Castledine Environmental

LAND CONTAMINATION SURVEYS

Phase 3 Remediation Strategy and Verification Plan

for

Mr Athar Iqbal

on the site of

4 Highfield Road, Manchester M19 3JX5

Date: February 2023

Status:	Final Report
Reference:	3462K P3 Iqbal - Manchester
Date:	22/02/2023

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1.0 QUALITY ASSURANCE

Castledine Environmental confirm that all reasonable efforts have been made to ensure that the information outlined within this report is accurate.

Castledine Environmental would further confirm that due care, attention and technical skill were used in the creation of this report.

For and on behalf of Castledine Environmental.

Kevin Castledine

(Director)

2.0 LIMITATIONS

The conclusions and recommendations made in this report are limited to those based on the findings of the investigation. Where comments are made based on information obtained from third parties, Castledine Environmental assumes that all third-party information is true and correct. No independent action has been undertaken to validate the findings of third parties. The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at the time.

This survey has not included asbestos within existing structures, invasive plant species, geotechnical considerations or any elements unconnected with potential ground contamination at the site. If required, such surveys should be undertaken by suitably accredited organisations.

There may be other conditions prevailing at the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

3.0 INTRODUCTION

Castledine Environmental have been appointed Mr Athar Iqbal to undertake a Phase 3 remediation Strategy and Verification Plan on 4 Highfield Road, Manchester.

Due to there being only a small area of soft landscaping, and a modest sized single dwelling, the client has opted to remediate the soft landscape by replacement of soils and install gas protection in lieu of testing.

The following reports previous reports on the site are

- Phase 1 Desk Study by Advance Consulting Engineers Ltd. Doc ref C20185-ADV-RP-DS-3000(A) dated 18/12/2020

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Athar Iqbal and his appointees for the purpose of ensuring compliance with:

- Paragraph(s) 174, 179, 183 & 184 of the National Planning Policy Framework 2021
- part C1 of the building regulations.
- Condition 5 of the Manchester City Council planning approval reference 128773/FO/2020

This report may not be used or relied upon by any unauthorised third party, or for any other proposed use than that specified above, without the explicit written agreement of Castledine Environmental.

The report consists of a Remediation Strategy and Verification Plan in accordance with

- BS10175:2011+A2:2017, Investigation of potentially contaminated sites. Code of practice
- BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings and

- CLR11 “Model Procedures for the Management of Land Contamination”.
- LCRM “Land Contamination Risk Management”.

The objectives of the report are:-

- Report the existing information relating to the soil contamination and the ground gas regime within the area of the site.
- Set out the remediation measures and validation processes to be followed on site to ensure the site development does not pose a risk to human health.

5.0 SITE DESCRIPTION

The site is situated in the Levenshulme area approximately 5.7km to the SE of city of Manchester. The site is roughly triangular in shape and occupies an area of approximately 290 square metres.

6.0 OVERVIEW OF FINDINGS AND RECOMMENDATIONS FROM PREVIOUS REPORTS

The following previous reports have been referred to and should be read in conjunction with this report.

- Phase 1 Desk Study by Advance Consulting Engineers Ltd. Doc ref C20185-ADV-RP-DS-3000(A) dated 18/12/2020

The most pertinent information is summarised in the following sections.

6.1 SUMMARY OF SOIL CONTAMINATION

The site’s historic land use and site setting, indicate that the potential of sources of contamination is generally low. The presence of historic industrial land uses, landfill and possible mining, indicates a potentially low to moderate source of contamination may be present.

Given the site’s history no particular contaminants have been identified as a target determinands for the majority of the site area. A low to moderate risk from the area around the site may present a potential source of heavy metals.

6.2 SUMMARY OF GROUND GAS REGIME

The conceptual model indicates that there is a potential risk of ground gasses from landfilled area to the SW of the site, although low transmission through superficial deposits is likely.

Due to the historic site setting, localised hydrocarbons are a possibility although this is a low probability and is no protection is considered necessary.

Accordingly, gas protection measures for carbon dioxide and Methane are required for the development, the extents of which are illustrated on the Gas Protection Plan in Appendix A.

7.0 CAPPING OF SOFT LANDSCAPING AREAS

Guidance found in Section A.3 of BS3882:2015: *'Specification for Topsoil'* states that the minimum rooting depth for grass, shrubs and trees should be at least 450mm, 600mm or 900mm, respectively. Prior to the spreading of the imported material, the receiving area should be decomposed to increase the underlying permeability, to further plant growth and sustainability.

Capping of soft-landscaping areas with a minimum of 600mm of clean material.

Prior to the placement of imported material it should be tested in line with Guidance And Good Practice Verification Of Cover Systems – Testing Criteria For Subsoil And Topsoil, page 10, NHBC Technical Extra Note Issue 8 Nov 2012. (http://www.nhbc.co.uk/NHBCPublications/LiteratureLibrary/Technical/TechnicalExtra/filedownload,48980,en.pdf).

