

LAND AT WHITE MOSS ROAD, BLACKLEY

Remediation & Enabling Works Strategy





GEO-ENVIRONMENTAL CONSULTING

Project Quality Assurance Information Sheet

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Prepared For	THE CASEY GROUP LIMITED Rydings Road Rochdale OL12 9PS
Prepared By	BEK ENVIRO No 2 Landwick Court Metcalf Drive Altham Business Park Lancashire BB5 5GY
Author	Philip Conroy BSc (Hons) PGCE
Checked	David Emmott BSc (Hons) MSc MEnvSc CEnv
Authorised	Michael Buckley BSc (Hons) MSc MEnvSc CEnv
Contact	mbuckley@bekenviro.co.uk www.bekenviro.co.uk Office: 01254 377622 Mobile: 07906753583



GEO-ENVIRONMENTAL CONSULTING

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PROJECT NO: 24070

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REVISION STATUS / HISTORY

Rev	Date	Issue / Comment	Prepared	Checked
A	10/01/25	Inclusion of further Site Investigation works and associated changes to recommendations	AH	MB
B	05/03/25	Minor modifications following Local Authority comments	AH	MB
C				
D	11/06/25	Minor modifications following Local Authority comments	AH	MB

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TABLE OF CONTENTS

1.	INTRODUCTION
1.1	Appointment
1.2	Project Overview
1.3	Limitations
2.	PREVIOUS SITE INVESTIGATION
2.1	Previous Reports
2.2	Curtins – Phase 2 Geo-Environmental and Geotechnical Report – White Moss Road (November 2024)
2.3	Curtins – Phase 2 Geo-Environmental and Geotechnical Report – Dam Head Drive (November 2024)
2.4	BEK Comments
3.	FURTHER SITE INVESTIGATION
3.1	General
3.2	Machine Excavated Trial Pits
3.3	Laboratory Testing
3.4	PID Testing
3.5	Ground Conditions
3.6	Quantitative Risk Assessment – Potentially Significant Pollutant Linkages
3.7	Risk Assessment: Human Health Risks from Exposure to Contaminated Soil
3.8	Risk Assessment: Human Health Risks from Indoor Inhalation of Volatile Organic Compounds
3.9	Risk Assessment: Controlled Waters
4.	REMEDIATION STRATEGY
4.1	Graden / Landscaped Areas
4.2	Ground Gas Mitigation
4.3	Piling Considerations
4.4	Imported Material
4.5	Off-Site Disposal
4.6	Dewatering
4.7	Construction Workers/Contractors
4.8	Concrete Mix Design
4.9	Unforeseen Circumstances
4.10	Utilities
4.11	Re-use of Waste Soils on Site
4.12	Communication
4.13	Statutory Consultation
4.14	Pre-Start Meeting
4.15	Closure
5.	GROUND GAS PROTECTION MEASURES
5.1	General
5.2	Floor Slab
5.3	Ventilation Measures
5.4	Gas Resistant Membrane



6.	INSTALLATION OF GROUND GAS PROTECTION MEASURES
6.1	General Comments
6.2	Components of the Membrane System
6.3	Ventilation Measures
6.4	Ground Gas Membrane Installation – Outline Methodology
6.5	Installer of Ground Gas Measures
6.6	Verification

7.	GAS MEASURES VALIDATION PLAN
7.1	Supervision of Works
7.2	Key Verification Responsibilities & Hold Points
7.3	Visual Inspection & Integrity Testing
7.4	Verifier Checklist

8.	SUPERVISION AND VALIDATION
8.1	Supervision of Works
8.2	Validation of the Works
8.3	Imported Material
8.4	Assessment Criteria
8.5	Assessment of the Chemical Test Results
8.6	Capping Thickness
8.7	Unexpected Areas of Ground Contamination

9.	REPORTING
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APPENDICES	
Appendix A	Exploratory Logs
Appendix B	Trial Pit Photographs
Appendix C	Chemical Test Results
Appendix D	Example Gas Proforma Sheet
Appendix E	Drawings
Appendix F	UKWIR



1. INTRODUCTION

1.1 Appointment

- 1.1.1 BEK Enviro (BEK) has been commissioned by The Casey Group Limited to prepare a Remediation Enabling Works Strategy required to support the re-development work at land at White Moss Road, Blackley (hereafter referred to as 'the site').

1.2 Project Overview

- 1.2.1 The site has been subjected to a series of contamination assessments (desktop studies/site investigations). The previous reports split the site into the northern half (White Moss Road) and the southern half (Dam Head Drive). This report will summarise the entirety of the site inclusive of both White Moss Road and Dam Head Drive.
- 1.2.2 The site occupies an irregular shaped piece of land occupied by public open space which covers an area of approximately 1.01 ha (10,100 m²) within a largely residential area of Blackley, Manchester. The site is located to the south of White Moss Road, further extending east of Dam Head Drive and Lindsides Walk to the north. The site is currently occupied by public open space, with the majority grass surface cover. The site is relatively flat, with a number of trees in the centre of the site and a few trees generally across the southern half of the site.
- 1.2.3 Development proposals for the site include the construction of residential dwellings, together with associated garden areas, car parking facilities and access.
- 1.2.4 The proposed development can be seen on John McCall Architects Ltd drawing entitled 'Proposed Site Plan' (Drawing No.1785-L.052D, dated November 2023), a copy of which is presented in Appendix E and an extract of which can be seen below.



Figure 1: Proposed Development Plan

1.3 Limitations

- 1.3.1 This report has been prepared to provide a summary of the remediation works required and the methodology for the validation of these works. The validation is important to confirm that the required works have been carried out in accordance with the approved remediation scheme and there are no future risks to end users of the site or the environment.
- 1.3.2 The site has been subject to previous site investigation and contamination assessment by others (see Section 2 below). These reports provide the basis for the remediation works required. BEK has also carried out some additional site investigation.
- 1.3.3 This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of its issue.
- 1.3.4 BEK has prepared this report for the sole use and reliance of The Casey Group in accordance with our standard Conditions & Limitations. This report may not be used or relied upon by any unauthorised third party without the explicit written agreement from BEK.



2. PREVIOUS INVESTIGATION

2.1 Previous Reports

2.1.1 The site has been subjected to several phase of contamination assessments (desktop studies/site investigations) to support the re-development of the site for residential use, the details of which are provided within the following reports:

- Curtins – Phase 1 Preliminary Risk Assessment, White Moss Road, Ref: 077873-CUR-00-XX-RP-GE-007, dated 07 May 2021 – **Northern Half of the Site**
- Curtins - Phase 1 Preliminary Risk Assessment, Dam Head Drive, Ref: 077873-CUR-00-XX-RP-GE-009, dated 07 May 2021 – **Southern Half of the Site**
- Curtins - Phase 2 Geo-Environmental and Geotechnical Report for White Moss Road, Ref: 077873-CUR-00-XX-RP-GE-040-P01, dated 28 November 2022 - **Northern Half of the Site**
- Curtins - Phase 2 Geo-Environmental and Geotechnical Report for Dam Head Drive, Ref: 077873-CUR-00-XX-RP-GE-042-P01, dated 29 November 2022 - **Southern Half of the Site**
- BEK – Factual Site Investigation Letter – Land at Whitemoss Road, Manchester, Ref: BEK-24070-240726-CG, dated 26th July 2024 – **Entire Site**
- BEK – Asbestos Management Plan - Land at Whitemoss Road, Blackley, Ref: BEK-24070-2, dated December 2024 - **Entire Site**

2.1.2 The above assessments form the basis for the remediation works required at the site and should be read in conjunction with this report. This report assumes that all previous reports/assessments have been approved by the regulator.

2.1.3 The 'Phase 2 Geo-Environmental and Geotechnical Report for White Moss Road' by Curtins (Ref: 077873-CUR-00-XX-RP-GE-040-P01, dated November 2022) and the 'Phase 2 Geo-Environmental and Geotechnical Report for Dam Head Drive' by Curtins (Ref: 077873-CUR-00-XX-RP-GE-042-P01, dated November 2022), which includes a ground gas risk assessment, forms the basis for the remediation works required at the site.

2.1.4 In addition to the reports produced by Curtins, further investigation undertaken by BEK also contributes to the recommended remedial works. Details pertaining to this further investigation can be found in Section 3.0.



2.2 Curtins - Phase 2 Geo-Environmental and Geotechnical Report for White Moss Road (November 2022) – Northern Half of the site

- 2.2.1 The site investigation carried out by Curtins was been designed to provide indicative information for the ground conditions across the site with respect to the quantitative assessment for the potential risks associated with contamination and ground gas, as identified in the Phase 1 Preliminary Risk Assessment.
- 2.2.2 The site investigation was undertaken in August 2022 and consisted of the drilling of eight window sample boreholes (WS01, WS02, WS03, WS04, WS04, WS05, WS06, WS07 and WS08) advancing to a maximum depth of 5.45 m bgl or refusal. In-situ testing including Standard Penetration Tests (SPTs) were undertaken at 1 m intervals within the superficial soils.
- 2.2.3 The ground conditions at the site comprised of laterally continuous made ground of varying depths from a minimum thickness of 0.25 m to a maximum thickness of 1.4 m. The made ground generally comprised the following subtypes:
- Surface cover of grass over dark brown very gravelly sand with occasional cobbles.
 - Blackish brown very gravelly clayey sand with high ash content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, sandstone.
 - Grey gravelly slightly sandy cobbles of angular concrete. Gravel is subangular to subrounded fine to coarse of concrete and brick.
 - Soft to firm blackish grey sandy clay with slight hydrocarbon odour.
- 2.2.4 Hydrocarbon odours were encountered at the base of a suspected infilled pond in WS01 and WS07.
- 2.2.5 Natural superficial deposits were encountered in all locations underlying the made ground. The minimum proven thickness of the superficial deposits was 0.5 m, whilst the maximum was 4.5 m. The superficial strata was generally described as the following:
- Soft or firm, locally stiff slightly sandy to sandy slightly gravelly to gravelly CLAY. Gravel is subangular to rounded fine to medium of sandstone and coal. Occasionally no gravel fraction was encountered.
- 2.2.6 Groundwater was recorded as seepages within five of the eight boreholes (WS01, WS02, WS06, WS07 and WS08) during the site investigation. The groundwater was encountered at varying depths between 1.2 m and 4.8 m.



- 2.2.7 Groundwater, likely representing perched water within granular layers in the generally cohesive Glacial Till, was recorded during gas monitoring visits.
- 2.2.8 Bedrock was not encountered within any of the exploratory locations on site.
- 2.2.9 Curtins selected a total of 8 soil samples, six from the made ground and two from the natural strata, for environmental chemical testing. Analysis was undertaken to assess the contamination risk presented to site end users and construction works in this area of the site. Where asbestos was encountered, asbestos quantification testing was undertaken (2 locations).

Contamination Assessment

- 2.2.10 The chemical test results were compared to relevant generic assessment criteria to identify potential contaminants of concern. Based on the contamination assessment herein and with respect to the redevelopment of the site for residential use with gardens, widespread elevated concentrations of PAH compounds (except naphthalene) were encountered and speciated total petroleum hydrocarbons (Aromatic >C12 – C16) have been identified at the site. The Asbestos encountered during chemical testing in WS01 identified loose fibres of amosite (<0.001%) and WS03 identified chrysotile and crocidolite board at soil concentrations of 0.011%.

Ground Gas Risk Assessment

- 2.2.11 The ground gas risk assessment by Curtins concluded that the site is classified as 'Amber 1' and gas mitigation measures need to be installed within all buildings at the site.

2.3 Curtins - Phase 2 Geo-Environmental and Geotechnical Report for Dam Head Drive (November 2022) – Southern Half of the site

- 2.3.1 The site investigation carried out by Curtins was been designed to provide indicative information for the ground conditions across the site with respect to the quantitative assessment for the potential risks associated with contamination and ground gas, as identified in the Phase 1 Preliminary Risk Assessment.
- 2.3.2 The site investigation was undertaken in August 2022 and consisted of the drilling of six window sample boreholes (WS01, WS02, WS02A, WS02B, WS03 and WS04) advancing to a maximum depth of 3.45 m bgl. In-situ testing including Standard Penetration Tests (SPTs) were undertaken at 1 m intervals within the superficial soils.
- 2.3.3 The ground conditions at the site comprised of laterally continuous made ground of varying depths from a minimum thickness of 0.35 m to a maximum thickness of 2.6 m. The made ground generally comprised the following subtypes:



- Grass over loose dark brown slightly clayey gravelly fine to medium sand. Gravel is angular to subrounded, fine to coarse of sandstone, brick, plastic and concrete.
- Soft to firm brown gravelly very sandy clay. Gravel is angular to rounded fine to coarse of brick, concrete, sandstone and coal.
- Grey sandy gravel of fine to coarse subangular of brick, concrete and sandstone.
- Concrete.

2.3.4 Natural superficial deposits were encountered underlying the made ground. The minimum proven thickness of the superficial deposits was 0.8 m, whilst the maximum was 1.15 m. The superficial strata was generally described as the following:

- *Firm to stiff slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and coal.*
- *Brown gravelly SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded of sandstone, coal and mudstone.*

2.3.5 Groundwater strikes were recorded in two of the six boreholes during the site investigation, WS01 and WS04 during the site investigation. The groundwater was encountered at varying depths between 0.9 m and 2.3 m.

2.3.6 Groundwater, likely representing perched water within granular layers in the generally cohesive Glacial Till, was recorded during gas monitoring visits.

2.3.7 Bedrock was not encountered within any of the exploratory locations on site.

2.3.8 Curtins selected a total of 4 soil samples from the made ground for environmental chemical testing. Analysis was undertaken to assess the contamination risk presented to site end users and construction works in this area of the site.

Contamination Assessment

2.3.9 The chemical test results were compared to relevant generic assessment criteria to identify potential contaminants of concern. Based on the contamination assessment herein and with respect to the redevelopment of the site for residential use with gardens, elevated concentrations of PAH compounds (except naphthalene) and marginally elevated mercury was encountered in three locations.



Ground Gas Risk Assessment

- 2.3.10 The ground gas risk assessment by Curtins concluded that the site is classified as 'Characteristic Situation 1 (CS1)' where gas protection measures will not be required.

2.4 BEK Comments

- 2.4.1 The reports produced by Curtins are generally well written and concise. BEK is concurrent that further site investigations in the footprint of the historic pond are required to further establish the risks from volatile contamination on site. An Asbestos Management Plan will also be required to mitigate risks to groundworkers and a UKWIR will also need to be completed following further investigation of the site.
- 2.4.2 Curtins recommended gas mitigation measures in all new builds in the northern part of the site in accordance with Amber 1. However, the NHBC traffic light system to determine gas mitigation measures has been withdrawn. BEK therefore recommends gas mitigation measures comply with Characteristic Situation 2 (CS2) of BS8485:2015+A1:2019.

