

Completion Report

For a site at

Site 2 Broadoak Road, Wythenshawe

Undertaken for

PJ Services (Bolton) Ltd

Report Title:	Site 2 Broadoak Road, Wythenshawe Validation Completion Report
Report Reference:	8398G-WML-XX-ZZ-RP-G-0007-A
Client:	PJ Services (Bolton) Ltd
Issue Date:	25th May 2021
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Revision Status / History

Rev	Date	Issue	Prepared	Checked	Authorised
-	25/05/2021	Original Issue	TPB	SCS	SCS
A	23/09/2021	Revised following comments	TPB	SCS	SCS

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CONTENTS

1.0	INTRODUCTION	1
	Appointment	1
	Proposed Development	1
	Background	1
	Verification	1
2.0	SUMMARY OF ENVIRONMENTAL CONDITIONS	2
	Ground Conditions	2
	Ground Gas Monitoring	3
3.0	SUMMARY OF REMEDIATION OBJECTIVES.....	4
	Gas Protection Measures	4
	Capping Requirements for Private Gardens.....	4
	General.....	4
4.0	VALIDATION.....	6
	Unforeseen Ground Contamination	6
	General Groundworks	6
	Gas Protection.....	6
	Imported Topsoil / Subsoil	7
	Capping Thickness	7
	Water Supply Pipes.....	7
5.0	CONCLUSIONS	9
	Capping Requirements for Garden / Landscaped Areas	9

APPENDICES

Appendix 01	-	Drawings
Appendix 02	-	Photographs
Appendix 03	-	Gas Membrane Specification
Appendix 04	-	Chemical Analyses from Source
Appendix 05	-	Chemical Analyses from Site
Appendix 06	-	Waste Transfer Documentation
Appendix 07	-	Soil Assessment Criteria
Appendix 08	-	United Utilities Risk Assessment

1.0 INTRODUCTION

Appointment

- 1.1 WML Consulting (WML) has been commissioned by PJ Services (Bolton) Ltd to prepare a Completion Report in relation to development of land located at the junction of Broadoak Road and Honford Road, Wythenshawe.

Proposed Development

- 1.2 It is understood that the redevelopment will comprise the construction of 2no semi-detached and 1no detached single-storey residential units with hardstanding for parking together with private gardens and landscaped area.
- 1.3 The proposed development plan is presented in Appendix 01.

Background

- 1.4 WML were initially commissioned by Wythenshawe Community Housing Group to undertake a Phase 1 Desk Study and Phase 2 Investigation and Assessment. These culminated in the following reports.
- Phase 1 Desk Study and Preliminary Geo-environmental Assessment, Reference 8398G/02, dated September 2018.
 - Phase 2 Geo-environmental Investigation and Assessment, Reference 8398G/04, dated October 2018.
 - Updated Ground Gas Risk Assessment, Reference 8398G/TPB, dated 10th January 2019.
- 1.5 Subsequently WML were commissioned by PJ Services (Bolton) Ltd to produce the following report in consideration of the need for remedial measures to be outlined and agreed as a pre-development requirement.
- Remediation Strategy, Reference 8398G/06, dated February 2020.
- 1.6 The reports have been presented to Manchester City Council Planning Division in support of Planning Application No. 122464/FO/2019.

Verification

- 1.7 This report presents the compilation of the remediation / validation information obtained during the redevelopment programme associated with the capping of garden areas as identified within the Remediation Strategy.

2.0 SUMMARY OF ENVIRONMENTAL CONDITIONS

- 2.1 The following paragraphs summarise the most relevant findings of the Phase 1 and Phase 2 reports.
- 2.2 British Geological Survey (BGS) plans indicate the site to be underlain by Devensian Glacial Till which mainly comprises clay with occasional sand and silt. The superficial deposits are indicated to be underlain by strata of the Triassic Bollin Mudstone Member which generally comprise mudstone with horizons of halite.
- 2.3 The property is not in a radon affected area as defined by the BGS/Public Health England as less than 1% of properties are above the action level of exposure.
- 2.4 The glacial till is classified as a 'Secondary Aquifer – Undifferentiated' (formerly unproductive). The bedrock underlying the site is classified as a 'Secondary (B) Aquifer'.
- 2.5 The nearest surface water feature is Baguley Brook 399m north-west of the site boundary.
- 2.6 There are no active, non-operational or historic landfills recorded within 1km of the site.
- 2.7 There are 4no potentially contaminative industrial sites within 250m of the subject site, all electricity sub-stations around 197m and 200m north-east and 212m south-west.
- 2.8 The earliest map dated 1876 indicate the site to comprise a centrally located pond, with a smaller, presumably interconnected pond in the north-eastern corner. The ponds were surrounded by tree lined (presumably oak) field boundaries. A footpath extended roughly south-west to north-east between the two ponds before extending northwards from the northernmost apex of the site. By 1938 the smaller pond had been infilled and the site appeared to form an area of public open space surrounded by Broadoak Road to the north, east and west and Hanford Road to the south. Although the site has remained undeveloped, the historical plans indicate that the centrally located larger pond was infilled between 1977 and 1985.

Ground Conditions

- 2.9 Ground conditions encountered during the intrusive investigation in summary comprise made ground to depths of between 0.30m and 3.00mbgl underlain locally by pond deposits and glacial deposits to depths of between 2.05m and 3.80mbgl. Below these depths the superficial deposits were in turn underlain by weathered Bollin Mudstone to proven depths of 4.45mbgl.
- 2.10 No significant visual and/or olfactory evidence of significant ground contamination was identified during the investigation.
- 2.11 Groundwater seepages were encountered during the formation of WS2, WS3 and WS4 at a depths between 1.40m and 2.50mbgl. During the monitoring visits standing groundwater was recorded at depths of between 1.20m and 2.00mbgl. Although WS3 was noted to be dry on the second occasion.
- 2.12 Chemical analysis indicated several exceedances of CoC's within the Made Ground, when compared to the current LQM/CIEH (Suitable 4 Use Levels (S4ULs) reference values for residential with plant uptake. These relate in the main to lead, mercury and several PAH compounds, for which the 'PAH - Double Ratio Plots' for different congeners suggested these represent urban background combustion/pyrolytic signatures.
- 2.13 This was considered to confirm to a degree the site observations, in that no visual or olfactory evidence of hydrocarbon contamination was identified with the investigation logs indicating the presence of ash, coal, wood and clinker in the made ground in the majority of locations. The

elevated concentrations of PAH encountered were therefore attributed to these materials being entrained within the soil matrix.

- 2.14 No asbestos fibres were detected in any of the samples analysed.

Ground Gas Monitoring

- 2.15 Ground gas monitoring, primarily for methane and carbon dioxide, with associated flow rates, was undertaken on 6no occasions, between 23rd October 2018 and 9th January 2019.
- 2.16 The results indicate concentrations of methane ranging from below detection to 0.1% by volume in air (v/v) with carbon dioxide concentrations ranging from below detection limits of 0.1% to 7.2% v/v. A maximum detectable ground gas flow of 11.40l/hr has been recorded during the monitoring visits.
- 2.17 The results give a maximum Q_{hg} value of <0.0154l/hr and indicate that the site classifies as Characteristic Situation (CS) 1 – Very Low Gas Risk'. However, as carbon dioxide concentrations exceed 5% the classification would need to be increased to Characteristic Situation (CS) 2 – 'Low Gas Risk' in accordance with BS8485:2015.

3.0 SUMMARY OF REMEDIATION OBJECTIVES

3.1 The following objectives were outlined in the Remediation Strategy.

Gas Protection Measures

3.2 The following site specific gas protection measures were initially to be incorporated into all new structures to satisfy Characteristic Gas Situation 2 as outlined in BS8485:2015.

- Passive sub-floor dispersal (minimum 150mm clear void) with cross ventilation to internal sleeper walls of very good performance which meets all criteria out in Paragraph B.6 of BS 8485:2015.
- Sub-slab ventilation, swan neck pipes connected to external airbrick, at maximum 1,500mm centres to at least opposing sides of the structure.
- Lapped and taped gas resistant membrane, in the floor slab construction which meets all the criteria as set out in Table 7 of BS 8485:2015 and installed to reasonable levels of workmanship in line with current good practice.
- Membrane to be sealed around all penetrations and to damp proof course and taken over cavity walls.

3.3 Typical details of the gas protection system are provided on the AEW drawing in Appendix 01.

Capping Requirements for Private Gardens

3.4 As the level of contamination in the Made Ground renders it unsuitable for direct use beneath proposed garden/landscaped areas, development will need to include the provision of a clean cover over the Made Ground to break the direct contact pollution linkage as set out below.

3.5 Therefore, new private garden areas will need to be capped with a nominal 600mm clean cover over the existing Made Ground to break the direct contact pollution linkage. The make-up of the 600mm cover would be expected to consist of:

- 150mm of clean imported Topsoil;
- 450mm of clean imported sub-soil.

3.6 The surrounding landscaped areas, outside the current development zone, are to be retained unmodified with the exception of the localised planting of new trees.

3.7 The following were to be provided.

- Results of subsequent chemical analysis of imported Topsoil/sub-soil to confirm compliance with the Site Specific Assessment Criteria.
- Records of the volumes and suitability of all imported fill, Topsoil and sub-soil delivered to site in the form of delivery slips and certificates.
- Photographic evidence of suitable sub-soil/Topsoil cover in gardens where underlain by Made Ground.

General

3.8 The following additional information was also to be provided.

- Details of any unexpected ground contamination and the measures undertaken to deal with this, to include records of excavation, the results of chemical analysis resulting from the removal of contaminated soil and / or groundwater.
- Sample waste management records confirming compliance with Duty of Care regulations.
- Confirmation of potable water supply pipe materials.

- 3.9 On completion of the Remediation Works, a Validation Report including the information as summarised above was to be submitted to the Local Planning Authority for approval.

4.0 VALIDATION

Unforeseen Ground Contamination

- 4.1 No evidence of contamination, unusual ground conditions, organic materials such as peat, and/or asbestos have been reported to WML during the construction phase of the works.
- 4.2 Furthermore, no evidence of such was reported by WML during periodic visits to site to inspect the building construction works.

General Groundworks

- 4.3 Due to the low levels of contamination within the existing topsoil and made ground, together with the limited site area, all site-derived soils were removed from site to an appropriate landfill.
- 4.4 The waste transfer documents provided by PJ Services are presented in Appendix 06.

Gas Protection

- 4.5 Details of the intended gas protection measures were presented on the AEW Drawings in Appendix 01. The protection measures were considered sufficient to provide protection against 'Characteristic Gas Situation (CGS) 2 – Low Gas Risk' with a score of 3.5 points in accordance with BS8485:2015.
- 4.6 Subsequently between August and September 2020 gas protection measures were installed by ground workers under the supervision of PJ Services.