Material can be sourced from other developments and commercial companies. Dependent on the source of the material it can be classified as either from a 'Greenfield/Manufactured' or 'Brownfield/Screened' source.

Broadly speaking material can be classified as follows:

- Greenfield - if it can be demonstrated that it has not been developed and that no past contaminative uses have occurred at the site.
- Manufactured – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost).
- Brownfield – material from a donor site that has previously been developed
- Screened – material from a company who deal with skip/demolition waste which is screened for unsuitable material i.e. bricks, wood, plastic etc.

Brownfield and screened material are more likely to be of a lesser quality and will require more robust testing to prove their suitability therefore Greenfield or Manufactured material will be used. Imported soil must not contain materials such as plastics, metals, asbestos, glass, tarmac, demolition rubble etc.

Any supplied testing results from a commercial company must be from the actual material to be imported and be no more than two months old. This should be provided to the relevant Local Authority prior to importation.

If certificates are not supplied then testing should be done before being brought to site, the testing should be carried out by a UKAS accredited laboratory and there should be either:

- one sample per 250 m^3 with a minimum of three tests

For soil from a single source, a minimum of:

- 3 No. samples for every 15m^3 (for smaller quantities, a minimum of 3 No. tests will be required)

Each test must include as a minimum:

- Standard metals/metalloids (should include as a minimum As,Cd,Cr,CrVI,Cu,Hg,Ni,Pb,Se,Zn)
- PAH (16 USEPA speciation)
- Asbestos
- Total TPH
- pH

- Pesticide suite (from agricultural sources)

Environmental samples of imported materials will be tested inline with current CLEA Soil Guideline Values and relevant Generic Acceptance Criteria (GAC) and SGV's.

Imported material should preferably not be stockpiled on site but placed in the intended area straight away so as to not cause cross contamination.

Test results for the intended imported material must be submitted to the local authority and approved before being brought onto site.

All transfer notes and/or receipts for the soil should be retained.
The thickness of the soil placed will require evidence either via photographs during its placement or by digging of post placement verification trial holes.

8.0 GAS PROTECTION MEASURES DESIGN

As discussed above, gas protection measures are required for the proposed development. These have been designed in line with the current British Standard BS8485:2015+A1:2019 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

8.1 DETERMINATION OF GAS PROTECTION SCORE

When determining the gas protection score, the Characteristic Situation and building type are taken into account. As discussed, the site has been characterised as CS2. The proposed development comprises private residential property and so represents Type A buildings, as per Table 3 of BS8485:2015+A1:2019.

Taking into account the gas regime and the building type, using Table 4 in BS8485:2015+A1:2019, the minimum Gas Protection Score required for the site is 3.5 points.

8.2 DETERMINATION OF PROTECTION MEASURES

A combination of two or more of the following protection measures should be used to achieve the Gas Protection Score, as determined in Section 4.3.1 of BS8485:2015+A1:2019:

- Structural barrier, or basement slab and wall if present.
- Ventilation measures.
- Gas resistant membrane.

8.2.1 FLOOR SLAB

The residential property is to have a Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement). Based on Table 5 of BS8485:2015+A1:2019, this will achieve a Gas Protection Score of 0.5 points.

