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Our Ref: E19/7465/MD/011

Date: 15 April 2021

FAO: Stewart Brown
Yorkshire Country Properties
Suite 3
39 Huddersfield Road
Holmfirth
HD9 3JH

Dear Sir,

Re: Proposed development off Abbey Road North, Shepley (Phase 1)

1. INTRODUCTION

1.1 Haigh Huddleston & Associates have been requested by Yorkshire Country Properties to provide a remediation statement for the proposed development at Abbey Road North, Shepley (Phase 1).

1.2 The purpose of the document is to specify the remediation philosophy for the site and to specify any fill materials that may be required for the controlled backfilling and capping of the site.

1.3 Site investigation works have been undertaken and are detailed in HHA Report E19/7465/R002 dated August 2019. This report has been utilised to compile this Remediation Statement.

2. RESULTS OF THE INVESTIGATION

2.1 The site investigation works generally proved up 0.2-0.3m of topsoil overlying 0.6-1.7m of clays with a sandstone or mudstone bedrock encountered at 0.8-1.9m below existing ground levels. No made ground was encountered on site.

2.2 The borehole investigation proved alternating bands of mudstone beneath the sandstone with no evidence of coal of historical workings encountered to a depth of 30m.

2.5 No elevated levels of contaminants or asbestos were recorded in the samples taken from site.

2.6 Gas testing has proven a maximum carbon dioxide concentration of 5.0% and no methane. Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be classified as Amber 1, or CS2 by BS 8485:2105 Table 2.

2.7 It was recommended that the topsoil should be stockpiled and further testing undertaken to confirm its suitability for use on site.

2.8 REMEDIATION OBJECTIVES

2.8.1 From the above, the remediation works required can be stated as follows:

- Installation and validation of gas protection measures on site.
- Existing topsoil on site to be stockpiled and further testing to be undertaken to confirm it's suitability for use on site.

3. REMEDIATION PROPOSALS

3.1 GAS PROTECTION MEASURES

3.1.1 A maximum carbon dioxide concentration of 5.0% and no methane was recorded in BH02A. A maximum peak flow rate of 95.1 l/hr and steady flow rate of 6.2 l/hr has been recorded on site.

3.1.2 Due to the high ground water table conditions on site, the air within the piezometers has become compressed within the upper plain pipe section. This results in an artificially high flow rate at the start of measuring the flow, which rapidly reduces to a much lower steady flow rate. We would therefore use the steady flow rate for the calculation of the GSV in this situation.

3.1.3 The proposed development consists of low rise residential housing and therefore the gas regime has been characterised in accordance with the traffic light methodology as outlined in *CIRIA Report C665*. Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Amber 1,** or CS2 by BS 8485:2105 Table 2. GSV = max carbon dioxide concentration x max flow rate 0.05 x 6.2 = 0.31 l/h

3.1.4 When consulting BS 8485:2015 Table 2 the site can be characterised as CS2 for Type A buildings. Consulting tables 5 - 7 we would recommend the following to achieve a score of 4.5:

- Fully vented minimum 150mm deep void below suspended slab. To be increased to 250mm where the proximity of trees affect the foundation construction.	2.5 Points
- Continuous membrane across the cavity/party walls.	0 Points
- Cavity tray in the external walls.	0 Points
- Fully sealed service entries and ducts to manufactures specification.	0 Points
- Beam and block floor slab	0 Points

- A Visqueen Gas Barrier meeting all of the following criteria: 2.0 Points

    - Sufficiently impervious to gasses with a methane gas Transmission rate <40.0ml/day/m2/atm (average) for sheets and joints (tested in accordance with BS ISO 15105-1 manometric method).

    - Sufficiently durable to remain serviceable for the anticpated life of the building and duration of gas Emissions.

    - Sufficiently strong to withstand in-service stresses (eg. Settlement if placed below a flood slab).

    - Sufficiently strong to withstand the installation process And following trades until covered (eg. Penetrations From steel fibres in fibre reinforced concrete, Penetration from reinforcement ties, tearing due to Working above it, dropping tools etc.)

    - Capable, after installation, of providing a complete Barrier to the entry of the relevant gas.

    - Verified in accordance with CIRIA C735 [N1]

Total **4.5 Points**

3.2 FURTHER TOPSOIL TESTING

3.2.1 The existing topsoil on site should be scraped and stockpiled on site behind protective fencing to prevent cross contamination. The topsoil should be screened to remove organic and inorganic waste materials. Testing should be undertaken at a rate of 1 sample per 250m^3 of stockpiled material to confirm it is suitable for re-use on site prior to being relaid.