Sub-floor Ventilation

- 4.7 Although WML were not party to the sub slab inspections, photographs of the sub-slab voids and swan neck vents were provided by as verification evidence see photographs in Appendix 02.
- 4.8 The photographs clearly indicate the construction to include a suspended beam and block floor which PJ Services have confirmed to have a minimum 150mm sub-floor void, the internal sub-slab blockwork is also understood to include at least 2no cross ventilation points to allow for a very good performance for airflow.
- 4.9 The sub-slab void is vented to all sides by periscopic vents connected to external wall mounted air vents. The plots are split into two blocks as outlined on the AEW drawings, in Appendix 01, with at least two opposing sides of each block includes unobscured air bricks as required in BS8485.

Gas Barrier

- 4.10 Photographic evidence in Appendix 02, confirms, that the product used within Plots 1 to 3, was the Radbar flexible hydrocarbon membrane laid to the top of the beam and block floor.
- 4.11 WML did not inspect the installation of the proprietary DPC from Radbar across the cavity wall. However, PJ Services have provided typical photographs of the installation from the subject site.
- 4.12 The photographs are presented in Appendix 02 and show the Radbar was cut to form a DPC strip which was placed over the cavity wall. An overlap of around 450mm is indicated for subsequent lapping and taping to the Radbar barrier.
- 4.13 Photographs in Appendix 02 indicate sealing details to the barrier, confirming that the membrane continues over the cavity wall construction, thus providing full coverage to all ground floor areas.
- 4.14 All service entry ducts were fitted with 'top-hat' details and double taped to ensure a suitable seal which includes a secure jubilee clip arrangement and surface taping.

- 4.15 Photographs are presented in Appendix 02 with details of the gas membranes in Appendix 03.

Conclusion

- 4.16 WML consider that the gas protection measures employed are adequate to address low risk ground gas conditions with photographic evidence confirming that they have been installed to a reasonable standard of workmanship and are therefore validated as appropriate for the intended use.

Imported Topsoil / Subsoil

- 4.17 No suitable site-won topsoil or subsoil was available for re-use at the site for the capping of proposed garden areas. Therefore, all topsoil and subsoil required for use as capping soil was imported to site from a Greenfield site located at Astor Drive, Grappenhall. Chemical analyses of 2no soil samples from the source are presented in Appendix 04.
- 4.18 Comparison of these results with the Assessment Criteria for 'residential with home-grown produce' as provided within Appendix 07, indicates that the relevant criteria were not exceeded.
- 4.19 After import of the capping soils, WML attended site on 21st April 2021 in order to obtain samples from the emplaced soil in order to submit them for chemical analyses and to check the thickness of the capping strata.
- 4.20 During the inspection three samples of the imported topsoil (VP01 – 0.10, VP02 – 0.30 and VP03 – 0.20) and three samples of the imported subsoil (VP01 – 0.40, VP03 – 0.60 and VP04 – 0.50) were obtained. The samples, were submitted for chemical analyses and the test results are presented in Appendix 05.
- 4.21 Comparison of these results with the Assessment Criteria for 'residential with home-grown produce' as provided within Appendix 07, indicates that the relevant criteria were not exceeded.
- 4.22 Therefore, the soil was considered suitable, in terms of contamination levels, for the intended use.

Capping Thickness

- 4.23 The capping thicknesses were verified by the formation of hand excavated validation pits on 21st April 2021 by WML.
- 4.24 Selected photographs of the validation pits are provided in Appendix 02 and indicate between 350mm and 450mm of subsoil and between 200mm and 300mm of topsoil in rear garden areas.
- 4.25 VP02, located in the front garden of Plot 2, indicated 400mm of topsoil underlain by a granular break layer. It is understood that a reduced capping thickness and granular break layer in this area was required due to the underlying pre-existing services running across the site as indicated on the proposed development plan presented in Appendix 01.
- 4.26 A drawing showing the locations of the validation pits is presented in Appendix 01.
- 4.27 The imported topsoil generally comprised a dark brown clayey, organic sand. The imported subsoil generally comprised an orange brown, gravelly sand.
- 4.28 The gardens form an area of approximately 421m² with an average thickness of topsoil and subsoil at 286mm and 350mm respectively. This indicates the volume of emplaced imported soils to be around 268m³ confirming sampling and testing to have been undertaken at a ratio of 1 sample per 40m³ of topsoil and 1 sample per 49m³ of subsoil.

Water Supply Pipes

- 4.29 United Utilities Water were consulted with regards the selection of suitable water supply pipe materials for the development. In light of the ground conditions encountered, the requirement for specific materials and measures to protect the water supply from ground contamination was not required.
- 4.30 A copy of the United Utilities Risk Assessment is presented in Appendix 08.

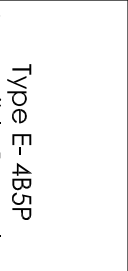
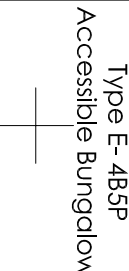
5.0 CONCLUSIONS

Capping Requirements for Garden / Landscaped Areas

- 5.1 Clean imported topsoil and subsoil were found to be generally emplaced to depths of at least 600mm. The Topsoil and sub-soil have been confirmed by chemical analysis to generally conform to appropriate site specific assessment criteria.
- 5.2 Therefore, as far as can be established the pre-occupation works required in relation to the relevant Planning Conditions have been undertaken to a reasonable standard of workmanship and appropriately validated.

APPENDIX 01

Drawings

House Type Schedule			
Key Image	Type	Area (GIA)	Count
	Type E- 4B5P Accessible Bungalow	106.8m²	2
	Type G- 2B3P Accessible Bungalow	69.1m²	1

NOTES

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

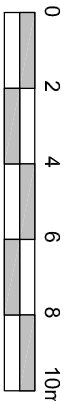
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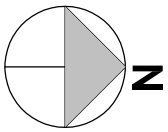
CDM 2015

Client notified of duties:
Principal Designer:

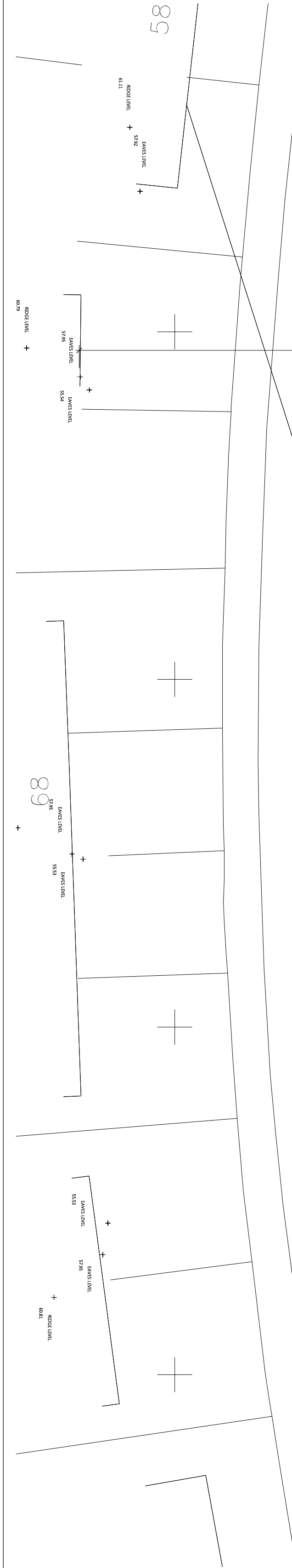
Unless noted below, all known hazards have been highlighted on the drawing:



Scale @ 1:200



KEY	
	Retained Amenity Space
	Lawn
	Paving
	Tarmac
	2100mm High Fence (1800mm Privacy Panel with 300mm Trellis)
	900mm High Metal railings
	900mm Low brick wall with piers and metal railings
	2100mm wall consisting of low brick wall with 2100mm brick piers and metal railings
	2100mm High timber fence
	New trees



Dwg No

Rev

P3

S10404-AEW-XX-SI-DR-A-521

AEW ARCHITECTS AND DESIGNERS LTD
THE ZENITH BUILDING, SPRING GARDENS
MANCHESTER M2 1AB
T: 0161 612 1443
F: 0161 612 1443



Proposed Site Layout- Site 2

Broaddock Road - Site 2

WCHG

REV	Date	Drawn By:-	Checked By:-
P3	29.08.19	DS	CK
Approximate location of sewer shown with easement			
P2	14.03.19	DS	CK
Adjusted following planners feedback - Plot 4 Omitted to retain trees & units adjusted to suit			
P1	21.12.18	DS	CK
Planning Submission			

Status	Purpose of Issue
S2	Planning

drawing stage **Planning**

Client

project

Broaddock Road - Site 2

drawing title

date 21.12.18 drawn DS

scale @ A2 1 : 200 checked CK

KEY	
	Retained Amenity Space
	Lawn
	Paving
	Tarmac
	2100mm High Fence (1800mm Privacy Panel with 300mm Trellis)
	900mm High Metal railings
	900mm Low brick wall with piers and metal railings
	2100mm wall consisting of low brick wall with 2100mm brick piers and metal railings
	2100mm High timber fence
	New trees

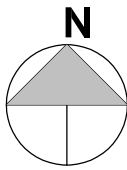
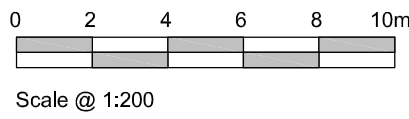
House Type Schedule			
Key Image	Type	Area (GIA)	Count
	Type E- 4B5P Accessible Bungalow	106.8m²	2
	Type G- 2B3P Accessible Bungalow	69.1m²	1

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This drawing contains the following model files: -
S10404-AEW-XX-XX-M3-A-0001 [P0.1] [S0]

CDM 2015

Client notified of duties:
Principal Designer:
Unless noted below, all known hazards have been highlighted on the drawing:



KEY
 Validation Pit

P3	29.08.19	DS	CK
Approximate location of sewer shown with easement			
P2	14.03.19	DS	CK
Adjusted following planners feedback - Plot 4 Omitted to retain trees & units adjusted to suit			
P1	21.12.18	DS	CK
Planning Submission			
REV	Date	Drawn by: -	Checked by: -
Status	Purpose of Issue		
S2	Planning		
Drawing stage			
Planning			
Client			

WCHG

project

Broad oak Road - Site 2

drawing title

Proposed Site Layout- Site 2

date	21.12.18	drawn	DS
scale @ A2	1 : 200	checked	CK

WMLCONSULTING

Project: Broad oak Rd Site 2
Drg Title: Validation Location Plan
Job No: 8398G By: TPB
Drg No: SK02 Rev: -
Date: 13/05/2021 Scale: NTS

APPENDIX 02

Photographs



Photograph 1
Swan neck vent being installed into Plot 1.



