

3951-05 / PSp

2nd May 2024

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VALIDATION OF REMEDIAL MEASURES FOR LAND AT VICTORIA AVENUE, BLACKLEY, PLOTS 3-5.

This Remediation Validation Report has been prepared at the request of John Southworth. Instructions to proceed with this report were received in March 2024.

This report pertains to a c. 0.59 Ha site located to the south of Victoria Avenue, c. 6km north west of Manchester city centre at the approximate postcode M9 0SR. The National Ordnance Survey Grid Reference for the centre of the site is 385276E, 404107N. A site location plan is contained in Appendix 1.

This report follows, and should be read in conjunction with, the following reports:

- IGE Consulting Ltd., 'Remediation Strategy Report - LAND OFF VICTORIA AVENUE, HIGHER BLACKLEY (ref: 3951-01 / AS / AE, dated: April 2023).

This Validation Report concerns the garden cover system validation and the ground gas protection system of Plots 3-5 only.

Further validations for further plots will be produced as they become available. This report is to be used for submission to the building insurer, to achieve sign-off of Plots 3-5.

Clean Cover System

The following procedure is outlined for use in private gardens and in areas of soft landscaping where Made Ground is deeper than 600mm below finalised levels (300mm in areas of soft landscaping):

1. Excavate to 600mm bgl in private gardens (300mm in soft landscaping areas).

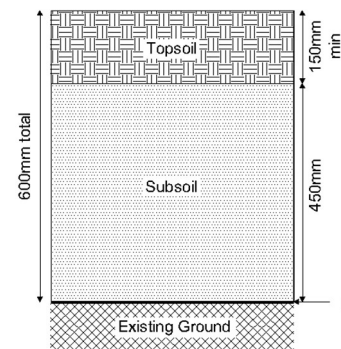


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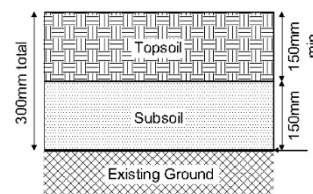
2. A 600mm clean cover system is recommended to be added to the proposed private gardens (300mm in soft landscaping areas). This is to consist of:

- No less than 150mm and no more than 300mm suitable topsoil, underlain by;
- Suitable subsoil to a total (topsoil + subsoil) depth of 600mm (300mm in areas of soft landscaping), underlain by;
- Validate in line with the below strategy.



Where Made Ground is shallower than 600mm in garden areas or shallower than 300mm in soft landscaped areas, excavating to the required depth for a cover system in these areas would constitute source removal. Therefore, where this is the case, the following procedure is proposed:

1. Excavate to the base of the Made Ground (<600mm in gardens and <300mm in soft landscaping areas). A clean cover system is not necessary.
2. Add suitable subsoil and topsoil to create a garden / soft landscaping to the client's specification.
3. Validate in line with the below strategy.



Topsoils

No topsoil is present on-site so it will need to be imported and this must be validated as detailed below to ensure its suitability for use (i.e., no glass or plastic is to be included and meets chemical testing acceptability criteria).

Subsoils

Based upon initial chemical testing it is anticipated that it will be feasible to reuse the site-won subsoil on-site which may be won from drainage trench excavation arisings and the like during development. These must also be chemically tested as with imported soils to ensure their suitability for use.

Upon the initial testing it has been determined that materials from Stockpile 2 may be suitable to be repurposed on-site and make up the subsoil for the proposed gardens. This is subject to further chemical testing of the materials to ensure their suitability for use in inline with the below validation testing ratio and suite.

Clean Cover System Validation

Topsoil will be imported to site for use in the clean cover system, Subsoil for use in the clean cover system may be won from site or imported. All soils for use in the proposed garden area shall be subject to validation and testing to determine that they are '*suitable for use*':

Validation requirements

- Details of the source of the topsoil and subsoil.
- Visual inspection to determine the absence of deleterious anthropogenic constituents.
- Waste transfer notes to provide evidence of source of imported soils.
- Confirmation of addition of suitable topsoil and subsoil with photographs.
- All topsoil and subsoil, whether site-won or imported is required to be tested at the following frequency, in line with Manchester City Council's 'Planning and Contaminated Land Technical Guidance':

