

1161 ROCHDALE ROAD
BLACKLEY

DETAILED
REMEDIATION AND VERIFICATION
STRATEGY

Job Number: LKC 21 1140
Date: May 2022
Client: R H Kennedy Properties Ltd



INCREASING LAND VALUE

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GROUP

LK Consult			
Document Verification			
Site Address	1161 Rochdale Road, Blackley, Manchester, M9 2ER		
Report Title	Detailed Remediation and Verification Strategy		
Job Number	LKC 21 1140	Document Ref.	CL-602-LKC 21 1140-02
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Revision No.	Date	Nature of Revision	Approved By
1	1 st August 2023	Update Table 2-2 to be in line with MCC's guidance.	RP/EK

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1 INTRODUCTION

1.1 Background

LK Consult Ltd (LKC) has been commissioned by R H Kennedy Properties Ltd to provide a Detailed Remediation and Verification Strategy for 1161 Rochdale Road, Blackley in order to discharge Condition 14 of planning application reference 116936/FO/2017.

The Detailed Remediation and Verification Strategy is required to determine the work necessary in order to ensure the site is “suitable for use” for the proposed residential development with regards to potential contaminated land pollutant linkages.

Site details are provided in Table 1-1. Figure 1 shows the site location and boundary. Figure 2 shows the proposed development plan.

Site Location	Northeast of junction between Rochdale Road and Lion Road. Centred at approximate National Grid Reference 385887E, 403205N.
Approximate Area	330m ² (275m ² proposed residential houses and 55m ² detached garage).
Topography	80-75 metres Above Ordnance Datum (AOD). Gentle slope down to Rochdale Road / southeast.
Current Site Use	Large detached residential house with private rear garden, soft landscaping and associated driveway.
Purpose of Report	Planning.
Planning Ref.	116936/FO2017 and 107956/FO/2015/N1
Proposed Development	Residential housing with gardens / soft landscaping. Erection of two pairs of three storey, semi-detached dwelling houses fronting Rochdale Road with three storey detached dwelling house to the rear (Class C3) together with access alterations, landscaping, parking and boundary treatment. Erection of single-storey detached domestic garage, ancillary to refurbished dwelling house at 1161 Rochdale Road

Table 1-1: Summary of site details.

The following reports have previously been undertaken for the site and should be read in conjunction with this report:

- » Phase 1 Preliminary Risk Assessment & Phase 2 Geo-Environmental Site Investigation, Risk Assessment and Remediation Strategy, undertaken by LKC (ref. CL-602-LKC 21 1140-01 R0, dated April 2021).

Historically, the site was an agricultural field until 1923 mapping, 2no. embankments appear in the southwest of the site from the 1909 until the 2021 mapping and the rectory is first noted in the northwest of the site from the 1933 until the 2021 mapping. Additionally, an unmarked building is present in the northeast of the site from the 1951 to the 1995 mapping. Made ground was identified onsite to depth of 0.15-0.40mbgl and generally consisted of sandy gravelly silt with frequent rootlets, rare glass, ash, concrete, brick and plastic fragments and was found to contain elevated PAHs. The primary potential offsite contaminated land offsite was identified to be a landfill and potentially infilled features.

A potential risk to human health (soil and hazardous gas), controlled waters and infrastructure was identified.

This report will provide more detail on the required validation work as per guidelines set out in Land Contamination Risk Management (LCRM) Stage 3 remediation and verification¹, which states:

You will need to develop and then agree a remediation strategy that can be implemented in practice. You will already have set your remediation objectives and criteria in step 1 of options appraisal. You will need to set monitoring objectives and criteria to track performance of the remediation. The remediation strategy is a record of how you will meet and carry out the remediation objectives.

You will need to produce a verification plan. This will be a part of the remediation strategy. It will need to set out all of the data requirements, including compliance criteria and monitoring details. This will establish a 'lines of evidence' approach which will verify remediation is working or has worked.

1.2 Aims and Objectives

In order to satisfy the remedial objectives as per the Phase 2 report completed by LKC (ref. CL-602-LKC 21 1140-01 R0, dated April 2021), the following will be required:

- » Removal of all reworked topsoil / made ground from garden and soft landscaping and raise levels (as required) with suitably chemically validated topsoil.
- » Appropriate testing of imported material for gardens and landscaped areas.
- » Gas protection measures to CS2.
- » United Utilities (UU) risk assessment for potable water pipes and likely installation of barrier pipes, as required.
- » Appropriate disposal of waste soil material to a licensed recycling facility (if required).
- » Detail and further assessment of unexpected contamination (if identified).

Further details are given in the following Sections.

LKC recommend that the proposed works are prior approved by the regulators (and United Utilities, as required) prior to the commencement of construction works.

Once this strategy is approved, a Remediation Statement and Validation Checklist will be provided to the relevant parties on site which summarises the required remedial works and trigger points for inspections and validation works.

¹<https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-stage-3-remediation-and-verification>

2 ON-CONSTRUCTION / BUILD PHASE REMEDIATION WORKS

2.1 Validation of Imported Topsoil

The protocol for validating the clean environmental cover system is presented in Table 2-1.

Activity	Responsibility	Information to be provided in Site Completion Report / Individual Plot Report
1) Excavation of made ground	Contractor / site manager to provide photographic evidence. LKC to inspect / assess if natural strata encountered.	Photographs.
2) Removal of made ground from site	Contractor to collate and provide Waste Transfer Notes to LKC.	Copy of Waste Transfer Notes.
3) Validation of imported topsoil	Contractor to identify topsoil source and confirm to LKC. LKC to collect soil samples for chemical validation (see Table 2-2). Preferably testing some at source to have confidence soil is suitable and the rest from the delivered soil in a stockpile onsite (50:50 split). This is to prevent double handling if soil fails. Once delivered to site material needs to be suitably stockpiled in a designated quarantine area.	Details of validation sampling, quantities required, soil risk assessment and statement of suitability.
4) Validation of cover layer depth	LKC to excavate inspection trial hole in each plot (rear gardens) and landscaping areas at 50m spacing. Depth measurement using a staff.	Photographs. Statement if correct depth provided.

Table 2-1: Validation protocol.

Chemical validation of all imported soils to be used on site in the environmental capping layers should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements are presented in Table 2-2. Validation samples should be taken prior to placement in gardens to ensure suitability for use (preferably from source).

Material Type	Source	Suite of Analysis	Sampling Rate (min. 3 per source)		
			Garden	Landscape	Other *
Topsoil / subsoil / Fill material	Proven Greenfield	Suite A	200m ³	200m ³	200m ³
	Remediated	Suite A / B dependent upon original SI	100m ³	150m ³	200m ³
	Brownfield / Unknown	Suite B	50m ³	150m ³	200m ³

Table 2-2: Sampling requirements for imported soils.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

* Other assumed to be stone / 6F2 / mass fill etc.

Any soil with visual or olfactory evidence of hydrocarbons or asbestos should be rejected.

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882²). LKC advise this information is provided by the supplier before material is imported onto site.

² BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

Imported material to be used in gardens and soft landscaping will be compared against 'residential with plant uptake' criteria. Appropriate remedial target criteria are presented in Appendix B.

Collation of the above information will comprise sufficient 'lines of evidence' to show that the direct contact risk from soil contaminants has been minimised and a suitable level of remediation has been successfully carried out.