3.0 FURTHER SITE INVESTIGATION

3.0.1 This section provides a summary of the further site investigation works undertaken by BEK in December 2024.

3.1 General

3.1.1 The site investigation has been designed to provide indicative information with respect to the location of an infilled pond in the north of the site identified through previous site investigation to potentially pose risks through volatile contamination.

3.1.2 Eight exploratory locations were set by the site engineer to establish representative conditions in proximity to the infilled pond. The location of the pond was first inferred through historical mapping (See Figure 2) and previous site investigation information, with the exploratory locations on the day dynamically moved as more site investigation was undertaken and more info became available.

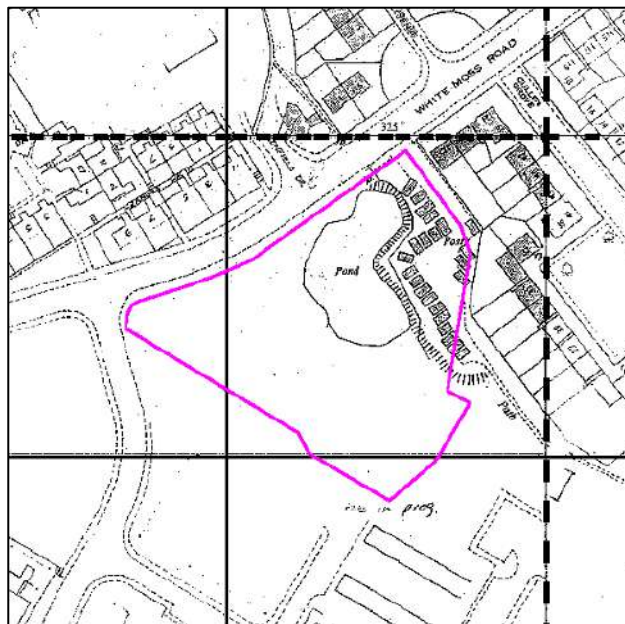


Figure 2: Extract from Appendix B of Curtins 'Phase 1 Preliminary Risk Assessment, White Moss Road'. Map Produced Between 1972 and 1977 (Last mapped occurrence of pond)

3.1.3 The exploratory locations are illustrated on BEK Drawing No 24070-1, an extract of which is shown below and a copy of which is presented in Appendix E.



Figure 3: Extract from Intrusive Location Plan (24070-1, Appendix E)

3.2 Machine Excavated Trial Pits

- 3.2.1 Eight trial pits were excavated at various locations across the north of the site using a JCB-3CX machine. A maximum depth of 4.4 m was reached.
- 3.2.2 Representative samples were recovered for chemical testing in accordance with the ground conditions encountered during the site investigation, and the ground conditions encountered previously.
- 3.2.3 The ground conditions were recorded by an engineer from BEK and copies of the trial pit records are presented in Appendix A. A series of photographs showing the trial pits are presented in Appendix B.
- 3.2.4 All exploratory locations are illustrated on BEK Drawing No 24070-1 presented in Appendix E.

3.3 Laboratory Testing

- 3.3.1 Following a review of the ground conditions, BEK selected representative samples for chemical testing in accordance with the recommendations of previous reporting, the scope of site investigation works, and the ground conditions encountered during the investigation.



3.3.2 All samples were delivered to the UKAS laboratory of Envirolab for the following selected analysis:

8 No. samples were tested for: *Total Petroleum Hydrocarbon Compounds (TPH-CWG)*, *Soil Organic Matter (SOM)*, *BTEX & MTBE*.

3 No. samples were tested for: *Volatile Organic Compounds (VOCs) & Semi-volatile Organic Compounds (SVOCs)*.

3.3.3 Copies of the chemical test results are presented in Appendix C.

3.4 PID Testing

3.4.1 In trial pits where olfactory evidence for the presence of hydrocarbons was detected, soil headspace screening was undertaken using a Photoionization Detector (PID).

3.4.2 This involved sampling of the odorous material and placing it within a sealed container. Each container was then given time to equilibrate before the measuring of headspace VOC concentrations. The results of the PID testing are assessed within Section 3.8.

3.5 Ground Conditions

3.5.1 Site investigation showed that the former pond has been infilled with a mixture of heterogeneous made ground which extends laterally across the footprint of the pond to a maximum proven depth of 4.3 m (TP5).

3.5.2 The made ground present about the pond footprint generally comprised an uppermost, relatively thin layer of clayey soil (made ground) which was laterally continuous across the pond footprint and present to a minimum depth of 0.1 m and a maximum of 0.2 m. The uppermost soil was generally described as:

'Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets'

3.5.3 Present beneath the above layer was another layer of laterally continuous made ground present within all trial pits from a minimum depth of 0.1 m (TP4 & TP7) to a maximum depth of 0.9 m (TP2) and generally described as:

'Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal'



3.5.4 Made ground present beneath the above layer comprised the majority of the pond infill and generally comprised brown/grey/black clays and gravels with varying quantities of anthropogenic materials and miscellaneous waste including (but not limited to): whole/broken brick, concrete, clinker, pottery, metal, plastic, treated wood, glass, fabric and tires. A number of large treated wood beams, thought to be railway sleepers, were also found at depth within Trial Pit TP5. The made ground was present from a minimum depth of 0.6 m (TP8) to a maximum proven depth of 4.3 m (TP5). Detailed descriptions of the strata encountered can be found on the exploratory logs presented in Appendix A.

3.5.5 Hydrocarbon odours of varying intensities were noted within several of the trial pits, as well as oily sheens on arisings and on standing water within several of the pits.

3.5.6 Further strata present beneath the main pond infill/made ground was interpreted to possibly be natural (lacking any evidence of anthropogenic influence) although significant quantities of the strata could not be assessed due to trial pit collapse, water ingress, and depth limitations of the machine. This means that within several of the trial pits the base of the made ground could not be conclusively proven. The possible natural strata was encountered beneath made ground in Trial Pits TP1, TP2, TP5 and TP8 from a minimum depth of 2.5 m (TP1) to a maximum proven depth of 4.4 m (TP5) and was generally described as:

'Greyish brown/brown slightly sandy/sandy silty CLAY. Sand is fine to coarse. Rare fine to coarse gravels of stone of mixed lithologies'

Natural Strata

3.5.7 Whilst the majority of trial pits were excavated within the confines of the infilled pond, some were located outside the pond footprint in order to delineate the pond extents and inform on the accuracy of the existing records (See Figure 2).

3.5.8 Trial Pits TP3 and TP4 encountered the same uppermost two subtypes of made ground encountered within the confines of the pond (described in Section 3.5.2 and 3.5.3) but were underlain by natural clay strata from a depth of 0.7 m to a maximum proven depth of 1.3 m (TP4), indicating that the pond did not extend to these localities. The natural clay was generally described as:

'Brown sandy silty CLAY with rare fine to coarse rounded to subrounded gravels of stone of mixed lithologies'

3.5.9 Moreover, Trial Pit TP6 encountered the edge of the pond as natural clay strata was encountered towards the east/right of the trial pit, whilst the general pond infill (described in Section 3.5.4) was encountered towards the west/left of the trial pit, underlain by natural clay. This is largely consistent with historical records for the pond location.



Visual/Olfactory Evidence of Contamination

- 3.5.10 Visual/olfactory evidence of contamination included hydrocarbon odours of varying intensities encountered within several of the trial pits. Oily sheens were also noted to be present on standing water within several of the pits, as well as on some arisings. Varying proportions of ash and clinker were also encountered within made ground present within several of the trial pits.
- 3.5.11 A summary of the encountered visual/olfactory evidence for the presence hydrocarbons can be found in Table 1 below.

Location	Evidence for Contamination
TP1	Moderate hydrocarbon odour (towards base, ~2.5 m) Lenses of black stained clay with moderate hydrocarbon odour Slight oily sheen on standing water in pit
TP2	Slight to Strong hydrocarbon odour (increasing in intensity from slight at ~0.8 m to strong at ~2.5 m) Moderate oily sheen on standing water in pit Oily sheen/staining on arisings
TP5	Slight hydrocarbon odour (beyond ~2.6 m) Layers of black silty clay with slight hydrocarbon odour (beyond ~2.6 m)
TP6	Slight hydrocarbon odour (at base ~2.4 m)
TP7	Moderate hydrocarbon odour (at base ~2.0 m) Slight oily sheen on standing water in pit
TP8	Slight oily sheen on standing water in pit

Table 1: Summary of Visual/olfactory Evidence for the Presence of Contamination

Groundwater

- 3.5.12 A summary of groundwater encountered during the site investigation is presented in Table 2 below:

Location	Depth to Water (m) bgl	Depth to Base (m) bgl	Comment
TP1	2.4	2.7	Standing water
TP2	2.2	2.7	Standing water
TP5	2.6	4.4	Slight water ingress
TP6	2.2	3.3	Water ingress
TP7	1.8	2.0	Water ingress
TP8	2.0	3.7	Standing water

Table 2: Summary of Groundwater Encountered During Site Investigation



3.5.13 The groundwater is considered to represent perched water present within the pore spaces of made ground present in the confines of the former pond and it likely to be laterally continuous across the pond.

3.6 Quantitative Risk Assessment – Potentially Significant Pollutant Linkages

3.6.1 The potentially significant pollutant linkages for which are the subject of this further site investigation are as listed below:

- (i) Human Health - risks associated with contamination in the made ground and/or natural strata: risk via ingestion (soil or home-grown produce), inhalation (dust or vapour) or direct contact.
- (ii) Human Health - risks associated with indoor inhalation of volatile organic compounds
- (iii) Controlled Waters - risks associated with contamination in the site soil and made ground affecting water quality in the bedrock 'Secondary B' aquifer, as well as the quality of perched water/surface water features within the vicinity of the site. Risks are associated with dissolution of contamination into perched water/leachate and lateral/vertical migration to water receptors.

3.7 Risk Assessment: Human Health Risks from Exposure to Contaminated Soil

3.7.1 The risks to human health have been assessed by the inspection of shallow soils for the presence of elevated contaminants based on the expected contaminant findings detailed in the conceptual model and completion of a quantitative risk assessment.

3.7.2 The soil contamination concentrations have initially been compared to a range of generic assessment criteria. These include the use of the Land Quality Management and Chartered Institute of Environmental Health assessment criteria (S4ULs), the Contaminated Land: Applications in Real Environments assessment criteria (CL:AIRE) Category 4 Screening Levels (C4SLs) and the ATKINS ATRISK Screening Criteria.

3.7.3 These assessment criteria have been derived using the CLEA model and fully justified input parameters. The derivation of the assessment criteria assumes a residential end use with plant uptake. The initial assessment assumes a soil organic matter (SOM) of 1% as a conservative approach.

3.7.4 Table 3 summarises the chemical test results for the samples tested and lists the relevant assessment criteria and the samples with a concentration in excess of the assessment criteria. Note that only determinands with a concentration above the laboratory limit of detection are presented in the table below:



Determinand	Range of Concentrations (mg/kg)	Assessment Criteria (mg/kg)	Samples Fail
Dibenzofuran	<1* – 0.37	9.15 ³	---
4-Nitrophenol	<0.1 – 14.1	6.95 ³	TP1 (2.4 m)
2,4-Dinitrotolulene	<1* – 0.35	2.75 ³	---
2-Methylnaphthalene	<1* – 0.41	20.77 ³	---
Acenaphthene	<0.1 – 2.16	210 ¹	---
Anthracene	0.17 – 3.14	2400 ¹	---
Benzo(a)anthracene	0.18 – 5.93	7.2 ¹	---
Benzo(b)fluoranthene	0.21 – 5.36	2.6 ¹	TP1 (2.4 m)
Benzo(k)fluoranthene	<0.1 – 2.87	77 ¹	---
Benzo(a)pyrene	0.17 – 5.77	2.2 ¹	TP1 (2.4 m)
Benzo(ghi)perylene	<0.1 – 3.06	320 ¹	---
Chrysene	0.2 – 5.79	15 ¹	---
Fluoranthene	0.58 – 15.3	280 ¹	---
Fluorene	0.21 – 2.05	170 ¹	---
Indeno(1,2,3-cd)pyrene	<0.1 – 2.71	27 ¹	---
Phenanthrene	0.61 – 12.1	95 ¹	---
Pyrene	0.48 – 13.4	620 ¹	---
Naphthalene	<1* – 0.67	15 ²	---
Perylene	<0.1 – 1.56	2.2 ⁴	---
Ali HCs >C6-C8	<0.01 – 0.09	100 ¹	---
Ali HCs >C8-C10	<1 – 9	27 ¹	---
Ali HCs >C10-C12	<1 – 30	130 ¹	---
Ali HCs >C12-C16	<1 – 70	1100 ¹	---
Ali HCs >C16-C21	<1 – 62	65000 ¹	---
Ali HCs >C21-C35	11 – 122	65000 ¹	---
Aro HCs >C8-C10	<1 – 5	34 ¹	---
Aro HCs >C10-C12	<1 – 32	74 ¹	---
Aro HCs >C12-C16	4 – 88	140 ¹	---
Aro HCs >C16-C21	7 – 141	260 ¹	---
Aro HCs >C21-C35	14 – 305	1100 ¹	---

Table 3: Summary of Elevated Contaminants of Concern in Soils

1 CIEH/LQM Derived Assessment Criteria (S4ULs based on 1% SOM)

2 Category 4 Screening Levels (C4SL)

3 BEK Derived Assessment Criteria

4 Given that the World Health Organisation (WHO) have assigned perylene as a class three carcinogen (not classifiable as to its carcinogenicity to humans due to further research being required), and in the absence of any assessment criteria for perylene, we have adopted the conservative assessment criteria for the structurally similar compound benzo(a)pyrene.

*Limit of detection raised by laboratory for sample TP1 (2.4 m)

- 3.7.5 It can be seen from the above that there are elevated concentrations of 4-Nitrophenol, Benzo(b)fluoranthene, and Benzo(a)pyrene within one sample of made ground recovered from within the footprint of the infilled pond at the site.

Further Assessment – 4-Nitrophenol (SVOC)

- 3.7.6 Further assessment of the elevated concentration of 4-Nitrophenol shows it to be present within the made ground sample recovered from Trial Pit TP1 at 2.4 m depth, with all other results for the chemical being at limit of detection.



