land officer should be informed of the discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.
4. Depending on the findings of the preliminary assessment, a more detailed investigation of the suspected contaminated material will be undertaken appropriately in accordance with the assessed risks. The investigation works will be carried out in the presence of a suitably qualified geo-environmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area and depth over which contaminated materials are present.
5. Any unexpected contaminated material encountered will either be left in situ or be stockpiled whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires to be disposed as appropriate.
6. Where the material is left in situ awaiting results it will be reburied or covered with plastic sheeting.
7. Where the potentially contaminated material is to be temporarily stockpiled it will either be placed either on a prepared surface of compacted clay, or on 2000 gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
8. Any areas where unexpected visual or olfactory ground contamination will be surveyed, a photographic record kept and testing results incorporated into the Verification Report.
9. A photographic recorded will be made of relevant observations.
10. The testing suite will be determined by the independent geo-environmental specialist on the basis of visual and olfactory observations.
11. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
12. The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority and if necessary the Environment Agency, materials should either be:
    - re-used in areas where test results indicate that it meets compliance targets so it can be reused without treatment; or
    - treatment of material on site to meet compliance targets so it can be reused; or
    - removal from site to a treatment centre or to a suitably licensed landfill or permitted treatment facility.
13. A separate Verification Report will be produced for the work which will be incorporated into an appendix of the main investigation report.

Asbestos

Asbestos is to be expected to be encountered across the site (see the Asbestos Plan of Work). Asbestos cement products and asbestos fibres have locally been encountered in the soils at the site and further Made Ground material containing similar asbestos should be expected to be encountered. If asbestos is encountered in excavations which is assessed to require non-notifiable non-licensed works (e.g. chrysotile asbestos cement board) then it will be dealt with in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and the HSE's ACoP for asbestos (2013) and the Asbestos Plan of Work set out in at the end of this Appendix. Finding non-notifiable asbestos is a very common occurrence on brownfield sites and is a relatively low risk activity and can be dealt with as a matter of routine. Therefore, it is not proposed that the Council will be notified but an appropriate record will be kept of confirmatory testing and disposal. This will be included in remediation verification reports.

Based on the investigations licensable asbestos works will be carried out to remove AIB at this location. A separate Licensable Asbestos Working Plan will be produced for this work in accordance CAR (2012) and the HSE's ACoP for asbestos (2013). Further areas requiring Licensable Asbestos Work to carry out remediation is to be expected and the Council and the HSE will be notified. Any additional areas with Licensable Asbestos Work will be carried out using this Licensable Asbestos Working Plan (updated as necessary if risks are different).

Unexpected Tanks

No buried underground fuel storage tanks have been encountered during the site investigation works and are not expected. However, there remains a low risk that tanks are present on site. Should an underground tank be encountered, operations should cease in the area. Additionally there may be pipework associated with these tanks which could have oily residues. The following procedures are to be adhered to if tanks and pipework are identified:

1. All site works at the position of the tanks/pipework should stop.
2. A description of the tank should be made by the geo-environmental engineer including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic recorded will also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. The independent geo-environmental engineer will inform Client and the Local Authority.
5. During the presence of the independent geo-environmental engineer, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined on the basis of visual and olfactory observations by independent geo-environmental engineer.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Degassing and removal of the tank by a suitably qualified contractor will be required, and a Naked Flame Certificate should be provided.
10. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be kept and included in the Verification Report.

11. Excavation and remediation of any contaminated soils around the tank will be carried out.
12. Samples of the base and sides of the resultant hole will be sampled and supervised by the independent geo-environmental engineer to confirm whether risks to human health or controlled waters.

Verification

All of the above information will be incorporated into the Verification Report and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.

Asbestos Management Plan

Asbestos has not been encountered to date; although it is prudent, considering the history of this site, to have a plan should asbestos be encountered during the enabling and groundworks phase of the development.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. Construction works on site will need to be undertaken in compliance with these requirements.

Specialist remediation contractor is not required for the construction-phase groundworks but specific training of groundworkers and management of the groundworks is required. CL:AIRE have published guidance to aid in the classification of remediation works on Asbestos Containing Soils (ACS) compliant with Control of Asbestos Regulations 2012 (CAR). This is detailed in CL:AIRE (2016) "Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry Guidance.

Where asbestos containing soils are classified in accordance with CAR they can fall into three designations:

- Licensed Asbestos Works (LAW);
- Notifiable Non-Licensed Works (NNLW); and
- Non-Licensed Works (NLW).

Based on the site investigation findings, the groundworks at this site will be classified as Non-Licensed Works (NLW).

The Asbestos Management Plan, which will only need to be enacted should asbestos be encountered, will need to be produced by the Principal Contractor, and will not be limited to but will include the following information describing;

- Site Welfare Facilities, Access and Health & Safety.
- Information relating to site delineation, parking, traffic management, access and egress.
- Details of welfare facilities and location.
- Key discussions on management of Health & Safety to include risk assessments and method statements.
- Training of groundworkers on the risks and procedures.

- Control Monitoring and Reporting of General Aerial Emissions, Dusts and Particulates.
- Damping down of soils – to include measures to minimise control the emission of dust, such as site speed limits, use of modern appropriate plant, planning of haul routes, working hours.
- General control of dusts – to include information such as cleaning of roads, damping down, sealing of stockpiles.
- Re-assurance air monitoring – boundary and personal monitoring to assess risk of fibre release when working on sites with risk of asbestos in soils. A specialist UKAS accredited asbestos consultant is required to undertake asbestos air monitoring following procedures of HSG248 (HSE, 2005).
- The qualification and competencies of all operatives undertaking monitoring and calibration documentation of equipment is to be provided to the Principal Contractor.
- The Principal Contractor is to be responsible for management and record keeping as detailed in their method statement document. Failure to keep accurate records of these works will be considered the same as registering excess fibre levels and the Specialist Remediation Contractor would be liable for any retrospective works required.
- The verification approach for asbestos air monitoring is to be reflective of the site-specific risk, factoring in the source, type of works, duration of works, and the persons potentially exposed.
- The initial monitoring proposals may be reduced subject to the confidence in the works and findings of the monitoring results. The tiered approach is subject to the results being provided to the Principal Contractor and agreement that it is appropriate to reduce the monitoring frequency.
- The results of the air monitoring must be provided to the Principal Contractor within 48 hours of the completion of the monitoring to ensure the results can be appraised and records verified for approval.
- Any advice or recommendations made by the appointed asbestos consultant should be followed and documented. Should monitoring results disclose fibre concentrations approaching the HSE clearance indicator of 0.01f/ml then site procedures will need to be reviewed in order to mitigate asbestos airborne fibre release such as: Increased soaking of soils and misting systems) and procedures documented.
- Where fibre concentrations above the clearance indicator level of 0.01f/ml are present all Made Ground works should cease, and asbestos monitoring consultants should meet with the Principal Contractor to assess and revise the mitigation procedures and monitoring requirements.
- The monitoring data should include all relevant information to allow correlation of monitoring data, including locations of monitoring, weather conditions, sample volumes, fibre count, graticule diameter, number of fields examined, exposed filter diameter, and fibre concentrations. The air monitoring should work to the minimum detection limits defined within HSG248. For initial monitoring to establish background levels the appointed contractor should attempt to increase sample volumes to as large as reasonably practicable to enable lower fibre concentrations to be appraised.

Note that if encountered, Asbestos Containing Material (ACM) is to be picked and removed to a suitably licenced disposal facility when encountered during the construction works; ACM is not to be disturbed by excavation and relocated elsewhere on the site