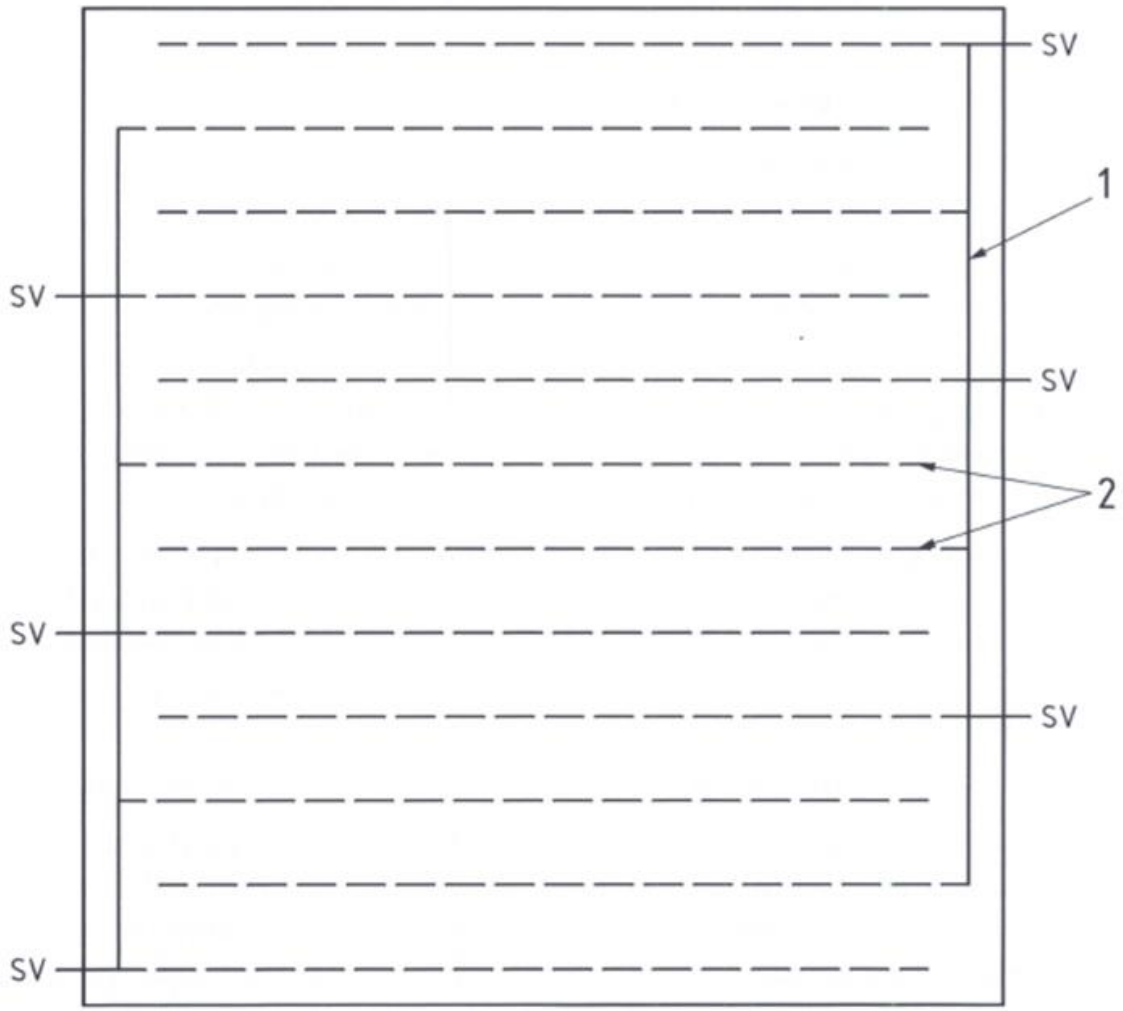
8.2.2 VENTILATION MEASURES

The properties are to have a minimum 200mm no-fines gravel layer with gas drains as ventilation. MOT Type 1 or Type 2 aggregate are not acceptable.

The number of gas drains is to be confirmed but will meet or exceed the building regulations requirements of 1,500mm²/m run of wall (small to medium buildings) on at least two opposite sides. Should the building exceed 15m in length (larger buildings), this this should be increased to 2000mm²/m per run of wall, on at least two opposite sides.

This should be sufficient to provide a good performance. Based on Table 6 of BS8485:2015+A1:2019, this will achieve a gas protection score of 1.5 points.

Configuration of gas drains (example)



Key

1	Header pipe
2	Gas drains
SV	Side vent

NOTE: Should a site visit not be carried out whilst the development is at the stage above (installation of the ventilation piping), then a good, comprehensive photographic record of the piping should be kept. This is crucial for the validation stage of the works. Records should also be kept for invoicing, receipts and ticketing for importation of the 20-40mm graded stone.

8.2.3 GAS RESISTANT MEMBRANE

A gas resistant membrane which meets all of the requirements of Table 7 of BS8485:2015+A1:2019 (reproduced as Table 1) will achieve a score of 2 points.

TABLE 1. BS8485:2015 TABLE 7 GAS PROTECTION SCORE FOR THE GAS RESISTANT MEMBRANE REPRODUCED FROM BS8485:2015

Protection element/system	Score	Comments
Gas resistant membrane meeting all of the following criteria: • sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m^2/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); • sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); • sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. For example, a minimum 0.4 mm thickness (equivalent to 370 g/m2 for polyethelene) reinforced membrane (virgin polymer) meets the performance criteria in Table 7 (see C.3). If a membrane is installed that does not meet all the criteria in column 1 then the score is zero.

As designers, Castledine Environmental have specified a membrane which is considered to be suitable for use as a gas barrier at the site and this is

- Visqueen Gas Barrier

Suitable accessories are

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

If an alternative product is proposed, then the manufacturer, membrane name and specification sheet should be forwarded to Castledine Environmental and the LPA for assessment and approval prior to installation.

The membrane shall be extended across cavities and sealed around joints/service entries. Joints can be heat welded or taped with Double sided butyl joint tape. Joints are to be overlapped by min 100mm and if joint tape is being used then it must be applied using a silicone roller to remove trapped air. Visqueen self-adhesive Gas Membrane or Visqueen Top Hats and preformed corners should be used for sealing around protuberances.

If lap tape is to be used then it should not be fitted until the double sided jointing tape has been verified

8.2.4 GAS PROTECTION SCORE SUMMARY

By implementing the above measures, the Gas Protection Score would be

TABLE 2. CALCULATION OF GAS PROTECTION SCORE

Protection Measures	Score
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5
Ventilation measures	1.5
Gas resistant membrane	2.0
Total	**4.0**

8.3 OTHER ELEMENTS

The gas membrane is to be installed when the construction is at slab level and then the insulation and screed placed upon it. This will protect the membrane from on-going site activities.