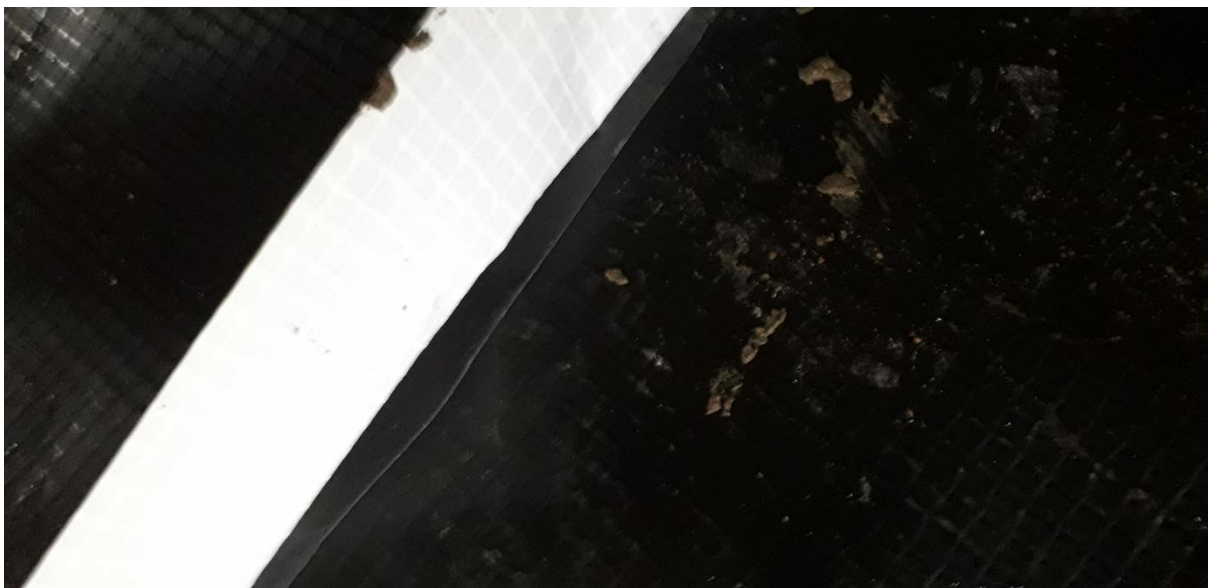
Photograph 2
Swan neck vent being installed into Plots 2 & 3.



Photograph 3
Typical edge detail to top of beam and block floor in Plots 2 & 3.



Photograph 4
Typical lapped and taped Radbar hydrocarbon membrane



Photograph 5
Close view of lapped and taped Radbar hydrocarbon membrane



Photograph 6
200mm of topsoil and 450mm of subsoil emplaced in VP01.



Photograph 7
Garden area showing VP01 location.



Photograph 8
400mm of topsoil emplaced over granular break layer in VP02.



Photograph 9
Garden area showing VP02 location.



Photograph 10
250mm of topsoil and 400mm of subsoil emplaced in VP03.



Photograph 11
Garden area showing VP03 location.



Photograph 12
300mm of topsoil and 350mm of subsoil emplaced in VP04.



Photograph 13
Garden area showing VP04 location.

APPENDIX 03

Gas Membrane Specification



FLEXIBLE HYDROCARBON MEMBRANE

Radbar Flexible Hydrocarbon Membrane is manufactured from a blend of virgin polymers engineered to provide protection against the ingress of hydrocarbons and VOC's.

Radbar Flexible Hydrocarbon Membrane complies with BS 8485: 2015

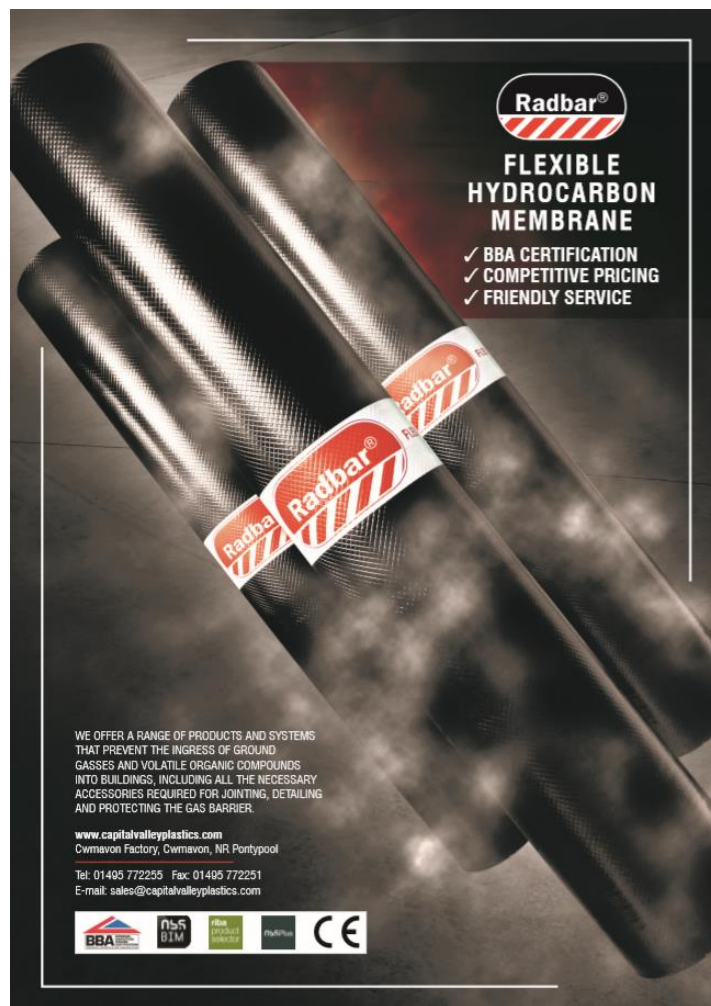
Length	EN 1848-2	M	20
Width	EN 1848-2	M	1.3
Thickness	EN 1848-2	mm	1.0
Tensile Strength	EN EN 12311	N/mm ²	>22
Elongation	EN EN 12311	%	>398
Joint Strength	EN 12317-2	N	520
Watertightness 2kPa	EN 1928	-	Pass
Resistance to impact	EN 12691	mm	660
Resistance to static loading	EN 12730	Kg	20
Resistance to nail tear	EN 12310-1	N	>700
Durability (heat ageing)	EN 1926	-	Pass
Durability (chemical resistance)	EN 1847	-	Pass
Resistance to low temperature	EN 495-5	-	Pass @ -40
Water vapour permeability	EN 1932	g/m ² /day	0.08
Radon permeability		m ² /S	9.5 x 10 ⁻¹²
Methane permeability	ISO 15105-1	ml/m ² /day/atm	28
Diesel permeability	ISO 6179	g/m ² h	0.004
Petrol permeability	ISO 6179	g/m ² h	5.172
Xylene permeability	ISO 6179	g/m ² h	4.845
Toluene permeability	ISO 6179	g/m ² h	6.695
Chemical Resistance - Acidic	EN 14414-A	-	Pass
Chemical Resistance - Basic	EN 14414-B	-	Pass
Chemical Resistance - Solvents	EN 14414-C	-	Pass
Chemical Resistance – synthetic leachates	EN 14414-D	-	Pass
Resistance to leaching – Hot water	EN 14415-A	-	Pass



Resistance to leaching – Aqueous Alkaline	EN 14415-B	-	Pass
Resistance to leaching – Organic Alcohol	EN 14415-C	-	Pass

Accessories available from the Radbar range:

Jointing tape, double-sided and overlap tape
 Top Hats, for sealing pipe penetrations
 Pre-formed corners
 Detailing Strip, self-adhesive for corners and penetrations
 Protection Boards, for protecting the membrane post installation



sales@capitalvalleyplastics.com



01495 772255

Declaration of Performance

1. **Unique identification code of the product-type:**
Radbar Flexible Hydrocarbon Membrane (1.00mm)
2. **Product type:**
Type A in accordance with EN 13967:2012 + A1:2017
3. **Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:**
Flexible sheets for waterproofing – Definitions and characteristics (EN 13967:2012 + A1:2017)
4. **Name and contact address of the manufacturer:**
Capital Valley Plastics
Cwmavon Works
Cwmavon Near Pontypool
Gwent
NP4 8UW
5. **Name of the authorized representative whose mandate covers the tasks specified in Article 12, Paragraph 2:**
Mathew Spiller
6. **System of assessment and verification of constancy of performance of the construction product:**
2+
7. **Notified body:**
British Board of Agreement (BBA)
NB 0836

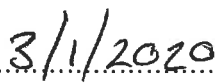
8. **Declared Performance**

ESSENTIAL CHARACTERISTICS	1.0 MM	HARMONISED STANDARD
Water tightness 2kPa	Pass	EN 13967:2012+A1:2017
Reaction to fire	F	
Resistance to static loading	Pass	
Resistance to impact	245nn	
Durability against ageing - heat	Pass	
Durability against chemicals - alkali	Pass	

9. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. This declaration of performance (DOP) is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by


.....
Mathew Spiller, Technical Manager
Capital Valley Plastics Ltd
Pontypool


.....
Date

Capital Valley Plastics Ltd

Cwmavon Works
Cwmavon
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Agrément Certificate

17/5422

Product Sheet 1

CAPITAL VALLEY PLASTICS HYDROCARBON MEMBRANE

RADBAR FLEXIBLE HYDROCARBON MEMBRANE

This Agrément Certificate Product Sheet⁽¹⁾ relates to Radbar Flexible Hydrocarbon Membrane, a thermoplastic tri-polymer membrane to protect buildings from moisture, radon, methane and carbon dioxide, for use above or below the slab in concrete ground floors which are not subject to hydrostatic pressure. The product is chemically resistant when exposed to volatile organic compounds (VOCs).

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

Resistance to water and water vapour — the product, including joints, will restrict the passage of moisture into the structure (see section 6).

Resistance to underground gases — the product is capable of restricting the ingress of radon, methane and carbon dioxide into the structure (see section 7).

Resistance to chemicals — the product is chemically resistant when exposed to, and limits the transmission of, volatile organic compounds (VOCs) (see section 8).

Resistance to damage — the product has high resistance to puncture and on a smooth or blinded surface will not be damaged by foot or site traffic (see section 9).

Durability — under normal service conditions the product will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and VOC vapours during the lifetime of the flooring construction in which it is installed (see section 13).



The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 4 May 2017

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Certificate amended on 25 August 2017 to update Tables 1 and 3.

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Radbar Flexible Hydrocarbon Membrane, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement: C1(2)

Comment:

Site preparation and resistance to contaminants

The product can contribute to a structure satisfying the conditions of this Requirement. See sections 7.1 and 7.2 of this Certificate.

Requirement: C2(a)

Comment:

Resistance to moisture

The product, including joints, will enable a floor to satisfy this Requirement. See sections 6.1 and 6.2 of this Certificate.

Regulation: 7

Comment:

Materials and workmanship

The product is acceptable. See section 13.1 and the *Installation* part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)

Comment:

Durability, workmanship and fitness of materials

The use of the product satisfies the requirements of this Regulation. See section 13.1 and the *Installation* part of this Certificate.