Table 2 Sampling frequencies for imported or site-won fill materials

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

Extract taken from Manchester City Council 'Planning and Contaminated Land, Technical Guidance' (dated February 2021).

https://www.manchester.gov.uk/download/downloads/id/11878/planning_guidance_relating_to_ground_contamination.pdf

Once tested, the results are to be compared against the GACs for a 'residential with home grown produce' end use, noted below:

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>5 - <10 ⁽³⁾
	Total Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Free Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Soluble Sulphate (mg/l)	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200 ⁽¹⁾	630 ⁽¹⁾	1300	2330 ⁽¹⁾

	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
D	Naphthalene	2.3	4900	1200	
	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	
	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
	Benzo(ghi)perylene	320	640	1400	
E	Total PAHs				1000 ⁽⁴⁾
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	
	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21				
	TPH-CWG - Aliphatic >EC21 - EC35	65000	250000	450000	
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	
	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	
	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000 ⁽⁴⁾
H	Benzene	0.087	72	90	
	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000*&***	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD ⁽³⁾	LOD ⁽³⁾	LOD ⁽³⁾	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

- 1) Category 4 Screening Levels (March 2014)
- 2) CL:AIRE Soil GAC for Human Health Assessment (January 2010)
- 3) In-house screening criteria used as no GAC methodology currently exists
- 4) Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.

Assumed 1% SOM (most conservative) for those values dependent upon SOM. ND = Not Detected. LOD = Limit of Detection

*Exceeds vapour saturation limit

**Exceeds solubility saturation limit

Suitability of Imported Topsoil

The topsoil for the clean cover system was imported to site. The imported topsoil after placement within the rear garden area of plots 3 to 5, this was analysed by i2 Analytical and assessed by IGE Consulting.

No exceedances above human health criteria were detected. On this basis, the soils were deemed acceptable for use on residential development sites. The chemical test results are contained in Appendix 2.

Suitability of Site Won Subsoil

The subsoil for the clean cover system comprises site won materials from excavations for foundations, drainage, services etc, in accordance with

IGE Consulting : Ltd., 'Remediation Strategy Report - LAND OFF VICTORIA AVENUE, HIGHER BLACKLEY (ref: 3951-01 / AS / AE, dated: April 2023).

The subsoil was visually assessed and found to contain no plastics, glass, metals, or other deleterious anthropogenic materials. Chemical testing of subsoil samples taken directly from the garden area of plots 3 to 5 was analysed by i2 Analytical and assessed by IGE Consulting. A wide range of contaminants were analysed and compared to GACs for a 'residential with plant uptake' end use. No concentrations were present in exceedance of their respective GACs. Therefore, the subsoil was deemed suitable for use.

Thickness of Clean Cover

A small hole was dug in the garden area of Plots 3-5, as per the remedial strategy. Photographs were taken of the cover system, which was found to be greater than or equal to those required.

The photographs and confirmation of cover depth for Plots 3-5 are contained in the Verification Log in Appendix 3.

A development site layout plan, showing the locations of the gardens and soft landscaping areas, is contained in Appendix 1.

Cover System Validation Summary

On the basis of the information provided, it is confirmed that the clean cover system remediation objectives have been met for Plots 3-5.

Ground Gas System Validation Plots 3 to 5

All 25 properties on the Victoria Road site have been constructed with a ground gas protection system in accordance with:

IGE Consulting : Ltd., 'Remediation Strategy Report - LAND OFF VICTORIA AVENUE, HIGHER BLACKLEY (ref: 3951-01 / AS / AE, dated: April 2023).

Method of Ground Gas Protection System Installation

The low-rise residential dwellings were constructed using suspended Pre-Cast Concrete (PCC) block and beam floor slabs. An open void is present beneath the floor slab construction (measuring not less than 150mm deep). The void is vented via telescopic vents linked to air bricks positioned on two opposing elevations of each dwelling. All sleeper walls (i.e. sub-floor slab building compartments) are vented via missed blockwork (or air bricks) at 1.0m centres.

For all plots, the installation contractors used the Visqueen® 'Gas Barrier' membrane which was deemed suitable for the application and both meet the IGE specification. The membrane datasheets are contained in Appendix 4.