- 3.7.7 The assessment criteria derived for 4-Nitrophenol initially assumed a soil organic matter (SOM) of 1% as a conservative initial screening. Given that the SOM for the sample was for which 4-Nitrophenol was elevated was 6%, the assessment criteria can be rederived with this SOM, giving a new soil assessment criteria value of 29.91 mg/kg. This shows that the concentration of 4-Nitrophenol is no longer elevated.
- 3.7.8 Moreover, considering the depth for which the sample was taken, together with the primary exposure pathway for the chemical being through the consumption of homegrown produce and attached soil (as oppose to vapour inhalation), the potential risks to human health from the chemical are considered to be low and will not be considered further.

Further Assessment – Polycyclic Aromatic Hydrocarbons (PAHs)

- 3.7.9 Concentrations of Benzo(b)fluoranthene and Benzo(a)pyrene were found to be marginally elevated within the made ground sample recovered from Trial Pit TP1 at 2.4 m depth. Elevations of these chemicals are consistent with the findings of previous site investigation undertaken by Sutcliffe's, and as such the recommendation for the implementation of a capping system within soft-landscaped areas is considered to be sufficient to protect end-users from the elevated concentrations of PAH compounds (excluding naphthalene).
- 3.7.10 The capping system will serve to break the major pathways of dermal contact, ingestion of soil and consumption of home grown produce.
- 3.8 Risk Assessment: Human Health Risks from Indoor Inhalation of Volatile Organic Compounds**
- 3.8.1 The assessment of concentrations of volatile organic compounds, semi-volatile organic compounds, and total petroleum hydrocarbons within the made ground samples recovered from the site has shown no elevations against conservative residential (with homegrown produce) thresholds.
- 3.8.2 Notwithstanding the above, visual/olfactory evidence of for the presence of hydrocarbons was encountered within several of the trial pits during the site investigation (See Table 1), ranging in intensity from 'slight' to 'strong'. Sutcliffe's also noted hydrocarbon odours during previous site investigation within 2No. window samples drilled in the footprint of the infilled pond.
- 3.8.3 PID testing was undertaken on 7No. samples where hydrocarbon odours were noted, the results of which are summarised in Table 4 below.



Location	PID Reading (ppm)	Depth of Sample (m)
TP1	17.9	2.4
TP2	51.6	1.3
	116	2.4
TP5	17.9	2.6
	0	3.2
TP6	0	2.1
TP7	0	1.8

Table 4: Summary of PID Testing Results

- 3.8.4 The PID testing shows that made ground encountered within some areas of the infilled pond contains compounds which have the potential to volatilize, although the PID readings themselves are not considered to be exceptionally high.
- 3.8.5 With account of all available information with respect to the presence of hydrocarbon contamination, risks to human health from the indoor inhalation of organic compounds cannot be conclusively ruled out and risks from organic vapours are considered to be present. Specific mitigation measures will be required in order to address the risks.
- 3.8.6 Vapour resistant membranes will be required within buildings to be located above/immediately adjacent to the infilled pond. Considering that the gas risk assessment prepared by Curtins concluded that Amber 1 measures (now CS2 of BS8485:2015+A1:2019) are required to be installed within all new-builds in the northern-half of the site, plots located above/immediately adjacent to the infilled pond should include an upgraded membrane which can protect against vapour ingress (in addition to carbon dioxide and methane).
- 3.9 Risk Assessment: Controlled Waters**
- 3.9.1 BEK considers it prudent to reassess risks to controlled waters given the findings of the further site investigation works.
- 3.9.2 Risks to controlled waters were described to be 'very low' by Curtins within the conceptual site model included in the Phase 1 Preliminary Risk Assessment. This was due to a low likelihood of contamination, the lack of historical industrial land uses for the site, and the lack of any source protection zones or abstraction points within 1 km of the site. The nearest surface water feature was also noted to be a significant distance from the site (171 m south-east). Risks to controlled waters were not considered within site investigation undertaken by Curtins.



- 3.9.3 Further site investigation has proven a significant thickness of made ground is present within the confines of the infilled pond in the north of the site. The assessment of chemical test results has shown contaminants are generally below stringent residential (with homegrown produce) thresholds, with marginal elevations of Benzo(b)fluoranthene and Benzo(a)pyrene encountered within one sample.
- 3.9.4 Groundwater was encountered within all trial pits excavated within the confines of the infilled pond at depths of between 1.8 and 2.6 m bgl. The water is considered to represent perched water present within the pore spaces of the material/made ground used to infill the pond. This water is likely to be laterally continuous across made ground in the pond.
- 3.9.5 Oily sheens were noted to be present on standing water within several of the trial pits. An oily sheen was also noted on arisings excavated from Trial Pit TP2. This indicates free product may be present within the confines of the infilled pond and shows the contents of the made ground may have the potential to leach contaminants/hydrocarbons.
- 3.9.6 Risks to controlled waters at the site are mainly associated with the bedrock Secondary B aquifer. The distance of the nearest surface water feature (171 m south-east) is considered to be significant enough to rule out any risks. The superficial deposits are classified as 'Secondary Undifferentiated' aquifer and any water held within the deposits does not represent a significant receptor.
- 3.9.7 Superficial deposits at the site comprise Glacial Till (Boulder Clay) which is considered to be laterally continuous and impermeable. The impermeability of the deposits is supported by the historical presence of the pond, especially given that no pond liner was encountered during any site investigation works. Moreover, groundwater was absent within all trial pits located outside the confines of the infilled pond.
- 3.9.8 Five cable percussive boreholes were drilled by BEK in July 2024 to a depth of 15 m to support piling design. Boreholes drilled in the north of the site encountered significant thicknesses of clay interbedded with sands (minimum clay thickness of 3.2 m). This clay is likely to inhibit the vertical migration of any contamination associated with the infilled pond, as well as any other made ground deposits which are/may be present at the site.
- 3.9.9 With consideration to the above, risks to controlled waters at the site are considered to be low and will not be considered further.
- 3.9.10 Given that piling is to be undertaken at the site, it will be necessary for the piling contractor to undertake a piling risk assessment in accordance with EA guidance 'Piling into Contaminated Sites'.



4. REMEDIATION STRATEGY

4.0.1 In order to remove potential risks to the development and/or human health specific remediation and mitigation measures need to be carried out.

4.1 Contamination

4.1.1 To mitigate the potential risks to human health associated with PAHs, Speciated Total Petroleum Hydrocarbon (Aromatic >C16 – C21) and the Asbestos contamination within the made ground, the following works will need to be undertaken:

- (i) Where contaminated soils are excavated, they should be removed from site immediately, or placed within a storage area. If stored on site, contaminated soils should be placed on and covered with a suitable membrane (ie Visqueen), as well as a clear bund around the area to prevent cross contamination and water run-off. The planned location to store any excavated contaminated soils is presented as Figure 4.
- (ii) All soft landscaped **private garden areas** will be capped with a minimum of 600 mm of clean suitable soil (150 mm topsoil and 450 mm subsoil). The capping soils should be underlain by a 100 mm granular no-dig layer or a geotextile membrane to prevent mixing.
- (iii) All soft landscaped **public open space (POS) areas** will be capped with a minimum of 450 mm of clean suitable soil (150 mm topsoil and 300 mm subsoil). The capping soils should be underlain by a 100 mm granular no-dig layer or a geotextile membrane to prevent mixing. (Manchester City Council Guidance, Planning & contaminated Land, Technical Guidance, Feb 2021).
- (iv) The soils used in the capping system will need to be tested and assessed to ensure suitability of use. Materials can be sourced from other developments and commercial companies. The capping thickness will also require validation.
- (v) In all cases, the made ground should be segregated from the on-site topsoil to prevent it from being placed within garden areas on site.

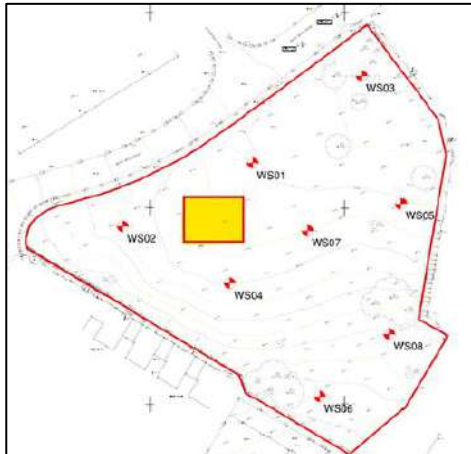


Figure 4: Storage Area Marked in Yellow for Storing Excavated Contaminated Soils

4.2 Ground Gas Mitigation

- 4.2.1 On the basis of the assessment of the potential risks from ground gas, mitigation measures which adhere to CS2 of BS8485:2015+A1:2019 will be required within all buildings to be located in the northern half of the site.
- 4.2.2 The gas membrane utilised within those buildings which are to be located above/immediately adjacent to the infilled pond should be upgraded to mitigate against risks from organic vapours. The plots for which this is required are outlined on BEK Drawing 24070-2, a copy of which is presented in Appendix E and an extract of which can be seen as Figure 5 below:

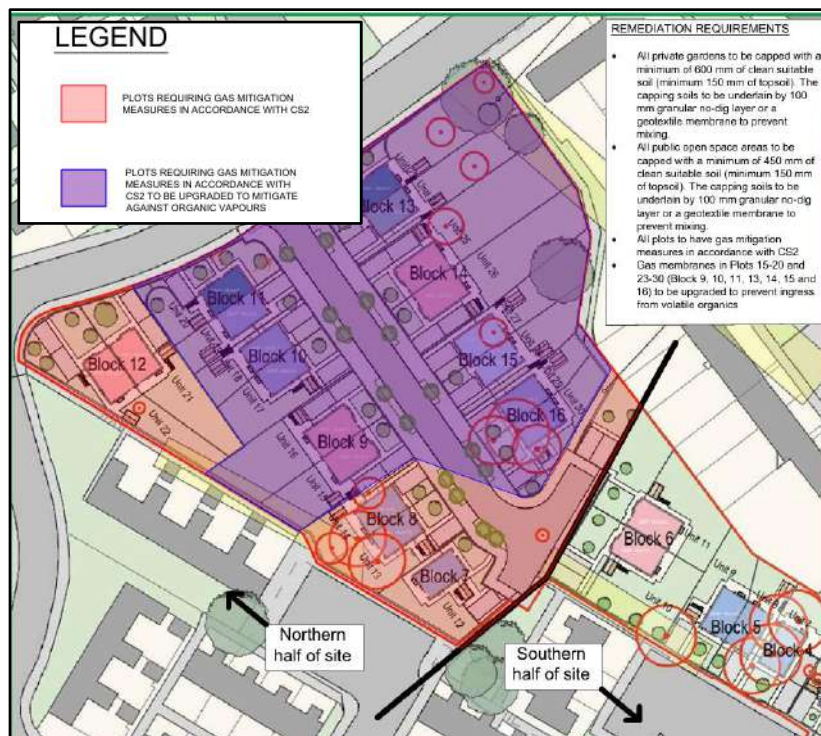


Figure 5: Plots in the Northern Half of the Site Which Require Upgraded Gas Membranes (Extract from BEK Drawing 24070-2, See Appendix E)



4.2.3 On the basis of the assessment of the potential risks from ground gas, no mitigation measures are required in the southern half of the site as zoned by Sutcliffe's following the completion of a gas risk assessment.

4.2.4 Sections 5, 6 and 7 of this report herein include a Gas Verification Plan for the site which provides details of the specific mitigation measures required at the site to ensure the proposed gas measures comply with the points system presented within BS8485:2015+A1:2019 for the appropriate building type. The gas mitigation measures should be validated in accordance with CIRIA C735.

4.3 Piling Considerations

4.3.1 Given that piling is to be undertaken at the site, it will be necessary for the piling contractor to undertake a piling risk assessment in accordance with EA guidance 'Piling into Contaminated Sites'. The piling contractor should satisfy themselves that the piling works will not create a preferential pathway to between the made ground and any controlled waters receptors identified.

4.3.2 The made ground and groundwater located within the confines of the infilled pond should be of particular focus for the piling risk assessment.

4.4 Imported Material

4.4.1 There may be a requirement to import suitable topsoil/subsoil for use in the landscaped/garden areas of the development.

4.4.2 The suitability of the sub/topsoil and any other material imported to the site should be independently validated.

4.4.3 The details pertaining to the independent validation of material to be imported to the site are outlined within Section 8 of this report.

4.5 Off-Site Disposal

4.5.1 The chemical testing regime for off-site disposal may be different to the chemical testing required to assess the suitability of the soils for retention on site and the risks to human health. Therefore, additional assessment may be required to classify the soils for off-site disposal with testing criteria to assess whether the soil is hazardous, non-hazardous or inert waste.

4.5.2 However, existing laboratory test certificates will help inform the process. Any additional testing should also be used in the classification of the waste soils for off-site disposal.



4.5.3 The receiving landfill may require additional specialist laboratory testing to further characterise the material proposed for disposal against Waste Acceptance Criteria (WAC). We would recommend early consultation between the Contractor and the receiving landfill to determine any specific laboratory testing requirements.

4.5.4 Individuals/companies removing soils from the site are bound by a Duty of Care and as such this should only be undertaken by an authorised person. All waste movements should be accompanied by a Waste Transfer Note.

4.5.5 Where there is a requirement to remove materials from site, Waste Transfer Notes and Duty of Care Certificates should be retained for inclusion/reference within the Validation/Completion Report and for future reference.

4.6 Dewatering

4.6.1 Based on site investigation works it was determined that groundwater levels are variable and not representative of laterally continuous perched water. The water encountered is likely to be associated with pockets of perched water within more permeable layers of the made ground/superficial strata.

4.6.2 However, if water entering any of the excavations is visually or olfactory affected by contamination then consideration should be made for dewatering. Any impacted water should be carefully pumped from the excavation directly into a tanker for off-site disposal. Water will be pumped from the near surface of the water and (as much as practicable) away from the sides of the excavation to avoid pumping up soils.

4.6.3 All pumping activities will be carefully monitored to watch for drawing in contaminated water from elsewhere on the site. Pumping will continue until visual/olfactory evidence of contamination has reduced/gone or as is considered reasonably practicable.

4.7 Construction Workers/Contractors

4.7.1 It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE equipment (i.e. boots, gloves and overalls).

4.7.2 In addition, hygiene facilities should be made available in accordance with general health and safety guidelines. The successful remediation/site works contractor should undertake a suitable Risk Assessment to confirm the appropriate level of PPE.

4.7.3 A copy of all reports relating to the site should be included in the site Health & Safety File and site workers should be made fully aware of the site's setting.



- 4.7.4 In addition to the above, site specific RAMS should be prepared for contractors working at the site for safety measures/precautions during any excavation work within area of contaminated soils.