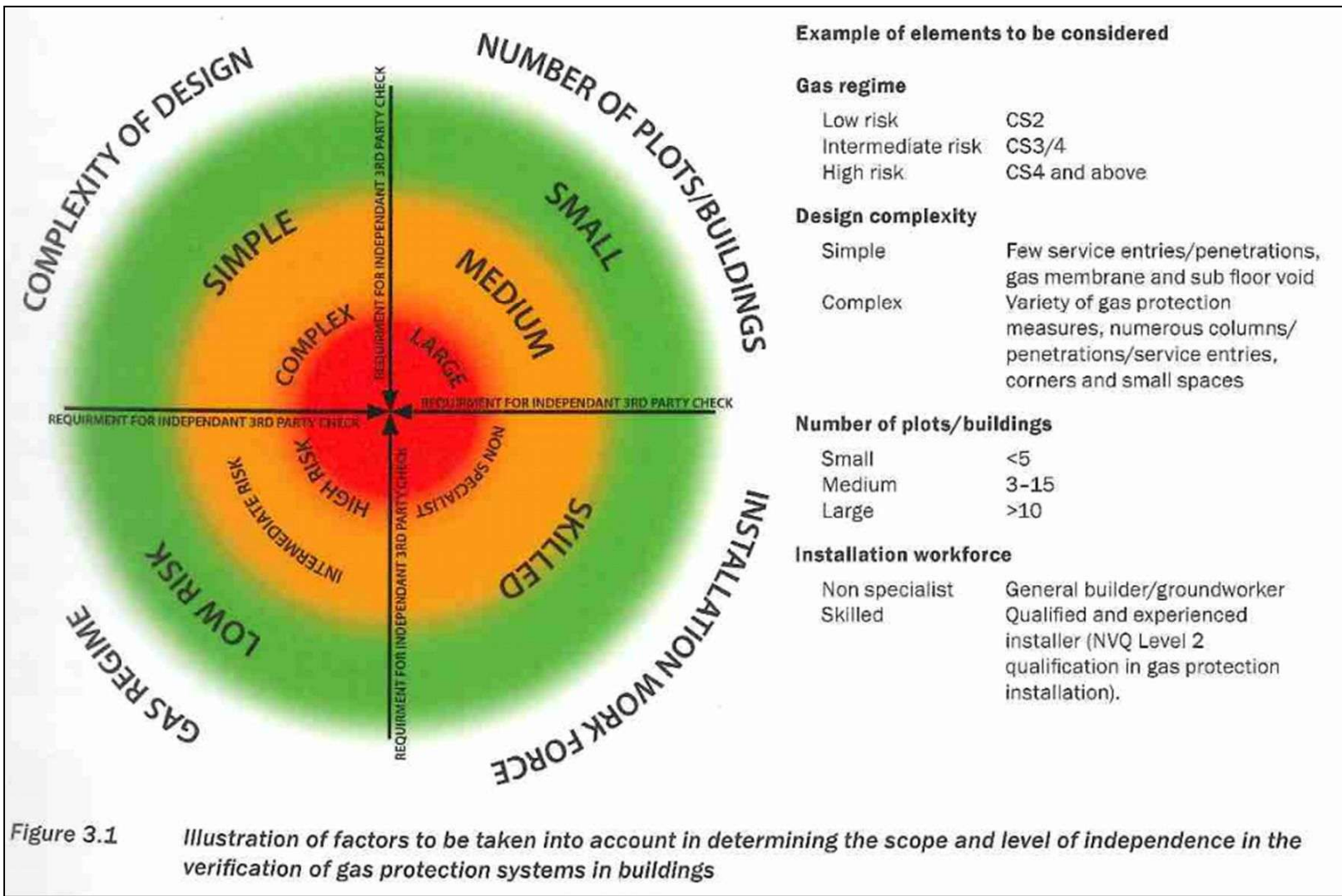
Validation testing certificates shall be collated and included in the Completion Report.

2.2 Gas Risk Mitigation

The Phase 1: Preliminary Risk Assessment & Phase 2: Geo-Environmental Site Investigation, Risk Assessment and Remediation Strategy by LKC required CS2 gas protection measures. To provide this level of protection the following will be required:

- » 150mm (minimum) clear void passively ventilated to atmosphere.
- » Proprietary gas resistant (carbon dioxide) membrane – Visqueen yellow (low permeability membrane).
- » Proprietary gas proof cavity tray / DPM – Visqueen Gas Resistant DPC.

CIRIA C735³ provides guidance on the scope of the verification plan and an extract is provided below:



Considering the low gas risk of the site (CS2), according to CIRIA C735 the primary protection will be from the passive ventilated subfloor void and not the membrane. Therefore, according to CIRIA C735, CS2 is considered 'light touch...' with regards to validation and likely to be designated as 'low risk' from the table above.

³ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

As per Table A1 of CIRIA C735, a visual inspection of the gas membrane and void prior to the concrete pour and photographs will be sufficient. Additionally, LKC will undertake a manual “pull test” of the membrane seals to ascertain their appropriateness.

An example copy of the on-site inspection proforma is provided below:

Onsite Inspection Record		
Date		LKC Staff
Plot No.		
Height of Void Space (if required)		
External Wall Air Bricks	Air Bricks/Swan Necks Present?	
	Air Brick Spacing (c. 2m)	
	Distance from corners (c. 450mm)	
	Total No. of Air Bricks	
	Below Membrane / DPM?	
Materials	Membrane	
	Tape	
Extent of Membrane Coverage		
Membrane Condition	Clean / Dirty	
	Wet / Dry	
	Smooth / Gravelly below	
	Creased / Flat	
	Intact / Punctured	
	Clear / Tools / Blocks / Steels present	
	Repair Patching Required?	
	Membrane overlapped (150mm)	
	All Joints Sealed?	
	Membrane sealed to DPM?	
	Correct Sealing around Stanchions and Windposts?	
Service Entries	No. Service Entries	
	Top Hats Present and Sealed (✓)	
Pass / Fail (✓)		

LKC will collect photographic evidence of the above for inclusion in the Completion Report along with the completed pro-forma (example contained in Appendix C).

The above inspections and presentation of accompanying photographic evidence will comprise sufficient 'lines of evidence' that confirm a suitable level of gas protection has been installed to an appropriate standard.

It should also be noted that there is an onus on the developer to sufficiently protect the gas membranes following validation works. Construction activities such as the placement of floor slab reinforcement have the potential to damage protective membranes.

Membrane specification and foundation cross-sections are presented in Appendix D. Gas protection membranes should be fitted to the manufacturer's specification and using the recommended supplementary components e.g. tapes, top hat covers.

2.3 Potable Water Supply Pipes

A UU risk assessment should be completed once the pipe routes and depths are known. It is likely that the water pipes will be laid in natural ground. A UU risk assessment will need to be undertaken after the reduced level dig has been completed due to elevated TVOCs (naphthalene). Barrier pipe will likely be required for the site where made ground is still present (see Section 10.5.2 of report ref. CL-602-LKC 21 1140-01 R0, dated April 2021).

In the event that barrier pipe is required then the risk assessment should be approved by UU prior to any installation works. Without their approval, no supply and billing point will be sanctioned and they would not connect.

For the purposes of the Completion Report example photographs illustrating the installation of barrier pipe and proof of purchase, if required, are recommended.

3 SITE WIDE CONSIDERATIONS

3.1 Stockpile Management

Stockpiled material should be suitably managed. The source of each stockpile should be recorded and appropriate validation testing for the proposed re-use or potential offsite disposal should be undertaken as required. Depending on the nature of the material the potential for dust generation or release of asbestos fibres will be mitigated by dampening down and covering as required.