Regulation: 9

Standard: 3.1

Standard: 3.2

Comment:

Building standards applicable to construction

Site preparation – harmful and dangerous substances

Site preparation – protection from radon gas

When properly installed in a correctly-designed structure, the product forms an effective barrier to the movement of radon, methane and carbon dioxide gases and VOC vapour within the ground-floor slab, enabling compliance with these Standards, with references to clauses 3.1.2⁽¹⁾⁽²⁾, 3.1.6⁽¹⁾⁽²⁾, 3.1.7⁽¹⁾⁽²⁾, 3.1.8⁽¹⁾⁽²⁾, 3.2.1⁽²⁾ and 3.2.2⁽¹⁾⁽²⁾. See sections 7.1 and 7.2 of this Certificate.

Standard: 3.4

Comment:

Moisture from the ground

The product, including joints, will enable a floor to satisfy the requirements of this Standard, with reference to clauses 3.4.2⁽¹⁾⁽²⁾, 3.4.4⁽¹⁾⁽²⁾ and 3.4.6⁽¹⁾⁽²⁾. See sections 6.1 and 6.2 of this Certificate.

Standard: 7.1(a)

Comment:

Statement of sustainability

The *product* can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.

Regulation: 12

Comment:

Building standards applicable to conversions

Comments in relation to *the product* under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1⁽¹⁾⁽²⁾ and Schedule 6⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 13.1 and the <i>Installation</i> part of this Certificate.
Regulation:	26(1)(b)(2)	Preparation of site and resistance to dangerous and harmful substances
Comment:		The product can contribute to a construction satisfying the requirements of this Regulation. See sections 7.1 and 7.2 of this Certificate
Regulation:	28	Resistance to moisture and weather
Comment:		The product, including joints, will enable a floor to satisfy this Requirement. See sections 6.1 and 6.2 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2017

In the opinion of the BBA, Radbar Flexible Hydrocarbon Membrane, provided it is installed, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 4.1 *Land quality – managing ground conditions* and 5.1 *Substructure and ground bearing floors*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13967 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Radbar Flexible Hydrocarbon Membrane is a thermoplastic tri-polymer membrane available in black.

1.2 The membrane has the following nominal characteristics:

Thickness* (mm)	1
Roll length*(m)	20
Roll width* (m)	1.3
Mass per unit area* ($\text{g}\cdot\text{m}^{-2}$)	921
Tensile strength* ($\text{N}\cdot\text{mm}^{-2}$)	
MD	24
CD	22
Water vapour transmission (S_d) value (m)	
Watertightness* (kPa)	Pass
Nail tear* (N)	
MD	700
CD	750

1.3 Ancillary products for use with the membrane include:

- Radbar Double-sided HC Jointing Tape — butyl tape for sealing joints and laps
- Radbar Single-sided HC Overlap Tape — for securing over joints.

1.4 Ancillary products for use with the membrane, but outside the scope of the Certificate, include:

- Radbar Top Hat Unit and Clip — to seal service entry points to the membrane
- CVP Protection Boards — protection layer for preventing damage to the membrane
- Radbar Gas Sump — underfloor ventilated sump
- Radbar Pre-formed Corner Details and Cloaks — prefabricated details
- Radbar Gas Venting Membrane.

2 Manufacture

2.1 The product is manufactured by an extrusion process.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Capital Valley Plastics Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by NQA (Certificate 6634).

3 Delivery and site handling

3.1 Rolls are wrapped in polythene film. Each roll has a leaflet enclosed describing the product and installation details. The BBA logo and the number of this Certificate are printed on the leaflet and pallet label.

3.2 The rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Radbar Flexible Hydrocarbon Membrane.

Design Considerations

4 Use

4.1 Radbar Flexible Hydrocarbon Membrane is satisfactory for use as a gas-resistant barrier to restrict radon, methane and carbon dioxide into buildings from landfill and naturally occurring sources. The product is chemically resistant when in contact with VOCs.

4.2 Buildings in areas of risk should be constructed in accordance with the recommendations of BRE Report BR 211 : 2015, and following the guidance set out in BS 8485 : 2015.

4.3 Building in areas at risk of volatile organic compounds (VOCs) should follow the guidance detailed in CIRIA C748.

4.4 The product is also satisfactory for use as a damp-proof membrane in accordance with CP 102 : 1973, Section 2, and BS 8000-4 : 1989.

5 Practicability of installation

The membrane is designed to be installed by a competent builder or contractor experienced with this type of product.

6 Resistance to water and water vapour



6.1 The membrane, including joints, provides an effective barrier to the passage of liquid moisture from the ground.

6.2 When installed in accordance with the following documents, the membrane will comply with the minimum sheet thickness detailed in the national Building Regulations:

England and Wales — Approved document C, Requirements C2(a), Section 4.6

Scotland — Mandatory Standard 3.4, clauses 3.4.2, 3.4.4 and 3.4.6

Northern Ireland — Regulation 28(a).

6.3 The membrane is impervious to water and provides a waterproof layer capable of accepting minor structural movements without damage.

7 Resistance to underground gases



7.1 The product will restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally occurring sources, and meet the performance for a gas-resistant membrane as defined in BS 8485 : 2015.

7.2 Measured gas permeability/diffusion values on unjointed membrane are given in Table 1.

Table 1 Gas permeability of Radbar Flexible Hydrocarbon Membrane

Gas	Method	Result
Methane	BS ISO 15105-1	28 ml·m ⁻² ·day ⁻¹ ·atm ⁻¹

7.3 BRE Report BR 211 : 2015 recommends a 300µm thick polyethylene sheet as a minimum required thickness for a radon gas-resistant membrane. It is generally accepted that other materials with comparable or higher gas resistance are suitable, provided they can withstand the construction process. In the opinion of the BBA, the product meets these criteria.

8 Resistance to chemicals

8.1 The product is resistant to chemicals commonly found on construction sites. Examples are given in Table 2, but a site specific examination and testing regime should be carried out on a case by case basis to establish suitability for a particular application. The butyl tape has limited resistance to diesel and similar materials. Welded joints must be used where there is any doubt over the compatibility of butyl tape.

Table 2 Resistance to chemicals

Test method	Exposure chemical	Tensile strength retained (%)	Result
BS EN 14414 Method A	Acid 10% solution	MD 92 CD109	Pass
BS EN 14414 Method B	Alkali	MD 98 CD 109	Pass
BS EN 14414 Method C	Diesel, paraffin and lubricating oil mixture	MD 98 CD 116	Pass
BS EN 14414 Method D	Synthetic leachate comprising a mixture of 14 acids, chlorides, sulfates and a phosphate	MD 100 CD 96	Pass

8.2 Examples of the transmission rates for commonly encountered volatile liquids are given in Table 3. A risk assessment should be carried out on a site specific basis to establish the product's suitability for a particular application.

Table 3 Transmission rate of volatile liquids of Radbar Flexible Hydrocarbon Membrane

Volatile liquid	Method	Result (g·m ⁻² ·h ⁻¹)
Xylene	BS EN ISO 6179 : 2010 (method B)	4.845
Toluene	BS EN ISO 6179 : 2010 (method B)	6.695
Petrol	BS EN ISO 6179 : 2010 (method B)	5.172
Diesel	BS EN ISO 6179 : 2010 (method B)	0.004

9 Resistance to damage

9.1 The membrane can be punctured by sharp objects, and care should be taken when handling building materials over the exposed surface.

9.2 Provided there are no sharp objects present on the membrane's surface prior to and during installation of the protective layer, the product will not be damaged by normal foot traffic.

10 Underfloor heating

There will be no adverse effect on the membrane from underfloor heating under normal service conditions. In other circumstances, the Certificate holder's advice should be sought.

11 Effects of temperature

When the membrane is loose-laid and the joints are taped, the installation temperature should not be below 5°C.

12 Maintenance

As the product is confined under concrete and has suitable durability (see section 13), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 17).

13 Durability



13.1 The membrane will, in normal circumstances, remain effective against the ingress of water and water vapour, and will restrict the ingress of radon, methane, carbon dioxide and VOC vapour during the lifetime of the building.

13.2 Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane.

14 Reuse and recyclability

The product contains polyethylene, which can be recycled.

Installation

15 General

15.1 Radbar Flexible Hydrocarbon Membrane must be installed in accordance with the Certificate holder's instructions, the relevant clauses of BRE Report BR 211 : 2015 and following the guidance of BS 8485 : 2015.

15.2 The membrane can be installed in all normal site conditions, provided that the air temperature is not below 5°C to prevent the risk of surface condensation.

16 Procedure

16.1 The product must only be applied to surfaces that have a smooth finish, ie they should be free from voids, projections and mortar deposits. Surfaces should be dry and free from dust and frost.

16.2 Concrete surfaces should be dense. Vertical surfaces of brickwork and blockwork must be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.

16.3 The membrane is rolled out with the embossed surface uppermost, ensuring that it is properly aligned. All end and side overlaps should be a minimum of 150 mm and prepared in accordance with the Certificate holder's instructions.

16.4 When the membrane is laid below the concrete slab, it should be loose-laid to accommodate any small movements.

16.5 All surfaces must be dried thoroughly prior to joining.

16.6 Joints can be installed using butyl tape, however the chemical compatibility must be checked. A strip of the tape is unrolled over the membrane with its nearest edge 50 mm from the membrane edge. The protective paper is removed from the butyl tape prior to rolling an adjacent run of the membrane, which must be carefully unrolled over the jointing tape, ensuring a 100 mm overlap.

16.7 Where doubt exists over the suitability of the butyl tape, the product can be welded using hot air or wedge welding equipment. All laps and junctions must be overlapped by 150 mm. The weld width must be a minimum of 40 mm.

16.8 All service penetrations and direction changes should be properly detailed in accordance with the Certificate holder's instructions. Service ducts should be vented to prevent the possibility of gas accumulating in confined spaces.

16.9 The continuity of the gas protection must extend over the footprint of the building, and the gas membrane must be sealed to a gas-resistant damp-proof course.

16.10 The membrane should be covered by a screed or other protective layer as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction.

16.11 The membrane installation should be subject to third-party independent validation, in accordance with BS 8485 : 2015.

17 Repair

Any damage to the product must be repaired using a patch of the membrane, and laps welded or sealed with double-sided tape and secured with the butyl tape. All patched areas must extend a minimum of 150 mm from the damaged area. If required by the local authority, repair work should be confirmed by an independent validation report, as all gas membrane installation should be subject to third-party validation in accordance with BS 8485 : 2015.

Technical Investigations

18 Tests

18.1 Tests were carried out on the membrane to determine:

- dimensions
- mass per unit area
- dimensional stability
- water vapour transmission
- watertightness
- tensile strength and elongation
- effect of heat ageing
- effect of exposure to UV
- effect of water exposure
- resistance to static loading
- resistance to impact
- resistance to tearing
- resistance to chisel impact on joints:
- shear strength
- resistance to leakage on controls, following heat ageing and exposure to chemicals.