The cavity should be filled to a level where it will support the membrane across the cavity. Any exposed sections across the cavity wall will be protected using sacrificial sheeting or DPM while any cavity work is undertaken.

Ground Gas Membrane is degraded by light and therefore if it is to be left exposed for two weeks or more it should be protected by covering with black plastic. Centre fold membranes must not be used.

9.0 VERIFICATION PLAN

9.1 CAPPING MATERIAL

9.1.1 VERIFICATION OF CORRECT DEPTH OF COVER LAYER

There are two main ways to confirm the depth of cap.

- **TOPOGRAPHICAL SURVEYS**
  This method requires an accurate survey of the base, following removal of any material as required, and final formation layer height to establish the depth of cover.
- **DEPTH TESTING IN SITU**
  Small trial pit excavated to allow measurement of its depth by tape measure or measuring staff. This would normally be one pit per garden area. Photograph each test pit showing depth of cap.

9.1.2 PHOTOGRAPHIC EVIDENCE FOR VALIDATING THE DEPTH OF COVER

The following is guidance on photographs as additional evidence to support either of the above methods.

- Proof that the depth of inert cover has been installed
- Proof there is a geotextile separator and visual warning membranes (if used) between the made ground and suitable for use soils.

- Proof of the method of placement and different layers if appropriate
- Proof of the completed project
- Inclusion of geographic background features which will aid locating the photograph

9.2 GAS PROTECTION

In order to achieve the points claimed for the gas resistant membrane above, a validation procedure must be in place. The validation should be carried out by a suitably qualified and *independent* inspector and be undertaken in line with CIRIA C735. Membranes installed by a suitably qualified installer are more robust, require less verification (assuming that the work is to an acceptable standard) and are likely to be more cost effective. If the installation is to be carried out by a qualified and experienced installer then one visit should be carried out immediately following the fitting of the membrane. If the fitting is to be carried out by the builder / groundworker then an extra visit will be required when the site has been prepared for the membrane but before it is fitted.

If during the initial or subsequent inspections or based on the installer supplied information the quality of the installation is not deemed to be to a sufficient standard, then additional visits and integrity testing may be required.

10.0 WATCHING BRIEF

It remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include oily pockets within the soil, potential for asbestos containing materials, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and former demolition materials.

Should previously undiscovered contamination be encountered during the demolition/construction of the new buildings the following course of action should be adhered to:

1. The ground workers should report any suspected contamination immediately to the Client's site supervisor. The supervisor should contact the Client or their appointed agent who will in turn contact Castledine Environmental to request an engineer to visit the site to assess the extent of the 'contamination'.
2. Castledine Environmental shall make records of their inspection, and pass details of these to the Local Authority.
3. Where the conditions revealed differ from those previously anticipated, Castledine Environmental shall take samples as deemed appropriate to be dispatched for appropriate chemical testing.
4. Depending on the results of the testing either:
    a. no further work will be required;
    b. a further detailed risk assessment will be required; and/or
    c. Localised specific remedial measures will be necessary. Appraisal criteria will vary depending on the nature of the assessment.
5. The results of any such testing will be sent to the Local Authority Pollution Control Section, Local Authority development control section, and the appointed building inspector. If remediation is required, the LA/Building inspector will be informed of the date and time of the proposed works.
6. Remediation will be undertaken in accordance with a method statement submitted for approval. The works shall be supervised where necessary by Castledine Environmental who shall provide a Verification Report for the Local Authorities.
7. A copy of the discovery strategy (Appendix C) should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

11.0 REPORTING

11.1 CAPPING MATERIAL

When the Capping layer has been completed and verified, a report should be produced for submission to the Local Authority. This should confirm that the works have been done and confirm that the site is now suitable for its intended use.

The report should contain

- A summary of the remediation strategy and work undertaken.
- Copies of waste transfer note(s) and / or invoice(s) showing how much material has left site and its destination.
- A copy of the laboratory analysis results for imported material
- Copies of the transfer note(s) and / or invoice(s) for imported material showing the amount imported.
- Good quality photographs as indicated in section 9.1.2

11.2 GAS PROTECTION

Reporting of the verification activities will be completed following a site visit and verification of the installed gas protection measures. The verification report will summarise the extent to which the remedial methods have been achieved and supporting documentation to include site plans and membrane photographs.

12.0 REFERENCES

12.1 LEGISLATION AND REGULATIONS

12.1.1 ACTS

[1] Environmental Protection Act 1990, Part IIA: inserted by Environment Act 1995, Section 57. See Environment Act 1995 for text of Part IIA.