4.8 Concrete Mix Design

- 4.8.1 It is recommended that a concrete classification of sulphate class DS-1 and Aggressive Chemical Environment for Concrete (ACEC) class of AC-1 is suitable for the site.

- 4.8.2 Confirmation that the correct concrete mix has been used on site is outside the BEK validation remit.

4.9 Unforeseen Circumstances

- 4.9.1 Any areas of previously unidentified potentially contaminated soils encountered during site construction works must be brought to the attention of BEK, to ensure that the recommendations herein apply. Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.

4.10 Utilities

- 4.10.1 Prior to redevelopment of the site, BEK recommends that a copy of this report and the previous reports relating to the site are supplied to utility companies, and that their recommendations relating to appropriate supply pipes are adhered to.

- 4.10.2 With respect to water supply pipes, a UK water supplier risk assessment (UKWIR) was completed by BEK in January 2025 and included all site investigation data to date. The UKWIR concluded that PE Barrier Pipe Type A is required for the site due to exceedances of several test groups. A copy of the risk assessment is presented in Appendix F.

- 4.10.3 Trenches for water pipes will be approximately 900 mm deep x 300 mm wide, lined with sand and filled with a fine granular material e.g. pea gravel.

4.11 Re-use of Waste Soils on Site

- 4.11.1 The re-use of waste soils generated at the site should be covered through environmental permit exemptions (if applicable) and/or through the preparation of a Material Management Plan as part of compliance with the Definition of Waste: Code of Practice (DoW:CoP).



4.12 Communication

- 4.12.1 We would recommend that regular communication is maintained between BEK and the Site Manager throughout the development works.

4.13 Statutory Consultation

- 4.13.1 We would recommend that a copy of this Remediation Method Statement is issued to the local authority for review/comment and approval prior to the commencement of re-development works on site.
- 4.13.2 The insurer may also require written approval of the remediation proposals from the regulators in order to satisfy their Land Quality Conditions.

4.14 Pre-Start Meeting

- 4.14.1 It is recommended that a meeting is held between the relevant parties on site, prior to commencement of validation works.

4.15 Closure

- 4.15.1 Following satisfactory completion of remediation works, BEK will produce a Validation/Completion Report to demonstrate compliance with this Remediation Method Statement.



5 GROUND GAS PROTECTION MEASURES

5.1 General

5.1.1 In accordance with Table 4 of BS 8485 (2015) + A1 (2019), the proposed property is assumed to represent a **Type A** building. In order to protect against the CS2 ground gas risks identified, a gas protection score of **3.5 points** must be achieved.

5.1.2 A combination of two or more of the following protection measures should be used to achieve the Gas Protection Score:

- Structural barrier (floor slab)
- Ventilation measures
- Gas resistant membrane

Site Specific Assessment of Foundation Design - Gas Protection Score Assessment

5.1.3 The proposed construction elements to achieve the required points of 3.5 points are given below:

- Beam and block floor construction is to be utilised. This achieves **0 points**.
- A ground gas resistant membrane is recommended. This achieves **2 points**.
- A clear void passive venting layer with 'very good' performance is recommended. This achieves **2.5 points**.

5.2 Floor Slab

5.2.1 This floor type contains many construction joints and discontinuities and can be affected by cracking. As such, it offers little resistance to the passage of ground gas and has high permeability.

5.2.2 Based on Table 6 of BS8485:2015+A1:2019, this will achieve a gas protection score of 0 points.

5.3 Ventilation Measures

5.3.1 For the proposed development, it is intended to include a minimum 150 mm deep ventilated sub-floor void with ventilation provided via air vents around the perimeter of the property. The number of vents is to be confirmed but will meet or exceed the BS8485:2015+A1:2019 requirements of 1,500 mm²/m run of wall on at least two opposite sides. This should be sufficient to provide very good performance.



5.3.2 Where there are multiple internal obstructions to air flow (caused by beams) there should be at least four (to five) times the area of the side vents provided to the internal obstruction.

5.3.3 Based on Table 6 of BS8485:2015+A1:2019, this will achieve gas protection score of 2.5 points.

5.4 Gas Resistant Membrane

5.4.1 A low permeability methane and carbon dioxide resistant membrane (also protective against ingress of radon) which meets all of the requirements of Table 7 of BS8485:2015+A1:2019 will achieve a score of 2 points. This membrane should:

- Be made from virgin polymer and have a methane transmission rate of less than 40.0ml/day/m²/atm (average);
- Be chemically resistant to degradation by other contaminants that may be present;
- Be sufficiently impervious, both in the sheet material and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane;
- Be sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- Be sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); and to withstand in-service stresses (e.g. settlement if placed below a floor slab);
- Be capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
- Be verified in accordance with CIRIA C735

5.4.2 The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. If a membrane is installed that does not meet all the criteria above then the score is zero.



6. INSTALLATION OF GROUND GAS PROTECTION MEASURES

6.1 General Comments

6.1.1 In concurrence with the NHBC guidance 'Hazardous Ground Gas - an essential for housebuilders – April 2023', BEK has advised the client that the welded solution is the preferred method for sealing gas membranes at critical junctions including laps and joints.

6.2 Components of the Membrane System

6.2.1 The manufacturer of the membrane and its associated components has yet to be confirmed by the client. The installed membrane and its associated components will need to meet the requirements of BS8485:2015+A1:2019. The gas membrane utilised within those buildings which are to be located above/immediately adjacent to the infilled pond (See Figure 5) should be upgraded to mitigate against risks from organic vapours.

6.2.2 For those plots which require an upgraded gas membrane to mitigate against vapour ingress (See Figure 5), BEK recommends the following two membranes:

- Juta GP TITANFLEX
- Visqueen Ultimate HC BLOK

6.2.3 For those plots which do not require mitigation against vapour ingress, BEK recommends the following two membranes:

- Juta GP1 (Juta)
- Visqueen Ultra Gas Barrier

6.2.4 All membrane installation must be undertaken to the manufacturer's specification.

6.2.5 Installation accessories will also be necessary (the exact components will depend on the installation method and the exact design of the building). Components utilised to install the gas membrane system include but are not limited to:

- Jointing tape (double sided, gas resistant tape)
- Pre-formed top hats
- Pre-formed Corners and Stop Ends
- Jubilee clips
- Gas Resistant Self Adhesive Membrane (and primers if this is sealed directly to masonry, metal or concrete)

- Gas Resistant Damp Proof Course (strongly preferred in areas where internal and external walls are to be constructed)
- Liquid Gas Membrane

6.2.6 All products utilised in the gas membrane system will need to be pre-approved by BEK. Any additional products utilised will need to be re-reviewed to confirm they meet the requirements of BS8485:2015+A1:2019.

6.3 Ventilation Measures

Sub-Floor Void

6.3.1 The beam and block system should incorporate a void depth of a minimum 150 mm free from debris and obstructions.

Air Bricks

6.3.2 The number of vents will meet or exceed the BS8485:2015+A1:2019 requirements of 1,500 mm²/m run of wall on at least two opposite sides. A typical air brick provides (6,000mm² vent area).

6.3.3 Regardless of ground gas protection requirements, the NHBC advise for protection against moisture is that void ventilation should be provided to whichever gives the greater opening area of either (i) 1500mm² per metre run of external wall or (ii) 500 mm² per m² of floor area. Therefore, minimum NHBC requirements are likely to be appropriately protective in terms of ground gases for low rise housing. It is outside the BEK remit to confirm whether the NHBC standards/building regulations are met with regards to protection against moisture.

6.3.4 BEK will validate that the number of vents will meet or exceed the BS8485:2015+A1:2019 requirements of 1,500 mm²/m run of wall on at least two opposite sides.

Internal Sleeper Walls

6.3.5 Where there are multiple internal obstructions to air flow caused by beams and sleeper walls, cross vents will need to be installed. These need to provide a minimum of 6,000 mm²/m.

6.3.6 The simplest approach is to use short sections of 100 mm diameter PVC drainage pipe through the sleeper wall or construct it with gaps in the blockwork.

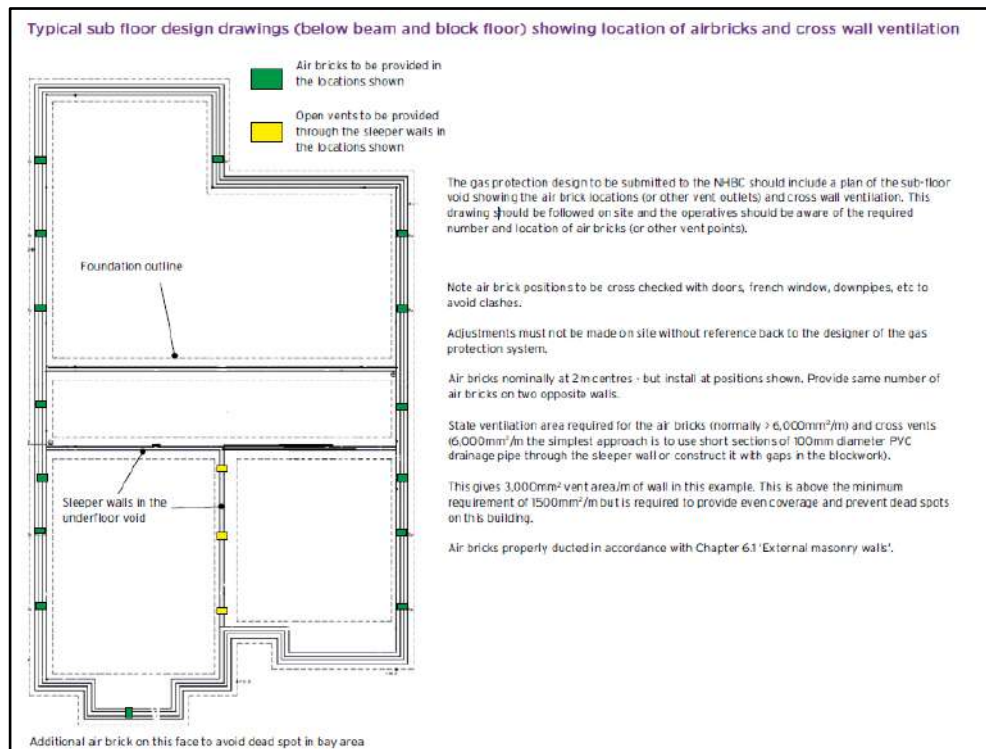


Figure 6: Example Drawing Showing Air Brick Locations

6.4 Ground Gas Membrane Installation - Outline Methodology

Preparation of the surface underlying the membrane

- 6.4.1 The surface underlying the membrane should have a smooth finish - free from voids, projections, and mortar deposits.
- 6.4.2 The gaps between the block and beams should be filled with a sand cement screed brushed into the joint. In many instances blocks are cut leaving gaps around pipe penetrations, these should be filled with expanding foam or sand and cement to ensure that the gas membrane is fully supported.
- 6.4.3 The beam and block floor should be prepared as per the manufacturer's specification (e.g. a sand blinding layer, protection fleece, or a smooth concrete float finish).

Laying of the Gas Membrane System

- 6.4.4 The membrane system shall be laid loosely extended across cavities and sealed around joints/service entries as per the manufacturers specification. This will typically require 150 mm membrane overlaps with proprietary double-sided tape within the joint and single sided proprietary tape over the top of the joint. A cross section showing the installation of membrane is illustrated in Figure 7.

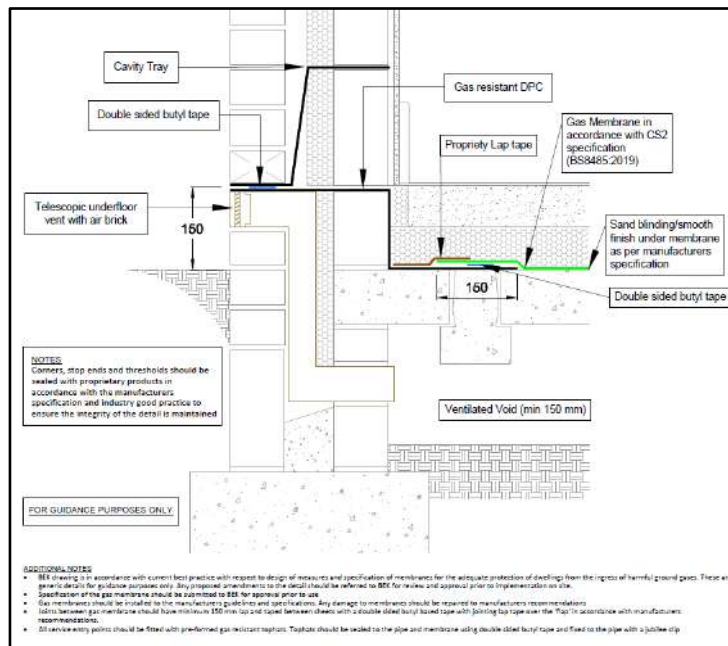


Figure 7: Typical Gas Membrane Edge Detail

- 6.4.5 Service penetrations shall be sealed with proprietary 'top hats' to the membrane and service pipe using propriety products in accordance with the manufacturer's specification. Top hats should be sealed to the pipe and gas membrane utilising double sided jointing tape and fixed with a jubilee clip. A schematic showing the installation of a top hat as per the manufacturer's specification is shown in Figure 8.

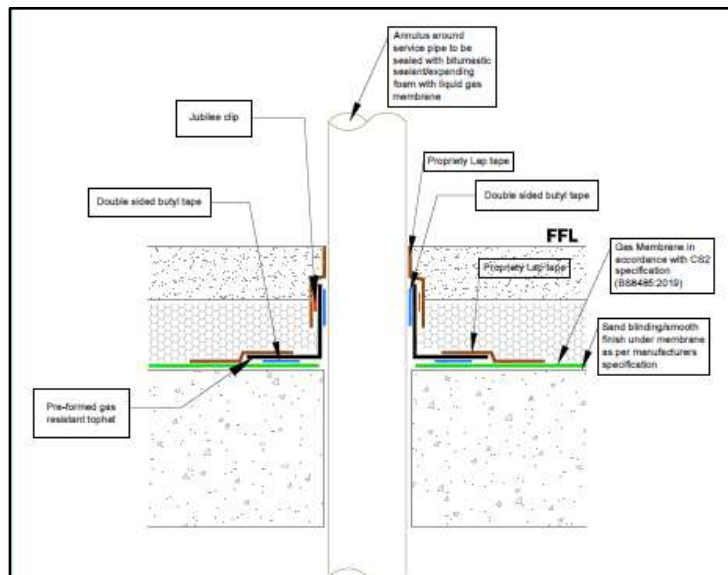


Figure 8: Typical Penetration Detail for Pre-Formed Tophats

- 6.4.6 Corners and non-standard service entries will be preferentially sealed utilising Gas Resistant Self-Adhesive Membrane. Corners and block ends can also be sealed with pre-formed units.