Material should be segregated by type and source. For example, site won stone or 6F2, site won topsoil and site won subsoil.

A quarantine area for suspect contaminated soils should be established on site. This should comprise a Visqueen (or similar) lined area with a small bund to prevent run off and to minimise the risk of contaminating other areas of the site. The material should also be covered to minimise the generation of vapours, fibres, dust and possible nuisance to adjacent receptors, and to prevent rainwater ingress which may mobilise soluble contaminants.

With regards to any imported soil required for the clean environmental capping layer a clear quarantine area will be clearly marked, so clean imported material is separated from any site produced material to be disposed of. Imported soil will be placed on Visqueen or on a sacrificial clean layer, to avoid cross-contamination with underlying impacted made ground.

3.2 Unexpected Contamination

A watching brief by site workers should be maintained for evidence of contamination during the development works.

If in the unlikely event evidence of contamination is identified, then works in the area will stop pending further sampling and assessment and the Local Authority will be informed.

Delineation works will be undertaken; this may include collection of appropriate samples for laboratory analysis to further characterise the material and allow a risk assessment to be undertaken, or the removal of the impacted material to quarantine before removal to an appropriate landfill.

If obvious gross contamination is encountered, then impacted soils will be carefully excavated, stockpiled on an impermeable membrane such as Visqueen and quarantined pending further testing and assessment.

Soil samples will be taken and analysed for an appropriate suite of contaminants, including *inter alia* Soil Organic Matter, VOCs, SVOCs, BTEX, TPHCWG and asbestos.

Soil samples should represent the impacted area and in order to determine that significantly impacted soils have been removed samples will be collected from the base and sides of the excavation.

After analysis quarantined material may be removed offsite to a licensed treatment facility or an assessment made of its potential for treatment and / or retention on site.

3.3 Disposal

If any made ground or natural material is required to be removed from site this should be undertaken under an appropriate duty of care. The results of chemical analysis should be provided to a licensed landfill for confirmation of waste classification.

Waste records such as disposal tickets and waste carrier licences should be provided to LKC and should be included in the Site Completion Report.

4 REPORTING

Once the site has been completed a Site Completion Report will be produced stating:

- » All plots have been validated with regards to gas membranes on an individual basis,
- » Presenting waste transfer noted for the made ground removed,
- » Validation of the imported topsoil for the gardens and soft landscaped areas at the prescribed frequency.

Once all the remediation and validation work has been completed and documented to the satisfaction of the Regulators, the contaminated land conditions should be able to be discharged and the site 'suitable for use'.

5 SUMMARY OF REMEDIATION AND VALIDATION REQUIREMENTS

The following build phase remediation and validation required for this site are presented in Table 5-1.

<u>Environmental Cover System (Residential with garden and landscaped areas)</u> As made ground is to be stripped to natural strata then no specific clean cover depth is required, just nominal 150mm topsoil cover as a growing medium.	Chemical validation of imported soils: See Section 2-2, Table 2-1. Soil results compared to 'Residential with Plant uptake' for gardens. Photographic evidence of natural strata reached in the gardens and landscaped areas. Example Photographs in Appendix A.
<u>Gas Protection Measures</u> In line with CS2 / Amber 1 as per UK guidance^{4,5}. This will include: • Passive subfloor ventilation system (150mm void) with appropriate venting. • Carbon dioxide resistant membrane installed as per manufacturer's instructions. • Ventilation of confined spaces within the building. • Well-constructed reinforced suspended, raft or cast in situ ground slab. • Minimum penetration of ground slab by services. • All joints and penetrations to be sealed. The gas protection measures should be detailed and approved with the Local Authority (see Appendix D).	Supply and review of foundation designs. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735⁶. Example of the gas validation proforma is presented in Section 2.2 and example photographs in Appendix C.
<u>Potable Water Pipes</u> It is recommended that a Water Pipeline Assessment is undertaken once the location and depth of potable water pipes are known. It is likely that barrier pipe will be required if any made ground remains.	Water Pipeline Risk Assessment. Delivery Notes of Pipe Material or Example photographs of the Installed Pipe.

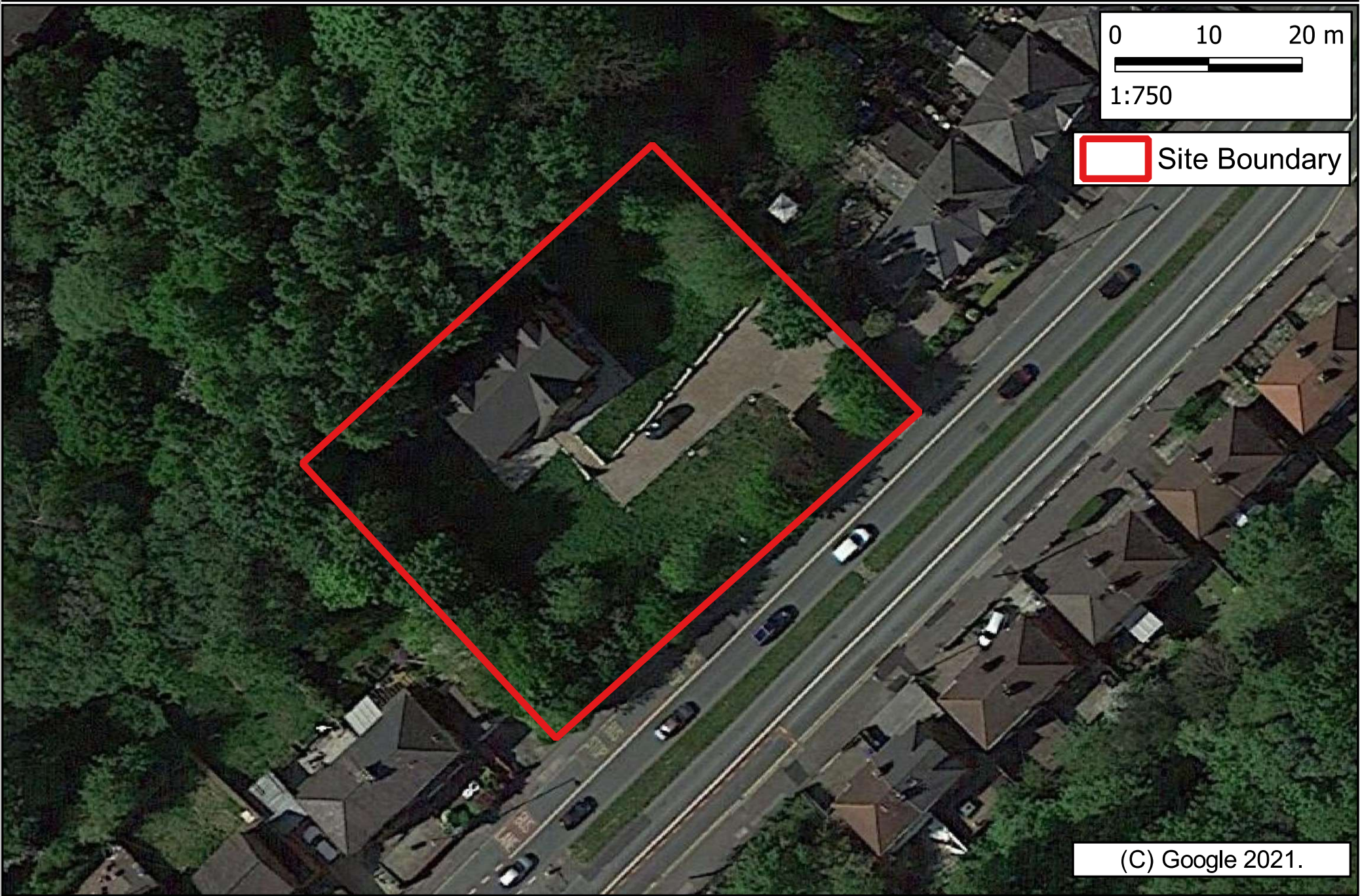
Table 5-1: Summary of remediation and validation requirements.

