VALIDATION REPORT
OF

REMEDIATION

HOUSE PLOTS 7 TO 13
MIDLOTHIAN, NEW MILL
HOLMFIRTH, HD9 7LN

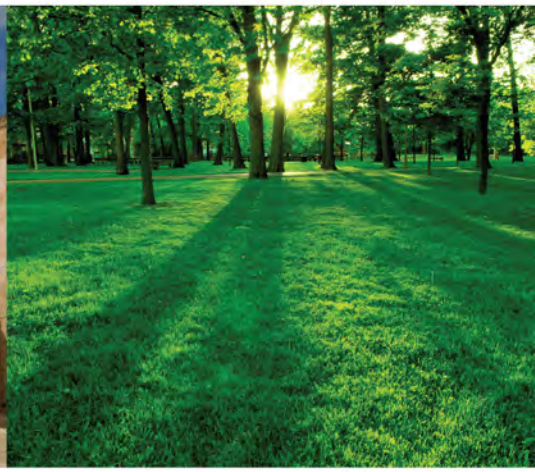
FOR

SIGNATURE HOMES (Yorkshire) LTD

REPORT REF: SIG 3454 VAL 7 TO 13

Engineering Geologists and Environmental Scientists





Ashton Bennett

North: Bridge Mills, Huddersfield Road,
West Yorkshire, Holmfirth HD9 3TW

South: 22c Lambourn Road,
Clapham, London SW4 0LY

Tel: 0845 8687488

email: geoenviro@ashton-bennett.co.uk
www.ashton-bennett.com

VALIDATION REPORT
OF

REMEDIATION

HOUSE PLOTS 7 TO 13
MIDLOTHIAN, NEW MILL,
HOLMFIRTH HD9 7LN

FOR

SIGNATURE HOMES (Yorkshire)LTD

REPORT REF: SIG 3454 VAL 7 to 13

ASHTON BENNETT CONSULTANCY

Engineering Geologists & Environmental Scientists

September 2021

CONTENTS

FIGURES

APPENDICES

APPENDIX A	Photographs
APPENDX B	Environmental Test Results & Guidelines
APPENDIX C	Gas Membrane Verification Plan & Validation Reports

Quality Management

Project	House Plots 7 to 13, Former Midlothian Site, New Mill Road, Holmfirth, HD9 7LN		
Client	Signature Homes (Yorkshire) Ltd		
Date	August 2021		
Version	Issue 1		
Reference	3454 Val 7 - 13		
Prepared by	Frances A Bennett	BSc (Hons), CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AIEMA, MIEnvSci	Director Ashton Bennett Ltd
	Tristan Bennett	BSc (Hons)	Engineer

1. INTRODUCTION

1.1 The Report

Signature Homes (Yorkshire) Ltd have planning permission to construct 56 houses on a site formerly known as Midlothian in New Mill Road, Holmfirth, HD9 7LN. This report describes the Validation of the remediation undertaken beneath the house plots 7 to 13 inclusive in Phase I of the development to make the plots suitable for their proposed use. The report was commissioned by the client Signature Homes (Yorkshire) Ltd and was carried out by the Ashton Bennett Consultancy.

Phase I and Phase II Reports were undertaken on the site in 2008, 2015 and 2018 and a Remediation Statement compiled by Eastwood and Partners Consulting Engineers was agreed by Kirklees Council in 2019. The Remediation Statement described the remediation required on the site to render the site suitable for its proposed use for residential housing with gardens.

This Report describes the remediation undertaken on house plots 7 to 13 and validates that these house plots have been remediated in accordance with the Remediation Statement.

Photographs of the remediation are presented in Appendix A, environmental test results for validation and guidelines for environmental assessment and confirmation

of a MCERTS accredited laboratory for soil testing are presented in Appendix B. Gas membrane verification plan and validation reports are in Appendix C.

The information for this report is from sources recommended by the Institute of Civil Engineers (ICE), the Association of Geotechnical and Geoenvironmental Specialists (AGS), Construction Industry Research and Information Association (CIRIA) and the Department of the Environment Transport and the Regions (DETR). The report has been compiled in accordance with the latest ICE, DETR, Department of Environment, Food and Rural Affairs (DEFRA), British Standard Draft Documents and British Standards, CIRIA, CLR 11 & other CLEA Reports and Eurocode 7, and the Verification Requirements for Cover Systems, Technical Guidance for Developers, Landowners and Consultants, Yorkshire and Lincolnshire Pollution Advisory Group November 2017.

In addition, the scope of the investigation has used the extensive knowledge and experience of the staff of Ashton Bennett Consultancy to assess the data and to interpret the findings.

1.2 Site Address and Planning Reference

The site address is Signature Homes (Yorkshire) Ltd, New Mill Road, Holmfirth, HD9 7LN. The Planning Reference is 2015/93824.

1.3 Responsible Persons

Mr John Hewitt of Signature Homes Yorkshire Ltd is responsible for site management.

This report was prepared by Frances A Bennett an engineering geologist who has a degree in Geology, a postgraduate qualification in Soil Mechanics and is a Chartered Geologist CGeol, Chartered Environmentalist CEnv and Chartered Water and Environmental Manager C.WEM with 45 years of experience in the fields of geology, geotechnical engineering, slope stability, hydrogeology, contamination, mining, waste disposal and site management.

2. THE SITE

2.1 Site Description

The site, formerly known as Midlothian, lies to the west of the A635 New Mill Road, one mile north of Holmfirth town centre. The site measures circa 2.07 hectares and lies around National Grid Reference 414898E 409262N. The site topography generally slopes from 183m aOD in the south to 172m aOD in the north.

The development site is bounded to the north by tennis courts and residential housing. The site is bounded to the west by a slope down to a footpath known as Berry Bank Lane with the former Holmfirth rail lines and the Sands Recreation Ground and River Holme at lower ground levels.

The site is bounded to the south by two houses with large gardens, and to the east by the A635 with residential houses and gardens beyond. The existing main vehicular and pedestrian access to the site is from A635 New Mill Road near the centre of the site frontage.

This report describes the validation of the remediation to house plots 7 to 13 lying within the south east area of the site.