12.1.2 PLANNING REGULATIONS

[2] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 SI1999/No.293

[3] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000 SI2000/No.2867

12.1.3 CONTAMINATED LAND REGULATIONS

[4] The Contaminated Land (England) Regulations 2000. SI2000/No.227

[5] The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/No.663

[6] The Contaminated Land (England) Regulations 2006 SI2006/No.1380

12.2 STATUTORY GUIDANCE

[7] Department of Environment, Food and Rural Affairs. 2012. *Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.* Department of Environment, Food and Rural Affairs

[8] Communities and local Government, 2012: National Planning Policy Framework.

12.2.1 CL:AIRE

[9] Card G, Wilson S, Mortimer S. 2012. *A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17*. CL:AIRE, London, UK. ISSN 2047- 6450 (Online)

12.3 BRITISH STANDARDS

[10] BS 5930:2015 Code of practice for site investigations

[11] BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of practice

[12] BS 8485:2015 +A1:2019 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

[13] BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)

12.4 NON-STATUTORY TECHNICAL GUIDANCE

12.4.1 ENVIRONMENT AGENCY

[14] Cassella Stranger, 2002. Model Procedures for the Management of Contaminated Land, Contaminated Land Report (CLR) 11, Department for Environment, Food, and Rural Affairs.

12.4.2 CIRIA PUBLICATIONS

[15] Wilson, S., Oliver, S., Mallett, H., Hutchings, H., and Card, G.. 2007, *C 665 Assessing risks posed by hazardous ground gases to buildings* London: Construction Industry Research and Information Association

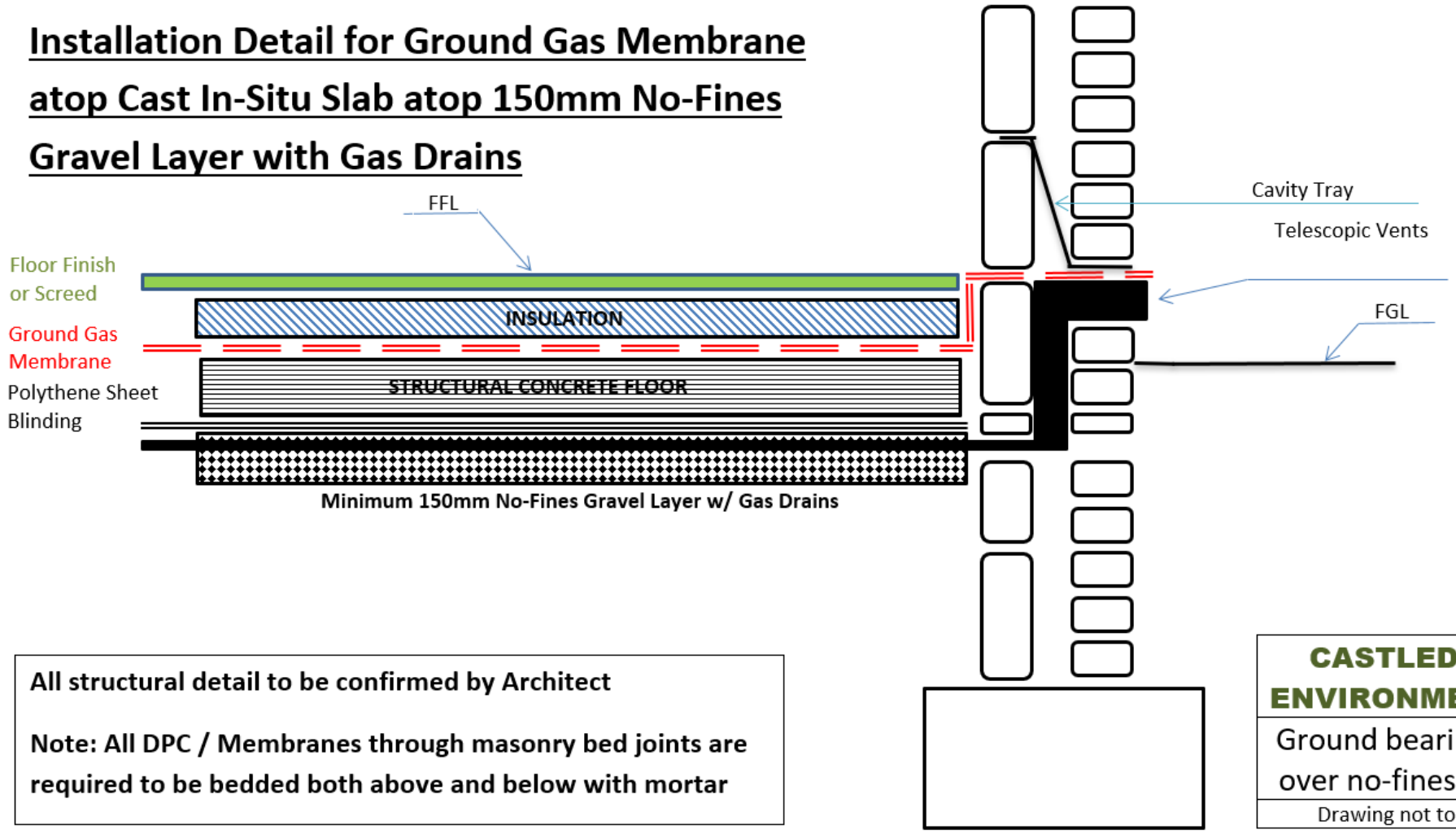
[16] Mallett, H., Cox, L., Wilson, S. and ,Corban M... 2014, *C 735 Good practice on the testing and verification of protection systems for buildings against hazardous ground gases* London: Construction Industry Research and Information Association