⁴ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

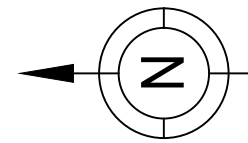
⁵ BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

⁶ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

FIGURES



Client: RH Kennedy Properties Ltd				Title: Site Location & Boundary Plan				
Site: 1161 Rochdale Road, Blackley								
Job No.: LKC 21 1140				Scale (see scale bar): 1:10,000 & 1:750 @ A4		Figure: 1		Revision:
Drawn By: EK				Checked By: BS		Drawn: Mar 2021		



KEY

Site Boundary



Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

CONSULT LIMITED

Client: RH Kennedy Properties Ltd

Site: 1161 Rochdale Road, Blackley

Title: Proposed Development Plan

Job No.: LKC 21 1140	Scale (See Scale Bar): See Scale Bar	Figure: 2	Revision:
Drawn By: AC	Checked By: EK	Drawn: Apr 2021	

APPENDIX A

EXAMPLE OF GARDEN DEPTH VALIDATION PHOTOGRAPHS

Plots 44 Front

 A photograph showing the front garden of a red brick house. A person in a yellow high-visibility vest and blue cap stands in the garden area. The garden is partially excavated, showing dark soil and some green plants.	View of garden to front of Plot 44.
 A close-up photograph of an excavation in the garden. A white measuring tape is visible, showing a depth of approximately 640mm. The soil is dark and appears to be a capping layer.	View of soil in capping layer excavation in garden area to the front of Plot 44.
 A photograph showing a depth measurement in the garden. A white measuring tape is placed vertically in the soil, showing a depth of approximately 640mm. A red bag is visible in the background.	Depth measurement in garden area to the front of Plot 44 (<i>circa</i> 640mm).

Plots 44 Front

 A photograph showing the front garden of a red brick house. A worker in a yellow high-visibility vest and blue cap is standing on the right. The garden area is partially excavated, showing dark soil. A small concrete path leads to the front door.	View of garden to front of Plot 44.
 A close-up photograph of an excavation in the garden. A white measuring tape is held vertically against the soil face, indicating a depth of approximately 640mm. The soil is dark brown and appears to be a capping layer.	View of soil in capping layer excavation in garden area to the front of Plot 44.
 A photograph showing a depth measurement in the garden. A white measuring tape is held vertically against the soil face, indicating a depth of approximately 640mm. A red bag is visible in the background.	Depth measurement in garden area to the front of Plot 44 (<i>circa</i> 640mm).

APPENDIX B

REMEDIATION VALIDATION CRITERIA (SOIL)

Summary Table for the Generic Assessment Criteria for Human Health Risk
Assessment Land Quality Management (LQM) S4ULs.

All GAC are based on sandy loam soils with a pH 7.

		LQM Generic Assessment Criteria (mg/kg) Dry weight soil						
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel	6%	180	180	230	980	230	3,400
	Selenium	6%	250	430	88	12,000	1,100	1,800
	Vanadium	6%	410	1,200	91	9,000	2,000	5,000
	Zinc	6%	3,700	40,000	620	730,000	81,000	170,000
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90
		2.5%	0.17	0.70	0.034	47	72	100
		6%	0.37	1.4	0.075	90	73	110
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920) ^{vap}
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220) ^{vap}
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}
	o-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470) ^{vap}
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}
	p-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}

NOTES
^{Sol / vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).
f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000
		2.5%	5,400	35,000	950	540,000	74,000	150,000
		6%	11,000	37,000	2,200	540,000	74,000	150,000
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49
		2.5%	11	14	6.5	170	29	56
		6%	13	15	13	180	29	62
	Benzo(a)pyrene (only)	1%	2.2	3.2	0.97	35	5.7	11
		2.5%	2.7	3.2	2.0	35	5.7	12
		6%	3.0	3.2	3.5	36	5.7	13
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13
		2.5%	3.3	4.0	2.1	44	7.2	15
		6%	3.7	4.0	3.9	45	7.2	16
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400
		2.5%	340	360	470	4,000	640	1,500
		6%	350	360	640	4,000	640	1,600
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370
		2.5%	93	110	75	1,200	190	410
		6%	100	110	130	1,200	190	440
	Chrysene	1%	15	30	4.1	350	57	93
		2.5%	22	31	9.4	350	57	110
		6%	27	32	19	350	57	120
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3
		6%	0.3	0.32	0.43	3.6	0.58	1.4
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300
		2.5%	560	1,600	130	23,000	3,100	6,300
		6%	890	1,600	290	23,000	3,100	6,400
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150
		2.5%	36	46	21	510	82	170
		6%	41	46	39	510	82	180
	Naphthalene	1%	2.3 ^f	2.3 ^f	4.1 ^f	190 ^f (76.4) ^{sol}	4,900 ^f	1,200 ^f (76.4) ^{sol}
		2.5%	5.6 ^f	5.6 ^f	10 ^f	460 ^f (183) ^{sol}	4,900 ^f	1,900 ^f (183) ^{sol}
		6%	13 ^f	13 ^f	24 ^f	1,100 ^f (432) ^{sol}	4,900 ^f	3,000
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200
		2.5%	220	1,500	38	22,000	3,100	6,200
		6%	440	1,500	90	22,000	3,100	6,300
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000
		2.5%	1,200	3,800	270	54,000	7,400	15,000
		6%	2,000	3,800	620	54,000	7,400	15,000
Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4	
	2.5%	0.98	1.2	0.67	15	2.2	4.7	
	6%	1.1	1.2	1.2	15	2.2	4.8	

NOTES

^{sol}/^{vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

^f = naphthalene is based on comparison of inhalation exposure with TDI_{inhal} for localised effect.

All GAC are based on sandy loam soils with a pH 7.