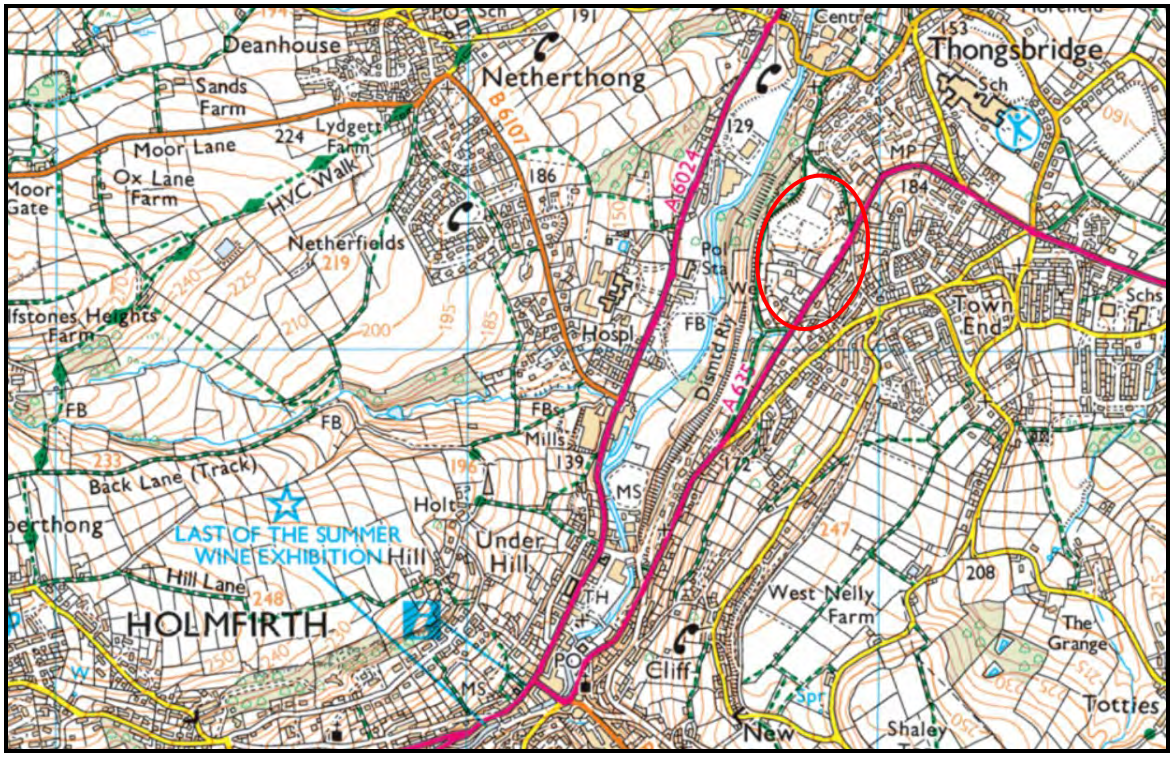


Figure 1 Site Location Plan

Figure 2 Aerial Site Location Plan

2.2 The Project

The project involves the demolition of all existing buildings on the site and the construction of 56 houses in two phases of development as detailed on Figure 3.

The subject of this report is the validation of remediation and mitigating measures for House Plots 7 to 13 inclusive within Phase I of the development.

Figure 3 Site Plan

3. GEOLOGY

The geological maps of the British Geological Survey (BGS) at 1:10,560 scale, County series 260SE, indicate the site to be underlain by strata of the Millstone Grit Series. The Huddersfield White Rock Sandstone is indicated to underlie the majority of the site, with the Marsden Formation mudstone and siltstone beneath the eastern edge of the site. The Huddersfield White Rock is underlain by the Guiseley Grit to the west of the River Holme.

The strata are shown by the BGS map to dip at 8 degrees to the horizontal towards the east, with the Huddersfield White Rock overlain by the Rossendale Formation and the Rough Rock Sandstone east of the site. The Huddersfield White Rock Sandstone is indicated to be exposed along Berry Bank Lane with a height of 12ft or 3.3m of 'massive flaggy grit overlain by sandy shale and flags'.

No alluvial or other superficial deposits are indicated to be present. Made ground was generally recorded at depths of 0.10m to 0.40m in the ground investigations undertaken in the area of house plots 7 to 13.

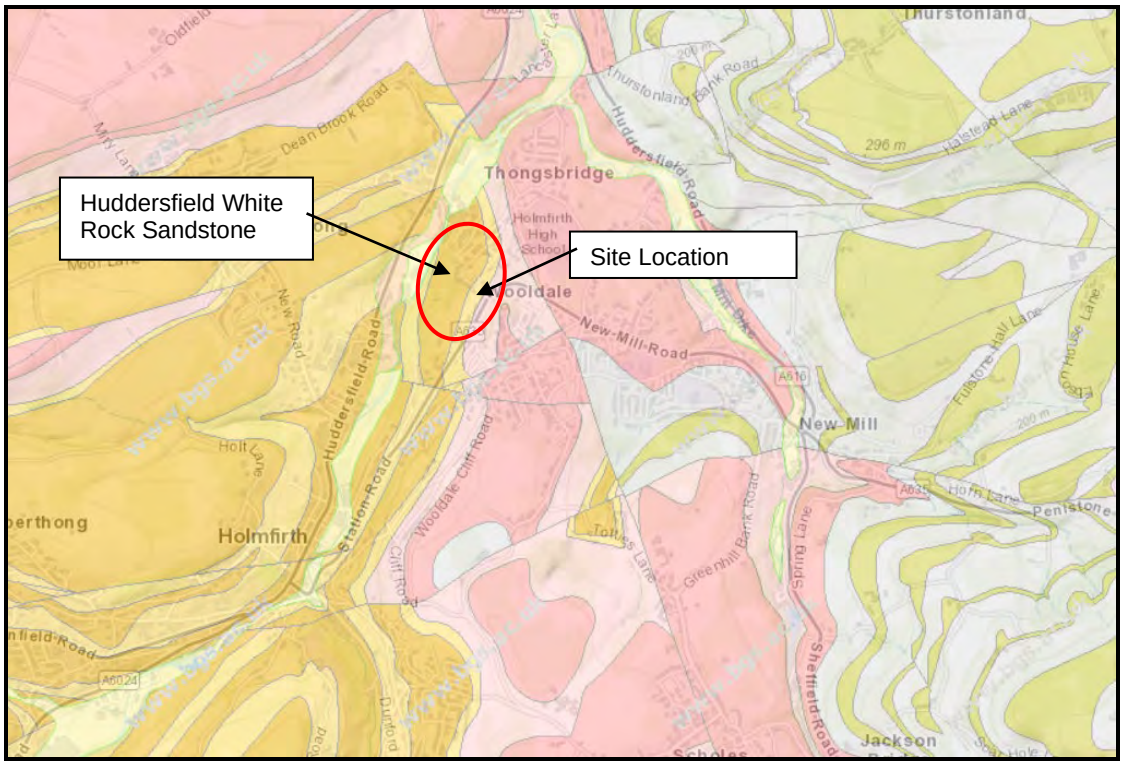


Figure 4 Site Geology Plan

4. REMEDIATION STRATEGY

4.1 Objectives

The objective of the Remediation Strategy was to ensure, according to the 1990 Environment Act the condition of the land is unlikely to cause pollution to the environment or harm to human health. The objective of the Remediation Strategy was to ensure an environmentally safe site for the construction and future use of the site for residential houses with gardens and with landscaped ground. The objectives include:

- To install gas protection measures in accordance with NHBC Amber 2 specification in all plots.
- To ensure that 600mm of clean inert physically suitable, permeable material, including at least 150mm of topsoil, is present within gardens and

areas of soft landscaping where made ground remains. A geotextile membrane is to be included at the base of the capping layer.

- Upon identification of any additional or unexpected contamination, a suitable strategy to determine any remedial action is to be in place.
- To reduce the risks to construction workers, they should be aware of the presence of any elevated levels of contaminants and ensure that appropriate personal protective equipment (PPE) is used and worn and the requisite working practices are adhered to. No further guidance with regard to this is considered necessary as part of this document.

4.2 Mitigation Proposals

4.2.1 Contamination

The concentrations of contaminants recorded at elevated levels across the site in the ground investigations were localised throughout the made ground and were generally only mildly elevated above the respective assessment values. Several elevated concentrations were sporadically encountered and at significant depth below ground level. Contamination was not detected in the area of House Plots 7 to 13.

The Remediation Implementation Plan stated that where made ground is to remain beneath private gardens or soft landscaped areas of the proposed development, the potential risks to human health presented by the made ground could be mitigated through the use of a capping layer of inert material which should be placed above the made ground.

The capping layer should be a minimum of 600mm in thickness. At least 150mm of this capping thickness should comprise topsoil to act as a growing medium for plants. A geotextile membrane should be included at the base of the capping to differentiate between the subsoil and the underlying made ground.

The placement of the capping layer will also mitigate against the slight risk to plant growth presented by elevated levels of phytotoxic metals within the soils.

4.2.2 Gas

Gas has been monitored on the site from the 1980s by Kirklees Council and by Consultants acting for Tesco Stores and for Prospect Estates between 2008 and 2018. The recent results indicated that low levels of carbon dioxide were present and methane was generally absent. Elevated levels of gas were recorded in three boreholes in the north west of the site. A maximum flow of 0.7l/hr was recorded and the results indicate that the site is classified as ‘Amber 2’ under the NHBC traffic light classification system, assuming that the precast concrete floors with a ventilated void below would be used for all plots. Methane and carbon dioxide were not encountered in the area of House Plots 7 to 13. Radon protection measures are not required.