Protection of the Gas Membrane System

- 6.4.7 BEK recommends that the gas membrane is protected through placement of the insulation and/or fleece protection above the membrane within one working day of a passed inspection (as per the manufacturers specification).

Sealing of Internal Annulus around Service Pipe

- 6.4.8 In terms of the internal annulus of the duct holding each of the service pipes and conduits (electric cables and water pipes in some areas etc.) this will be filled with expanding foam and liquid applied gas membrane. The detail for this is provided in Figure 9.

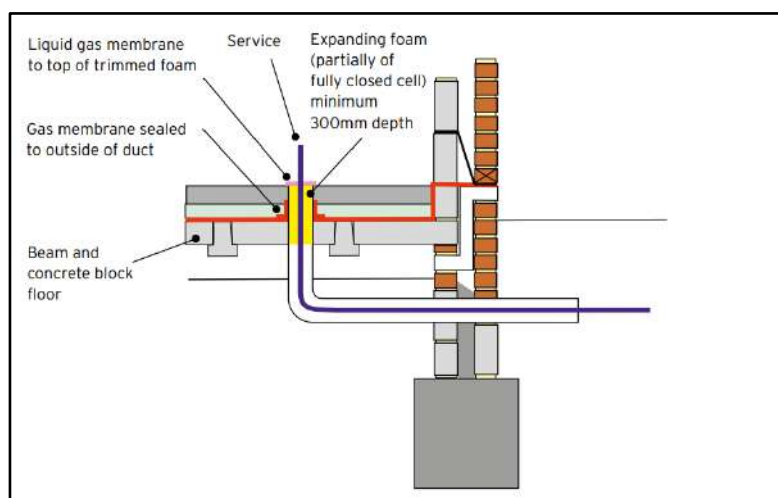


Figure 9: *Sealing of the Internal Annulus of the Service Duct (extracted from NHBC – an essential guide for house builders – April 2023)*

6.5 Installer of Ground Gas Measures

- 6.5.1 The exact construction company appointed to install the gas protection measures is unknown at the time of writing. The installers should be trained and experienced in the installation of ground gas resistant membranes.
- 6.5.2 BEK has recommended that in accordance with the NHBC 'Hazardous Ground Gas – an essential guide for housebuilders' the installation of the gas membrane system should be carried out by a specialist gas membrane installation company (specialist installer) with at least 50% of staff holding an NVQ level 2 (gas membrane installation) and/or TWI/CSWIP plastic welding accreditation with the remaining staff working towards one of those qualifications.
- 6.5.3 If non-specialist groundworkers are utilised to install the ground gas mitigation measures, BEK recommends that the general contractor doing the installation should receive adequate training from the suppliers of materials and be suitably qualified to carry out the installation.



6.6 Verification

- 6.6.1 The installation of the membrane will be independently validated by an appointed environmental consultant from BEK. Michael Buckley (BSc (Hons) MSc MEnSci CEnv), owner and Managing Director at BEK has over 28 years' experience in the verification of ground gas mitigation measures. Michael Buckley is responsible for the appointment/training of suitably qualified staff to verify gas measures and the ultimate sign off of all verified gas mitigation measures.
- 6.6.2 All staff involved in the verification of ground gas mitigation measures are degree qualified and a number of employees at have attended the 'Verification of Gas Protection Systems Course' delivered by CL:AIRE. In house training has been delivered to all BEK employees involved the verification of ground gas mitigation measures.



7. GAS MEASURES VALIDATION PLAN

7.1 Supervision of Works

7.1.1 The verification as described herein follows the recommendations set out in CIRIA C735 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases'. The works will be verified in accordance with CIRIA 735 (2014) by an experienced, suitably qualified verifier.

7.1.2 The installation of the gas protection measures (ventilation system and gas membrane installation) will be checked and verified by the Engineer at key stages during the works.

7.2 Key Verification Responsibilities & Hold Points

7.2.1 Verification lines of evidence need to be collated at a number of hold points. Such lines of evidence are required to ensure that the gas mitigation measures have been installed in accordance with the methodology presented in the Gas Verification Plan report herein.

7.2.2 However, it will not always be possible (or practicable) for BEK to be present for every stage of the remediation works in every plot and therefore some degree of verification will need to be undertaken by the developer. However, this should only be done following communication with BEK to ensure that appropriate validation records are maintained.

7.2.3 In all cases, it will be the responsibility of the developer to ensure that the verifier is contacted to collate verification evidence/in house verification evidence is collated at the below mentioned hold points:



Verification Hold Points	Evidence Requirement and Party Responsible for collation of such evidence
Verify depth of sub-floor void	Verification Consultant &/or Developer (Developer can only provide these records when BEK is confident that appropriate evidence has been collated) - Provide location referenced example photos
Spacing of air bricks, inspection of underside of membrane placement and sealing of the gas membrane across the entire building footprint	Verification Consultant - is to conduct a thorough visual inspection of 100% of the membrane area prior to it being overlain by insulation and a concrete screed poured to ensure all joint/penetrations are sealed appropriately. BEK is also to verify that the air bricks have been installed at the locations specified in the design drawings.
Placement of the insulation and/or fleece protection above the membrane.	Developer - is to ensure that the membrane is insulated within 1 working day of the inspection passing on a given plot. This should be considered for periods of site closures (ie the Christmas break).
Watch brief following inspection of the membrane and prior to concrete pour to ensure gas membrane is not punctured/damaged by follow on trades	Developer - is to ensure that follow on trades are aware of the presence and purpose of the gas membrane, and who they should contact if they believe their actions have had the potential to compromise it. A watch brief should be maintained by the developer to ensure that the membrane is not damaged by follow on trades. BEK should be contacted if the developer has reason to believe the measures have been compromised.
Sealing of service ducts (prior to occupation)	Developer - is to provide confirmation that the internal annulus of any open portion of any service duct annulus has been sealed in accordance with the design drawings. Plot specific location referenced photos to be collated for all seals and to be provided to the local authority on request
Ground level checks at airbricks (prior to occupation).	Developer - is to inspect the placement of airbricks with reference to finished ground levels after completion of landscaping works to ensure these have not been obscured.

Table 4: Summary of Key Verification Hold Points and Lines of Evidence Required at Each Hold Point.

7.3 Visual Inspection & Integrity Testing

7.3.1 A visual inspection method is recommended to be carried out by BEK. This should be undertaken following laying of the beam and block floor and laying of gas membrane on top, but prior to laying of insulation and poring of the screed.



7.3.2 Integrity testing is not required. However, pick testing may be carried out on site at the discretion of the BEK engineer.

7.4 Verifier Checklist

7.4.1 The BEK verifier or other suitably qualified verifier will:

- Confirm that the correct membrane has been used, including sealing/jointing tape and preformed components e.g. top hats, corners, self-adhesive gas membrane.
- Confirm that the underside of the membrane has been installed and prepared as per the manufacturer's specification with the underside of the membrane being free from voids, projections, and mortar deposits.
- Inspect the general condition of the membrane for punctures, rips and tears.
- Check that joints and laps have been sealed in accordance with manufacturers specification.
- Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.
- Check that top hats have been correctly installed around service entries, including jubilee clips around the pipe and correct sealing arrangements to the membrane/pipe infrastructure as per the manufacturer's specification.
- Check that vents have been installed around the perimeter of the building in sufficient number and in the correct locations, including inspecting the condition i.e., not blocked or otherwise restricted.
- Check the presence of a passive ventilation system (clear >150mm void), including measuring that this is of a sufficient depth and the void has not been filled or otherwise compromised.
- Check that internal sleeper walls are also vented to provide adequate flow-through within the void so that none of the walls are blocking off unvented sections within the void.

7.4.2 Any sections of the gas membrane displaying a flaw, failing a visual inspection or failing integrity testing (if required) should be repaired under the supervision of the verification consultant until rectifications are considered acceptable. The verification consultant should record the type and result of the repairs on the gas proforma.

7.4.3 If the verification consultant leaves the site without rectifications being made then the plot inspection will be failed subject to re-inspection at a later date.

7.4.4 Photographic evidence will be recorded during all inspections and a suitable record of the validation will be included within a validation report.

7.4.5 A gas measures proforma sheet will be completed detailing the inspection for each inspection visit. An example of the gas pro-forma to be used is presented in Appendix D.



8. SUPERVISION AND VALIDATION

8.1 Supervision of Works

8.1.1 The works will be supervised by BEK who will ensure the following verification procedures are adopted:

- (i) Liaison with the appointed groundwork/remediation contractor
- (ii) Inspection and supervision of the works
- (iii) Collection of samples and co-ordination of laboratory testing

8.1.2 The remediation areas will be checked and verified by the Engineer at key stages during the works, including:

- (i) Verification of clean service trenches
- (ii) During excavation of any contaminated soils to confirm this is done in accordance with the recommendations
- (iii) Installation of the telescopic vents for the passive ventilation
- (iv) Following placement and sealing the proprietary gas membrane
- (v) Prior to/following placement of the capping soils to ensure suitability and capping thickness of suitably clean soils and placement of the geotextile membrane

8.1.3 For a sustainable approach it is recommended that the excavated soils are retained on site. However, this may not be achievable due to the requirements in meeting finished site levels.

8.2 Validation of the Works

8.2.1 Validation testing is required to ensure the remediation works have been undertaken in accordance with the methodology presented herein.

8.3 Imported Material

8.3.1 It may be necessary to import additional soil for use in the landscaped/garden areas. If possible, all imported soils should be sourced locally. The capping soils will be placed on a geotextile membrane that will help prevent mixing and act as a marker layer to mitigate any deep excavations in the future. The presence of the geotextile membrane will need to be confirmed and validated.



- 8.3.2 The methodology to validate the quality of any imported material for use in the gardens will depend on source of those materials.
- 8.3.3 To confirm the suitability of all imported sub/topsoil it will be necessary to recover representative samples for chemical testing and assessment.
- 8.3.4 For all cover system soils that are to be imported, it is recommended that testing is undertaken at the source to determine if the soils are likely to be suitable prior to importation (recommended 3 samples at source). Sampling of the soils for chemical analysis will be required once the soils have been imported to site to confirm the soils are the same as those sampled at the donor site. Testing of imported soils can be undertaken upon import within a stockpile, or preferably upon placement within rear gardens areas. Testing will vary based on the source of the material.
- 8.3.5 A visual inspection shall also be carried out to ensure that the soil is visually acceptable for use and does not contain any deleterious material (i.e. glass, plastic, brick, concrete etc.).
- 8.3.6 The type of testing and sampling frequency will be determined by the origin of the materials. The validation of the placement of the capping soils will follow the guidance by Manchester City Council 'Planning & Contaminated Land - Technical Guidance' (dated February 2021).

End-Use	Greenfield Soils	Remediated Soils	Brownfield Soils	Unknown Soil Source
Residential Gardens	1:200m ³	1:100m ³	1:50m ³	1:50m ³
Soft landscaping	1:200m ³	1:150m ³	1:150m ³	1:150m ³
Other	1:200m ³	1:200m ³	1:200m ³	1:200m ³

Table 5: Summary of Soil Testing Frequency (taken from Manchester City Council Guidance)

- 8.3.7 The sampling frequency may be varied at the discretion of the Engineer depending on the nature and variability of the imported material and its source (subject to Local Authority approval).
- 8.3.8 The verification report will need to include confirmation of the total volume of each material type imported to site to ensure representative sampling has been undertaken in accordance with the appropriate sampling frequency.
- 8.3.9 Assessment of the soil chemical analysis results against the LQM/CIEH Suitable 4 Use Levels (S4ULs), Category 4 Screening Levels (C4SL), or other similarly derived Generic Assessment Criteria for a residential with plant uptake end use, are acceptable.



Further Considerations

- 8.3.10 All soils from greenfield sources will be checked to confirm the greenfield status and confirmation will be provided in the Validation Report (i.e. red line site boundary, grid reference and other checks).
- 8.3.11 If other materials will be used, re-used or imported as a component of the cover system in the top 600 mm/450 mm then they should be afforded the same sampling and analytical strategy as the soils in order to provide confidence that they are suitable for use.

8.4 Assessment Criteria

- 8.4.1 Taking account the proposals to redevelop the site for a residential end-use it is necessary to adopt appropriate assessment criteria which protect end-users of the site. For a conservative assumption a Soil Organic Matter (SOM) of 1 % has been used.

Imported Soils

- 8.4.2 The following table provides a list of assessment criteria for assessing suitability of material to be used within the landscaped areas of the proposed development.
- 8.4.3 The criteria have been sourced from the LQM/CIEH Suitable 4 Use Level (S4UL). In addition, the Category 4 Screening Levels (C4SLs) for lead and naphthalene have been used, as well as the Atkins ATRISKSIL screening level for cyanide.



Contaminant of Concern	Assessment Criteria (mg/kg)
Arsenic	37 ¹
Phenol	120 ¹
Cadmium	11 ¹
Chromium (total)	910 ¹
Copper	2400 ¹
Lead	210 ²
Mercury	40 ¹
Nickel	130 ¹
Selenium	250 ¹
Zinc	3700 ¹
Cyanide	34 ³
Acenaphthene	210 ¹
Acenaphthylene	170 ¹
Anthracene	2400 ¹
Benzo(a)anthracene	7.2 ¹
Benzo(a)pyrene	2.2 ²
Benzo(b)fluoranthene	2.6 ¹
Benzo(ghi)perylene	320 ¹
Benzo(k)fluoranthene	77 ¹
Chrysene	15 ¹
Dibenzo(ah)anthracene	0.24 ¹
Fluoranthene	280 ¹
Fluorene	170 ¹
Indeno(1,2,3-cd)pyrene	27 ¹
Naphthalene	15 ²
Phenanthrene	95 ¹
Pyrene	620 ¹
Aliphatic Hydrocarbons >C5-C6	42 ¹
Aliphatic Hydrocarbons >C6-C8	100 ¹
Aliphatic Hydrocarbons >C8-C10	27 ¹
Aliphatic Hydrocarbons >C10-C12	130 ¹
Aliphatic Hydrocarbons >C12-C16	1100 ¹
Aliphatic Hydrocarbons >C16-C21	65000* ¹
Aliphatic Hydrocarbons >C21-C35	65000* ¹
Aromatic Hydrocarbons >C5-C7	70 ¹
Aromatic Hydrocarbons >C7-C8	130 ¹
Aromatic Hydrocarbons >C8-C10	34* ¹
Aromatic Hydrocarbons >C10-C12	74 ¹
Aromatic Hydrocarbons >C12-C16	140 ¹
Aromatic Hydrocarbons >C16-C21	260 ¹
Aromatic Hydrocarbons >C21-C35	1100 ¹
BTEX - Benzene	0.087 ¹
BTEX - Toluene	130 ¹
BTEX - Ethyl Benzene	47 ¹
BTEX - m & p Xylene	115 ¹
BTEX - o Xylene	60 ¹
Asbestos	None detected

Table 6: Assessment Criteria for Imported Soils

1 CIEH/LQM Derived Assessment Criteria (S4UL) (1% SOM)

2 Category 4 Screening Level (C4SL)

3 Atkins ATRISKSOIL screening level



8.5 Assessment of Chemical Test Results

- 8.5.1 BEK will be responsible for the assessment of all chemical test results to determine suitability of material to be used on site.
- 8.5.2 The assessment will be undertaken in accordance with current UK policy and guidelines and any specific requirements of the local authority.
- 8.5.3 All chemical test results will be presented in the Validation Report.