The following IGE Consulting remedial requirements were met:

MITIGATION	PROPOSED IGE SPECIFICATION (2023)	VERIFIED	IGE VERIFICATION COMMENT (2023)
Void	Minimum open void depth of 150mm required.	✓	Typical void depth of 200mm+ achieved.
Air Bricks, Ventilation	Required around two opposing external walls of buildings / garages.	✓	Air bricks installed on at least 2 sides.
	Air bricks to be positioned at 2m centres (so far as practicable, allowing for doors, gas boxes etc.).	✓	Air bricks placed at c. 2m centres except where doorways or access prevented this.
	Air bricks to provide circa 6000m ² ventilation each.	✓	Air bricks with 6170mm ² ventilation used.
	All air bricks positioned minimum 100mm above finished ground.	✓	All air bricks positioned c. 200mm above ground level.
Sleeper Walls	All sleeper walls (i.e. sub floor slab building compartments) to be vented via missing blockwork (or air bricks) at 1.5m centres.	✓	Sleeper walls vented via missing bricks at c. 1m-1.5m centres.
Gas Resistant Membrane	Visqueen Gas Barrier or equivalent.	✓	Visqueen Gas Barrier.
	Fully welded system.	✓	All membrane joints hand welded, detailed corner installations, and top hat bases were welded. Double sided tape was only used to seal the top hat collars.
	Continuous across cavity wall construction.	✓	All membranes were extended sufficiently across the cavity wall, to the outside edge of the outside brick.
	Corner and utility service penetrations to be formed by a combination of prefabricated and hand detailed installations, specification as per membrane.	✓	Visqueen detailing tape was used to install corners and service penetrations by hand, membrane to specification.
Protection	Membrane to be protected immediately following verification (as part of verification works) with insulation board, prior to screed topping.	✓	Immediately following verification, insulation was laid and the screed was then poured, minimising the time the membrane was open to damage from the elements and follow-on trades.

In line with CIRIA 735 (2014), IGE Consulting independently verified the installation of the gas protection measures in accordance with IGE's verification requirements, as follows:

The IGE qualified verifier conducted a thorough visual inspection of all plots using the visual and pick technique to test the strength of weld and joints etc.

The IGE qualified verifier:

- Identified that the correct membrane has been used, including pre-fabricated units and accessories.
- Inspected the general condition of the membrane for rips, tears and punctures.
- Checked that all jointing has been carried out to a good standard.
- Checked that the membrane has been installed correctly across cavities, including correct jointing in these areas.
- Checked that top hats have been correctly installed around service entries, including the installation of detailing tape around the pipe and the brim to membrane base interface.
- Checked 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.
- Checked the presence of a clear 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.
- Took photographs to provide evidence of the above.

Any minor defects noted by the IGE Consulting qualified verifier were communicated to the installer on site to be rectified under verifier supervision. Further inspection of the addressed issues was then carried out. Photographic evidence was taken of all aspects of the verification process. Major defects required a repeat visit. This did not occur for any of the plots concerned within this report.

The Ground Gas Resistant Membrane Inspection Record sheets including photographic evidence of correct installation and 'sign-off' for Plots 3 to 5 are included in Appendix 5.

Ground Gas Protection Measure Summary

The site was designated by IGE Consulting as Characteristic Situation 2 (CS2) / NHBC Amber 1. for the development (Type A Building), in accordance with BS8485+A1 (2019).

- A pre-cast suspended segmental subfloor (beam and block) has been installed at Plots 3 - 5, this achieves 0 points.
- A 'very good' passive subfloor dispersal layer has been installed at Plots 3 - 5, this achieves 2.5 points.

- A fully sealed and validated ground gas resistant membrane has been installed at Plots 3 - 5, this achieves 2 points.

To conclude, the correct ground gas protection measures, meeting the required points score, have been installed at Plots 3 - 5 and have been successfully validated.

CONCLUSIONS

The remedial objectives for Plots 3-5, inclusive, have been met. No further recommendations are made for these plots.

Further validations are required for further plots as they are completed, before the site as a whole can be validated. These will be included in a revision or addendum to this report once complete.

If any additional information is needed, do not hesitate to ask.