5. REMEDIATION AND MITIGATION

The remediation comprised mitigating measures including the incorporation of a methane resistant membrane within construction of the houses, in accordance with

the GeoShield Verification Plan presented in Appendix C, and in accordance with the NHBC Amber 2 traffic light classification.

A gas membrane to specification BS8485 :2015+2019 was installed to CIRIA 735. The building Type is Type A and the site is C53. The membrane was installed in accordance with the GeoShield Verification Plan and verified by GeoShield staff.

The substrata was prepared in accordance with manufacturers instructions and BS8485. Materials used were Visqueen standard gas barrier, Visqueen GR DPC, Visqueen double sided butyl tape and GR Foil tape and Lap Tape, Visqueen Pro Detailing Tape and telescopic air vents. The specifications for these are presented in the Verification Plan in Appendix C.

The NHBC Amber '2' gas protection system requires 4.5 points and compliance is achieved by building a suspended block and beam floor with a ventilated subfloor void with a gas membrane on top. The ground gas membrane meets the requirements of BS8485:2019 Table 7 and also the products specified in the plan. The 4.5 points were achieved with 2.5 points for the venting and 2 points for the gas membrane.

Photographs, records and details of the Geoshield validation for house plots 7 to 13 are included in Appendix C.

There were no special necessary requirements to control dust, noise, odours associated with the remediation. There was no requirement for control of water run off associated with remediation.

The front gardens will be hard covered. In the rear gardens an orange geotextile was laid on natural ground, on the lower and upper garden areas. The geotextile was overlain by 600mm of topsoil tested as uncontaminated, and will be covered in turf. Part of the lower rear gardens will be hard covered with paving over the geotextile.

The topsoil was imported from a greenfield site at Hade Edge, Holmfirth known to the environmental engineer. Visual inspection indicated a good organic content making it suitable for growing. The topsoil was free of obvious contaminating materials with no odour, staining or free product. The topsoil was free from bricks and other waste materials, and there was no evidence of asbestos fibres. The donor site does not contain Japanese Knotweed. Test results for the topsoil as imported are presented in Report 90429 in Appendix B. The topsoil was found to be uncontaminated by heavy metals, PAH USEPA16, TPH CWGUK, asbestos fibres and to have acceptable levels of pH and sulphate for use on residential gardens. Approximately 350m3 of topsoil was used for the gardens.

The geotextile was an Abtex Orange, a permeable split tape woven polypropylene geotextile for use as a separator and marker layer in civil engineering. It has a mass of 62g/m2 and a tensile strength of 10/9kN.m2, it is 1500N CBR puncture resistant. A full specification is presented in Appendix B.

The rear gardens were covered in a geotextile and 600mm of topsoil before turfing. Visits were made to site to view the laying of the geotextile and photographs are presented in Appendix A. Testing was undertaken in the rear upper and lower

gardens of all plots to check 600mm thickness of topsoil above the geotextile and soil samples were collected for testing for potential contaminating compounds.

All laboratory testing of soil samples for validation as uncontaminated soil was carried out by a NAMAS MCERTS accredited laboratory.

Observations during the ground works to construct the houses did not detect any soil remaining in the ground with an unusual odour, colour or appearance that would suggest it was contaminated.

Photographs of the remediation of the rear gardens are presented in Appendix A.

6. VALIDATION

6.1 Geotextile and Depth of Topsoil

Validation of the geotextile laid in the rear gardens of house plots 7 to 13 was undertaken by daily inspection during placing and covering in topsoil. The geotextile was laid overlapping between plots. Figure 5 illustrates the geotextile beneath the first layer of topsoil in the lower garden area. Figure 6 illustrates the geotextile and topsoil being laid in the upper garden areas. All the soil laid was topsoil and the thickness was confirmed by insertion of a metal rod of appropriate length and measuring tape. Photographs are presented in Appendix A.

Figure 5 Geotextile and first layer of topsoil laid in lower rear gardens

Figure 5 Geotextile and first layer of topsoil laid in upper rear gardens

6.2 Environmental Testing of Topsoil

6.2.1 Methodology

Of the soil samples collected, 12 samples were selected for testing, 1 from each of the lower gardens of House plots 7 to 13 plus 4 extra samples from the upper gardens and one from the topsoil stockpile. The soil samples were tested by Chemtech of County Durham, a MCERTS laboratory, for speciated Polyaromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons (TPH), sulphate, pH, asbestos and heavy metals. Results are detailed in Tables 1, 2 and 3 and are presented in full in Appendix B.

In addition, one sample was tested from the topsoil stockpile and results are presented in Tables 4, 5 and 6 and in full in Chemtech Report 90429 in Appendix B.

All environmental test results are presented in full in Appendix B.

6.2.2 Environmental Assessment Guidelines

There are no definitive legal standards for contaminated land in the United Kingdom, although the Government Department of the Environment in the late 1970's published guidance on a restricted number of contaminants. Further guidance was published in March 2002 as the Contaminated Land Exposure Assessment (CLEA) by the Department of Environment, Food and Rural Affairs (DEFRA). These were withdrawn in August 2008 and new guidelines for some compounds were released in 2009. The UK Risk Assessment Framework is based on a tiered approach, Tier 1 being a risk screening or qualitative risk assessment, Tier 2 is a generic quantitative risk assessment and Tier 3 is a detailed quantitative risk assessment. Where the Tier 2 identifies a potentially unacceptable risk to human health either a Tier 3 Detailed Quantitative Risk Assessment (DQRA) is undertaken or risk management action recommended to remove the pathway and the risk.

For this site both a Tier 1 and Tier 2 assessment have been undertaken using generic assessment criteria and site specific assessment criteria based on CLEA 2009 and ATRISK 2019 which are based on the new CLEA guidance 2008 and 2009 (SC050021/SR3 (the CLEA Report) and SC050021/SR2 (the TOX report), SC050021/SR4, CLEA Software version 1.071 (2015) and toxicological reports and SGV technical notes (2009)). The figures used for assessment of lead are from DEFRA(2014b), Category 4 Screening Levels, which are based on the 'low level of toxicological concern (LLTC)'. C4SLs are 'estimates of contamination concentration in soil that present acceptable risk within the context of Part 2A'. In addition, assessment has used the LQM/CIEH S4ULs (2015) for Human Health Risk Assessment. The S4ULs are based on the principles of 'minimal' or 'tolerable' risk enshrined in SR2 (EA2009A), which has not been withdrawn and are based on the EA software. The guidance set out in these documents has been used to establish a conceptual model of the risks on the site.

The site will be used for residential use with plant uptake and landscaped ground. The risk assessment has used a scenario of residential use with plant uptake as the model for assessment. In deriving the SSVs a child has been chosen as the critical receptor with exposure over a lifetime being the most appropriate and conservative scenario.

The assessment of the risks to users on the site has been undertaken within the framework set out in guidance published by DEFRA and the Environment Agency for the assessment of risks to human health associated with chronic long term exposure to contaminated soils. The guidance set out in this documentation has been used to establish a conceptual model of the risks on the site following redevelopment.

The Contaminated Land Exposure Assessment (CLEA) model provides a means of establishing concentrations of contamination in soils at a site. If results exceed these concentrations, then further assessment or intervention by mitigation or remediation may be required to reduce risks to human health.

6.2.3 Environmental Test Results for House Plots 7 to 13

On August 26th 2021, 7 soil samples were collected from the rear gardens of house plots 7 to 13. A further 4 soil samples were collected on September 16th 2021. The soil samples were tested for 9 heavy metals, speciated PAH, TPH CWGUK, pH, sulphate and asbestos. There was no olfactory evidence of hydrocarbons during the soil sampling.

Results of tests on the soil samples collected from house plots 7 to 13 are given in Tables 1, 2 and 3.

