



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Our Ref: E19/7366/MD/05B

Date: 22 June 2021

Rev Date: 5 May 2023

Firth Buildings, 99 -101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Dear Sir,

Remediation Method Statement for Site at Station Road, Skelmanthorpe

1. INTRODUCTION

- 1.1 Haigh Huddleston & Associates have been requested by Yorkshire Country Properties to provide a remediation statement for the proposed development off Station Road, Skelmanthorpe.
- 1.2 The purpose of the document is to specify the remediation philosophy for the site and to specify the fill materials that are required for regrading the site if required.
- 1.3 Site investigation works have been undertaken on two occasions and are detailed in HHA Report E19/7366/R001 dated April 2019 and letter reference E19/7366/MD/007A dated May 2022. Gas monitoring was undertaken following the original site investigation works and is reported in HHA Letter E19/7366/DP/001 dated June 2019. These reports have been utilised to compile this Remediation Statement.

2. RESULTS OF THE INVESTIGATIONS

- 2.1 Trial pits in the majority of the site proved 0.2-0.4m of topsoil overlying 0.5-1.3m of firm to stiff clay. Underlying this a weak weathered mudstone was encountered at depths of 0.8-3.6m below existing ground levels. The boreholes proved clay to depths of 2.3-3.1m underlain by alternating bands of mudstone.
- 2.2 The boreholes proved two unworked coal seams within the mudstone strata.
 - An upper unworked 0.3-0.8m thick coal seam encountered at 1.5-8.7m below existing ground levels.
 - A lower unworked 0.6-1.0m thick coal seam encountered at 7.8-13.0m below existing ground levels.
- 2.3 A site scrape was undertaken in the location of the opencast mineworkings in the north east of the site and proved an approximately 9m wide strip of re-engineered ground extending from the north eastern boundary into the development. The depth of re-engineered ground got shallower as it extended into the site and boreholes undertaken proved the coal here had been unworked.
- 2.4 The investigation works indicate that this is not an extension of the opencast mineworks into the site, however, it is suspected of being a ramped access to the base of the opencast mineworkings. No other evidence of historical mineworking was proved during the site scrape.

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- 2.5 No elevated levels of contaminants were recorded in the samples submitted for chemical analysis.
- 2.6 No asbestos was found in the samples taken from site.
- 2.7 On site, no methane concentrations were detected. Carbon dioxide values were found between 0.0 and a maximum of 3.8%. The only gas flow recorded on site was as a result of elevated ground water levels causing increased pressure within the monitoring station. Based on a high sensitivity end use under the NHBC traffic light system in conjunction with CIRIA C665, the GSV value corresponds to the site being characterised as **Green**.
- 2.8 Due to the steep nature of the existing site, re-grading works will be required along with retaining walls. Extra material may need to be imported to site to achieve the proposed site levels. However, it is anticipated that in this instance there will be more cut than fill.

2.9 REVISED CONCEPTUAL MODEL

- 2.9.1 In HHA Report E19/7366/R001 dated April 2019, it was noted that there had been little previous historical use of the site that was likely to have caused contamination, and the investigation works on site have proven on-site material to be free from contaminants.
- 2.9.2 Similarly, the gas monitoring undertaken on the existing site proved low levels of carbon dioxide which were not considered a risk to future site residents and the site was therefore classified as CS1 by BS 8485:2015 or Green by the NHBC traffic light system.
- 2.9.3 However the proposed regrading works to the site are likely to expose/cut through the existing shallow coal seams on site, particularly in the eastern half of the site, and open potential migration pathways for ground gases to the proposed properties.
- 2.9.4 In addition to this, there is an increased risk of combustion of exposed/shallow coal seams in the eastern half of the site.
- 2.9.5 The development of the site therefore exposes the developers and future residents to the following risks:
i) Possible migration of ground gases from exposed coal to proposed properties.
ii) Possible combustion of shallow coal during/following regrading works.
The risk to the developers and future site residents is therefore considered to be low/medium and remediation measures will be required to address there.

2.10 REMEDIATION OBJECTIVES

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

- Topsoil to be stockpiled behind protective fencing prior to re-use on site.
- Site levels to be regraded.
- Gas protection measures to be installed within the eastern half of the site where coal is exposed during the foundation excavation.
- Minimum of 1m of inert clean material to be provided above coal seam in soft landscaped areas.