19 Investigations

19.1 An evaluation was made of the results of test data regarding permeability of methane.

19.2 A visit to a site in progress was carried out to assess the practicability of installation.

19.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS 8485 : 2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

BS EN 13967 : 2012 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet — Definitions and characteristics*

BS EN 14414 : 2004 *Geosynthetics — Screening test method for determining chemical resistance for landfill applications*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS ISO 15105-1 : 2007 *Plastics — Film and sheeting — Determination of gas-transmission rate — Differential-pressure methods*

BS EN ISO 6179 : 2010 *Rubber, vulcanized or thermoplastic — Rubber sheets and rubber-coated fabrics — Determination of transmission rate of volatile liquids (gravimetric technique)*

BRE Report BR 211 : 2015 *Radon : Guidance on protective measures for new buildings*

CIRIA C748 *Guidance on the use of plastic membranes as VOC vapour barriers*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

20 Conditions

20.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

20.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

20.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

20.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

20.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

20.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

APPENDIX 04

Chemical Analyses from Source



E3P

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Manchester | London | Edinburgh

Ref: 12-613-L5
Date: 2nd November 2020

Rowland Homes Limited,
Farington House,
Stanifield Business Park,
Stanifield Lane,
Leyland
PR25 4UA

BY Email

Dear Sirs,

BRITISH STANDARD TOPSOIL ANALYSIS REPORT ASTOR DRIVE, GRAPPENHALL

BACKGROUND

E3P have been retained by Rowland homes to complete sampling of materials at the above site to confirm their suitability for reuse within a residential setting.

The purpose of the analysis was to determine the materials compliance with the requirements of the British Standard for Topsoil – BS3882:2015 – Specification for Topsoil.

This report serves as an indication of the soils suitability and should not be used as a means for validation testing or waste designation purposes.

MATERIAL

The Laboratory described the samples as Brown clay and loam with gravel and vegetation and on gathering the samples there were no notable odours or visual evidence of any contamination.

ANALYTICAL SUITES

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following testing suites were completed:



-  Particle size distribution
-  Stone content
-  pH and electrical conductivity values
-  Exchangeable sodium percentage
-  Major plant nutrients
-  Organic matter content
-  C:N Ratio
-  Heavy Metals
-  Total Cyanide and total phenols
-  Speciated PAHs
-  Aromatic and Aliphatic TPH (Banded)
-  Asbestos Screen

The results are presented on the attached certificates of analysis and an interpretation of the results is presented below.

RESULTS

Particle Size analysis and Stone Content

The sample fell into the sandy loam texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The soils were virtually stone free with only 2.2% of the sample containing >2mm gravels. As such stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was slightly acidic in reaction (pH 7.1), with a pH value that would be considered suitable for general landscape purposes.

The electrical conductivity value by CaSO₄ extract (BS3882 requirement) was within compliant range (1800us/cm) below the maximum specified value (3300us/cm) given in BS3882:2015-Table1, which indicated that soluble salts should not be present at levels that would be harmful to plants.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter, total nitrogen, extractable potassium and extractable magnesium.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to BS3882:2015 – Table 1: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use.



This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the residential with home grown produce land use in the suitable for use levels (S4ULs) presented in the LQM/CIEH S4ULs for human health risk assessment (2015).

Of the potential contaminants determined, none exceeded their respective guideline values for residential with home grown produce land use.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined, none was found at levels that exceeded the maximum permissible levels specified in BS3882:2015 – Table 1.

CONCLUSION

The Purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil (BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).

From the soil examination and subsequent laboratory analysis, the sample was described as a slightly acid, non-saline, non calcareous sandy loam with a very low stone content. The sample was adequately supplied with organic matter, total nitrogen, extractable phosphorus, extractable potassium and extractable magnesium. Of the potential contaminants determined, none exceeded their respective guideline values for residential with home grown produce land use.

Based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (eg, Stockpiling, resspreading). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soils structure prior to and planting, turfing or seeding.

Soil handling methods are outlined within BS3882:2015.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd



Roy Walker
Senior Consultant





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Analytical Report Number : 20-34336

Replaces Analytical Report Number: 20-34336, issue no. 1

Client references/information amended.

Project / Site name:	Astor Drive	Samples received on:	07/10/2020
Your job number:	12.613	Samples instructed on/ Analysis started on:	07/10/2020
Your order number:	12.613.HM.A	Analysis completed by:	14/10/2020
Report Issue Number:	2	Report issued on:	30/10/2020
Samples Analysed:	2 soil samples		

Signed: 

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 20-34336

Project / Site name: Astor Drive

Your Order No: 12.613.HM.A

Lab Sample Number				1643369	1643370
Sample Reference				TS101	TS102
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				07/10/2020	07/10/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	23	25
Total mass of sample received	kg	0.001	NONE	0.6	2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7	7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	600	680
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	52	120
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.026	0.058
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	25.9	58.2
Sulphide	mg/kg	1	MCERTS	24	28
Total Sulphur	mg/kg	50	MCERTS	280	310

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.48
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.81
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.75
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.38
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.47
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.45
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.27
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.42
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	4.03
-----------------------------	-------	-----	--------	--------	------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	18
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	60	62
Lead (aqua regia extractable)	mg/kg	1	MCERTS	67	78
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.2
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	75	84

Analytical Report Number: 20-34336

Project / Site name: Astor Drive

Your Order No: 12.613.HM.A

Lab Sample Number				1643369	1643370
Sample Reference				TS101	TS102
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				07/10/2020	07/10/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection
				Accreditation Status	
Petroleum Hydrocarbons					
TPH (C5 - C6)		mg/kg	1	NONE	< 1.0
TPH (C6 - C8)		mg/kg	0.1	MCERTS	< 0.1
TPH (C8 - C10)		mg/kg	0.1	MCERTS	< 0.1
TPH (C10 - C12)		mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16)		mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21)		mg/kg	1	MCERTS	< 1.0
TPH (C21 - C35)		mg/kg	1	MCERTS	< 1.0
TPH (C35 - C40)		mg/kg	10	MCERTS	< 10
TPH Total C5 - C40		mg/kg	10	MCERTS	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 20-34336
Project / Site name: Astor Drive

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1643369	TS101	None Supplied	None Supplied	Brown clay.
1643370	TS102	None Supplied	None Supplied	Brown clay.



Analytical Report Number : 20-34336

Project / Site name: Astor Drive

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Sample Deviation Report



Analytical Report Number : 20-34336

Project / Site name: Astor Drive

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TS102	None Supplied	S	1643370	b	Monohydric phenols in soil	L080-PL	b
TS102	None Supplied	S	1643370	b	Speciated EPA-16 PAHs in soil	L064-PL	b
TS102	None Supplied	S	1643370	b	TPH in (Soil)	L076-PL	b

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404

Fax: 01923 237404

email:reception@i2analytical.com

Certificate of Analysis									
BS 3882:2015 Specification For Topsoil									
	Pass BS 3882 for Multipurpose Topsoil;						client		
Report No:	20-34340					e3p			
Location	Astor Drive								
Lab Reference (Sample Number)	1643379								
Sampling Date	07/10/2020								
Sample ID	TS101								
Depth (m)	0.00			Compliant with range (Y/N)					
		unit	Result	Multi-P	Acid	Calc	Low-F	Low-F(a)	Low-F(c)
Soil texture	<2mm fraction	%m/m	SANDY LOAM	Y	Y	Y	Y	Y	Y
Maximum coarse fragment content:	>2mm	%m/m	2.20	Y	Y	Y	Y	Y	Y
	>20mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	>50mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
Mass loss on ignition		%	5.20						
	Clay 5-20%		Y	Y	Y	Y	Y	Y	Y
	Clay 20-35%		-	-	-	-	-	-	-
Soil pH:		pH	7.10	Y	N	N	Y	N	N
Carbonate:		%m/m	1.30	-	-	Y	-	-	Y
Available plant nutrients	Nitrogen	%m/m	0.24	Y	Y	Y	-	-	-
	Extractable Phosphate (as P)	mg/l	47.00	Y	Y	Y	N	N	N
	Extractable Potassium	mg/l	183.00	Y	Y	Y	-	-	-
	Extractable Magnesium	mg/l	370.00	Y	Y	Y	-	-	-
Carbon: Nitrogen Ratio:		:1	13.00	Y	Y	Y	Y	Y	Y
Conductivity		us/cm	1800.00	Y	-	-	-	-	-
Phytotoxic contaminants:	** Total Zinc	mg/kg	84.00	Y	Y	Y	Y	Y	Y
	** Total Copper	mg/kg	64.00	Y	Y	Y	Y	Y	Y
	** Total Nickel	mg/kg	20.00	Y	Y	Y	Y	Y	Y
Visible contaminants:	>2mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Plastics	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Sharps	no. in 1 kg	0.00	Y	Y	Y	Y	Y	Y
Compliance:				Pass	Fail	Fail	Fail	Fail	Fail
Results are expressed on a dry weight basis, after correction for moisture content where applicable Stated limits are for guidance only and I2 cannot be held responsible for any discrepancies with current legislation									

** = MCERTS accredited

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404

Fax: 01923 237404

email:reception@i2analytical.com

Certificate of Analysis									
BS 3882:2015 Specification For Topsoil									
	Pass BS 3882 for Multipurpose Topsoil;				client				
Report No:	20-34340			e3p					
Location	Aston Drive								
Lab Reference (Sample Number)	1643380								
Sampling Date	07/10/2020								
Sample ID	TS102								
Depth (m)	0.00			Compliant with range (Y/N)					
		unit	Result	Multi-P	Acid	Calc	Low-F	Low-F(a)	Low-F(c)
Soil texture	<2mm fraction	%m/m	SANDY LOAM	Y	Y	Y	Y	Y	Y
Maximum coarse fragment content:	>2mm	%m/m	1.70	Y	Y	Y	Y	Y	Y
	>20mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	>50mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
Mass loss on ignition		%	4.90						
	Clay 5-20%		Y	Y	Y	Y	Y	Y	Y
	Clay 20-35%		-	-	-	-	-	-	-
Soil pH:		pH	7.10	Y	N	N	Y	N	N
Carbonate:		%m/m	0.90	-	-	N	-	-	N
Available plant nutrients	Nitrogen	%m/m	0.26	Y	Y	Y	-	-	-
	Extractable Phosphate (as P)	mg/l	48.00	Y	Y	Y	N	N	N
	Extractable Potassium	mg/l	179.00	Y	Y	Y	-	-	-
	Extractable Magnesium	mg/l	370.00	Y	Y	Y	-	-	-
Carbon: Nitrogen Ratio:		:1	11.00	Y	Y	Y	Y	Y	Y
Conductivity		us/cm	1800.00	Y	-	-	-	-	-
Phytotoxic contaminants:	** Total Zinc	mg/kg	81.00	Y	Y	Y	Y	Y	Y
	** Total Copper	mg/kg	63.00	Y	Y	Y	Y	Y	Y
	** Total Nickel	mg/kg	21.00	Y	Y	Y	Y	Y	Y
Visible contaminants:	>2mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Plastics	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Sharps	no. in 1 kg	0.00	Y	Y	Y	Y	Y	Y
Compliance:				Pass	Fail	Fail	Fail	Fail	Fail