TABLE 1
Results of Tests for Heavy Metals

Metals	Units	Minimum Value	Maximum Value	ATRISK Contaminated Land Screening Values (SSV)
				Residential with plant uptake in mg/kg
Mercury	mg/kg	<0.5	<0.5	1.44
Nickel	mg/kg	12	16	136
Copper	mg/kg	20	55	4790
Selenium	mg/kg	<0.3	0.9	375
Zinc	mg/kg	53	73	20,300
Chromium	mg/kg	138	224	14.300
Arsenic	mg/kg	8.2	11	37
Cadmium	mg/kg	<0.2	0.3	22.1
Lead	mg/kg	47	66	200
pH		6.4	7.0	5-9
Asbestos		NAD	NAD	NAD
Sulphate	mg/l SO4	54	249	500

NAD = No asbestos detected

All tests undertaken for heavy metals were within guidelines for residential use of the site with plant uptake. Asbestos fibres were not detected and pH and sulphate were within acceptable levels.

TABLE 2
Results of Tests for Polyaromatic Hydrocarbons (PAH)

Polyaromatic Hydrocarbons	Units	Minimum Value	Maximum Value	ATRISK Contaminated Land Screening Values (SSV)
				Residential with plant uptake in mg/kg
Naphthalene	mg/kg	<0.02	0.03	12.2
Acenaphthylene	mg/kg	<0.02	0.03	920
Acenaphthene	mg/kg	<0.02	0.07	2760
Fluorene	mg/kg	<0.02	0.07	2610
Phenanthrene	mg/kg	0.13	0.77	440
Anthracene	mg/kg	0.02	0.18	26200
Fluoranthene	mg/kg	0.29	1.31	2980
Pyrene	mg/kg	0.26	1.14	2120
Benzo(a)anthracene	mg/kg	0.12	0.84	13
Chrysene	mg/kg	0.15	0.84	27
Benzo(b)fluoranthene	mg/kg	0.19	0.95	3.7
Benzo(k)fluoranthene	mg/kg	0.10	0.41	100
Benzo(a)pyrene	mg/kg	0.13	0.77	4.95
Indeno(1,2,3-cd)pyrene	mg/kg	0.10	0.53	41
Dibenz(a,h)anthracene	mg/kg	<0.02	0.06	0.3
Benzo(ghi)perylene	mg/kg	0.09	0.43	350
TOTAL PAH	mg/kg	1.54	7.41	

All PAHs results were within guidelines for use of the site for residential houses with plant uptake.

TABLE 3
Results of Tests for Total Petroleum Hydrocarbons (TPH)

Total Petroleum Hydrocarbons		Minimum Value mg/kg	Maximum Value mg/kg	ATRISK Contaminated Land Screening Values (SSV)
				Residential with plant uptake in mg/kg
Aromatic Hydrocarbons (mg/kg)	>C5-C7	<0.01	<0.01	0.871
	>C7-C8	<0.01	<0.01	780
	>C8-C10	<0.01	<0.01	232
	>C10-C12	<1	<1	468
	>C12-C16	<1	<1	830
	>C16-C21	<1	4	1040
	>C21-C35	<1	5	1710
	>C35-C40	<1	<1	28400
Aliphatic Hydrocarbons (mg/kg)	>C5-C6	<0.1	<0.1	369
	>C6-C8	<0.1	<0.1	1240
	>C8-C10	<0.1	<0.1	204
	>C10-C12	<4	<4	1180
	>C12-C16	<4	8	4130
	>C16-C35	41	273	210,100
	>C35-C40	18	59	

All TPHs results were within guidelines for use of the site for residential with plant uptake.

6.2.4 Environmental Test Results for Topsoil Stockpile

The stockpile was tested for heavy metals, PAH speciated, TPH CWG UK, pH, sulphate and asbestos fibres. Test results are presented in Tables 4, 5 and 6 and detailed in full in Chemtech Report 90429 in Appendix B.

TABLE 4
Results of Tests for Heavy Metals

Metals	Units	Value	ATRISK Contaminated Land Screening Values (SSV)
			Residential with plant uptake in mg/kg
Boron	mg/kg	<0.5	290
Mercury	mg/kg	<0.5	1.44
Nickel	mg/kg	10	136
Copper	mg/kg	20	4790
Zinc	mg/kg	51	20,300
Selenium	mg/kg	0.7	375
Chromium VI	mg/kg	<1	20.5
Arsenic	mg/kg	9.2	37
Cadmium	mg/kg	0.2	22.1
Lead	mg/kg	50	200
pH	-	6.9	5-9
Sulphate	mg/l SO4	89	500
Asbestos	-	NAD	NAD

NAD = No Asbestos detected

All tests undertaken for heavy metals, pH and sulphate were within guidelines for residential use of the site with plant uptake. No asbestos fibres were detected in the samples.

Figure 6 Topsoil stockpile

TABLE 5
Results of Tests for Polyaromatic Hydrocarbons (PAH)

Polyaromatic Hydrocarbons	Units	Value	ATRISK Contaminated Land Screening Values (SSV)
			Residential with plant uptake in mg/kg
Naphthalene	mg/kg	<0.02	12.2
Acenaphthylene	mg/kg	<0.02	920
Acenaphthene	mg/kg	0.05	2760
Fluorene	mg/kg	0.03	2610
Phenanthrene	mg/kg	0.47	440
Anthracene	mg/kg	0.09	26200
Fluoranthene	mg/kg	0.84	2980
Pyrene	mg/kg	0.74	2120
Benzo(a)anthracene	mg/kg	0.34	13
Chrysene	mg/kg	0.43	27
Benzo(b)fluoranthene	mg/kg	0.46	3.7
Benzo(k)fluoranthene	mg/kg	0.18	100
Benzo(a)pyrene	mg/kg	0.31	4.95
Indeno(1,2,3-cd)pyrene	mg/kg	0.31	41
Dibenz(a,h)anthracene	mg/kg	0.04	0.3
Benzo(ghi)perylene	mg/kg	0.25	350
TOTAL PAH	mg/kg	4.53	

All tests undertaken for speciated Polyaromatic Hydrocarbons were within guidelines for residential use of the site with plant uptake.

TABLE 6
Results of Tests for Total Petroleum Hydrocarbons (TPH)

Total Petroleum Hydrocarbons		Value	ATRISK Contaminated Land Screening Values (SSV)
			Residential with plant uptake in mg/kg
Aromatic Hydrocarbons (mg/kg)		<0.01	0.871
	>C7-C8	<0.01	780
	>C8-C10	<0.01	232
	>C10-C12	<1	468
	>C12-C16	<1	830
	>C16-C21	3	1040
	>C21-C35	3	1710
	>C35-C40	<1	28400
Aliphatic Hydrocarbons (mg/kg)	>C5-C6	<0.1	369
	>C6-C8	<0.1	1240
	>C8-C10	<0.1	204
	>C10-C12	<4	1180
		5	4130
	>C16-C21	83	210100
	>C21-C35	83	
	>C35-C40	35	210100

All tests undertaken for speciated Total Petroleum Hydrocarbons were within guidelines for residential use of the site with plant uptake.

The soil samples from the gardens and the topsoil stockpile were all found to be uncontaminated according to guidelines by heavy metals, hydrocarbons, pH and sulphate and asbestos.

Tests for PAHs on soil samples showed none of the samples exceeded the guidelines for individual compounds and none exhibited free product and therefore all samples are considered uncontaminated in line with guidelines. Tests on soil samples for TPH all fell within guidelines for individual compounds. The results indicate the soils tested are not contaminated by hydrocarbons.

Based on the environmental test results on soil samples, the visual and olfactory evidence and the remediation and mitigating measures undertaken on site it is validated that the remediation of the gardens has taken place in accordance with the Remediation Statement.

The area remediated is fit for purpose according to the investigation and environmental testing and remediation undertaken and validated.

6.3 Gas Membrane and underfloor venting area

The validation of the installation of the gas membrane, taping and validation of the underfloor venting area was undertaken by GeoShield with all photographs and validation sheets presented in Appendix C.

Figure 7 Underfloor Venting Areas

7. SUMMARY

The remediation was validated by site inspection by GeoShield and Ashton Bennett, with site visits and laboratory testing in August and September 2021.