Yours sincerely,

Paul Speakman CEng MICE

Civil Engineer

Appendix 1 – Site Layout Plan

Appendix 2 – Chemical test results at site

Appendix 3 – Garden Cover System Verification Logs – Plots 3 - 5

Appendix 4 – Visqueen gas barrier Data Sheets

Appendix 4 – Ground Gas System Validation Certificate – Plots 3 - 5

APPENDIX 1

Site Layout



FOR GUIDANCE PURPOSES ONLY

Approximate Site Boundary

Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: Land off Victoria Avenue, Higher Blackley			
For: John Southworth			
Drawing Title: Site Location Plan			
IGE consulting			
Office 16, Bartle House, Manchester, M2 3WQ Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 914 9170			
Scale: 1:2000 @A3		Date: Apr 2023	
Drawn: AS		Checked: AE	
Contract No. 3951		Drawing No. SI-01	P1



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0 1m 5m 10m

Scale - 1:200 @A1

Development Boundary

Accommodation Schedule

2b/3p Dwelling (24A-1) - 13no.
3b/4p Dwelling (35A-1) - 4no.
3b/4p Dwelling (35A-1-D) - 6no.
3b/5p Dwelling (35C) - 2no.
Total - 25 dwellings

Rev	Date	Comment	Dr	Ch
P04	07.03.23	Update to Unit 7&8 FFL	Q	Q
P03	17.02.23	Corrected waterbuds	Q	Q
P02	10.02.23	General update	Q	Q
P01	13.01.23	First issue	Q	Q

Drawn/Checked: CT / DT
First Issue: 13.01.23

Client: **JOHN SOUTHWORTH**
BUILDING FUTURES TODAY

Job Title: Victoria Ave, Blackley

Scale: 1:200@A1
Revision: P04
Drawing Status: A4 - Technical Drawing

Name: 2240-GWP-01-01-DR-A-(00)-0003
Scale: 1:200@A1
Revision: P04
Drawing Status: A4 - Technical Drawing

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APPENDIX 2

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Analytical Report Number : 24-016068

Project / Site name:	Vic Ave	Samples received on:	24/04/2024
Your job number:		Samples instructed on/ Analysis started on:	24/04/2024
Your order number:		Analysis completed by:	01/05/2024
Report Issue Number:	1	Report issued on:	01/05/2024
Samples Analysed:	2 soil samples		



Signed: _____

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-016068
Project / Site name: Vic Ave

Lab Sample Number				180232	180233
Sample Reference				TP1	TP1
Sample Number				TS	SS
Depth (m)				0.10-0.15	0.20-0.30
Date Sampled				23/04/2024	23/04/2024
Time Taken				1300	1300
Analytical Parameter (Soil Analysis)		Units	Limit of detection	Accreditation Status	

Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	13
Total mass of sample received	kg	0.1	NONE	1.2	1.1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.7	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	530	260
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	264	130
Organic Matter (automated)	%	0.1	MCERTS	4.6	2.4
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	1.4
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	2	NONE	29	4.1
Water Soluble Nitrate (2:1) as NO ₃ (leachate equivalent)	mg/l	5	NONE	15	< 5.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.05	0.06
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.12	0.13
Fluorene	mg/kg	0.05	MCERTS	0.06	0.08
Phenanthrene	mg/kg	0.05	MCERTS	0.74	0.79
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.16
Fluoranthene	mg/kg	0.05	MCERTS	1.4	1.1
Pyrene	mg/kg	0.05	MCERTS	1.3	1.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.65	0.52
Chrysene	mg/kg	0.05	MCERTS	0.78	0.59
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.74	0.63
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.46	0.23
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.75	0.56
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.4	0.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.14	0.09
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.47	0.35

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	8.1	6.68
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Analytical Report Number: 24-016068
Project / Site name: Vic Ave

Lab Sample Number				180232	180233
Sample Reference				TP1	TP1
Sample Number				TS	SS
Depth (m)				0.10-0.15	0.20-0.30
Date Sampled				23/04/2024	23/04/2024
Time Taken				1300	1300
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.3	8
Barium (aqua regia extractable)	mg/kg	1	MCERTS	86	110
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.5	0.59
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.2
Chromium (hexavalent) Low Level	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	72	29
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	15
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	62	44

Petroleum Hydrocarbons

TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPHCWG - Aliphatic >C35 - C44 EH_CU_1D_AL	mg/kg	8.4	NONE	< 8.4	< 8.4
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	< 10
TPHCWG - Aliphatic >C5 - C44 EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	< 10

TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	12	< 10
TPHCWG - Aromatic >EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	9.3	< 8.4
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	12	< 10
TPHCWG - Aromatic >EC5 - EC44 EH_CU+HS_1D_AR	mg/kg	10	NONE	21	< 10

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 24-016068

Project / Site name: Vic Ave

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
180232	TP1	TS	0.10-0.15	Brown loam and sand with gravel and vegetation
180233	TP1	SS	0.20-0.30	Brown sandy loam with gravel

Analytical Report Number : 24-016068

Project / Site name: Vic Ave

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Water Soluble Nitrate (leachate equivalent)	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078	W	NONE
Hexavalent chromium in soil (low level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS

Analytical Report Number : 24-016068

Project / Site name: Vic Ave

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

APPENDIX 3



Office 16, Bartle House, Oxford Court,
Manchester, M2 3WQ
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk
tel: 0161 914 9170

Verification Log

Project Name: Victoria Avenue, Blackley

Project Number: 3951

Location: Victoria Avenue, Blackley

Client: John Southworth

Remediation Requirements:

150mm to 300mm 'clean' topsoil, underlain by up to 300mm to 450mm 'clean' subsoil, to provide a total of 600mm depth of clean cover materials.

Validation Requirements:

Plot thickness validation of rear gardens, Report and photographs provided. Chemical testing completed using appropriate volumes to determine the number of tests.

Plot Number: 3-5

Inspection date: 28th March 2024

Engineer: P SPEAKMAN

Photographs:



Rear view of Plots 3, 4 & 5



Depth of pit demonstrated
at 600mm



Photographs show 150mm of topsoil, 450mm of subsoil, and plot context.

This plot has PASSED /~~FAILED~~* verification

*Proposed further remedial works (if FAILED):

An additional inspection ~~IS~~/ IS NOT required for this plot

APPENDIX 4

Visqueen Gas Barrier

Features and benefits

- BBA certified - third party accreditation
- Complies with NHBC Foundation's NF94 guidance for use in Type A membrane locations
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Flexible - easy to detail and install on site
- Multi functional - also acts as a radon and damp proof membrane
- Dual jointing methods - lap joints can be taped or heat welded

Product description

Visqueen Gas Barrier is a multi-layer reinforced polyethylene gas barrier with a 20 micron aluminium foil. The barrier is coloured blue on the upper surface and silver on the reverse. The product is supplied in single wound rolls (not folded), 2m x 50m.

Approvals and standards

- Third party accreditation (BBA 13/5069)
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Complies with NHBC Foundation's NF94 guidance for use in Type A membrane locations
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- CE Mark EN 13967:2017
- Quality Management System ISO 9001:2015
- Occupational Health and Safety System ISO 45001:2018
- Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier is suitable for use in all types of buildings to prevent the ingress of harmful levels of ground gases e.g. methane, carbon dioxide and radon.

The barrier can be positioned above or below reinforced cast in situ concrete floor slabs or above precast suspended segmental subfloors, e.g. beam and block floor.

The barrier can also be used as a high performance radon membrane and/or damp proof membrane.

Radon, carbon dioxide, and methane protection - NHBC NF94 guidance:

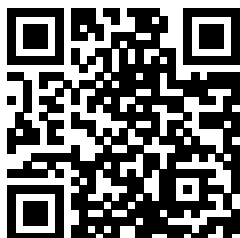
Visqueen Gas Barrier when installed with either taped or welded joints complies with NHBC Foundation's NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type A membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft). For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Services.

The product is not intended for use where there is a risk of hydrostatic pressure.

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m
- Visqueen GR Lap Tape, 150mm x 10m
- Visqueen Ultimate Top Hat Units
- Visqueen Preformed Units
- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen TreadGUARD 1500, 1m x 2m

Find your local stockist



Visqueen Gas Barrier

Storage and handling

Visqueen Gas Barrier should be stored horizontally, under cover in its original packaging.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Gas Barrier should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as voids or protrusions.

The barrier can be cut with a sharp retractable safety knife or robust scissors.

When installing the membrane in demanding site conditions, use Visqueen GR Lap Tape in place of Visqueen Gas Resistant Foil Lap Tape.

Installation

Visqueen Gas Barrier should be loose laid on the substrate with the blue side up so as to avoid sunlight glare.