Results are expressed on a dry weight basis, after correction for moisture content where applicable.
Stated limits are for guidance only and I2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

APPENDIX 05

Chemical Analyses from Site



2183

Final Report

Report No.:	21-14557-1		
Initial Date of Issue:	12-May-2021		
Client	WML Consulting Ltd		
Client Address:	No. 8 Oak Green Stanley Green Business Park Earl Rd Cheadle SK8 6QL		
Contact(s):	Sam Seddon		
Project	83980 Broadoak Road - Site 2		
Quotation No.:		Date Received:	04-May-2021
Order No.:	8398G	Date Instructed:	05-May-2021
No. of Samples:	6		
Turnaround (Wkdays):	5	Results Due:	11-May-2021
Date Approved:	12-May-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: 83980 Broadoak Road - Site 2

Client: WML Consulting Ltd	Chemtest Job No.:				21-14557	21-14557	21-14557	21-14557	21-14557	21-14557
Quotation No.:	Chemtest Sample ID.:				1192878	1192879	1192880	1192881	1192882	1192883
	Sample Location:				VP01	VP01	VP02	VP03	VP03	VP04
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.40	0.30	0.20	0.60	0.50
	Date Sampled:				29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021
	Asbestos Lab:				NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD						
ACM Type	U	2192		N/A	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-
Moisture	N	2030	%	0.020	25	11	24	22	10	10
pH	U	2010		4.0	7.7	8.2	7.1	7.1	8.1	7.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.41	< 0.40	0.68	0.42	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.018	0.011	0.10	0.099	0.027	0.012
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)	U	2430	mg/kg	100	1800	100	3200	440	< 100	< 100
Arsenic	U	2450	mg/kg	1.0	10	3.2	11	2.7	2.3	2.2
Cadmium	U	2450	mg/kg	0.10	0.55	0.26	0.44	0.15	0.13	0.14
Copper	U	2450	mg/kg	0.50	29	5.1	33	8.1	2.6	2.7
Mercury	U	2450	mg/kg	0.10	0.19	< 0.10	0.26	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	23	9.8	22	6.0	8.1	7.0
Lead	U	2450	mg/kg	0.50	50	10	58	13	4.3	5.2
Selenium	U	2450	mg/kg	0.20	0.22	< 0.20	0.43	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	27	9.9	28	6.8	8.3	7.1
Zinc	U	2450	mg/kg	0.50	67	31	82	21	21	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	7.6	0.86	14	12	0.69	0.72
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	1.5	< 0.10	2.4	1.9	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	1.7	< 0.10	2.4	2.1	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	3.2	< 2.0	4.8	4.0	< 2.0	< 2.0

Results - Soil

Project: 83980 Broadoak Road - Site 2

Client: WML Consulting Ltd	Chemtest Job No.:				21-14557	21-14557	21-14557	21-14557	21-14557	21-14557
Quotation No.:	Chemtest Sample ID.:				1192878	1192879	1192880	1192881	1192882	1192883
	Sample Location:				VP01	VP01	VP02	VP03	VP03	VP04
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.40	0.30	0.20	0.60	0.50
	Date Sampled:				29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021	29-Apr-2021
	Asbestos Lab:				NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD						
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

APPENDIX 06

Waste Transfer Documentation

DUTY OF CARE: CONTROLLED WASTE TRANSFER NOTE

A Description of the waste	1 Description of the waste being transferred: <u>Inert Soil + Stones</u> List of Waste Regulations code(s): <u>170504</u> 2 How is the waste contained? ☒ Loose ☐ Sacks ☐ Skip ☐ Drum ☐ Other (specify) _____ 3 How much waste? For example, number of sacks, weight: <u>500 T</u> 4 Analysis <u>attached / not attached / sent separately</u> (delete as appropriate)
B Producer / holder of the waste	Current holder of the waste - Transferor: By signing in Section D or F below I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011 Yes ☐ 1 Full name (print): <u>Nersham Civil Engineering Ltd</u> 2 Company name, address and postcode: <u>Barnet House, Watkinson Court Park Road, Middleton, Manchester M21 1AE</u> 3 SIC code (2007): <u>41291</u> 4 Which of the following are you? (please tick one or more boxes) A ☒ Waste producer ☐ Waste importer ☐ Collection/Disposal authority ☐ Broker B ☐ Env Permit holder (ref number): _____ ☐ Registered waste carrier (ref number): _____ C ☐ Waste exemption holder (exemption registration number): _____ ☐ Exempt from carrier registration (give reason): _____
C Carrier of the waste	1 Full name (print): <u>McDonnell Haulage Ltd</u> 2 Company name, address and postcode: <u>10 TURNPIKE CLOSE, ROCHDALE OL2 6HG</u> 3 SIC code (2007): <u>49410</u> 4 Which of the following are you? (tick one box) A ☐ Waste collection authority B ☒ Registered waste carrier (ref number): <u>CBDU 46027</u> C ☐ Exempt from carrier registration (give reason): _____
D First transfer (holder to carrier)	1 Place of transfer: <u>BROADWAY RD, WYTHEN SHALE</u> 2 Date of transfer: <u>JUNE 2020 - AUG 2020</u> 3 Time(s) of transfer: <u>07:00 - 18:00</u> Contract No: _____ (for multiple transfers give date range) 4 Name and address of broker arranging transfer (if applicable): <u>TURVE STONE LTD 114 NANGREAVE RD, STOCKPORT SK26 2PG</u> 5 Holder's representatives Name (print): _____ Carrier's representatives Name (print): <u>Greg Wilmott</u> Signed: _____ Signed: _____
E Disposer / recoverer of the waste	1 Full name (print): <u>Booth Ventures Ltd</u> 2 Company name, address and postcode: <u>78 CHOMLEY NEW ROAD, BOLTON BL1 4BY</u> 3 Which of the following are you? (tick one box) ☐ Holder of an Environmental Permit (ref number): _____ ☒ Holder of a valid waste exemption (ref number): <u>EPR/XP3796CW</u>
F Second transfer (carrier to disposer / recoverer)	1 Place of transfer: <u>HAMWOOD QUARRY</u> 2 Date of transfer: <u>JUNE 2020 - AUG 2020</u> 3 Time(s) of transfer: <u>08:00 - 16:00</u> Contract No: _____ (for multiple transfers give date range) 4 Name and address of broker arranging transfer (if applicable): <u>TURVE STONE LTD 114 NANGREAVE RD, STOCKPORT SK26 2PG</u> 5 Holder's representatives Name (print): <u>Greg Wilmott</u> Disposer's / Recoverer's representatives Name (print): _____ Signed: _____ Signed: _____

Producer's / Holder's Copy

This note must be retained by you and held for at least two years (or longer period specified in your Environmental Permit) from the date of the last transfer to which this note applies.

White - Producer's copy

Green - Carrier's copy

Pink - Disposer's / recoverer's copy

APPENDIX 07

Soil Assessment Criteria

Site Specific Assessment Criteria for Residential (with homegrown produce) assuming a 1% SOM for Hydrocarbons

Contaminant	Assessment Criteria for Residential (mg/kg)
Metals	
Arsenic	37
Boron	290
Cadmium	26
Chromium III	910
Chromium VI	6
Copper	2,400
Lead*	200
Mercury	1.2
Nickel	130
Selenium	250
Vanadium	410
Zinc	3,700
Non – Metals	
Phenol	120
Polyaromatic Hydrocarbons (PAH)	
Benz[a]anthracene	7.2
Benzo[a]pyrene	2.2
Benzo[b]fluoranthene	2.6
Benzo[ghi]perylene	320
Benzo[k]fluoranthene	77
Chrysene	15
Dibenz[ah]anthracene	0.24
Fluoranthene	280
Indeno[123-cd]pyrene	27
Naphthalene	2.3
Pyrene	620

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* Where not included in the S4UL's criteria for a limited number of contaminants, namely lead, have been derived by DEFRA in their document entitled SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, April 2014.

Contaminant	Criteria for Residential End Use (mg/kg)
Volatile Organic Compounds (VOCs)	
Benzene	0.087
Ethylbenzene	47
Toluene	130
Xylene	56
1,2-Dichloroethane	0.0071
1,1,1-Trichloroethane	8.8
Tetrachloroethane	1.6
Tetrachloroethene (PCE)	0.18
Tetrachloromethane	0.026
Trichloroethene (TCE)	0.016
Trichloromethane	0.91
Vinyl Chloride	0.00064
Semi-Volatile Organic Compounds (SVOCs)	
1,2-Dichlorobenzene	23
1,4-Dichlorobenzene	61 ^f
1,2,4-Trichlorobenzene	2.6
Hexachlorobenzene	1.8 (0.2) ^{vap}
Total Petroleum Hydrocarbons (TPH)	
Aliphatic C5-6	42
Aliphatic C6-8	100
Aliphatic C8-10	27
Aliphatic C10-12	130(48) ^{vap}
Aliphatic C12-16	1,100(24) ^{sol}
Aliphatic C16-35	65,000(8.48) ^{f, sol}
Aliphatic C35 - 44	65,000(8.84) ^{f, sol}
Aromatic C5 – 7 (benzene)	70
Aromatic C7 – 8 (toluene)	130
Aromatic C8-10	34
Aromatic C10-12	74
Aromatic C12-16	140
Aromatic C16-21	260 ^f
Aromatic C21-35	1,100 ^f
Aromatic C35 - 44	1,100 ^f

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* Where not included in the S4UL's criteria for a limited number of contaminants, namely lead, have been derived by DEFRA in their document entitled SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, April 2014.

APPENDIX 08

United Utilities Risk Assessment

Supplementary guidance for the selection of water pipes in land potentially affected by contamination

Introduction

In January 2011, UK Water Industry Research (UKWIR) published “Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites” (Ref 10/WM/03/21; the ‘UKWIR Guidance’). Its aim is to ensure that the correct materials are selected for water pipes and components to be used below ground in brownfield sites to protect the quality of drinking water whilst taking into account the service life of the water distribution system. It supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note 9-04-03 “Laying Pipes in Contaminated Land” which has been withdrawn.

The UKWIR Guidance is for use by developers, self-lay organisations, water companies and consultants when planning, designing and constructing water mains and/or services in brownfield sites. It defines brownfield sites as “land or premises that have previously been used or developed. They may also be vacant or derelict. However, they are not necessarily contaminated.” The UKWIR Guidance states that it does not apply to greenfield sites; however, we consider this supplementary guidance and the relevant sections of the UKWIR guidance as being equally suitable for application to those greenfield sites considered to be potentially affected by contamination. Where greenfield sites are not affected by contamination a preliminary risk assessment (see below) will suffice.