Contaminated soil was not detected beneath house plots 7 to 13. Any undetected contamination is unlikely to detrimentally affect sensitive receptors due to the hard standing cover over the site and the imported uncontaminated soil on the garden areas.

The remediation work to the rear gardens was validated by site visits by Ashton Bennett Consultancy and by selective laboratory environmental testing of soil samples and of imported topsoil and reporting of results to Planning Services, plus on site visual/olfactory observations during site visits.

Clean up standards were assessed against the latest ATRISK guidelines based on CLEA guidelines where published in 2017 and LQM/CIEH guidelines. Based on the soil testing there is no recorded contamination that has the potential to detrimentally harm sensitive receptors. The guidelines used are for land with residential use with plant uptake use in accordance with the guidelines of CLR11 (DEFRA).

Based on the site visits and environmental test results and the remediation and mitigating measures undertaken on site, it is validated that the remediation has taken place in accordance with the Remediation Statement. Any undetected contamination is sealed with hardcover or a geotextile and 600mm of topsoil, thus

breaking pathways for contamination to harm humans or the environment. The risk of the site causing harm has therefore been eliminated.

This Consultancy attended on an appropriate number of other occasions to check the nature of material exposed on the site and to validate the remediation including inspecting the laying of the geotextile and the assessment of laboratory tests on soil samples from the house gardens.

No material was removed from the site.

Standards for imported material were assessed against derived SSVs as detailed in Tables1 to 6 inclusive and as a risk assessment as to whether the material has the potential to harm sensitive receptors. The SSV guidelines used were for residential land use with plant uptake in gardens.

The risk assessment indicates there is a low risk of undetected contamination detrimentally affecting the future occupants and workmen or other users of the site in the future and a low risk of the environment and controlled waters being detrimentally affected as the garden areas have been sealed and any undetected contamination lies beneath sufficient topsoil cover.

The mitigating measures undertaken will prevent any undetected contamination from migrating and reaching sensitive receptors. The house plots 7-13 are fit for purpose according to the mitigating measures and validation of a gas membrane and underfloor venting in the houses and a geotextile and 600mm of tested as uncontaminated topsoil in the gardens.

8. GENERAL REMARKS

This report truly reflects the conditions found during the Validation of the remediation. Whilst the Validation and Remediation were undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research the results portrayed only pertain to the information attained and it is possible that other undetected information and undetected ground and gas conditions and undetected contamination and undetected mining may exist. The Validation was only undertaken within the house plots14 to 21 boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the Report SIG 3454 VAL 7-13 is read in full to ensure that all recommendations have been understood.

Frances A Bennett
BSc, CGeol, FGS, FIMMM, CEnv, MCIWEM, AIEMA, MIEnvSci.

Appendix **A**

View over the newly laid 600mm thick topsoil in rear gardens of 7 – 13 house plots

Trial Pits outside House Plot No 9 confirming 600mm of topsoil

View along retaining wall showing topsoil on upper and lower garden levels where trial pits were excavated. Aggregate laid over geotextile shows areas where hard cover will be laid.

Garden area of house plots 11 and 13 showing the 600mm depth of topsoil in the excavated trial pits.

Close up of measuring pole in TP indicating topsoil depth greater than 600mm

Appendix **B**

2531

ANALYTICAL TEST REPORT

Contract no: 90429

Contract name: ABC

Client reference: -

Clients name: Ashton Bennett

Clients address: 131 Huddersfield Road
Holmfirth
West Yorkshire
HD9 3TW

Samples received: 21 October 2020

Analysis started: 23 October 2020

Analysis completed: 30 October 2020

Report issued: 30 October 2020

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Karan Campbell
Director

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
90429-1	HE	-	Loam with Gravel	-	-	21.5
90429-2	FL	-	Clay with Gravel	-	-	17.3
90429-3	ML	-	Clay with Gravel	-	-	17.4

Chemtech Environmental Limited

SOILS

Lab number			90429-1	90429-2	90429-3
Sample id			HE	FL	ML
Depth (m)			-	-	-
Date sampled			19/10/2020	19/10/2020	19/10/2020
Test	**Method**	**Units**			
Arsenic (total)	CE127 M	mg/kg As	7.1	4.1	5.2
Cadmium (total)	CE127 M	mg/kg Cd	<0.2	<0.2	<0.2
Chromium (total)	CE127 M	mg/kg Cr	56	74	64
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	15	32	32
Lead (total)	CE127 M	mg/kg Pb	50	27	24
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	8.3	40	41
Selenium (total)	CE127 M	mg/kg Se	0.8	1.6	1.5
Zinc (total)	CE127 M	mg/kg Zn	63	88	112
pH	CE004 M	units	6.9	7.5	8.2
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	45	41	60
PAH					
Naphthalene	CE087 M	mg/kg	0.05	0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	0.02	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02
Fluorene	CE087 U	mg/kg	0.03	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	0.30	0.13	0.07
Anthracene	CE087 U	mg/kg	0.06	0.04	0.02
Fluoranthene	CE087 M	mg/kg	0.58	0.24	0.15
Pyrene	CE087 M	mg/kg	0.50	0.23	0.14
Benzo(a)anthracene	CE087 U	mg/kg	0.25	0.12	0.08
Chrysene	CE087 M	mg/kg	0.31	0.15	0.09
Benzo(b)fluoranthene	CE087 M	mg/kg	0.37	0.17	0.10
Benzo(k)fluoranthene	CE087 M	mg/kg	0.14	0.06	0.04
Benzo(a)pyrene	CE087 U	mg/kg	0.28	0.13	0.08
Indeno(123cd)pyrene	CE087 M	mg/kg	0.20	0.08	0.05
Dibenz(ah)anthracene	CE087 M	mg/kg	0.05	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.18	0.08	0.05
PAH (total of USEPA 16)	CE087	mg/kg	3.31	1.46	0.85
TPH					
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	0.04	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	2	<1	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	3	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1

Chemtech Environmental Limited

SOILS

Lab number			90429-1	90429-2	90429-3
Sample id			HE	FL	ML
Depth (m)			-	-	-
Date sampled			19/10/2020	19/10/2020	19/10/2020
Test	**Method**	**Units**			
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	51	16	20
EPH Aliphatic (>C35-C44)	CE068	mg/kg	15	<10	<10
Subcontracted analysis					
Asbestos (qualitative)	$	-	NAD	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
90429-1	HE	-	N	
90429-2	FL	-	N	
90429-3	ML	-	N	

ANALYTICAL TEST REPORT

Contract no: 99753

Contract name: ABC

Client reference: 3454

Clients name: Ashton Bennett

Clients address: 131 Huddersfield Road
Holmfirth
West Yorkshire
HD9 3TW

Samples received: 26 August 2021

Analysis started: 26 August 2021

Analysis completed: 03 September 2021

Report issued: 03 September 2021

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
99753-1	7	-	Sandy Loamy Clay with Gravel	-	-	21.0
99753-2	8	-	Sandy Loamy Clay with Gravel	-	-	18.7
99753-3	9	-	Sandy Loamy Clay with Gravel	-	-	16.9
99753-4	10	-	Sandy Loamy Clay with Gravel	-	-	21.9
99753-5	11	-	Sandy Loamy Clay with Roots	-	-	22.8
99753-6	12	-	Sandy Loamy Clay with Roots	-	-	20.2
99753-7	13	-	Sandy Loamy Clay with Roots	-	-	22.8