The barrier should be clean and dry at the time of jointing. It should be overlapped by at least 150mm, bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. Alternatively lap joints can be heat welded to achieve an effective seal. The overlap in the barrier is typically 100mm and when hand welding, a 35mm weld is normally achieved. When hand welding, a roller must be used.

Airtight seals should be formed around all service entry points. Visqueen Preformed Top Hat Units are recommended for sealing service entry pipes. The base of the top hat and the upstand should be bonded using VisqueenPro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. The upstand should be secured with the supplied jubilee clip. Alternatively VisqueenPro Detailing Strip can be used to seal service entry points. The upstand should be secured with a jubilee clip.

Forming an effective barrier to gases may give rise to complex three-dimensional detailing where, it is recommended Visqueen Preformed Units are used e.g. corners. Alternatively VisqueenPro Detailing Strip can be used to seal awkward junctions.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Pro Double Sided Jointing Tape and sealed with Visqueen Gas Resistant Foil Lap Tape. Alternatively a patch can be formed using VisqueenPro Detailing Strip and lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the membrane. The membrane should be covered by a protective layer immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the barrier the wire reinforcements and spacers must be prevented from puncturing the barrier. Where there is a high risk of potential damage, the barrier should be covered with Visqueen TreadGuard protection, screed or other approved protection material before positioning the reinforcement.

Usable temperature range

It is recommended that Visqueen Gas Barrier and all associated system components should not be installed below 5°C.

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief maybe required

Where hydrocarbon or VOC contamination is present use Visqueen Ultimate HC Blok or Ultimate GeoSeal gas protection systems

To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall constructions

For suspended beam and block floor detailing see GB-01

For internal and external corners Visqueen Ultimate Preformed Units should be used see PFU-553

To seal around steel columns use VisqueenPro Detailing Strip see GB-52

For additional detailing information, contact Visqueen Technical Services +44 (0) 333 202 6800

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Visqueen Gas Barrier

Property	Test method	Units	Compliance criteria	Result
Dimensions	EN 1848-2	m		2 x 50
Overall thickness including scrim mesh	EN 1849-2	mm	+/-10%	0.52
Mass	EN 1849-2	g/m ²	-0%/+5%	400
Tensile strength - MD	EN 12311	N/50mm	MLV	350
Tensile strength - CD	EN 12311	N/50mm	MLV	350
Tensile elongation - MD	EN 12311	%	MLV	20
Tensile elongation - CD	EN 12311	%	MLV	21
Joint strength	EN 12317-2	N	MLV	332
Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
Resistance to impact	EN 12691	mm	MDV	150
Dart impact	BS 2782	g	MDV	731
Low temperature flexibility	EN 495-5	°C	MDV	-40
Durability against ageing	EN 1296 and EN 1928	-	Pass/Fail	Pass
Durability chemical resistance	EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) CD	EN 12310-1	N	MDV	358
Resistance to tearing (nail shank) MD	EN 12310-1	N	MDV	368
Resistance to static loading	EN 12730	kg	MLV	20
Water vapour resistance	EN 1931	MNs/g	MDV	240,000
Water vapour permeability	EN 1931	g/m ² /d	MDV	0.0008658
Water vapour resistance factor	EN 1931	μ	MDV	120,000,000
Equivalent air layer thickness	EN 1931	SD in m	MDV	47,700
BS 8485:2015 + A1:2019 testing requirements				
Mass	EN 1849-2	g/m ²	Average >370	400
Methane gas transmission rate	ISO 15105-1	ml/m ² /day/atm	MDV	<0.15
Puncture CBR	BS EN ISO 12236	N	MDV	1114
Tensiles yield strength MD	ASTM D4885-01	kN/m	MDV	12.5
Tensiles yield strength CD	ASTM D4885-02	kN/m	MDV	7.3
Resistance to static loading	EN 12730	kg	>MLV	20
Yield elongation CD	ASTM D4885-04	%	MDV	19
Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	48.2
Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	44.8
Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	53.5
Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	60.6

Health and safety information

Refer to the Visqueen Gas Barrier safety datasheet (SDS).

Visqueen Gas Barrier

About Visqueen

The Visqueen name has long been recognised as one of the leading manufacturers of high quality advanced membrane technologies and design based solutions by specifiers, distributors, builders merchants and contractors throughout the UK and Europe.