The UKWIR Guidance also states that there should be no departure from its provisions “*except where formally approved by the Water Company, such departure being technically justifiable or representing advances in knowledge or product development*”.

We have adopted the UKWIR Guidance in principle and produced this company specific supplementary guidance (the ‘UUW Guidance’) which includes the Risk Assessment for Water Pipes (the ‘RA’).

This guidance does not cover operative safety, health exposure modelling or accidental pipe damage.

which the pipes are to be laid may be affected by contamination. The application of the source, pathway, receptor concept will be an integral part of any pipeline risk assessment. For each potential source (the contamination) and each potential receptor (the water pipe), consideration shall be given to whether a potential pathway between source and receptor exists, or may exist in the future, linking the two. There are normally only three pathways by which contamination may come into contact with water pipes. These are direct contact with the soil or backfill, an excessive vapour phase or a contaminated groundwater regime. If none of these conditions exist on site (adopting the source, pathway, receptor concept) then it is likely that extended and/or targeted soil testing will not be required and a simple risk assessment will suffice. For those sites where land may be affected by contamination appropriate testing shall be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials. The testing requirements are as described in the following section.

The signatories of the Water Supply Application Form and the RA must ensure that all assessments of land condition have been carried out in accordance with applicable current standards and guidelines by or under the direction of a suitably qualified competent person.

We require the competent person to be a) a chartered member of an appropriate professional body (such as the Institution of Civil Engineers, the Geological Society of London or the Royal Institution of Chartered Surveyors) with relevant experience of investigating contaminated sites or b) a Specialist in Land Condition (SiLC) with appropriate geo-environmental experience.

Risk Assessment for Water Pipes in Land Potentially Affected by Contamination

Any application for new water supplies to a development (construction of new properties, or renovation or conversion of existing buildings) in land potentially affected by contamination shall include a completed RA.

As a minimum a desk study (preliminary risk assessment) shall be provided with the RA in accordance with the framework in Environment Agency publication “Model Procedures for the Management of Land Contamination” (ref: CLR11) that sets out whether the land through

How to contact us about the information in this leaflet



DeveloperServicesWater@uuplc.co.uk



0345 072 6067

Opening hours:
8am-5pm Mon to Thurs
8am-4.30pm Fri

Testing Requirements

The soil, rock and if appropriate groundwater tests that are required on all sites where the potential for organic contamination has been identified in the desk study and where water pipes are proposed to be laid must be accredited by United Kingdom Accreditation Service (UKAS) as a minimum and where commercially available the Environment Agency's Monitoring Certification Service (MCERTS). These accredited tests should be undertaken for:

Banded hydrocarbons EC5-EC10, EC10-EC16, EC16-EC40 (Total aliphatic and aromatic hydrocarbons for each banding may be summed). Aliphatic/aromatic fractionation and subsequent banding may be required should a more detailed site specific risk assessment be undertaken. The bandings have been amended to take into account readily available laboratory tests. The equivalent carbon number (EC) is used to assess petroleum hydrocarbon mixtures rather than the actual number of carbon atoms in the molecule in line with guidance issued by the Environment Agency (2005).

Volatile organic compounds (VOCs) (method by head space or purge & trap GCMS) with tentative identification of compounds greater than 20µg/kg. The method used should be capable of detecting a wide range of compounds listed in US EPA Method 8260C or similar. The method should include analysis of naphthalene.

BTEX (Benzene, toluene, ethyl benzene and xylenes) plus MTBE (Methyl-tertiary butyl ether) (by head space GCMS)

Semi-Volatile Organic Compounds (SVOCs) (method by GCMS) with tentative identification of compounds greater than 20µg/kg The method used should be capable of detecting the compounds listed in US EPA Method 8270D or similar. The total concentration of SVOCs excludes polycyclic aromatic hydrocarbons, ethers, nitrobenzene, ketones, aldehydes, phenols, cresols and chlorinated phenols. Phenols, cresols and chlorinated phenols which are detected by the SVOC analysis are given their own assessment criteria.

We do not consider Table G1 and Table 3.1 of the UKWIR Guidance to be a definitive guide for assessing total concentrations. Table 1 in the RA below replaces Table 3.1 of the UKWIR Guidance.

Where previous site uses include the use, storage, treatment, disposal or manufacture of any of the following, appropriate testing for these substances will be required:

- Ethers, nitrobenzene, ketones, aldehydes and amines. Note that the presence of amines on any site at the proposed pipe depth +/- 1.0m precludes the use of polyethylene. The methods of analysis and method of calculation of total concentrations of these compounds will need to be agreed with UuW.

To comply with the testing requirements, the suites of tests that are required on all brownfield sites where wrapped steel, wrapped ductile iron or copper pipes are to be laid as minimum must include:

- pH, Conductivity and redox potential

Sufficiency of Testing

Water pipes are normally laid at between 0.75 and 1.35m from finished ground level to crown of pipe. Samples taken and tested must represent both a) the soil in which the water pipes are to be laid and b) the soil down to at least 500mm below the underside of the proposed pipe. Where the proposed depth of the pipes is unknown at the time of application, soil samples representative of the ground condition between surface level and 1.5m below finished ground level shall be taken as a minimum. Where appropriate (see UKWIR Guidance) groundwater sampling and groundwater monitoring will also be necessary. Photo-ionisation detection (PID) monitoring along the proposed route of the pipeline may be employed, though this does not provide a definitive guide to the suitability of water pipe materials.

Where required a sufficient number of test results should be obtained from the material in which the pipes are to be laid. CLAIRE/CIEH 2008 "Guidance on comparing soil contamination data with a critical concentration" may be used, where appropriate, to justify the number of soil samples tested; however, this statistical model should not be used on heterogeneous materials or used to average test results from different types of materials.

Further guidance on representative sampling is contained within BS10175:2011 Code of Practice for the Investigation of Potentially Contaminated Sites, the Department of the Environment's Contaminated Land Research Report "Sampling strategies for contaminated land" prepared by The Centre for Research into the Built Environment, Nottingham Trent University (Ref: CLR 4; 1994) and the Environment Agency's "Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination" (ref: R&D Technical Report P5-066/TR; 2000).

Where remediation has been carried out on the site, the test results obtained from validation samples will be used in the assessment. Where a horizontal capping system has been or will be employed using materials spread across a site, sufficient samples will need to be taken to characterise the capping material used and the results presented to UuW. However, the sufficiency of sampling on the horizontal capping system, in which the pipeline will be placed, may be assessed on the basis of the source, quantity and type of materials used.

Detection Limits

Only positive concentrations, ie those above the limit of detection should be used in summation of VOC and SVOC (or other test groups of compounds ie phenols, cresols and chlorinated phenols). Laboratory methods shall provide a minimum limit of detection of 10µg/kg for each individual VOC or SVOC (or other test groups of compounds) quantitatively detected in accordance with the methods described above. For tentatively identified compounds (TICs), only those compounds with a concentration of 20µg/kg or greater shall be used in the summation of VOC and SVOC (or other test groups of compounds).

Protective Measures

Where polyethylene, ductile iron, steel or copper pipes are to be laid on a brownfield site or other land potentially affected by contamination (whether or not it has been remediated) and where the concentrations exceed the generic guideline values set out in Table 1 of the RA, the developer shall provide either:

- a) a robust risk assessment to show how any contaminants will not significantly impact on proposed water supplies or buried assets over the lifetime of the assets; or
- b) more suitable pipe materials; or
- c) an engineering solution to protect the pipe work backed up by an adequate assessment of the risk.

Liquid free phase product (e.g. oil or free solvent layers) shall not remain in the ground or groundwater in the vicinity of water pipes, whether barrier pipe or any other pipe materials are used.

When designing pipe routes on land potentially affected by contamination, new preferential contamination pathways along the route of new water pipes shall not be created. Particular measures may be required to prevent the possible migration of contamination through pipe bedding and into controlled waters.

References

BS10175: 2011

“Investigation of Potentially Contaminated Sites Code of Practice”

CLAIRE/CIEH

“Guidance on comparing soil contamination data with a critical concentration” 2008

Department of the Environment Contaminated Land Research Report

“Sampling strategies for contaminated land”
prepared by The Centre for Research into the Built Environment, Nottingham Trent University (Ref: CLR 4) 1994

Environment Agency

“Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination”
(ref: R&D Technical Report P5-066/TR) 2000

Environment Agency

“Model Procedures for the Management of Land Contamination” (ref: CLR11), 2004

Environment Agency P5-080/TR3

“The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils”, 2005

UK Water Industry Research (UKWIR)

“Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites” (Ref 10/WM/03/21) January 2011

Water Regulations Advisory Scheme (WRAS)

Information and Guidance Note 9-04-03

“Laying Pipes in Contaminated Land” 2002

Frequently asked questions

Why has UUW published supplementary guidance to the 'UKWIR Guidance for the Selection of Water Pipes to be used in Brownfield Sites'?

UUW agrees with the UKWIR Guidance in principle; we have published supplementary guidance to clarify some of the areas in which it will operate.

Does the UKWIR Guidance only apply to 'brownfield sites'?

Yes, the UKWIR Guidance does apply to brownfield sites; in addition United Utilities Water will apply this guidance and the UUW supplementary guidance to any greenfield sites which are potentially affected by contamination.

Who is responsible for completing/ signing the Risk Assessment for Water Pipes (RA)?

This may be the Developer, the Developers representative, or the competent person directing the land assessment. The signatory of the Risk Assessment for Water Pipes (RA) must ensure that all land assessments have been carried out in accordance with current standards and guidelines by or under the direction of a suitably qualified competent person. For water supply applications on land potentially affected by contamination, UUW requires the competent person to be either a chartered member of an appropriate professional body (such as the Institution of Civil Engineers, the Geological Society of London or the Royal Institution of Chartered Surveyors) with relevant experience of investigating contaminated sites or a Specialist in Land Condition (SiLC). This level of competency is intended to promote good practice and high professional standards and is no greater than that required for planning purposes by Local Authorities.

Do we need to agree the number and location of soil samples with the Water Company as indicated by the UKWIR guidance following the Preliminary Risk Assessment (PRA)?

Where a preliminary risk assessment (PRA) highlights the need for a site investigation UUW considers it is a responsibility of the qualified competent person directing the land assessment to determine the location and frequency of sampling. UUW's role would be to confirm that the appropriate

choice of pipe material has been made on the basis of the information provided.

What do we do if the pipe route is not known when the Site Investigation report is commissioned?

Where the route of the pipe is not known at the site investigation stage, then any resultant pipe selection needs to take account of any contamination found on the site. Consideration should be given to identifying the route and depth of the pipeline at the site investigation stage to avoid unnecessary testing.

Is it acceptable not to undertake a site investigation and specify the use of barrier pipe which seems to be suitable for all conditions?