Chemtech Environmental Limited

SOILS

Lab number			99753-1	99753-2	99753-3	99753-4	99753-5	99753-6
Sample id			7	8	9	10	11	12
Depth (m)			-	-	-	-	-	-
Date sampled			23/08/2021	23/08/2021	23/08/2021	23/08/2021	23/08/2021	23/08/2021
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	9.5	9.3	8.2	9.9	9.8	9.8
Cadmium (total)	CE127 M	mg/kg Cd	0.2	0.3	<0.2	0.2	0.2	0.3
Chromium (total)	CE127 M	mg/kg Cr	182	199	170	200	188	177
Copper (total)	CE127 M	mg/kg Cu	21	21	20	20	21	22
Lead (total)	CE127 M	mg/kg Pb	53	50	47	54	57	66
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	13	13	12	12	12	16
Selenium (total)	CE127 M	mg/kg Se	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Zinc (total)	CE127 M	mg/kg Zn	59	53	53	56	55	59
pH	CE004 M	units	6.7	6.8	6.7	6.7	6.7	6.5
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	61	67	66	57	54	58
PAH								
Naphthalene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02	<0.02	0.03	<0.02	0.02	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	0.07	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02	0.05	<0.02
Phenanthrene	CE087 M	mg/kg	0.23	0.17	0.19	0.13	0.77	0.20
Anthracene	CE087 U	mg/kg	0.04	0.06	0.05	0.02	0.14	0.06
Fluoranthene	CE087 M	mg/kg	0.53	0.42	1.14	0.29	1.31	0.47
Pyrene	CE087 M	mg/kg	0.47	0.39	1.14	0.26	1.10	0.42
Benzo(a)anthracene	CE087 U	mg/kg	0.24	0.19	0.84	0.12	0.51	0.21
Chrysene	CE087 M	mg/kg	0.22	0.19	0.84	0.15	0.59	0.26
Benzo(b)fluoranthene	CE087 M	mg/kg	0.36	0.30	0.95	0.19	0.62	0.30
Benzo(k)fluoranthene	CE087 M	mg/kg	0.15	0.10	0.41	0.06	0.22	0.11
Benzo(a)pyrene	CE087 U	mg/kg	0.27	0.21	0.77	0.14	0.48	0.21
Indeno(123cd)pyrene	CE087 M	mg/kg	0.21	0.18	0.53	0.10	0.36	0.18
Dibenz(ah)anthracene	CE087 M	mg/kg	0.04	0.03	0.10	<0.02	0.06	0.03
Benzo(ghi)perylene	CE087 M	mg/kg	0.18	0.14	0.43	0.09	0.29	0.14
PAH (total of USEPA 16)	CE087	mg/kg	2.93	2.37	7.41	1.54	6.58	2.59
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	2	2	4	<1	4	2
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	2	2	5	<1	4	2
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Chemtech Environmental Limited

SOILS

Lab number			99753-1	99753-2	99753-3	99753-4	99753-5	99753-6
Sample id			7	8	9	10	11	12
Depth (m)			-	-	-	-	-	-
Date sampled			23/08/2021	23/08/2021	23/08/2021	23/08/2021	23/08/2021	23/08/2021
Test	**Method**	**Units**						
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	5	8	5	6
EPH Aliphatic (>C16-C35)	CE068	mg/kg	120	72	107	193	127	273
EPH Aliphatic (>C35-C44)	CE068	mg/kg	45	28	32	59	37	41
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			99753-7
Sample id			13
Depth (m)			-
Date sampled			23/08/2021
Test	**Method**	**Units**	
Arsenic (total)	CE127 M	mg/kg As	9.7
Cadmium (total)	CE127 M	mg/kg Cd	0.3
Chromium (total)	CE127 M	mg/kg Cr	224
Copper (total)	CE127 M	mg/kg Cu	20
Lead (total)	CE127 M	mg/kg Pb	53
Mercury (total)	CE127 M	mg/kg Hg	<0.5
Nickel (total)	CE127 M	mg/kg Ni	12
Selenium (total)	CE127 M	mg/kg Se	<0.3
Zinc (total)	CE127 M	mg/kg Zn	57
pH	CE004 M	units	6.4
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	249
PAH			
Naphthalene	CE087 M	mg/kg	0.03
Acenaphthylene	CE087 M	mg/kg	0.02
Acenaphthene	CE087 M	mg/kg	0.05
Fluorene	CE087 U	mg/kg	0.05
Phenanthrene	CE087 M	mg/kg	0.68
Anthracene	CE087 U	mg/kg	0.10
Fluoranthene	CE087 M	mg/kg	0.96
Pyrene	CE087 M	mg/kg	0.80
Benzo(a)anthracene	CE087 U	mg/kg	0.40
Chrysene	CE087 M	mg/kg	0.49
Benzo(b)fluoranthene	CE087 M	mg/kg	0.59
Benzo(k)fluoranthene	CE087 M	mg/kg	0.22
Benzo(a)pyrene	CE087 U	mg/kg	0.44
Indeno(123cd)pyrene	CE087 M	mg/kg	0.35
Dibenz(ah)anthracene	CE087 M	mg/kg	0.06
Benzo(ghi)perylene	CE087 M	mg/kg	0.28
PAH (total of USEPA 16)	CE087	mg/kg	5.54
TPH			
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	4
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	4
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1

Chemtech Environmental Limited

SOILS

Lab number			99753-7
Sample id			13
Depth (m)			-
Date sampled			23/08/2021
Test	**Method**	**Units**	
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	93
EPH Aliphatic (>C35-C44)	CE068	mg/kg	34
Subcontracted analysis			
Asbestos (qualitative)	$	-	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		6	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		6	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		15	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
99753-1	7	-	N	
99753-2	8	-	N	
99753-3	9	-	N	
99753-4	10	-	N	
99753-5	11	-	N	
99753-6	12	-	N	
99753-7	13	-	N	

ANALYTICAL TEST REPORT

Contract no: 100469

Contract name: Midlo

Client reference: 3454

Clients name: Ashton Bennett

Clients address: 131 Huddersfield Road
Holmfirth
West Yorkshire
HD9 3TW

Samples received: 16 September 2021

Analysis started: 16 September 2021

Analysis completed: 23 September 2021

Report issued: 23 September 2021

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
100469-1	Sample 10	-	Sandy Loam with Gravel	-	-	15.3
100469-2	Sample 11	-	Sandy Loam with Gravel & Roots	-	-	15.6
100469-3	Sample 12	-	Sandy Clayey Loam with Gravel	-	-	14.2
100469-4	Sample 13	-	Sandy Clayey Loam with Gravel	-	-	16.4

Chemtech Environmental Limited

SOILS

Lab number			100469-1	100469-2	100469-3	100469-4
Sample id			Sample 10	Sample 11	Sample 12	Sample 13
Depth (m)			-	-	-	-
Date sampled			13/09/2021	13/09/2021	13/09/2021	13/09/2021
Test	**Method**	**Units**				
Arsenic (total)	CE127 M	mg/kg As	9.9	10	10	11
Cadmium (total)	CE127 M	mg/kg Cd	0.3	0.3	0.2	0.3
Chromium (total)	CE127 M	mg/kg Cr	173	138	176	143
Copper (total)	CE127 M	mg/kg Cu	24	21	22	55
Lead (total)	CE127 M	mg/kg Pb	62	56	56	59
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	16	12	13	14
Selenium (total)	CE127 M	mg/kg Se	0.9	0.8	0.8	0.9
Zinc (total)	CE127 M	mg/kg Zn	72	55	55	73
pH	CE004 M	units	7.0	6.9	6.8	6.5
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	185	159	68	100
PAH						
Naphthalene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	0.03	0.02	0.03	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	0.04	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02	0.07	<0.02
Phenanthrene	CE087 M	mg/kg	0.27	0.20	0.58	0.14
Anthracene	CE087 U	mg/kg	0.04	0.05	0.18	0.03
Fluoranthene	CE087 M	mg/kg	0.57	0.51	0.75	0.41
Pyrene	CE087 M	mg/kg	0.45	0.46	0.71	0.40
Benzo(a)anthracene	CE087 U	mg/kg	0.22	0.22	0.33	0.20
Chrysene	CE087 M	mg/kg	0.21	0.21	0.31	0.18
Benzo(b)fluoranthene	CE087 M	mg/kg	0.34	0.35	0.38	0.31
Benzo(k)fluoranthene	CE087 M	mg/kg	0.14	0.14	0.16	0.13
Benzo(a)pyrene	CE087 U	mg/kg	0.23	0.26	0.29	0.22
Indeno(123cd)pyrene	CE087 M	mg/kg	0.20	0.22	0.24	0.20
Dibenz(ah)anthracene	CE087 M	mg/kg	0.04	0.05	0.06	0.03
Benzo(ghi)perylene	CE087 M	mg/kg	0.18	0.19	0.20	0.16
PAH (total of USEPA 16)	CE087	mg/kg	2.93	2.87	4.33	2.40
TPH						
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	2	2	3	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	2	2	3	2
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1