3.2.2 The results of the chemical analysis should be compared to the tier 1 trigger levels to confirm the suitability of the topsoil to be re-used on site.

4. REMEDIATION VALIDATION

4.1 Dependent on the warranty provider, validation of the installed gas membranes will be undertaken by a third party engineer, or the warranty provider themselves.

4.2 Should the material prove suitable to re-use on site, a copy of the chemical analysis results along with covering letter confirming the same should be submitted to Kirklees Council and the warranty provider to discharge the outstanding contaminated land conditions.

4.3 If suspected contaminated material is found during remediation works, the independent consultant must be contacted and the extent of it must be established by further testing. All contaminated material must be removed from the site and replaced by equivalent uncontaminated material.

4.4 Should the existing topsoil prove unsuitable for use, clean material will need to be imported to site to provide a growing medium to soft landscaped areas. All imported material to be used for the growing medium should be uncontaminated and comply with the specification for Engineering Fill. All imported material should be tested for the full range of contaminants listed to the rear of this report. Only material found to be below published trigger levels should be deemed uncontaminated and accepted for use on site.

4.5 If the imported material is from a Greenfield site, a minimum of 3 samples or 1 per 250m^3 of imported material should be taken for testing, whichever is greater. If it is from a brownfield site, a minimum of 6 samples, or 1 per 100m^3 of imported material should be taken for testing, whichever is greater. Material provided by a commercial supplier should be certified to the same level of testing, with the certificate less than two months old.

4.6 All imported certified material should be placed immediately. If this is not possible, or the material is not certified and sampling is to be carried out prior to being laid, it should be securely stored on site prior to use to prevent possible contamination from any materials on site.

We trust that the above is sufficient for your current requirements, however should you need any further information please do not hesitate to contact me direct.

Yours faithfully,

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TIER 1 SOIL GUIDANCE VALUES FOR USE IN DOMESTIC GARDENS

(WITH PLANT UPTAKE)

CONTAMINANT	ICRCL – TTV / DEFRA – SGV MG/KG
Arsenic	37 (4)
Cadmium	22 (4)
Chromium	130 (2)
Lead	200 (4)
Mercury	1.2 (1)
Selenium	250 (1)
Copper	2400 (1)
Nickel	180 (1)
Zinc	3700 (1)
Cyanide (total)	25
Sulphate	0.24% (3)
Sulphide	250
Thiocyanate	50
PAH (Total)	40
TPH (Total)	250
Phenols	280 (1)
PH	6-8
Asbestos	No fibres present

(1)

(2) DEFRA CLR SGV's withdrawn used for initial comparison

(3) BS 8110 1985 Table 6.1

(4) Category 4 Screening Level

TIER 1 SOIL GUIDANCE VALUES FOR USE IN DOMESTIC GARDENS WITH PLANT UPTAKE (SPECIATED PAH)

CONTAMINANT	SCREENING CRITERIA FOR PAH (mg/kg)
Acenaphthlene	210 (1)
Acenaphthylene	170 (1)
Anthracene	2400 (1)
Benz[a]anthracene	7.2 (1)
Benzo(a)pyrene	5 (2)
Benzo[b]fluoroanthene	2.6 (1)
Benzo[ghi]perylene	320 (1)
Benzo[k]fluoranthene	77 (1)
Chrysene	15 (1)
Dibenzo[ah]anthracene	0.24 (1)
Fluoranthene	280 (1)
Fluorene	170 (1)
Indeno[123-cd]pyrene	27 (1)
Naphthalene	2.3 (1)
Phenanthrene	95 (1)
Pyrene	620 (1)

(1)

(2) Category 4 Screening Level

LQM S4UL SCREENING VALUES FOR SPECIATED TOTAL TPH (RESIDENTIAL WITH PLANT UPTAKE 1% SOM)

Petroleum Hydrocarbons	LQM S4UL Screening Values (mg/kg)
Aliphatics	
C5-C6	42
C6-C8	100
C8-C10	27
C10-C12	130 (38)
C12-C16	1100 (24)
C16-C35	65000 (8.48)
Aromatics	
C5-C7	70
C7-C8	130
C8-C10	34
C10-C12	74
C12-C16	140
C16-C21	260
C21-C35	1100