Not all brownfield land is contaminated, and because of that a default to barrier pipe is not an acceptable approach to UUW, due to the possibility of higher installation and future maintenance costs. The approach as to whether a site investigation is needed should be risk based. For those sites where land may be affected by contamination appropriate testing shall be undertaken on the ground materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials.

Examples where defaulting to barrier pipe would not be acceptable:

- Where a capping layer (non-contaminated) is introduced within which the pipes will be installed.
- Sites with a potential low risk for contamination.
- Where liquid free phase product (e.g. oil or free solvent layers) is in the ground or groundwater in the vicinity of water pipes.
- Where the route of the pipe could be diverted to another suitable location free from contamination.

Are UUW employees who will assess the Design Proposals for contaminated sites suitably qualified?

It is the role of the Developer's suitably qualified competent person to deal with or direct the assessment of land. UUW's role is to assess the Risk Assessment for Water

Pipes and supporting Site Assessment Report (SAR) which is provided with any new water supply application (ie. it has been provided in the correct format, proposals for pipe selection are included, the methodology is in line with the UKWIR Guidance and UUW Supplementary Guidance, it has been directed by a suitably qualified competent person etc.). If UUW do need to provide assistance or information in deciding pipe materials then the assessment would be carried out under the direction of a suitably qualified competent person.

What happens to existing PE that is in the ground under the "old" guidelines?

The latest UKWIR guidance and UUW's supplementary guidance are intended to be used to decide what pipe materials will be used for new water mains and services. It will have no effect for developers with regard to any parts of UUW's existing network.

Will the Developer be required to submit a fully completed Risk Assessment for Water Pipes (RA) and supporting Site Assessment Report (SAR), including pipe material recommendation, for both the option of a mains requisition application and the option of a self-lay application?

Yes, UUW expect the 'Developer', as defined in UUW Supplementary Guidance, to submit a Risk Assessment for Water Pipes (RA) and supporting Site Assessment Report (SAR), including pipe material recommendation, in respect of any water pipes being installed on the development irrespective of who is to install them.

Does Table 1 in UUW's Risk Assessment for Water Pipes (RA) replace any of the tables to be completed in the Site Assessment Report (SAR) as required in the UKWIR Guidance?

UUW does not consider Table G1 and Table 3.1 of the UKWIR Guidance to be a definitive guide for assessing total concentrations. Table 1 in UUW's RA replaces Table 3.1 of the UKWIR Guidance.

Have any other Water Companies adopted the UKWIR Guidance yet?

You will need to contact the water company concerned if you are intending to install water pipes outside UUW's licensed area.

About us

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

Risk assessment for water pipes (RA)

The risk assessment for water pipes will help you choose appropriate materials for your development. We are happy to deal with a risk assessment for water pipes in advance of any formal application for a new water supply.

If you need any help completing the form please call us on **0345 072 6067**.

Section 1: Development details	
Development name (<i>if it has one</i>)	Broadoak Road, Site 2
Development address	Junction of Broadoak Road / Panfield Road, Wythenshawe, M22 9WE
OS Grid reference (<i>mid point</i>)	382348E, 387813N
Developer's name	PJ Services (Bolton) Ltd
UUW reference number (<i>for UU use only</i>)	
Please provide details below of the current and historical use of the site and adjacent sites. <i>If your supporting information has details of the current and historical site use, please reference below the relevant sections of your report.</i> The earliest maps dated 1876 indicate the site to mainly comprise a centrally located field pond, with a smaller, presumably interconnected pond in the north-eastern section of the site. The ponds were surrounded by tree lined (presumably oak) field boundaries. A footpath extended roughly south-west to north-east between the two ponds before extending northwards from the northernmost apex of the site. The surrounding area originally comprised undeveloped rural / agricultural land with several small field ponds, with more localised residential structures. By 1938 the smaller pond had been infilled and the site appeared to form an area of public open space surrounded by Broadoak Road to the north, east and west and Hanford Road to the south. At this time the area around the site had been extensively developed for residential housing in generally the most recent configuration. Although the site has remained undeveloped, the historical plans indicate that the centrally located larger pond was infilled between 1977 and 1985. .	
Section 2: Preliminary risk assessment	
Has your desk study and site walkover identified any land potentially affected by contamination?	☒ Yes ☐ No
If the site is potentially affected by contamination but you have not completed any intrusive site investigation please provide details below of the rationale behind the intended pipe selection. <i>If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.</i> Not Applicable, please refer to the Phase 2 report by WML. Phase 2 Geo-environmental Investigation and Assessment, referenced 8398G/04, dated November 2018.	

Section 3: Intrusive site investigation

Have you completed any intrusive site investigation?	☒ Yes ☐ No																								
Have you completed any none intrusive site investigation?	☐ Yes ☒ No																								
Date(s) when the site investigation(s) undertaken	<table><tr><td>0</td><td>5</td><td>1</td><td>0</td><td>2</td><td>0</td><td>1</td><td>8</td></tr><tr><td>D</td><td>D</td><td>M</td><td>M</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr><tr><td>D</td><td>D</td><td>M</td><td>M</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr></table>	0	5	1	0	2	0	1	8	D	D	M	M	Y	Y	Y	Y	D	D	M	M	Y	Y	Y	Y
0	5	1	0	2	0	1	8																		
D	D	M	M	Y	Y	Y	Y																		
D	D	M	M	Y	Y	Y	Y																		
At what level has groundwater been encountered?	<table><tr><td>1.20</td><td>metres below ground level or</td></tr><tr><td colspan="2">☐ Not encountered</td></tr></table>	1.20	metres below ground level or	☐ Not encountered																					
1.20	metres below ground level or																								
☐ Not encountered																									

Table 1 (Pipeline Selection Risk Assessment Summary (PSRAS)) below classifies testing required where the preliminary risk assessment has identified land potentially affected by contamination. Please provide details below of any test groups which have not been tested and the rationale for not testing.

If your supporting information has details of the rationale behind not testing any particular test groups, please reference below the relevant sections of your report.

Historical information does not identify any past industrial land use with the site being infilled with anticipated spoil from surrounding residential developments.

No significant visual / olfactory evidence of contamination was noted during the site investigations. Therefore, chemical analysis was limited to speciated hydrocarbons.

If the intrusive site investigation has identified concentrations above the PE threshold (see PSRAS) and your intended pipe selection is PE. Please provide details below of the rationale behind the intended pipe selection.

If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.

Not Applicable

Section 4: Site remediation

Please provide details below of any site remediation (which may include a change in site levels) already completed.

If your supporting information has details of the site remediation already completed, please reference below the relevant sections of your report.

None completed to date.

Has the PSRAS (Table 1) been completed using appropriate data after remediation?	☐ Yes ☐ No ☒ N/A
--	--

Please provide details below of any proposed site remediation and an analysis of whether this will affect your intended pipe selection.

If your supporting information has details of any proposed site remediation and whether this will affect your intended pipe selection, please reference below the relevant sections of your report.

No specific remedial measures required with the exception of suitable capping to soft landscaped areas.

Section 5: Final use of site

Please provide details below of any chemicals (including fuel) to be stored on site and any other future contamination risks which may affect your intended pipe selection.

If your supporting information has details of potential contamination risks which may affect your intended pipe selection, please reference below the relevant sections of your report.

The site is to be developed as low rise residential housing with no storage of chemicals / hydrocarbons anticipated.

What water pipe materials are intended to be used on site?

☒ PE ☐ PE Barrier Pipe Type A ☐ PE Barrier Pipe Type B
Other (please specify):

Section 6: Additional information

Please use the section below to provide any additional details to support your intended pipe selection.

Not Applicable

Section 7: Risk assessor

Name and relevant qualifications of person directing the risk assessment for water pipes

Samantha Seddon BSc (Hons), MSc, EurGeol, CGeol, FGS

Name and address of risk assessor's company

WML Consulting, No. 8 Oak Green | Earl Road | Stanley Green Business Park | Cheadle Hulme | Cheshire | SK8 6QL

Date risk assessment performed

1 1 0 2 2 0 2 0

Section 8: Declaration

I confirm I have completed this form and provided supporting information in accordance with 'UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' and UUW's Supplementary Guidance. I also confirm that if any further site investigation is needed and carried out, I will be required to submit an additional Risk Assessment for Water Pipes with the relevant supporting information. I understand that failure to supply any of the required information may delay my application being processed.

Name

Samantha Seddon

Company

WML Consulting

Telephone

01614820600

Date

D D M M Y Y Y Y

Please email the completed form and supporting information to DeveloperServicesWater@uuplc.co.uk or post to us at United Utilities Water, Developer Services, Second floor Grasmere House, Lingley Mere, Warrington WA5 3LP.



About us

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Warrington WA5 3LP.
Registered in England and Wales. Registered Number 2366678.

Table 1 - Pipe selection risk assessment summary (PSRAS)

1. Testing must be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials. Please use the appropriate testing data to complete Table 1 below.

2. If more than one pipe selection is being made, for example, for pipes in different areas of a large site, a completed PSRAS is required for each selection.

What materials have been tested to populate Table 1 below?

☒ Existing ground materials ☐ Remediated materials ☐ Imported capping materials

All concentrations in mg/kg								
Test Group	Testing Required?	PE threshold	Metal Pipes/ Barrier Pipe	Laboratory Detection Limit	Testing UKAS accredited Y/N	Maximum concentration at proposed pipeline depth See Note [2]	Maximum site concentration See Note [3]	Locations and depths where concentrations exceed proposed pipeline threshold
Total VOCs	Where Preliminary Risk Assessment (PRA) has identified land potentially affected by contamination	0.5	Pass	NA	NA	NA	NA	NA
Total BTEX & MTBE		0.1	Pass	NA	NA	NA	NA	NA
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	NA	NA	NA	NA	NA
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	1.0	Y	<1.0	<1.0	NA
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	1.0	Y	<1.0	<1.0	NA
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	1.0	Y	42	42	NA
Phenols* (from SVOC analysis)		2	Pass	NA	NA	NA	NA	NA
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	NA	NA	NA	NA	NA
Ethers*	Only where identified	0.5	Pass	NA	NA	NA	NA	NA
Nitrobenzene*		0.5	Pass	NA	NA	NA	NA	NA
Ketones*		0.5	Pass	NA	NA	NA	NA	NA
Aldehydes*		0.5	Pass	NA	NA	NA	NA	NA
Amines		Fail	Pass	NA	NA	NA	NA	NA
Corrosive	Conductivity, Redox and pH	Pass	See Note [1]	NA	NA	NA	NA	NA

Note [1] Threshold: For wrapped steel, corrosive if pH<7 and conductivity > 400µS/cm. For wrapped ductile iron corrosive if pH<5, Eh not neutral and conductivity > 400µS/cm. For copper, corrosive if pH<5 or >8 and Eh positive.

Note [2] Water pipes are normally laid at 0.75-1.35m below finished ground level.

Note [3] Also state if liquid free product is present in soil or groundwater.