Chemtech Environmental Limited

SOILS

Lab number			100469-1	100469-2	100469-3	100469-4
Sample id			Sample 10	Sample 11	Sample 12	Sample 13
Depth (m)			-	-	-	-
Date sampled			13/09/2021	13/09/2021	13/09/2021	13/09/2021
Test	**Method**	**Units**				
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	<4	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	50	133	41	44
EPH Aliphatic (>C35-C44)	CE068	mg/kg	19	45	18	19
Subcontracted analysis						
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		6	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		6	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		15	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
100469-1	Sample 10	-	N	
100469-2	Sample 11	-	N	
100469-3	Sample 12	-	N	
100469-4	Sample 13	-	N	

Appendix C

GEOSHIELD Verification Report

PROJECT REFERENCE:	GEO101204
REPORT NUMBER:	009
PROJECT:	Signature Homes - Holmfirth
PROJECT ADDRESS:	New Mill Road

Holmfirth

HD9 7LT

MEMBRANE SPECIFICATION:	Gas membrane to specification BS8485 2019

Installed to CIRIA 735

Visqueen GR DPC

Visqueen Standard Gas Barrier

Visqueen Double Sided Butyl Tape

Visqueen GR Foil Tape

Visqueen GR Lap Tape

Visqueen Pro Detailing Tape

GEOSHIELD Verification PLAN

SPECIFICATION:

INFORMATION INCLUDED:

Material Specification Technical Data Sheets

Geotechnical Survey Report - PR/AJK/39141/007

Site Layout - Final

Phase Plan

1602-110 House Type - Venice - Roma - Florence

1602-111 House Type - Tuscany

1602-300 Draft Foundations

1602-301 Draft Foundations

1451-700a Typical Tanking Detail

Information presented to at the pre-verification stage assumed correct.

Any change client will let GeoShield know, or this Pre-verification Plan will be void.

GEOSHIELD Verification Report

VERIFICATION OFFICER: Chris Ingham

VERIFICATION COMPANY: GeoShield Limited

Icon Business Park, 4100 Park Approach

Thorpe Park, LEEDS

West Yorkshire

LS15 8GB

CONTACT NUMBER: 07555214679

EMAIL ADDRESS: CIngham@Geoshield.co.uk

ORDER NUMBER:

PER VISIT: YES: ✔ NO: ☐ PROJECT: YES: ☐ NO: ✔

GEOSHIELD Verification Report

CLIENT DETAILS

CLIENT CONTACT:	John Hewitt
CONTACTS ROLE:	Signature Homes Ltd
MOBILE PHONE:	
EMAIL ADDRESS:	Johnhewittbeyond@hotmail.com

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	
NOTES:	
NOTES:	

GEOSHIELD Verification Report

APPLICATION TEAM LEADERS

APPLICATOR NAME: John Hewitt

COMPANY: Signature Homes

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME: Adrian Needle

COMPANY: Signature Homes

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES:

NOTES:

NOTES:

NOTES:

GEOSHIELD Verification Report

AREA SURVEYED: Plots 7-13

SITE CONDITIONS:

WEATHER: Sunny

TEMPERATURE: 20c

MEMBRANE TEMPERATURE: N/A

RELATIVE HUMIDITY: 71

TIME: 09:00 - 12:00 REPORT NUMBER: 009

DATE: 26/07/2021

ACCOMPANIED Adrian Needle

GEOSHIELD Verification Report

VERIFICATION LAYOUT

Plots 7-13 infills verified in this report

Highlighted above

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

Overview of Plots 7-13

Visqueen Standard Gas Barrier visible through glass doors

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

Overview of Plots 7-13

GEOSHIELD Verification Report

OVERVIEW PHOTOGRAPHS

Close up Alternative overview of the Installed Area.

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

LOCATION/GRID LINE: Plots 7-13

NOTES: Pipe penetrations were sealed previously with the perimeter and partition install. Visqueen Standard Gas Barrier sealed to the GR DPC and pipe pens details to good standard. All works visually inspected and tested with Mechanical Point Stress Test (Pick and probe). No faults found.

1. Pick and probe to pipe pen detail

2. Pick and probe to pipe pen detail

GEOSHIELD Verification Report

VERIFICATION ITEM ONE

3. Overview of pipe penetration sealed to good standard. Passed and verified.

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

LOCATION/GRID LINE: Plots 7-13

NOTES: Visqueen Standard Gas Barrier sealed to GR DPC

using double sided butyl tape and GR Lap Tape as per design detail. Visual inspection

and pick and probe carried out. Good bond achieved - no faults found.

1. Pick and probe carried out to GR Lap Tape

2. Good bond and good overlap, between strips of GR Lap Tape

Passed and verified with no faults found

GEOSHIELD Verification Report

VERIFICATION ITEM TWO

3. Photo evidence of good bond achieved.

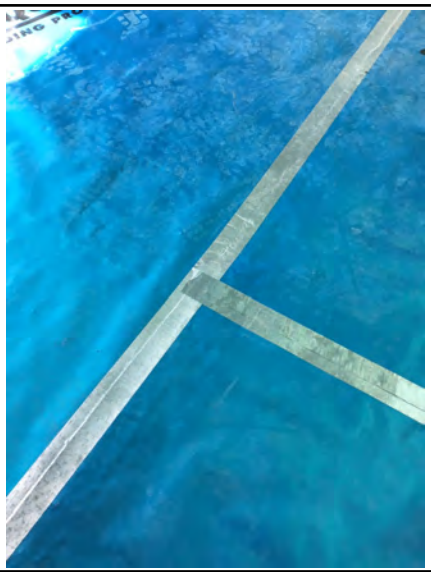
This good standard has been maintained throughout all plots.

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

LOCATION/GRID LINE: Plots 7-13

NOTES: Joints in the Visqueen Standard Gas Barrier have been sealed as per manufacturers specification. Visual inspection and pick and probe carried out. Good install with no faults found.



1. GR Foil Tape applied to overlaps and continuous seal achieved.

2. Double sided butyl tape installed in all joints

GEOSHIELD Verification Report

VERIFICATION ITEM THREE

3. Pick and probe carried out to ensure good bond achieved.

GEOSHIELD Verification Report

REMEDIATION LOG

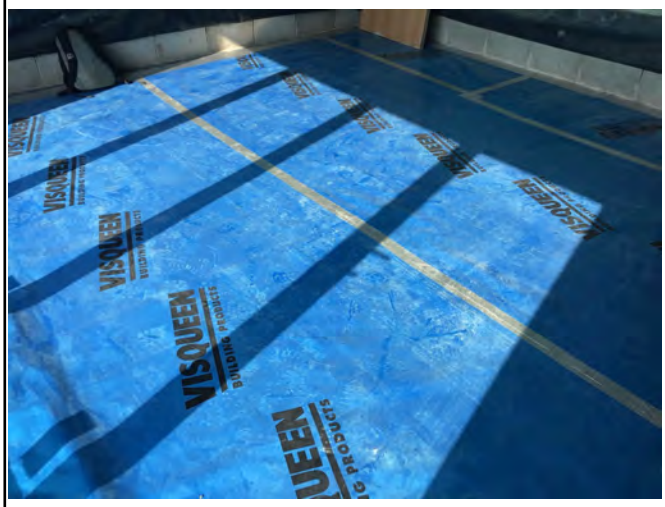
Date	Nr	Remediation Description	Y/N
02/11/2020	001	DPC installation had major limitations due to blockwork install.	✔
02/11/2020	002	GR DPC installed but major limitations caused by blockwork.	✔
02/11/2020	003	GR DPC already covered with blockwork, however, so limitations	
		were caused, however, remediations will be made during the infill	
		process.	✔
02/11/2020	004	Corners must be seen on future visit.	✔
13/11/2020	005	Visqueen Low Perm on site - informed needs upgrading to	✔
		Visqueen Standard Gas Barrier.	
11/12/2020	006	No faults found.	✔
28/02/2021	007	No faults found.	✔
24/03/2021	008	No faults found.	✔
26/07/2021	009	No faults found.	✔