8.6 Capping Thickness

- 8.6.1 The verification of the capping thickness will be completed via the excavation of a series of trial holes and the capping thickness relative to previous ground level be determined. Photographic evidence of the trial hole and capping depth will be presented in the Validation Report.
- 8.6.2 The engineer may take other measurements as required to verify the works have been carried out in accordance with the Remediation Method Statement.

8.7 Unexpected Areas of Ground Contamination

- 8.7.1 As stated previously within this report the site has been subject to previous site investigation and as such, indicative ground conditions are known. There is also no formal requirement for any hotspots of material to be removed from site.
- 8.7.2 However, if any area of suspect material is encountered during the development of the site (i.e. that do not conform to the anticipated ground conditions), or there is a requirement for the removal of contaminated material, then appropriate action will be taken.
- 8.7.3 This will initially include the cessation of work in the area of concern and information forwarded to BEK. Any material excavated/delineated should be stockpiled on impermeable material and covered to negate any risks of soils leaching, and the dispersal of any vapours and/or odours. The material should then be sampled for an appropriate range of determinands.
- 8.7.4 Once the laboratory analysis of the material is available an assessment should be undertaken to inform on reuse/disposal options.
- 8.7.5 Depending on the nature of any such impact it may be necessary to undertake validation testing of any excavation faces in order to demonstrate that no such materials are left in-situ.



9. REPORTING

9.1 On completion of the remediation and mitigation works, BEK will prepare a Validation/Completion Report.

9.2 The Validation/Completion Report will describe the works undertaken in order to satisfactorily demonstrate that the works have been completed successfully and will include the following:

- A description of works undertaken
- Record of any unforeseen contamination encountered during the works, including any remedial actions taken.
- Provision of all relevant records and supporting evidence, including waste disposal records.
- Confirmation of the suitability of the gas membrane and confirmation of the installation of the gas mitigation measures
- Record of any material imported into the site for use in the residential gardens (if required)
- Validation samples recovered and tested
- Assessment of the chemical test results
- Photographs showing the remediation works being undertaken and completed
- Photographs showing the appropriate storage of any contaminated soil arisings in accordance with the recommendations detailed within Section 4.1.1

APPENDIX A

Exploratory Logs



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070	DATE 12th December 2024
PROJECT NAME White Moss Road, Blackley	
CLIENT The Casey Group	TRIAL PIT NO TP1
	SHEET 1/8

COMPLETION 2.7 m

COMMENTS Standing water (slight oily sheen) at 2.5 m. Headspace PID at 2.4 m (17.9 ppm Peak)

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8					MADE GROUND: Brown/grey/black slightly ashy slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery, ceramic and metal. Occasional (treated, black) wood. Rare plastic, glass, clinker and other miscellaneous waste. Lenses of black stained clay with moderate hydrocarbon odour	0.8
1						1
1.2						1.2
1.4					Moderate hydrocarbon odour towards base	1.4
1.6						1.6
1.8						1.8
2						2
2.2						2.2
2.4	2.4	D = 2.4 m Headspace PID test on made ground at 2.4 m (17.9 ppm)	∇		POSSIBLE MADE GROUND: Greyish brown slightly sandy silty CLAY. Sand is fine to coarse. Rare fine to medium gravels of stone of mixed lithologies	2.4
2.6						2.6
2.8					Termination Depth at: 2.7 m	2.8
3						3
3.2						3.2
3.4						3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070	DATE 12th December 2024
PROJECT NAME White Moss Road, Blackley	TRIAL PIT NO TP2
CLIENT The Casey Group	SHEET 2/8

COMPLETION 2.7 m

COMMENTS Standing water (moderate oily sheen) at 2.2 m. Headspace PID at 1.3 m (51.6 ppm) and 2.4 m (116 ppm)

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8						0.8
1					MADE GROUND: Greyish black very clayey very sandy fine to coarse GRAVEL of clinker, brick and stone of mixed lithologies. Sand is fine to coarse. Occasional angular concrete and brick cobbles. Occasional lenses of grey silty clay. Rare (treated, black) wood, glass, metal and other miscellaneous waste.	1
1.2		Headspace PID test on made ground at 1.3 m (51.6 ppm)				1.2
1.4					Increasing hydrocarbon odour with depth, from slight at top to strong at base. Oily sheen/staining on arisings	1.4
1.6						1.6
1.8						1.8
2	2.0	D = 2.0 m				2
2.2			∇			2.2
2.4		Headspace PID test on made ground at 2.4 m (116 ppm)				2.4
2.6					POSSIBLE MADE GROUND: Greyish brown slightly sandy silty CLAY. Sand is fine to coarse. Rare fine to coarse gravels of stone of mixed lithologies	2.6
2.8					Termination Depth at: 2.7 m	2.8
3						3
3.2						3.2
3.4						3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070

DATE 12th December 2024

PROJECT NAME White Moss Road, Blackley

CLIENT The Casey Group

TRIAL PIT NO TP3

SHEET 3/8

COMPLETION 1.1 m

COMMENTS Trial Pit Dry

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6	0.6	D = 0.6 m			Brown/grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to subrounded stone of mixed lithologies.	0.6
0.8						0.8
1						1
1.2					Termination Depth at: 1.1 m	1.2
1.4						1.4
1.6						1.6
1.8						1.8
2						2
2.2						2.2
2.4						2.4
2.6						2.6
2.8						2.8
3						3
3.2						3.2
3.4						3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070

DATE 12th December 2024

PROJECT NAME White Moss Road, Blackley

CLIENT The Casey Group

TRIAL PIT NO TP4

SHEET 4/8

COMPLETION 1,3 m

COMMENTS Trial Pit Dry

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8					Brown/grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to subrounded stone of mixed lithologies.	0.8
1						1
1.2						1.2
1.4					Termination Depth at: 1.3 m	1.4
1.6						1.6
1.8						1.8
2						2
2.2						2.2
2.4						2.4
2.6						2.6
2.8						2.8
3						3
3.2						3.2
3.4						3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070

DATE 12th December 2024

PROJECT NAME White Moss Road, Blackley

TRIAL PIT NO TP5

CLIENT The Casey Group

SHEET 5/8

COMPLETION 4.4 m

COMMENTS Slight water ingress at 2.6 m. Maximum depth of machine reached. Headspace PID at 2.6 m (17.9 ppm Peak) and 3.2 m (0 ppm)

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8					MADE GROUND: Grey/black slightly ashy slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies.	0.8
1						1
1.2					Silt content and waste content (including pottery, metal, plastic, treated wood and other miscellaneous waste) increases with depth.	1.2
1.4						1.4
1.6						1.6
1.8						1.8
2						2
2.2						2.2
2.4	2.4	D = 2.4 m				2.4
2.6		Headspace PID test on made ground at 2.6 m (10.9 ppm)	▽			2.6
2.8					Layers of black silty clay with slight hydrocarbon odour present with depth (beyond 2.6 m)	2.8
3					No hydrocarbon odour detected until beyond the level of water ingress at 2.6 m	3
3.2		Headspace PID test on made ground at 3.2 m (0 ppm)			Large treated wooden beams/sleepers present towards base	3.2
3.4	3.4	D = 3.4 m				3.4
3.6						3.6
3.8						3.8
4						4
4.2					POSSIBLE NATURAL STRATA: Brown sandy silty CLAY with rare fine to coarse rounded to subrounded gravels of stone of mixed lithologies	4.2
4.4					Termination Depth at: 4.4 m	4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070

DATE 12th December 2024

PROJECT NAME White Moss Road, Blackley

TRIAL PIT NO TP6

CLIENT The Casey Group

SHEET 6/8

COMPLETION 3.3 m

COMMENTS Water ingress at 2.2 m. Headspace PID at 2.1 m (0 ppm)

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8					MADE GROUND: Grey/black gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent angular cobbles & boulders of brick and concrete. Occasional metal, plastic, fabric, pottery, wood and other miscellaneous waste. Slight hydrocarbon odour at base	0.8
1						1
1.2						1.2
1.4	1.5	D = 1.5 m				1.4
1.6						1.6
1.8						1.8
2		Headspace PID test on made ground at 2.1 m (0 ppm)				2
2.2			∇			2.2
2.4						2.4
2.6					Brown sandy silty CLAY with rare fine to coarse rounded to subrounded gravels of stone of mixed lithologies	2.6
2.8						2.8
3						3
3.2						3.2
3.4					Termination Depth at: 3.3 m	3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070

DATE 12th December 2024

PROJECT NAME White Moss Road, Blackley

CLIENT The Casey Group

TRIAL PIT NO TP7

SHEET 7/8

COMPLETION 2.0 m

COMMENTS Water ingress at 1.8 m (slight oily sheen). Pit terminated due to collapse. Headspace PID at 1.8 m (0 ppm)

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4	0.4	D = 0.4 m			MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6						0.6
0.8					MADE GROUND: Grey/dark grey sandy clayey fine to coarse angular to subangular GRAVEL of whole/broken brick, concrete and stone of mixed lithologies. Frequent angular cobbles/boulders of brick and concrete. Occasional concrete large boulders, plastic, metal, fabric, glass and other miscellaneous waste. Moderate hydrocarbon odour at base	0.8
1						1
1.2	1.2	D = 1.2 m				1.2
1.4						1.4
1.6						1.6
1.8		Headspace PID test on made ground at 1.8 m (0 ppm)	∇			1.8
2					Termination Depth at: 2.0 m	2
2.2						2.2
2.4						2.4
2.6						2.6
2.8						2.8
3						3
3.2						3.2
3.4						3.4
3.6						3.6
3.8						3.8
4						4
4.2						4.2
4.4						4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24070	DATE 12th December 2024
PROJECT NAME White Moss Road, Blackley	
CLIENT The Casey Group	TRIAL PIT NO TP8
	SHEET 8/8

COMPLETION 3.7 m
COMMENTS Standing water at 2.0 m (slight oily sheen). Pit terminated due to collapse

Depth (m)	Depth (m)	Samples/ Test	Water	Graphic Log	Material Description	Elevation (m)
0.2					MADE GROUND: Grass onto brown organic sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, concrete and stone of mixed lithologies. Frequent rootlets	0.2
0.4					MADE GROUND: Brown ashy gravelly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular brick and stone of mixed lithologies. Frequent pottery and ceramic. Occasional angular cobbles of brick and concrete. Rare plastic and metal	0.4
0.6					MADE GROUND: Grey/dark grey sandy very clayey fine to coarse angular to subangular GRAVEL of whole/broken brick, concrete and stone of mixed lithologies. Frequent angular cobbles/boulders of brick and concrete. Occasional concrete large boulders, plastic, metal, fabric, glass and other miscellaneous waste.	0.6
0.8						0.8
1						1
1.2						1.2
1.4						1.4
1.6						1.6
1.8						1.8
2			▽			2
2.2						2.2
2.4						2.4
2.6						2.6
2.8						2.8
3	3.0	D = 3.0 m				3
3.2						3.2
3.4						3.4
3.6					POSSIBLE NATURAL STRATA: Brown sandy silty CLAY with rare fine to coarse rounded to subrounded gravels of stone of mixed lithologies	3.6
3.8					Termination Depth at: 3.7 m	3.8
4						4
4.2						4.2
4.4						4.4

APPENDIX B

Trial Pit Photographs

	
P1: Trial Pit TP1	P2: Trial Pit TP1 (arising)
	
P3: Trial Pit TP2	P4: Trial Pit TP2
	
P5: Trial Pit TP2 (arising)	P6: Trial Pit TP2 (arising)
	
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.	
Photographs 1 to 6 Site: White Moss Road, Blackley Title: Appendix B – Trial Pit Photographs Project No: 24070 Client: The Casey Group Created By: AH Date: January 2025	

	
P7: Trial Pit TP3	P8: Trial Pit TP3 (arisings)
	
P9: Trial Pit TP4	P10: Trial Pit TP4 (arisings)
	
P11: Trial Pit TP5	P12: Trial Pit TP5
	
Photographs 7 to 12	
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.	
Site: White Moss Road, Blackley Title: Appendix B – Trial Pit Photographs	
Project No: 24070 Created By: AH Client: The Casey Group	
Date: January 2025	

	
P13: Trial Pit TP5 (arising)	P14: Trial Pit TP5 (arising)
	
P15: Trial Pit TP6 (natural strata in east of pit, MG in west)	P16: Trial Pit TP6 (natural strata in east of pit, MG in west)
	
P17: Trial Pit TP6	P18: Trial Pit TP6 (arising)
	
Photographs 13 to 18	
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.	
Site: White Moss Road, Blackley Title: Appendix B – Trial Pit Photographs	
Project No: 24070 Created By: AH Client: The Casey Group	
Date: January 2025	

				
P19: Trial Pit TP7	P20: Trial Pit TP7 (arising)			
				
P21: Trial Pit TP8	P22: Trial Pit TP8 (arising)			
				
P23: Trial Pit TP8 (arising)	P24: Trial Pit TP8 (arising)			
				
Photographs 19 to 24				
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.		Project No: 24070	Created By: AH	Date: January 2025
		Client: The Casey Group		
Site: White Moss Road, Blackley				
Title: Appendix B – Trial Pit Photographs				

APPENDIX C

Chemical Test Results

FINAL ANALYTICAL TEST REPORT SUPPLEMENT TO TEST REPORT 24/12193/1

Amendments: Request for Additional Analysis

Envirolab Job Number: 24/12193
Issue Number: 2

Date: 06 January, 2025

Client: BEK Enviro Ltd
2 Landwick Court
Metcalf Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: White Moss Road, Blackley
Project Ref: Not specified
Order No: 8499-24070-AH
Date Samples Received: 13/12/24
Date Instructions Received: 16/12/24
Date Analysis Completed: 06/01/25