[17] Wilson, S., Sopp, G., Mallett, H., Happold, B., Card, C., CBCard & Partners…2020, CIRIA C795 *Retrofitting hazardous ground protection measures in existing or refurbished buildings.* London: Construction Industry Research and Information Association

13.0 APPENDICES

APPENDIX A **GAS PROTECTION PLAN**

Installation Detail for Ground Gas Membrane atop Cast In-Situ Slab atop 150mm No-Fines Gravel Layer with Gas Drains



All structural detail to be confirmed by Architect

Note: All DPC / Membranes through masonry bed joints are required to be bedded both above and below with mortar

CASTLEDINE ENVIRONMENTAL

Ground bearing slab over no-fines gravel

Drawing not to scale

APPENDIX B **PROPOSED SITE PLANS**

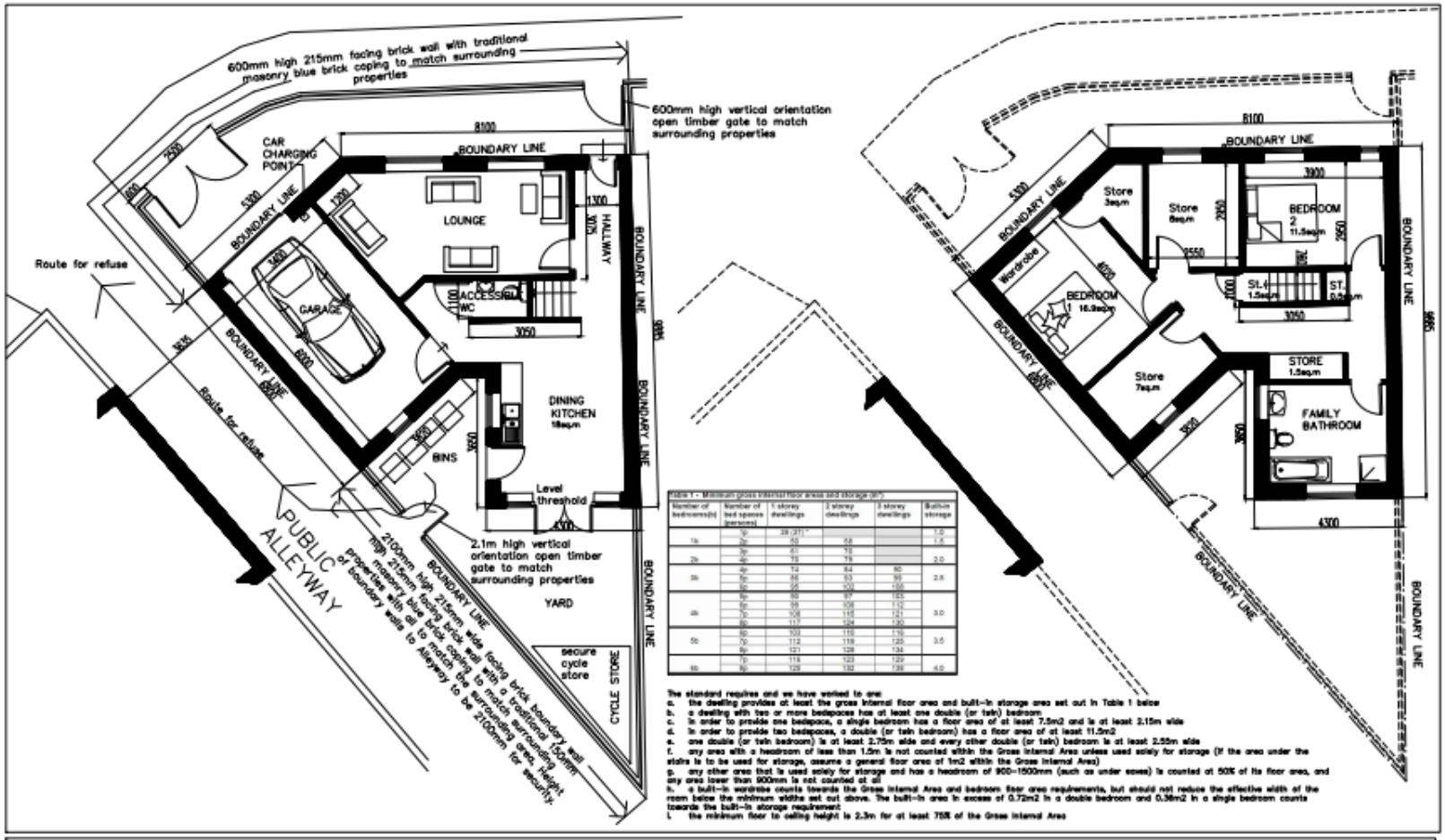


Table 1 – Minimum gross internal floor areas and storage (m²)