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

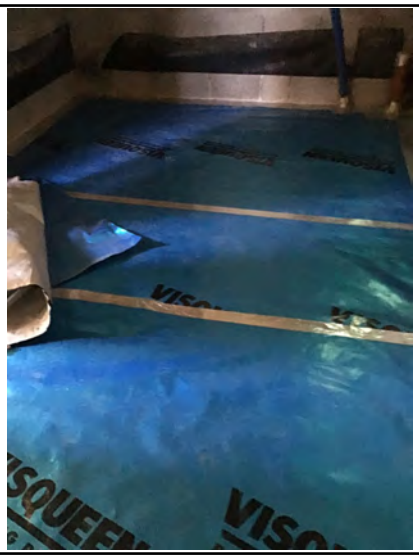
Plot 7

Exterior of Plot



Plot 7

Photo evidence of good install



Plot 7

Photo evidence of good install

Plot 7

Photo evidence of good install

GEOSHIELD Verification Report

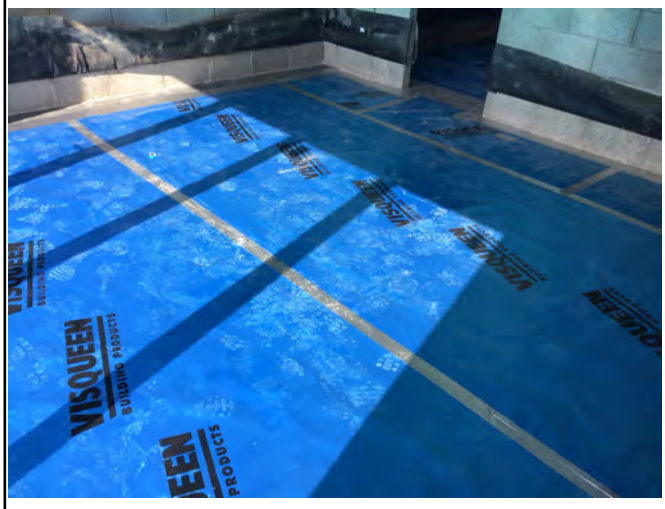
ADDITIONAL PHOTOGRAPHS

Plot 8

Photo evidence of good install

Plot 8

Photo evidence of good install



Plot 8

Photo evidence of good install

Plot 8

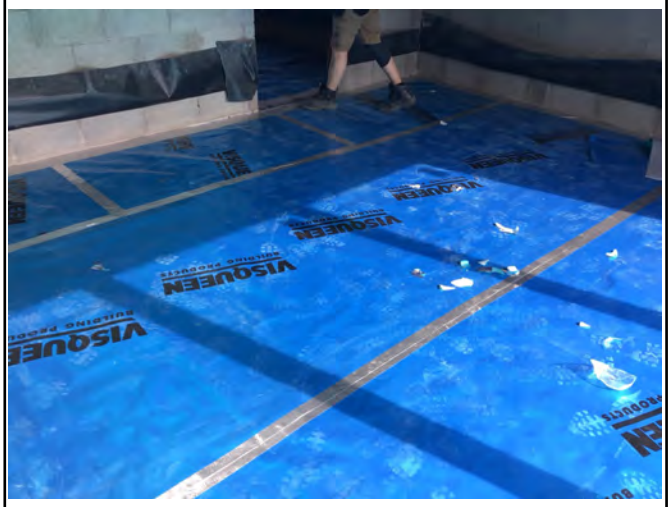
Photo evidence of good install

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Plot 9

Exterior of Plot



Plot 9

Photo evidence of good install

Plot 9

Photo evidence of good install

Plot 9

Photo evidence of good install

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Plot 10

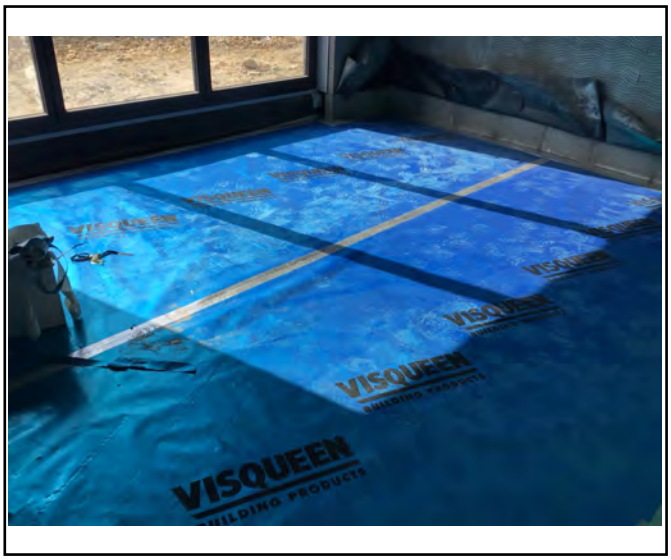
Exterior of Plot

Plot 10

Photo evidence of good install

Plot 10

Photo evidence of good install



Plot 10

Photo evidence of good install

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Plot 11

Exterior of Plot

Plot 11

Photo evidence of good install

Plot 11

Photo evidence of good install

Plot 11

Photo evidence of good install

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Plot 12

Exterior of Plot

Plot 12

Photo evidence of good install

Plot 12

Photo evidence of good install

Plot 12

Photo evidence of good install

GEOSHIELD Verification Report

ADDITIONAL PHOTOGRAPHS

Plot 13

Exterior of Plot

Plot 13

Photo evidence of good install

Plot 13

Photo evidence of good install

Plot 13

Photo evidence of good install

GEOSHIELD Verification Report

GAS MEMBRANE TESTING

VISUAL:	YES	✔	NO		SMOKE TEST:	YES		NO	✔
COMPRESSED AIR:	YES		NO	✔	DIELECTRIC	YES		NO	✔
DESTRUCTIVE:	YES		NO	✔	OTHER:	YES	✔	NO	

Testing checklist attached: YES NO

Gridline/Plot Sign off

Gridline/Plot Sign off	Plots 16,17 & 20,21 Perimeters and Partitions	✔
Gridline/Plot Sign off	Plots 14-15 & 18-19 Perimeters and Partitions	✔
Gridline/Plot Sign off	Plots 7-11 Perimeters and Partitions	✔
Gridline/Plot Sign off	Plots 12-13 Perimeters and Partitions	✔
Gridline/Plot Sign off	Plots 20-21	✔
Gridline/Plot Sign off	Plots 14-15 and 18-19	✔
Gridline/Plot Sign off	Plots 16-17	✔
Gridline/Plot Sign off	Plots 7-13	✔
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		
Gridline/Plot Sign off		

GEOSHIELD Verification Report

VERIFICATION SUMMARY

Report 009 is for Plots 7-13. Visqueen standard gas barrier has been installed in the infill as per manufacturers guidelines. All joints sealed with double sided butyl tape and GR Foil Tape or GR Lap Tape. Correct tapes used throughout.

Visual inspection and a Mechanical Point Stress Test (Pick and Probe) carried out to all works. Excellent standard of installation throughout.

Passed and verified in accordance with BS8485:2019 and CIRIA 735.

Phase 1 is now complete and ready for handover before works on Phase 2 commence.