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
Organic Matter _D ^{MS}	6.18	11.2	5.05	7.97	4.56	8.13	8.20	% w/w	0.14	A-T-032s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
SVOC										
4-Bromophenyl phenyl ether _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Hexachlorobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Diethyl phthalate _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Dimethyl phthalate _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Dibenzofuran _A	<1000	<100	369	-	-	-	-	µg/kg	100	A-T-052s
Carbazole _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate _A	<5000	<500	<500	-	-	-	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
4-Nitrophenol _A	14100	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
3+4-Methylphenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2-Nitrophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2-Methylphenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
1,2,4-Trichlorobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2-Chlorophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene _A	<1000	353	<100	-	-	-	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
1,4-Dichlorobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
1,3-Dichlorobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
1,2-Dichlorobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2-Chloronaphthalene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
2-Methylnaphthalene _A	<1000	<100	411	-	-	-	-	µg/kg	100	A-T-052s
Acenaphthylene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Acenaphthene _A	2160	<100	629	-	-	-	-	µg/kg	100	A-T-052s
Anthracene _A	3140	171	226	-	-	-	-	µg/kg	100	A-T-052s
Benzo(a)anthracene _A	5930	182	331	-	-	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
Benzo(b)fluoranthene _A	5360	208	400	-	-	-	-	µg/kg	100	A-T-052s
Benzo(k)fluoranthene _A	2870	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Benzo(a)pyrene _A	5770	169	349	-	-	-	-	µg/kg	100	A-T-052s
Benzo(ghi)perylene _A	3060	<100	217	-	-	-	-	µg/kg	100	A-T-052s
Chrysene _A	5790	203	366	-	-	-	-	µg/kg	100	A-T-052s
Fluoranthene _A	15300	582	863	-	-	-	-	µg/kg	100	A-T-052s
Fluorene _A	2050	205	537	-	-	-	-	µg/kg	100	A-T-052s
Indeno(1,2,3-cd)pyrene _A	2710	<100	163	-	-	-	-	µg/kg	100	A-T-052s
Phenanthrene _A	12100	605	1430	-	-	-	-	µg/kg	100	A-T-052s
Pyrene _A	13400	478	757	-	-	-	-	µg/kg	100	A-T-052s
Naphthalene _A	<1000	229	674	-	-	-	-	µg/kg	100	A-T-052s
Dibenzo(ah)anthracene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Phenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Pentachlorophenol _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
n-Dioctylphthalate _A	<5000	<500	<500	-	-	-	-	µg/kg	500	A-T-052s
n-Dibutylphthalate _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Nitrobenzene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Isophorone _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Hexachloroethane _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Hexachlorobutadiene _A	<1000	<100	<100	-	-	-	-	µg/kg	100	A-T-052s
Perylene _A	1560	<100	<100	-	-	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
VOC										
Dichlorodifluoromethane _A	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Chloromethane _A	<250	<50	<250	-	-	-	-	µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene) _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Bromomethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Chloroethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Trichlorofluoromethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethene _A [#]	<25 ^U	<5 ^U	<25 ^U	-	-	-	-	µg/kg	1	A-T-006s
Carbon Disulphide _A [#]	<25 ^U	<5 ^U	<25 ^U	-	-	-	-	µg/kg	1	A-T-006s
Dichloromethane _A	<125	<25	<125	-	-	-	-	µg/kg	5	A-T-006s
trans 1,2-Dichloroethene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
cis 1,2-Dichloroethene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
2,2-Dichloropropane _A [#]	<25 ^U	<5 ^U	<25 ^U	-	-	-	-	µg/kg	1	A-T-006s
Bromochloromethane _A [#]	<125	<25	<125	-	-	-	-	µg/kg	5	A-T-006s
Chloroform _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1,1-Trichloroethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1-Dichloropropene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Carbon Tetrachloride _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,2-Dichloroethane _A [#]	<50	<10	<50	-	-	-	-	µg/kg	2	A-T-006s
Benzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Trichloroethene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,2-Dichloropropane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Dibromomethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Bromodichloromethane _A [#]	<250	<50	<250	-	-	-	-	µg/kg	10	A-T-006s
cis 1,3-Dichloropropene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Toluene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
trans 1,3-Dichloropropene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1,2-Trichloroethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,3-Dichloropropane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Tetrachloroethene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Dibromochloromethane _A [#]	<75	<15	<75	-	-	-	-	µg/kg	3	A-T-006s
1,2-Dibromoethane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
Chlorobenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane _A	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Ethylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
m & p Xylene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
o-Xylene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Styrene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Bromoform _A [#]	<75	<15	<75	-	-	-	-	µg/kg	3	A-T-006s
Isopropylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane _A	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,2,3-Trichloropropane _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
Bromobenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
n-Propylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
2-Chlorotoluene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
4-Chlorotoluene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
tert-Butylbenzene _A [#]	<50	<10	<50	-	-	-	-	µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
sec-Butylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
4-Isopropyltoluene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,3-Dichlorobenzene _A	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,4-Dichlorobenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
n-Butylbenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,2-Dichlorobenzene _A [#]	<25	<5	<25	-	-	-	-	µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP) _A	<50	<10	<50	-	-	-	-	µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene _A	<75	<15	<75	-	-	-	-	µg/kg	3	A-T-006s
Hexachlorobutadiene _A [#]	<25 ^U	<5 ^U	<25 ^U	-	-	-	-	µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene _A	<75	<15	<75	-	-	-	-	µg/kg	3	A-T-006s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP5	TP3	TP5	TP6	TP7			
Depth to Top	2.4	2.0	3.4	0.6	2.4	1.5	0.4			
Depth To Bottom										
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24	12-Dec-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6ABE	5A	6ABE	6ABE	6A	6AE	4ABE			
TPH CWG with Clean Up										
Alii >C5-C6 _A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Alii >C6-C8 _A	<0.01	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Alii >C8-C10 _A	<1	9	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Alii >C10-C12 _A ^{M#}	1	30	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Alii >C12-C16 _A ^{M#}	10	70	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Alii >C16-C21 _A ^{M#}	14	62	<1	3	1	3	1	mg/kg	1	A-T-055s
Alii >C21-C35 _A ^{M#}	27	29	11	71	14	38	36	mg/kg	1	A-T-055s
Total Aliphatics _A	52	200	11	74	16	41	37	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	5	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	1	32	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	31	88	4	5	5	6	8	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	141	52	7	20	17	37	37	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	305	17	14	45	44	116	116	mg/kg	1	A-T-055s
Total Aromatics _A	478	195	26	69	66	159	161	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	530	395	37	143	82	200	198	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8									
Depth to Top	3.0									
Depth To Bottom										
Date Sampled	12-Dec-24									
Sample Type	SOIL									
Sample Matrix Code	6AE									
% Stones >10mm _A	<0.1							% w/w	0.1	A-T-044
Organic Matter _D ^{MS}	10.2							% w/w	0.14	A-T-032s

Envirolab Job Number: 24/12193

Client Project Name: White Moss Road, Blackley

Client Project Ref: Not specified

Lab Sample ID	24/12193/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8									
Depth to Top	3.0									
Depth To Bottom										
Date Sampled	12-Dec-24									
Sample Type	SOIL									
Sample Matrix Code	6AE									
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01							mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1							mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	3							mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	5							mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	122							mg/kg	1	A-T-055s
Total Aliphatics _A	130							mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1							mg/kg	1	A-T-055s
Aro >C10-C12 _A	2							mg/kg	1	A-T-055s
Aro >C12-C16 _A	20							mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	81							mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	277							mg/kg	1	A-T-055s
Total Aromatics _A	380							mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	510							mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01							mg/kg	0.01	A-T-022s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- The results reported herein relate only to the material supplied to the laboratory.
- The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
- Analytical results reflect the quality of the sample at the time of analysis only.
- Opinions and Interpretations expressed are outside our scope of accreditation.
- A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript "##"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "D" on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript "A"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis

"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.

Quantification: Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.

PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs
Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.					

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only. Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park,
Altham, Lancashire , BB5 5GY

Project: White Moss Road, Blackley

Clients Project No:

Project No: 24/12193

Date Received: 16/12/2024 (am)

Cool Box Temperatures (°C): 13.5

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	24/12193/1	24/12193/2	24/12193/3	24/12193/4	24/12193/5	24/12193/6	24/12193/7	24/12193/8
Client Sample No								
Client Sample ID/Depth	TP1 2.4m	TP2 2.0m	TP5 3.4m	TP3 0.6m	TP5 2.4m	TP6 1.5m	TP7 0.4m	TP8 3.0m
Date Sampled	12/12/24	12/12/24	12/12/24	12/12/24	12/12/24	12/12/24	12/12/24	12/12/24
A-T-006s	24/12/2024	24/12/2024	24/12/2024					
A-T-022s	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024
A-T-032s	06/01/2025	06/01/2025	06/01/2025	06/01/2025	06/01/2025	06/01/2025	06/01/2025	06/01/2025
A-T-044	17/12/2024	17/12/2024	17/12/2024	17/12/2024	17/12/2024	17/12/2024	17/12/2024	17/12/2024
A-T-052s	23/12/2024	20/12/2024	20/12/2024					
A-T-055s	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024
Calc-As Recd	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX D

Example Gas Proforma Sheet

BEK Ground Gas Validation Inspection Record

Site:				Inspected by:	
Plot No:		Date:		Inspection Method:	

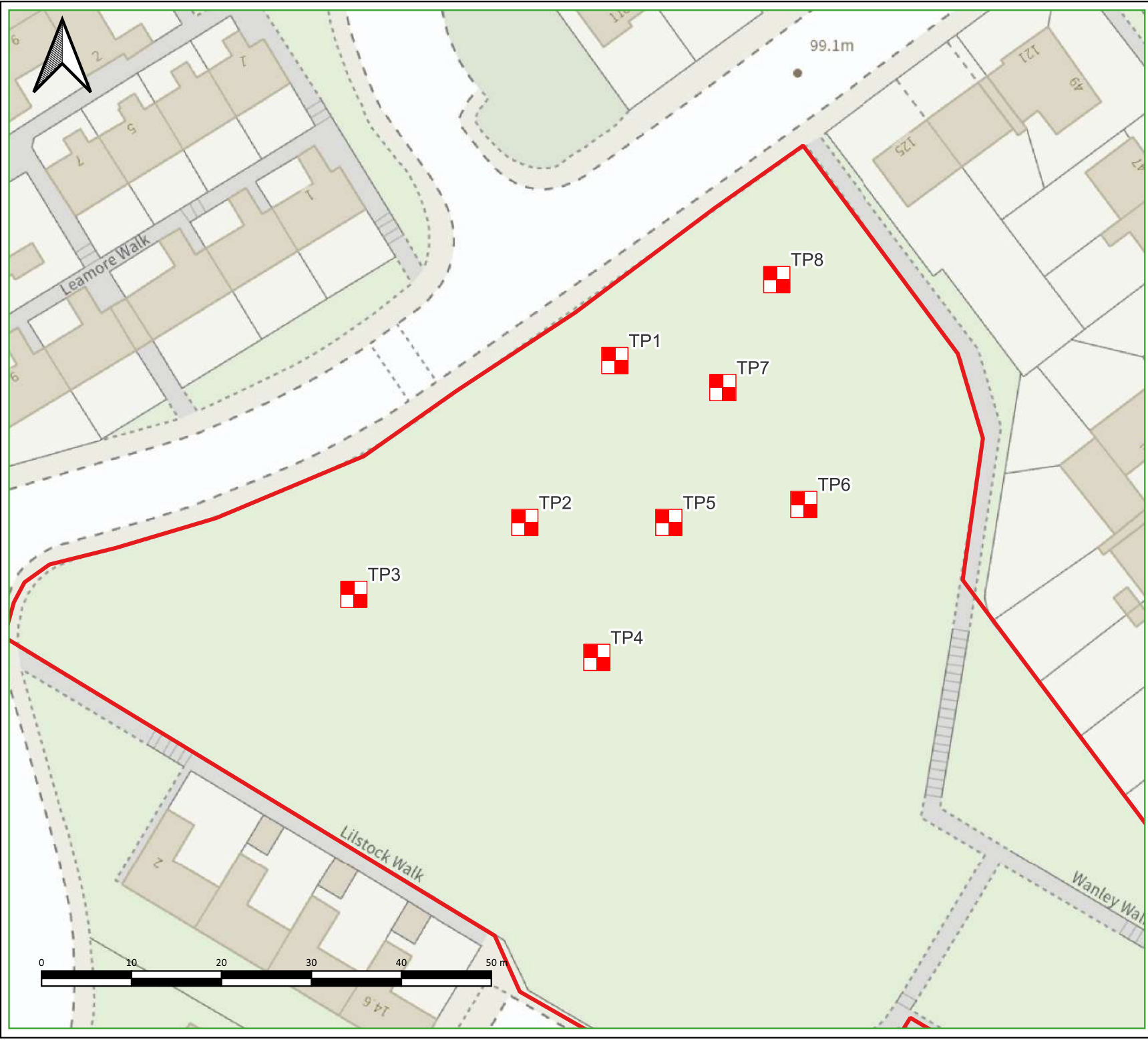
	Inspected Item	Y/N	Comments/Defects/Remedials requested	Photo? Y/N
1.1	External Wall Airbricks			
1.2	Sub-Floor Void/ Pressure Relief / Passive Venting			
1.3	Any internal sleeper walls – require appropriate ventilation			
1.4	External vent trenches/ducts			
2.1	Condition of subgrade and underside of membrane			
2.2	Gas Membrane type including associated components			
2.3	Gas Membrane Condition			
2.4	Lapping Design/Seals of Laps and Joints			
2.5	Perimeter Installation/Cavities and Corners			
2.6	Service Entries			
2.7	Are there any level changes/steels/abnormals?			
Additional Notes:				