LQM Generic Assessment Criteria (mg/kg) Dry weight soil

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Petroleum Hydrocarbons	Aliphatic							
	EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304) ^{sol}	95,000 (304) ^{sol}
	EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}
	EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}
	EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}
	EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}
	EC>16-35	1%	65,000 (8.48) ^{f,sol}	65,000 (8.48) ^{f,sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f
	EC>35-44	1%	65,000 (8.48) ^{f,sol}	65,000 (8.48) ^{f,sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f
	Aliphatic							
	EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}
	EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}
	EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}
	EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}
	EC>12-16	2.5%	2,400 (59) ^{sol}	2,400 (59) ^{sol}	13,000	82,000 (59) ^{sol}	13,000	25,000 (59) ^{sol}
	EC>16-35	2.5%	92,000 (21) ^{f,sol}	92,000 (21) ^{f,sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f
	EC>35-44	2.5%	92,000 (21) ^{f,sol}	92,000 (21) ^{f,sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f
	Aliphatic							
	EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150) ^{sol}
	EC>6-8	6%	530	530	13,000	40,000 (736) ^{sol}	620,000	320,000 (736) ^{sol}
	EC>8-10	6%	150	150	1,700	11,000 (451) ^{vap}	13,000	21,000 (451) ^{vap}
	EC>10-12	6%	760 (283) ^{vap}	760 (283) ^{vap}	7,300	47,000 (283) ^{vap}	13,000	24,000 (283) ^{vap}
	EC>12-16	6%	4,300 (142) ^{sol}	4,400 (142) ^{sol}	13,000	90,000 (142) ^{sol}	13,000	26,000 (142) ^{sol}
	EC>16-35	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f
	EC>35-44	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f
	Aromatic							
	EC5-7(benzene as non-threshold)	1%	70	370	13	26,000 (1,220) ^{sol}	56,000	76,000 (1,220) ^{sol}
	EC>7-8(toluene)	1%	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
	EC>8-10	1%	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
	EC>10-12	1%	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
	EC>12-16	1%	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000
	EC>16-21	1%	260 ^f	1,900 ^f	46 ^f	28,000 ^f	3,800 ^f	7,600 ^f
	EC>21-35	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f
	EC>35-44	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f
	Aromatic							
	EC5-7(benzene as non-threshold)	2.5%	140	690	27	46,000 (2,260) ^{sol}	56,000	84,000 (2,260) ^{sol}
	EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) ^{sol}	56,000	95,000 (1,920) ^{sol}
	EC>8-10	2.5%	83	110	21	8,100 (1,500) ^{vap}	5,000	8,500 (1,500) ^{vap}
	EC>10-12	2.5%	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (899) ^{sol}
	EC>12-16	2.5%	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
	EC>16-21	2.5%	540 ^f	1,900 ^f	110 ^f	28,000 ^f	3,800 ^f	7,700 ^f
	EC>21-35	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f
	EC>35-44	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f
	Aromatic							
	EC5-7(benzene as non-threshold)	6%	300	1,400	57	86,000 (4,710) ^{sol}	56,000	92,000 (4,710) ^{sol}
	EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
	EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}
	EC>10-12	6%	380	1,200	74	34,000 (2,150) ^{sol}	5,000	10,000
	EC>12-16	6%	660	2,500	130	38,000	5,100	10,000
	EC>16-21	6%	930 ^f	1,900 ^f	260 ^f	28,000 ^f	3,800 ^f	7,800 ^f
	EC>21-35	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f
	EC>35-44	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f
	Aliphatic +Aromatic >EC44	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f
		2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f
		6%	1,900 ^f	1,900 ^f	3,000 ^f	28,000 ^f	3,800 ^f	7,900 ^f

NOTES
Sol / vap = solubility / vapour limit (potentially use if free product identified, although highly conservative).
f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Chloalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	7.1E-03	9.2E-03	4.6E-03	0.67	29	21
		2.5%	1.1E-02	1.3E-02	8.3E-03	0.97	29	24
		6%	1.9E-02	2.3E-02	1.6E-02	1.7	29	28
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425) ^{vap}
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) ^{vap}
		6%	39	40	240	3,000	140,000	100,000 (6,392) ^{vap}
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800
		2.5%	3.4	8.0	0.89	550	1,400	2,100
		6%	7.5	17	2.0	1,100	1,400	2,300
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500
		2.5%	2.8	3.5	1.9	250	1,400	1,800
		6%	6.4	8.2	4.4	560	1,400	2,100
	Tetrachloroethene (PCE)	1%	0.18	0.18	0.65	19	1,400	810 (424) ^{sol}
		2.5%	0.39	0.40	1.5	42	1,400	1,100 (951) ^{sol}
		6%	0.90	0.92	3.6	95	1,400	1,500
	Tetrachloromethane (carbon tetrachloride)	1%	2.6E-02	2.6E-02	0.45	2.9	890	190
		2.5%	5.6E-02	5.6E-02	1.0	6.3	920	270
		6%	0.13	0.13	2.4	14	950	400
	Trichloroethene (TCE)	1%	1.6E-02	1.7E-02	4.1E-02	1.2	120	70
		2.5%	3.4E-02	3.6E-02	9.1E-02	2.6	120	91
		6%	7.5E-02	8.0E-02	0.21	5.7	120	120
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600
		2.5%	1.7	2.1	0.83	170	2,500	2,800
		6%	3.4	4.2	1.7	350	2,500	3,100
	Chloroethene (vinyl chloride)	1%	6.4E-04	7.7E-04	5.5E-04	5.9E-02	3.5	4.8
		2.5%	8.7E-04	1.0E-03	1.0E-03	7.7E-02	3.5	5.0
		6%	1.4E-03	1.5E-03	1.8E-03	0.12	3.5	5.4
	2,4,6-Trinitritoluene (TNT)	1%	1.6	65	0.24	1,000	130	260
		2.5%	3.7	66	0.58	1,000	130	270
		6%	8.1	66	1.4	1,000	130	270
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) ^{sol}
		2.5%	250	13,000	38	210,000	26,000	51,000
		6%	540	13,000	85	210,000	27,000	53,000
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) ^{vap}
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) ^{vap}
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) ^{vap}
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30
		2.5%	6.6	7.4	6.1	170	18	31
		6%	7.1	7.5	9.8	170	18	31
	Dieldrin	1%	0.97	7.0	0.17	170	18	30
		2.5%	2.0	7.3	0.41	170	18	30
		6%	3.5	7.4	0.96	170	18	31
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300
		2.5%	7.8	620	1.2	9,400	1,200	2,400
		6%	17.4	620	2.7	9,400	1,200	2,400
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26
		6%	0.14	6.6	2.2E-02	140	16	27
	Endosulfanns (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15
		2.5%	0.2	3.8	3.2E-02	65	8.1	15
		6%	0.46	3.8	7.7E-02	65	8.1	16

NOTES

Sol / vap = solubility / vapour limit (potentially use if free product identified, although highly conservative).

All GAC are based on sandy loam soils with a pH 7.

		LQM Generic Assessment Criteria (mg/kg) Dry weight soil						
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}
		6%	2.4	2.4	32	290	14,000	2,900
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190
		6%	22	38	7.0	830	100	190
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100
		2.5%	2.0	150	0.30	4,000	620	1,100
		6%	4.5	210	0.70	4,300	620	1,100
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110
		2.5%	0.52	29	8.0E-02	400	60	120
		6%	1.2	31	0.19	400	60	120
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300
		2.5%	0.29	0.29	10	22	11,000	1,900
		6%	0.62	0.62	23	47	11,000	2,700
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48
		2.5%	0.7	0.78	0.61	66	25	50
		6%	1.6	1.8	1.4	120	25	51
	Phenol	1%	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
		2.5%	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
		6%	1,100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)

NOTES

^{Sol / vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

^{dir} = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

^g = derived based on 2,3,4,6-tetrachlorophenol.