Number of bedrooms(b)	Number of bed spaces (persons)	1 storey dwellings	2 storey dwellings	3 storey dwellings	Built-in storage
1b	1p	39 (37)*			1.0
	2p	50	58		1.5
2b	3p	61	70		2.0
	4p	70	79		
3b	4p	74	84	90	2.5
	5p	86	93	99	
	6p	95	102	108	
4b	5p	90	97	103	3.0
	6p	99	106	112	
	7p	108	115	121	
	8p	117	124	130	
5b	6p	103	110	116	3.5
	7p	112	119	125	
	8p	121	128	134	
6b	7p	116	123	129	4.0
	8p	125	132	138	

The standard requires and we have worked to are:

a. the dwelling provides at least the gross internal floor area and built-in storage area set out in Table 1 below
b. a dwelling with two or more bedspaces has at least one double (or twin) bedroom
c. in order to provide one bedspace, a single bedroom has a floor area of at least 7.5m2 and is at least 2.15m wide
d. in order to provide two bedspaces, a double (or twin bedroom) has a floor area of at least 11.5m2
e. one double (or twin bedroom) is at least 2.75m wide and every other double (or twin) bedroom is at least 2.55m wide
f. any area with a headroom of less than 1.5m is not counted within the Gross Internal Area unless used solely for storage (if the area under the stairs is to be used for storage, assume a general floor area of 1m2 within the Gross Internal Area)
g. any other area that is used solely for storage and has a headroom of 900–1500mm (such as under eaves) is counted at 50% of its floor area, and any area lower than 900mm is not counted at all
h. a built-in wardrobe counts towards the Gross Internal Area and bedroom floor area requirements, but should not reduce the effective width of the room below the minimum widths set out above. The built-in area in excess of 0.72m2 in a double bedroom and 0.36m2 in a single bedroom counts towards the built-in storage requirement
i. the minimum floor to ceiling height is 2.3m for at least 75% of the Gross Internal Area

Ground Floor Plan As Proposed

First Floor Plan As Proposed

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This drawing must not be scaled

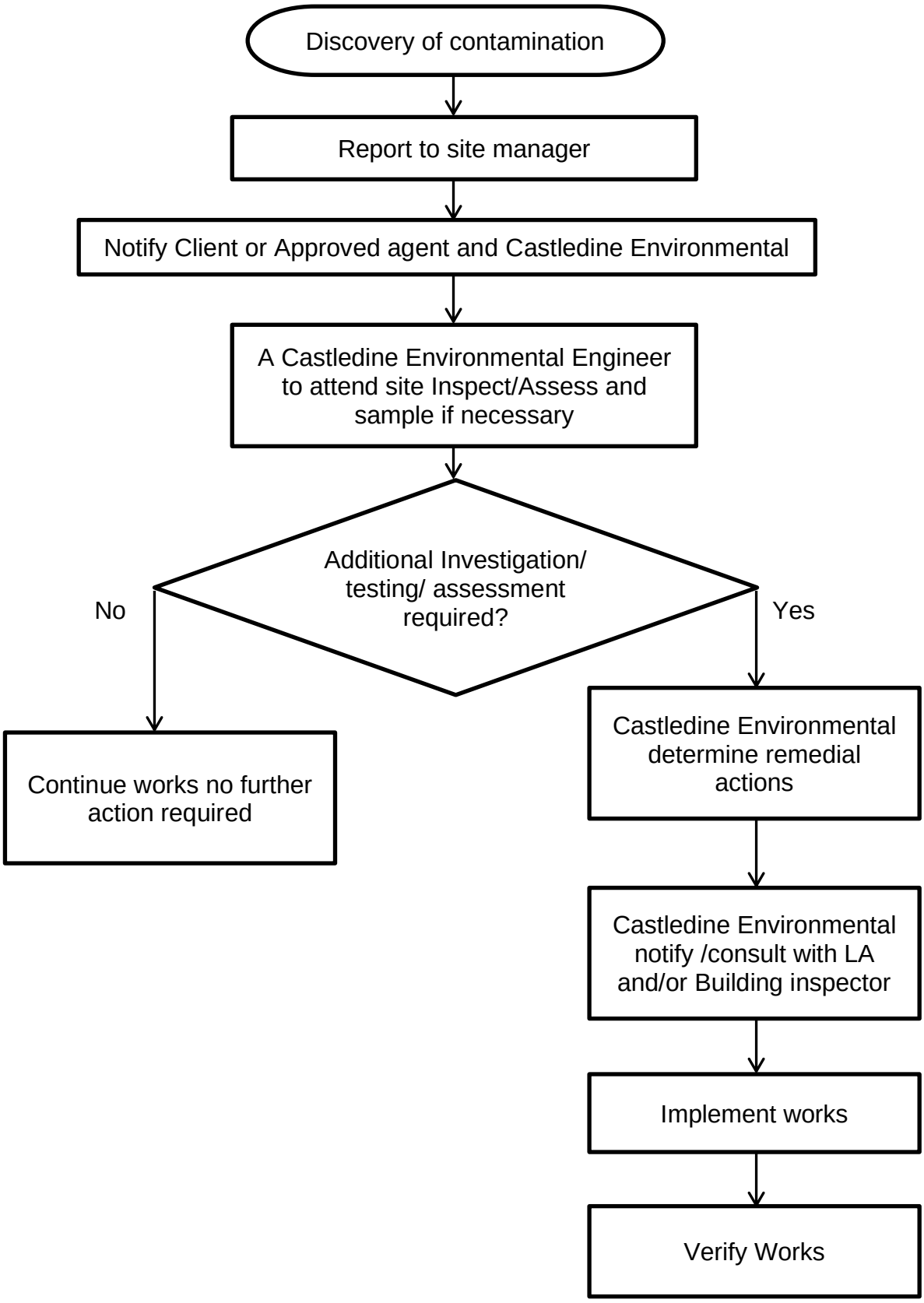
Dimensions are in millimetres unless otherwise stated