BEK Ground Gas Validation Inspection Record

	Inspected Item	Comments/Defects/Remedials requested
1.1	External Wall Airbricks	Meet or exceed the BS8485:2015+A1:2019 requirements of 1,500 mm ² /m run of wall on at least two opposite sides. A typical air brick provides (6,000mm ² vent area). Check design
1.2	Sub-Floor Void/ Pressure Relief / Passive Venting	Check the presence of a vented void / pressure relief pathway, including measuring that this is of a sufficient depth and not been filled or otherwise compromised. Subfloor Void minimum 150 mm for residential properties with beam and block construction (unless otherwise specified by design drawing)
1.3	Any internal sleeper walls	Venting of sleeper walls to provide adequate flow-through within the void (6,000 mm ² /m for low rise residential). Ventilation holes (honeycomb brickwork/pipe crossings?) – size, spacing, location in accordance with design? Check that none of the walls are blocking off unvented sections within the void
1.4	External vent trenches/ducts	Located and constructed in accordance with design drawings? If open-topped gravel – gravel type/presence of fines? If pipe or other vent, check position and construction for functionality and absence of blockages. Ability of void former to withstand bearing of the superstructure?
2.1	Condition of subgrade and underside of membrane	Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no sharp object E.g. projections, and mortar deposits. Check protective sand blinding layer or geotextile (if specified) is present and meets design specification
2.2	Gas Membrane Type including associated components	Ensure that the correct membrane have been used including components eg sealing/jointing tape, self-adhesive gas membrane, pre-formed tophats, corners, damp proof course
2.3	Gas Membrane Condition	Inspect for rips/tears/punctures/stretching of membrane. Confirm that the membrane is free from dirt, evidence of heavy foot traffic and building materials. Specify and photograph any repairs carried out during inspection
2.4	Lapping Design/Seals of Laps and Joints	Minimum lap as per manufacturers specification of 150 mm. Are joints lapped and sealed in accordance with manufacturers requirements/specification? Check double sided tape is sufficiently stuck and that lap tape isn't lifting/no fish mouths
2.5	Perimeter Installation/Cavities and Corners	Check that membrane goes across the cavity or that membrane jointed correctly to corners, stop ends and threshold (preformed corners/SAGM). Cavity should be free from debris and water.
2.6	Service Entries	Weld sealed using SAM or Tophats need to be correctly installed with no gaps between tophat and membrane and no lifting of tape. Double sided tape should be used around tophat and service entry. Jubilee clips around the pipe and correct sealing arrangements to the membrane/pipe infrastructure as per the manufacturers specification
2.7	Are there any level changes/steels/abnormals?	Changes of level are complex and should be undertaken in accordance with a site specific 3D drawing of the gas membrane detail. Steels require primer with liquid gas membrane and/or self-adhesive membrane

APPENDIX E

Drawings



Key

Site Boundary

TP locations

The client must not amend any drawing, design or other intellectual property produced by BEK without permission in writing from BEK in advance of any amendments being made.

In the event that such written permission is not obtained in advance of the amendments being made BEK shall not be liable for any damage and/or losses incurred as a result of the amended drawing, design or intellectual property.

Contains OS data © Crown copyright and database right 2021.
Contains Environment Agency Lidar Data available under the Open Government Licence (OGL). © OpenStreetMap contributors.

Rev:	Description	Date	BY

No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire, BB5 5GY
Tel: 01254 377622 Mob:07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

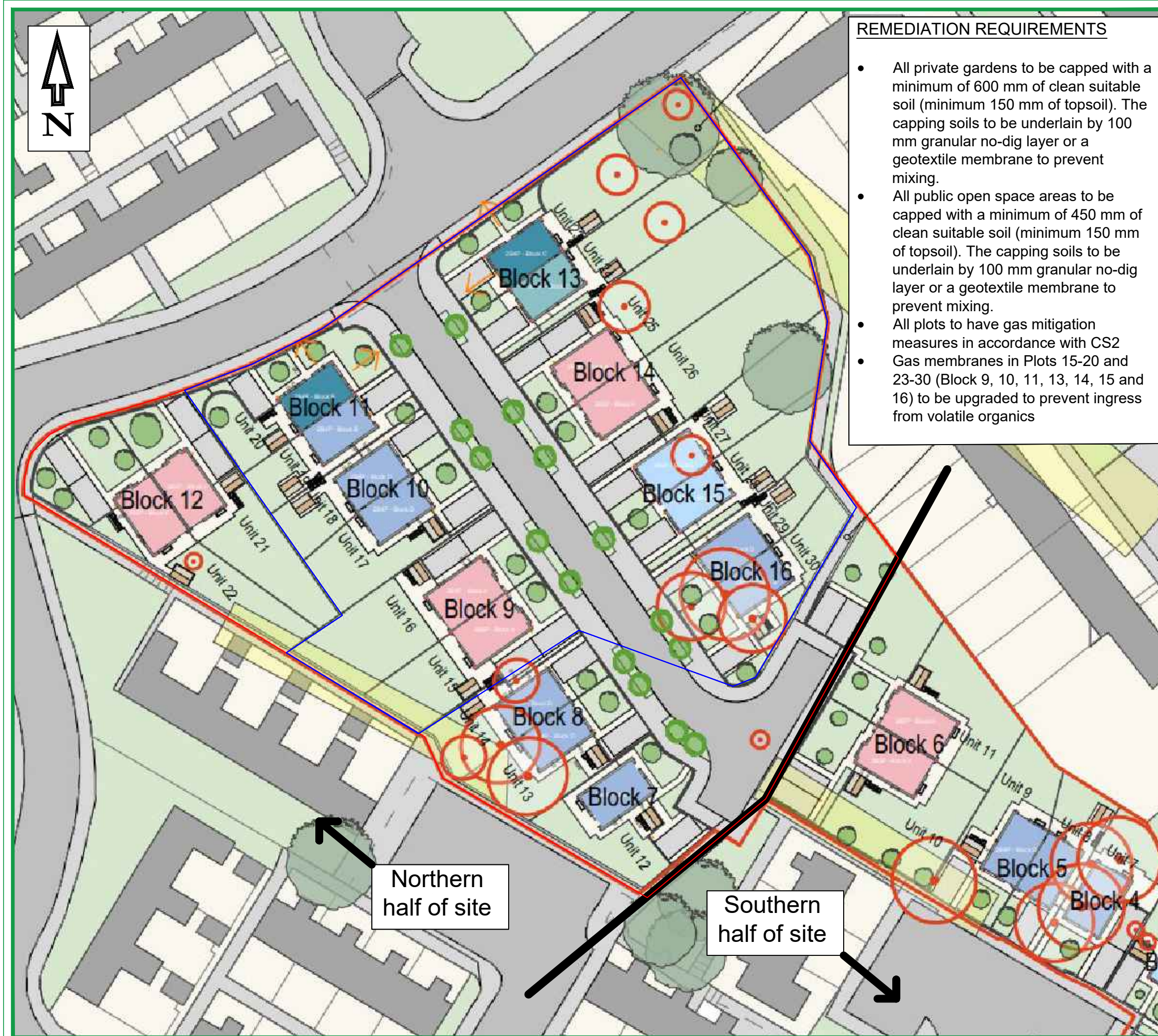
Client: The Casey Group

Job Title:
Land at White Moss Road, Blackley

Drawing Title:
Intrusive Location Plan

Scale @ A3	Drawn By: AH	Approved By: MB	Date: 07/01/25
------------	-----------------	--------------------	-------------------

Drawing No:
24070-1



REMEDIATION REQUIREMENTS

- All private gardens to be capped with a minimum of 600 mm of clean suitable soil (minimum 150 mm of topsoil). The capping soils to be underlain by 100 mm granular no-dig layer or a geotextile membrane to prevent mixing.
- All public open space areas to be capped with a minimum of 450 mm of clean suitable soil (minimum 150 mm of topsoil). The capping soils to be underlain by 100 mm granular no-dig layer or a geotextile membrane to prevent mixing.
- All plots to have gas mitigation measures in accordance with CS2
- Gas membranes in Plots 15-20 and 23-30 (Block 9, 10, 11, 13, 14, 15 and 16) to be upgraded to prevent ingress from volatile organics

LEGEND

- PLOTS REQUIRING GAS MITIGATION MEASURES IN ACCORDANCE WITH CS2
- PLOTS REQUIRING GAS MITIGATION MEASURES IN ACCORDANCE WITH CS2 TO BE UPGRADED TO MITIGATE AGAINST ORGANIC VAPOURS

REV	DESCRIPTION	DATE	BY



GEO-ENVIRONMENTAL CONSULTING
No 2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire, BB5 5GY
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

CLIENT.

THE CASEY GROUP

JOB TITLE.

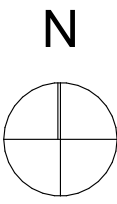
LAND AT WHITE MOSS ROAD,
BLACKLEY

DRAWING TITLE.

REMEDIATION REQUIREMENTS

SCALE © A3. N.T.S	DRAWN BY. D.E.	APPROVED BY. M.B.	DATE. 13/01/25
DRAWING No. 24070-2			REV. -

PROPOSED MASSING



SITE BOUNDARY

SITE AREA : 9,997m²



EXISTING TREES



EXISTING TREES TO BE REMOVED



PROPOSED SOFT LANDSCAPING (Subject to a detailed landscaping strategy)



PROPOSED TREES (Subject to a detailed landscaping strategy)



PROPOSED STREET TREES (Subject to a detailed landscaping strategy)



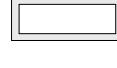
EV 7kW Charge Point



DUAL ASPECT UNITS TO ADDRESS EACH CORNER



DRAINAGE EASEMENT



AIR SOURCE HEAT PUMP WITH GRAVEL SURROUNDS

	House Type	Total
	2B4P House Type 1 @ 83m ²	4
	2B4P House Type 2 @ 83m ²	11
	2B4P House Type 3 @ 83m ²	2
	2B4P House Type 4 @ 83m ²	1
	3B5P House Type 1 @ 96m ²	12
		30

All parking spots to be 6m x 3m

Proposed Site Plan

1:500

APPENDIX F

UKWIR

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.

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 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.

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



About us

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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 0845 026 4296.

When completing this form electronically, the larger text boxes will expand in height if required.

Section 1: Development Details	
Development Name (if it has one)	White Moss Road, Manchester
Development Address	White Moss Road, Manchester, M9 6DA
OS Grid Reference (mid point)	386432, 403448
Developers Name	The Casey Group
UW reference number (for UU use only)	
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>	
Site History: Earliest mapping (1848) shows that the site was occupied by the Dam Head Farm and a large pond centre north, later accompanied by a smaller pond to the west which is not noted by 1909. Farm buildings were later constructed west of the pond. A spring is also shown at the south of site. The surrounding area is generally undeveloped agricultural fields with several ponds noted within 250m of the site (though no longer indicated on mapping after 1909), a wooded area 157m south and a watercourse adjacent to the north of this. The Booth Hall Infirmary (a children's hospital from 1932) is located 221m south of the site. Through the 1930s to 50s continued residential development to the east of the site occurs. By 1975 several small structures are located on site in the east. A large spoil mound is located 174m south of the site, no longer present on maps from 2006. From 1975 Dam Head Farm and from the 1980s the small structures to the east and the large pond are no longer present on maps. Residential developments populate areas surrounding the site in all directions including the associated White Moss Road adjacent to the northern boundary of site. Two electric substations are located 145m northwest and 176m east of the site and tanks are located 216m south of the site. Current Site: The site is located south of White Moss Road and surrounded by residential properties. The site is currently occupied by public open space, with grass surface cover. The sites topography is relatively flat with a number of trees noted to the east and south of the site.	
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>	

N/A

Section 3: Intrusive Site Investigation

Have you completed any intrusive site investigation?

☒ Yes ☐ No

Date(s) when the site investigation(s) undertaken

August 2022, July 2024, December 2024

At what level has groundwater been encountered?

1.2 - 4.8 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.

Site investigation work has been carried out at the site by Curtins in August 2022. Following a review of the ground conditions, Curtins selected soil samples for chemical testing. Additional soil samples were recovered by BEK for chemical testing in December 2024.

Selected samples were recovered from the window sample boreholes by Curtins in 2022.

Curtins tested 8 soil samples for Heavy metals, pH, 16 EPA Poly-Aromatic Hydrocarbons (PAH), Phenols, Sulphate 2:1 extract, Soil organic matter, Total Petroleum Hydrocarbons (TPH-CWG) and Asbestos Screen

BEK tested a further 8 samples for TPH CWG

4 of the 8 samples were tested for VOC'S & SVOC's

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.

N/A

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.

No remediation 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.

Curtins recommends a suitable thickness of clean and inert capping should be installed in all private gardens and areas of soft landscaping.

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.

N/A

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.

If your supporting information has additional information to support your intended pipe selection, please reference below the relevant sections of your report.

N/A

Section 7: Risk Assessor

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

Michael Buckley BSc (Hons) MSc MEnvSci CEnv

Name and address of risk assessor's company

BEK Enviro Limited, No 2, Landwick Court, Metcalf Drive, Altham, Buisness Park, Lancashire, BB5 5GY

Date risk assessment performed

6th January 2025

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	Michael Buckley	Company	BEK Enviro Limited
Phone Number	01254 377622	Date	6 th January 2025

Please e-mail the completed form and supporting information to water.connections@uuplc.co.uk. Alternatively you can fax a paper version to 01925 678926 or post to us at United Utilities Water, Metering and Connections, Ullswater House, Lingley Mere, Warrington, WA5 3LP.



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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	0.005 - 0.25	Y	N/A	<0.01	N/A
Total BTEX & MTBE		0.1	Pass	0.01	Y	N/A	<0.01	N/A
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	0.01	N	<0.5	81.2	TP1 (2.4 m), TP2 (2 m), TP5 (3.4 m)
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	1	Y	30	30	TP1 (2.4 m), WS01 (0.75 m), WS02 (0.4 m), WS03 (0.5 m)
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	1	Y	462	462	TP1 (2.4 m), TP2 (2 m), TP8 (3 m), WS01 (0.75 m), WS02 (0.4 m), WS03 (0.5 m), WS07 (0.8 m).
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	1	Y	2293	2293	WS01 (0.75 m), WS02 (0.4 m), WS07 (0.8 m)
Phenols* (from SVOC analysis)		2	Pass	0.1 to 1	Y	N/A	14.1	TP1 (2.4 m)
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	0.1 to 1	Y	N/A	1	N/A
Ethers*	Only where identified	0.5	Pass	0.1 to 1	Y	N/A	<1 (Note: LOD raised above PE threshold in 1 location)	Possibly (due to raised LOD): TP1 (2.4 m)
Nitrobenzene*		0.5	Pass	0.1 to 1	Y	N/A	<1 (Note: LOD raised above PE threshold in 1 location)	Possibly (due to raised LOD): TP1 (2.4 m)
Ketones*		0.5	Pass	N/A				
Aldehydes*		0.5	Pass	N/A				
Amines		Fail	Pass	0.1 to 1	Y	N/A	<1 (Note: LOD raised above PE threshold in 1 location)	Possibly (due to raised LOD): TP1 (2.4 m)
Corrosive	Conductivity, Redox and pH	Pass	See Note [1]	N/A				

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.