Summary of Category 4 Screening Levels: 2015

Substance	Residential (with home- grown produce)	Residential (without home- grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	170 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5.0 mg/kg	5.3 mg/kg	5.7 mg/kg	77 mg/kg	10 mg/kg	21 mg/kg
Cadmium	22 mg/kg	150 mg/kg	3.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	21 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2300 mg/kg	630 mg/kg	1300 mg/kg

APPENDIX C

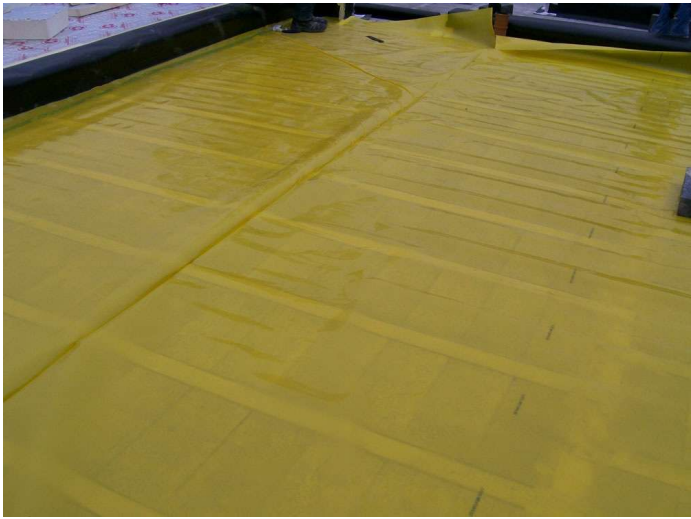
EXAMPLE OF GAS PROTECTION VALIDATION PHOTOGRAPHS

Plot Completion Report			
Site Name:	Hamlet Woods, Prescott		
Developer:	Taylor Wimpey North West Ltd		
NHBC Ref:	15/00022/OUT		
Plot Number:	Plot 44		
Construction phase remedial requirements specified in the Build Phase Enabling Works Strategy by E3P (ref: 12-1270, dated February 2018) and comprised: Installation of gas protection measures throughout the site to include ventilated sub-floor void and a low permeability gas membrane. Visqueen Low Permeability Membrane has been utilised on site in accordance with recommendations made by Visqueen. Membrane specification details are provided in Build Phase Enabling Works Strategy by E3P (ref: 12-1270, dated February 2018).			
Inspection Date:	23 rd November 2020		
			
Evidence of gas membrane installed across the plot.		Example of overlapping and sealing of gas membrane appropriately sealed at joints.	
			
Evidence of top hats and sealing at service entry points.		Evidence of installation of air bricks.	
LKC has completed the inspection of the gas membrane and conclude a suitable membrane was installed in accordance with the remedial requirements.			
Report Prepared By:	Hannah Moss	Signature	
Report Reviewed By:	Paul Quimby	Signature	

APPENDIX D

GAS MEMBRANE SPECIFICATION AND FOUNDATION CROSS SECTION

Low Permeability Gas Membrane
CE Mark to EN 13967:2017



- **Approved for use in NHBC Amber 1**
- **High quality robust co-polymer thermoplastic membrane**
- **Supplied in centre folded sheeting which reduces the risk of cracks in screed**
- **A high performance radon membrane**
- **BBA Certificate 13/5069 and CE Mark 13967:2012**

Description

Visqueen Low Permeability Gas Membrane is a robust co-polymer thermoplastic membrane approved for use in NHBC Amber 1 and radon applications. For ease of identification on site the membrane is coloured yellow. The membrane is flexible, easy to install and supplied in a 4m x 12.5m roll.

The membrane is manufactured as a centre folded product to limit creases which aids jointing and welding applications on site. Centre Folded films can also help to reduce cracks found in structural concrete screeds where traditional multi-folded DPMs are used.

Applications

Visqueen Low Permeability Gas Membrane offers a safe solution for the protection of buildings and occupiers against, damp radon and on NHBC amber 1 site conditions. NHBC Technical Extra Document 20 contains further information on their traffic light application criteria and is available on this [link](#).

BS8485:2015

Visqueen Low Permeability Gas Membrane does NOT meet the criteria of BS8485:2015 and should only be used on the above applications. To ensure correct specification Visqueen's new Gas Protection guide is an easy to use tool and contains a product selector - page 9 - and a gas membrane criteria check sheet on page 6.

[Please click here to download Visqueen's Ultimate Gas Protection Guide.](#)

Also, the product is not intended for use where there is risk of hydrostatic pressure.

System components

- Visqueen Double Sided Jointing Tape
- Visqueen Gas Resistant (GR) Foil Tape
- Visqueen Top Hat Units
- Visqueen TreadGUARD1500
- Visqueen Detailing Strip

-
-
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-
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Installation

Visqueen Low Permeability Gas Membrane and ancillary components must be installed



Low Permeability Gas Membrane

CE Mark to EN 13967:2017

in accordance with the recommendations of Building Research Establishment BRE 414 “Protective measures for housing on gas contaminated land”, NHBC guidelines and the Chartered Institute of Environmental Health Ground Gas Handbook.

The membrane should be installed on a smooth grouted surface allowing adequate overlap for jointing between the sheets. To avoid slip or shear planes and high compressive loadings it is not recommended to take the membrane through the wall. In order to provide a continuous barrier across the cavity Visqueen Zedex CPT DPC should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf.

Laps can be joined together by either using the Visqueen Gas Barrier jointing system or welded by our specialist on-site contractors.

Radon areas

The membrane can be used as a robust solution under concrete slabs on a top of a smooth blinding layer.

Jointing and Sealing

Visqueen Low Permeability Gas Membrane should be overlapped by at least 150mm and bonded with Visqueen Double Sided Tape. The joint should then be secured with Visqueen Gas Resistant (GR) Foil Jointing Tape. Ensure that the membrane is clean and dry at the time of jointing. Airtight seals should be formed around all service entry points. Visqueen Pre-formed Top Hat Units must be used for sealing service entry pipes. The base of the top hat should be sealed using Visqueen Double Sided Tape and Visqueen GR Foil Jointing Tape should be used to secure the joint.

NB. In demanding site conditions use Visqueen Gas Lap Tape as a high performance alternative to Visqueen GR Foil Jointing Tape.

Storage and Handling

The membrane should be stored under cover in a dry environment. The material is not recommended for applications where it will be exposed to long periods of outdoor weathering as exposure to ultraviolet light will embrittle the product. Weathering will not occur when the membrane is installed in accordance with CP 102:1973. Care should be taken to avoid accidental damage when handling the membrane on site. When the weather is cold all jointing tapes should be kept in a warm and dry place until needed. Installation is not recommended below 5°C

Technical Data and CE Mark

Visqueen Low Permeability Gas Membrane complies with the requirements and clauses of EN 13967 - Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic rubber basement tanking sheet - Definitions and characteristics.

British Board of Agreement performed initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control, and issued certificate of constancy of conformity of factory production control. 0836–CPD – 13/F029 applies.





Low Permeability Gas Membrane

CE Mark to EN 13967:2017

Product Data

Product Data

Characteristic	Test method	Units	Compliance criteria	Value or Statement
Visible defects	EN 1850 -2	-	Pass/Fail	Pass
Length	EN 1848-2	m	-0%/+10%	12.5
Width	EN 1848-2	m	-2.5%/+2.5%	4
Straightness	EN 1848-2	-	Pass/Fail	Pass
Thickness	EN 1849-2	mm	-12%/+12%	0.5
Grammage	EN 1849-2		-12%/+12%	460
Tensile Strength - MD	EN EN12311		>MLV	20
Tensile Strength - TD	EN EN12311		>MLV	20
Tensile Elongation - MD	EN EN12311	%	>MLV	300
Tensile Elongation - TD	EN EN12311	%	>MLV	300
Joint Strength	EN12317-2	N	>MLV	298
Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
Resistance to impact	EN 12691	mm	>MLV	200
Durability (artificial 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	333
Resistance to tearing (nail shank) MD	EN 12310-1	N	MDV	335
Resistance to static loading	EN 12730	Kg	>MLV	Pass-20kgs
Water vapour transmission - resistance	EN 1931	MNs/g	MDV	2100
Water vapour transmission - permeability	EN 1931		MDV	0.08
Radon Permeability	SP Test Method		MDV	5.477x10-12
Radon Transmittance	SP Test Method	m/s	MDV	5.477x10-12
Carbon Dioxide Permeability	ISO 2782	m/s/Pa	MDV	2.8x10-17
Methane Permeability	ISO 2782	m/s/Pa	MDV	1.13x10-17
Reaction to Fire	EN 13501-1	Class	MDV	F



Low Permeability Gas Membrane

CE Mark to EN 13967:2017

Appendix A

About Visqueen

Visqueen is the market leader in the manufacture and supply of structural waterproofing and gas protection systems. Visqueen offers the complete package – a proven, reliable range backed by a technical support service that goes unmatched in the market - everything you would expect from a reputable and ethical company.