3. REMEDIAL PROPOSALS

3.1 HISTORICAL WORKINGS

- 3.1.1 The site investigation works undertaken indicate that the historical opencast workings have not extended into the site boundary.
- 3.1.2 The thirty rotary boreholes undertaken on site have proven the presence of two coal seams on site. Both of these seams have been intact with no evidence of workings being proven within the site boundaries. The seams were noted to be shallower in the eastern half of the site, particularly towards the south east, and it is considered likely that the coal will be encountered in this area.
- 3.1.3 If the coal strata is encountered within the foundation or drainage excavations, the coal seam should be immediately sealed to prevent spontaneous combustion. Any foundations should be taken beneath the coal seam to the underlying natural strata.
- 3.1.4 Where the coal seam is encountered within the foundation excavations for a property, it is recommended that Amber 1/CS2 Gas Protection Measures are installed, as this would potentially form a preferred pathway for the ground gases.
- 3.1.5 We would therefore recommend the following construction details based on a CS2 classification to achieve a score of 4.5 in accordance with BS 8485:2015 tables 5-7:
- | | |
|--|------------|
| - 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 anticipated 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 SITE REGRADING

- 3.2.1 As part of the development, ground levels are to be raised and lowered to achieve acceptable gradients for the proposed adoptable highway, private drives and garden area. If there is insufficient site-won material to achieve this, clean 6F2 will need to be imported to site to raise the ground levels.
- 3.2.2 The infill material should be laid and consolidated in 150-200mm thick layers in accordance with the D.O.T. specification and dependant on the plant proposed for use on site.
- 3.2.3 Site levels should be re-graded to 300mm below proposed final ground where clean imported fill is used to raise levels to accommodate a minimum 300mm thickness of clean topsoils and subsoils. Beneath areas of hardstanding the final levels should be adjusted to accommodate driveway construction.
- 3.2.4 Due to the potential of combustion, a minimum of 1m clean inert cover should be provided to the shallow coal seams where they are encountered on site. If the final proposed levels do not allow for 1m cover to be provided within soft landscaped areas, the coal should be excavated to a minimum of 1m below proposed ground levels prior to clean capping being installed.

- 3.2.5 During all regrading and excavation works, there are to be no nearby sources of combustion.

3.3 TOPSOIL

- 3.3.1 A total of ten samples have been taken from the existing topsoil on site and have proven free from contaminants. Based on an average topsoil depth of 0.29m, and a site area of 8100m², there is approximately 2310m³ of topsoil on site.
- 3.3.2 A total of ten samples from site gives a sample per 230m³, which is more than required by YALPAG guidance which specifies one sample per 250m³ for a greenfield site.
- 3.3.3 We would therefore conclude that the existing topsoil on site is suitable for re-use within the proposed domestic gardens on site. The topsoil should be scraped and stockpiled prior to construction work starting on site to prevent cross contamination during development.
- 3.3.4 In the unlikely event there is insufficient topsoil, clean material will be required to be imported to site.
- 3.3.5 All imported material to be used for the capping/topsoil layer 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.
- 3.3.6 If the imported material is from a Greenfield site, a minimum of 3 samples or 1 per 250m³ 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 100m³ 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.
- 3.3.7 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.