For further guidance on the Visqueen services shown below, please refer to the relevant section of the Visqueen website (www.visqueen.com) or contact Visqueen Technical Services on +44 (0) 333 202 6800 or enquiries@visqueen.com

Complete Range, Complete Solution



Structural
Waterproofing



Gas
Protection



Damp Proof
Membrane



Tapes



Damp Proof
Course



Stormwater



Vapour
Control

Visqueen Technical Support

Visqueen combine an extensive product portfolio with industry leading levels of service and support which includes guidance over the phone, bespoke CAD drawings to help with complex detailing, electronic NBS specifications and access to a dedicated team of highly knowledgeable and experienced field based Technical Support Managers.

Visqueen Technical Support is available to all our customers including architects, specifiers, distributors, builders merchants, contractors and end users. All of our technical team have been awarded the industry recognised qualification Certificated Surveyor in Structural Waterproofing (CSSW).

Visqueen CPD Seminars

The Visqueen Continuing Professional Development (CPD) Seminars provide up-to-date information on changes within Building Regulations/Building Standards and nationally recognised industry guidance affecting damp proofing, water vapour control, hazardous ground gas protection and below ground structural waterproofing.

The one hour seminars have been produced for design specialists within the construction sector and are delivered by our team of Technical Support Managers.

Visqueen PI designs and special projects

From initial design to the completed project, Visqueen are with you every step of the way. Whether it be hazardous ground gas protection and/or below ground waterproofing protection employing barrier, structurally integral or drained systems, Visqueen can offer professional indemnity (PI) insurance for bespoke Visqueen design solutions.

Visqueen Technical Support Managers work with all stakeholders to provide cost effective Visqueen solutions offering complete peace of mind throughout the construction phase and beyond.

Visqueen Training Academy

Based at our manufacturing facility in Derbyshire, the Visqueen Training Academy is available to support Visqueen customers throughout the UK by providing a wide range of both theory and practical skills related training.

Courses include one day product awareness training for our distributors and builders merchants to help them in their day-to-day jobs, through to intensive three day courses giving detailed hands-on training in the practical skills required for safe and robust product installation.

APPENDIX 5

GROUND GAS RESISTANT MEMBRANE INSPECTION RECORD



Office 16, Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9170
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

Project:	VICTORIA AVENUE, BLACKLEY
Project No:	3951
Plot No. Inspected:	3-4-5
Date of Inspection:	23/08/2023
Inspected By:	PSP
Inspection Method:	VISUAL AND PICK TESTING

INSPECTED ITEM	YES/NO	COMMENTS	PHOTOGRAPHED YES / NO
Identification Identify that the correct membrane has been used, including sealing / jointing tape and pre-formed components e.g. tophats, corners.	Y	Visqueen 'Gas Barrier' membrane 'Pro Detailing Strip' Pre-formed top hats Double sided jointing tape	Y
General Condition Inspect the general condition of the membrane for rips, tears and punctures.	Y	Membrane in good condition. No holes.	Y
Jointing Check that all jointing has been carried out to the manufacturer's specification.	Y	Hand welded jointing. several gaps found in jointing at corners. Correctly patched and witnessed during inspection.	Y
Installation Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.	Y	Sufficient lap covering cavity. Corners installed correctly.	Y
Top Hat Installation Check that top hats have been correctly installed around service entries, including jubilee clip around pipe and correct lapping and jointing to membrane at base.	Y	Additional tape added to perimeter of top hats to reinforce the stability. Completed under supervision.	Y
Vent Installation 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.	Y	Sufficient air bricks installed and openings through internal walls present.	Y
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. 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.	Y	>150mm clear void.	N

This Plot has **PASSED / FAILED** inspection.

Additional inspection visit ~~IS~~ IS NOT required for this plot.

Engineer: Paul Speakman.....

Signed:

IGE Consulting Ltd
Registered in England No 10780128

Multidisciplinary Geo-Environmental Consultants

PHOTOGRAPHS



Figure 1 – General view of the plot. Sufficient coverage of cavities.



Figure 2 – General view of the plot.



Figure 3 – Corners installed using detailing tape giving sufficient coverage of cavities



Figure 4 – Sufficient vents can be seen (every 2m).



Figure 5 – Service entries sealed and secure.

Figure 6 – Joints are correctly hand welded.