Complete Range,
Complete Solution

- [Structural Waterproofing](#)
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- [Damp Proof Membranes](#)
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- [NBS Clauses](#)
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- [Material Safety Datasheets](#)
- [Specification Guide](#)

Find your local stockist

Search our directory of Visqueen specification [Specialist Centres](#) to locate your nearest Visqueen Partner.

Technical support
throughout your project

We are specialists in our field and can help you specify the correct solutions with the necessary performance levels, in accordance with building regulations.

- Nationwide site support team
- Specification advice
- Installation guidance & project sign off
- System design including CAD details

CPD Seminars and
Training Academy



Gas Protection CPD

The specification, technical design, and installation of gas protection systems, enabling the sustainable regeneration of brownfield sites.



Structural Waterproofing CPD

The specification, technical design, and installation of structural waterproofing systems for protection against water and damp ingress in both above and below ground projects.



Visqueen Training Academy

We are now able to offer exclusive in depth training opportunities on a wide variety of Visqueen products at our Training Academy.



Visqueen Special Projects

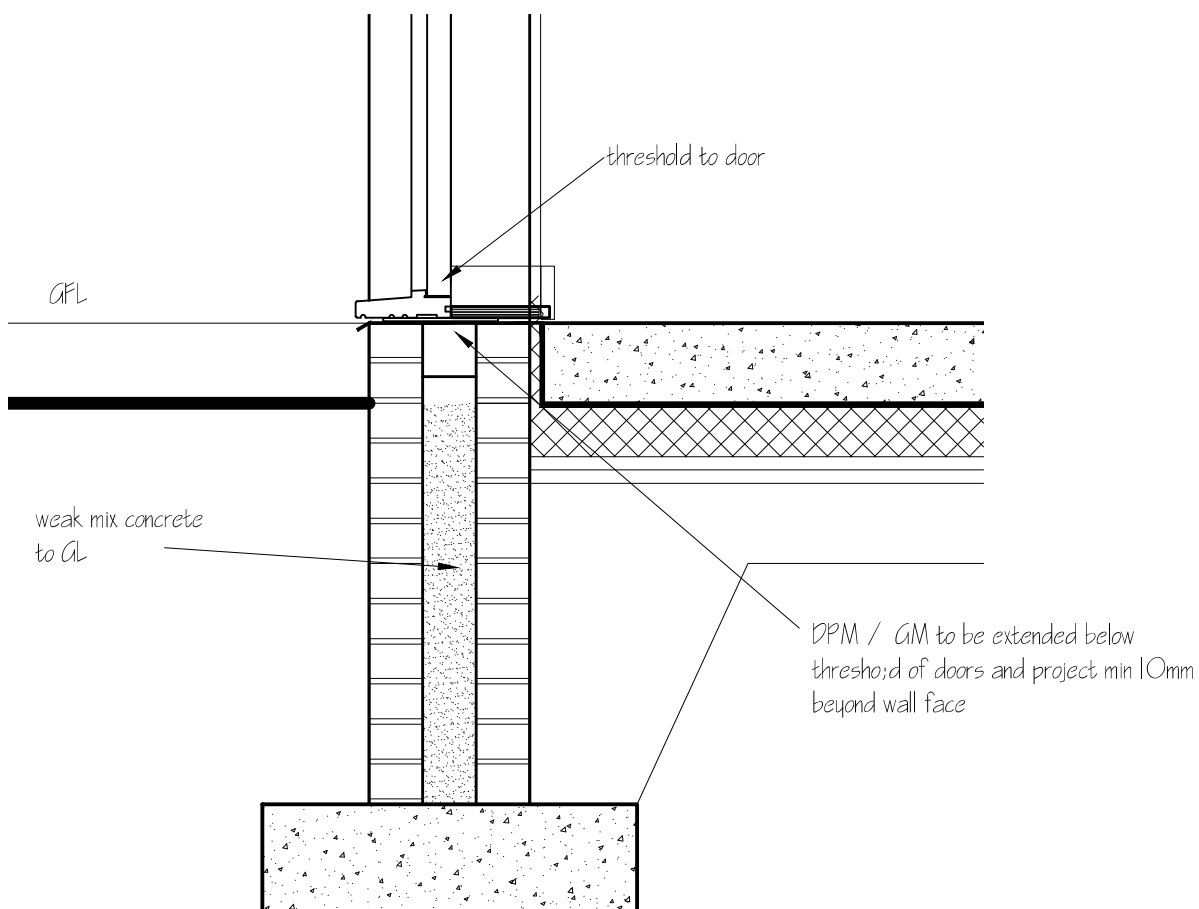
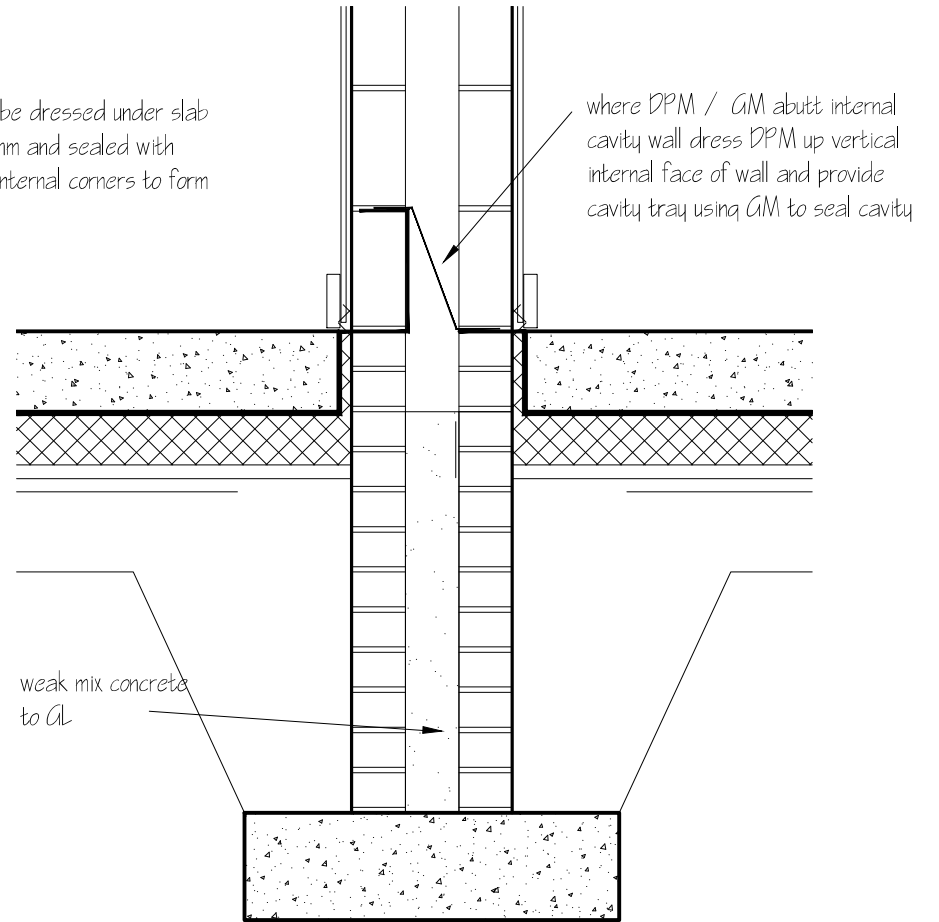
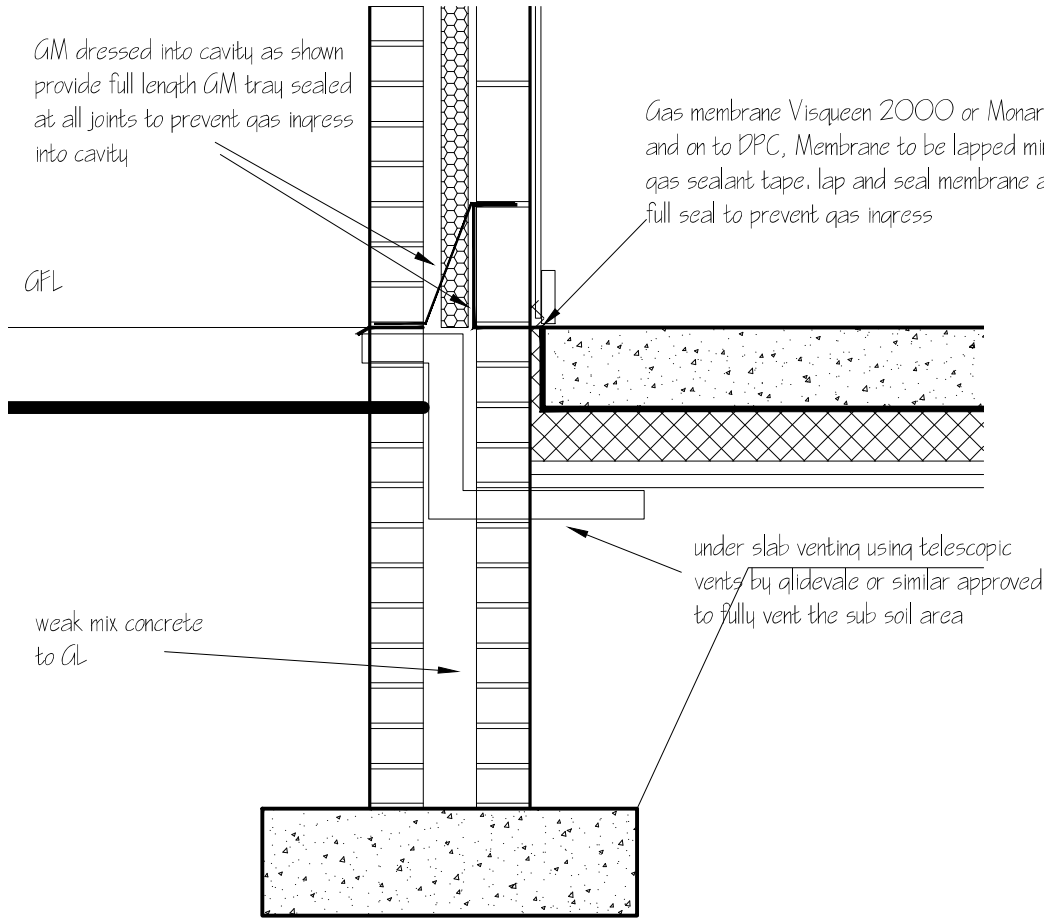
We provide high-level expertise, comprehensive support and experience in all types of waterproofing and gas protection.