4. REMEDIATION VALIDATION

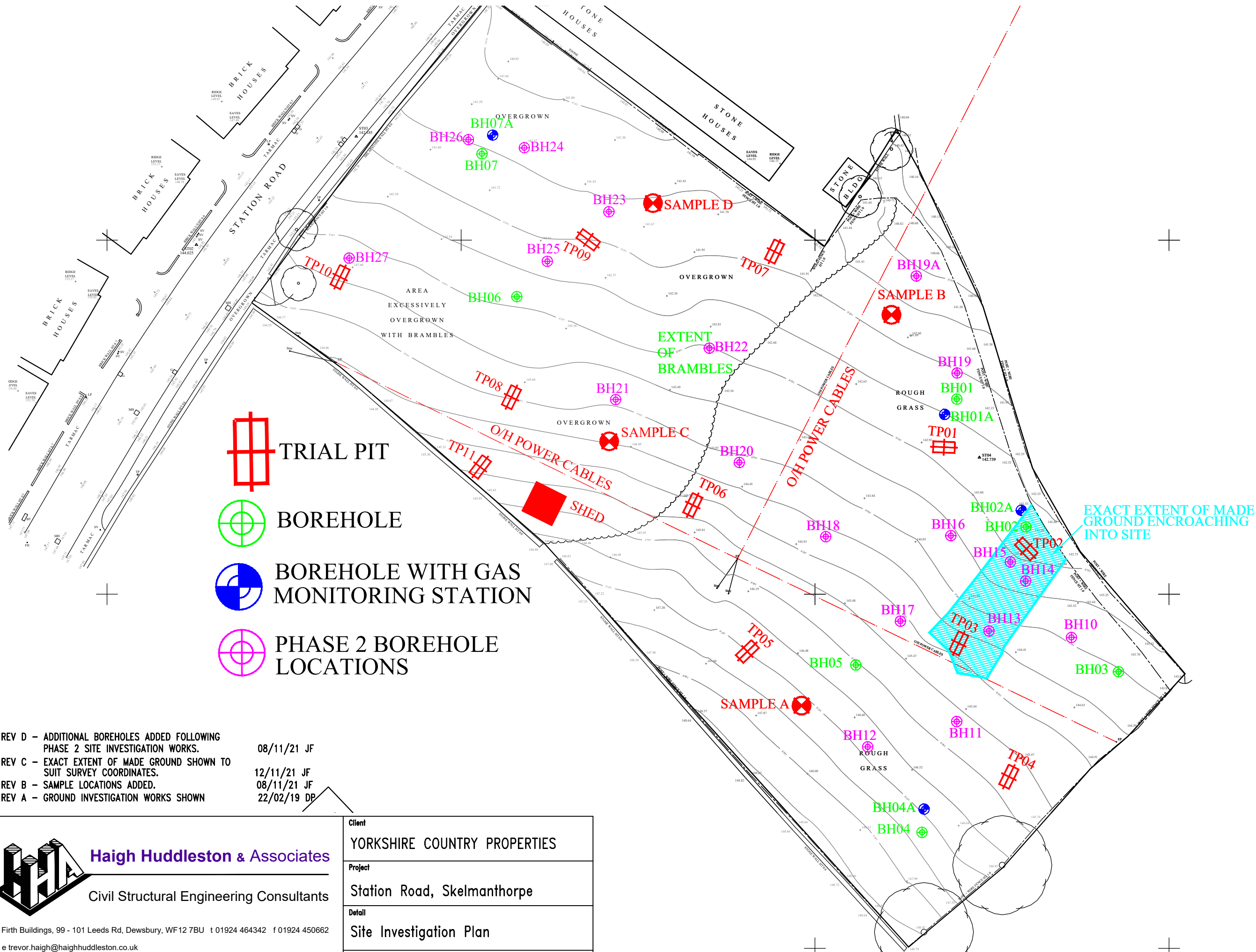
- 4.1 Any imported clean material should have been certified with testing having taken place within two months of the material being imported to site. In the absence of this, soil samples should be taken from the capping layer and chemically analysed to demonstrate that there are no elevated levels of contamination present.
- 4.2 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.

- 4.3 All site records and results of the shallow trial pits should be consolidated into a validation report. The report shall be completed in accordance with 'Yorkshire and Lincolnshire Pollution Advisory Group: Verification Requirements For Cover Systems'.
- 4.4 All topsoil must be in place and notification given to the validation engineers at least 2 weeks prior to the expected completion date. This will allow time for onsite investigation and chemical analysis to be undertaken and report compiled in line with the CML initiative.
- 4.5 Clean material imported should be visually inspected to confirm it doesn't contain unsuitable materials (i.e. glass, brick, etc)
- 4.6 Gas protection measures to plots where coal is exposed during the foundation excavation to be validated in accordance with Ciria C735 (N1)

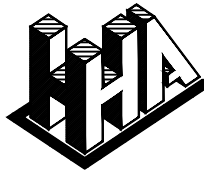
We trust that the above is sufficient for your current requirements, however should you need any further information please do not hesitate to contact me direct.

Yours faithfully,

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REV D - ADDITIONAL BOREHOLES ADDED FOLLOWING
PHASE 2 SITE INVESTIGATION WORKS. 08/11/21 JF
REV C - EXACT EXTENT OF MADE GROUND SHOWN TO
SUIT SURVEY COORDINATES. 12/11/21 JF
REV B - SAMPLE LOCATIONS ADDED. 08/11/21 JF
REV A - GROUND INVESTIGATION WORKS SHOWN 22/02/19 DP



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Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

Client	YORKSHIRE COUNTRY PROPERTIES			
Project	Station Road, Skelmanthorpe			
Detail	Site Investigation Plan			
Scale	Dwn	Chkd	Date	Dwg No.
1/500@A3 DP		JM	14-01-19	E18/7366/03D

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

<u>CONTAMINANT</u>	<u>ICRCL – TTV / DEFRA – SGV</u> <u>MG/KG</u>
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

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- (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)

<u>CONTAMINANT</u>	<u>SCREENING</u> <u>CRITERIA</u> <u>FOR PAH</u> <u>(mg/kg)</u>
Acenaphthlene	210 (1)
Acenaphthylene	170 (1)
Anthracene	2400 (1)
Benz[a]anthracene	7.2 (1)
Benzo(a)pyrene	5 (2)
Benzo[b]fluoranthene	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)

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- (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