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The information given in this datasheet is based on data and knowledge correct at the time of printing. Statements made are of a general nature and are not intended to apply to any use or application outside any referred to in the datasheet. As conditions of usage and installation are beyond our control we do not warrant performance obtained but strongly recommend that our installation guidelines and the relevant British Standard Codes of Practice are adhered to. Please contact us if you are in any doubt as to the suitability of application.

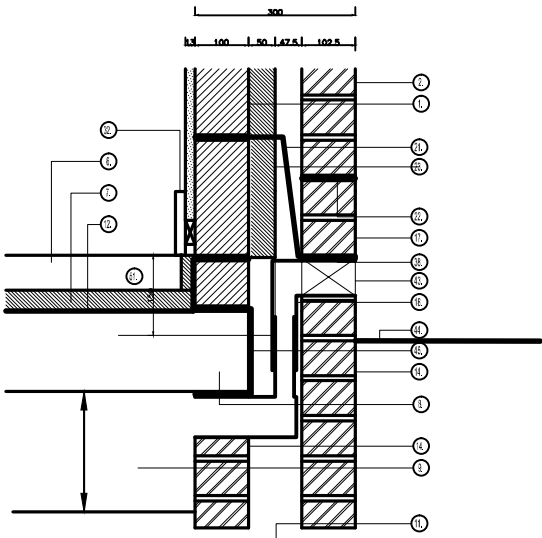




TITLE, GAS MEMBRANE DETAIL

REV. DRG.NO. 001

DATE MAY 2012 SCALE 1:20 @ A4



UNDERFLOOR VENTILATION
DETAIL

NOTES.

1. 100mm LIGHTWEIGHT CONCRETE BLOCKWORK.
2. 102.5mm FACED BRICKWORK.
3. 25mm SAND / CEMENT SCREED WITH REINFORCING FIBRE.
4. FLOORING SLAB WITH 40mm PROJECTING REINFORCING FIBRE.
5. BEAM AND BLOCK FLOOR AS STRUCTURAL ENGINEERS SPECIFICATION.
6. MINIMUM 150mm VENTED UNDER FLOOR VOID.
- 7.
- 8.
- 9.
- 10.
11. FOUNDATIONS AS STRUCTURAL ENGINEERS SPECIFICATION.
12. DPC TAKEN TO EXTERNAL WALL, TO RUN UP WALL AND TUCK IN UNDER DPC.
- 13.
14. 102.5mm BRICKWORK SUITABLE FOR LAYING UNDER GROUND.
15. DPC TAKEN UP AND BOLDED TO CONTAIN UNDER FLOOR MEMBRANE.
16. PROPRIETARY TELESCOPIC UNDER FLOOR VENTILATION UNITS TO GIVE TOTAL OF 150mm² AIR FLOW PER METRE RUN OF WALL.
- 17.
- 18.
- 19.
20. CUT DOORS AND BLOCKS REQUIRED.
21. DUTY TRAY OVER VENT WITH STOP ENDS.
22. SECONDARY DPC LEVEL AT RAISED ACCESS AREAS.
23. THERMAL INSULATION TO WALL TO BE KINGS PAN OR CEOTEK.
24. BREASTING BOARD.
- 25.
- 26.
- 27.
28. DPC.
29. AIR BRICK POSITION.
30. EXTERNAL GROUND LEVEL.
31. DPC WRAPPED AROUND FLOOR BEAMS.
32. EXPANDED TO JUNCTION OF WALLS.
33. 125mm PLASTERBOARD AND SUBMITTER, NO ADDITIONAL JOISTS REQUIRED.
- 34.
35. 100mm INSULATED WOOD ABSORBENT LAYER.
36. MINIMUM DENSITY 100kg/m³.
37. WALL INSULATION TO CONTINUE AT LEAST 150mm BELOW TOP OF FLOOR FINISH INSULATION.

TITLE. GAS VENT DETAIL		
REV.	DRG.NO. 002	
DATE MAY 2012	SCALE 1:20 @ A4	

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