REV	DATE	NOTE	BY
C	26.04.21	PLANS UPDATED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE
B	07.03.21	PLANS UPDATED AND FLOOR AREAS REDUCED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE
A	03.01.21	BIN, CYCLE STORE CAR CHARGING POINT ADDED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE

Project:
2 Highfield Road, Levenshulme
Ground and First Floor Plans As Proposed

Drawing No: 01C
Date: 11.10.20
Scale: 1:100@A3

APPENDIX C **DISCOVERY STRATEGY**



APPENDIX D VISQUEEN GAS BARRIER SPECIFICATIONS SHEET

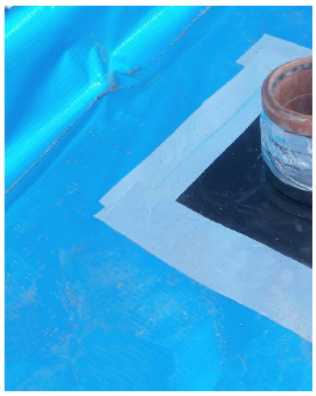
DATASHEET

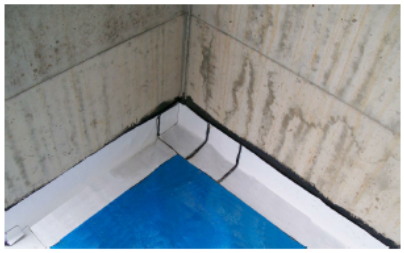
Technical Support: 0333 202 6800
LAST UPDATED: 06.11.2019

Page 1

VISQUEEN GAS BARRIER

Gas Barrier
CE Mark to EN 13967





- BBA approved, fully complies with BS8485:2015
- Low permeability to methane, radon and carbon dioxide
- Approved for use in NHBC Amber 2 applications
- Multi-layer reinforced LDPE membrane with aluminium core
- High puncture and tear resistance

Description
Visqueen Gas Barrier is a 400 gsm multi-layer reinforced polyethylene membrane with an integral 20 micron aluminium foil that is approved for use in BS8485:2015 and NHBC Amber 2 applications. For ease of identification on site Visqueen Gas Barrier is coloured blue on one side and silver on the reverse. The barrier combines strength and performance with flexibility and easy installation. Visqueen Gas Barrier also acts as a damp proof membrane.

BS8485:2015
When risk assessing under BS8485:2015 for sites which are effected by methane and carbon dioxide then the Visqueen Gas Barrier is an ideal solution.

The membrane has been modified to be 400 gsm with the multi layer structure greatly enhanced to improve its puncture and impact performance.

Visqueen utilise a 20 microns foil to avoid issues associated with thinner (12microns) foils.

Application
The Building Regulations require that proper precautions be taken to prevent danger to health and safety when building on contaminated land. Visqueen Gas Barrier offers a safe solution for the protection of buildings against methane, radon, stythe (a gas commonly found from disused mines, also known as blackdamp), and carbon dioxide, when installed in accordance with the relevant codes of practice such as BRE, CIRIA and the Chartered Institute of Environmental Health Ground Gas Handbook

Typically these are sites previously used as coalfields, landfill or are contaminated industrial sites.

The membrane should be installed blue side up

System components

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

Installation Guidelines
Visqueen Gas Barrier and ancillary components must be installed in accordance with the recommendations of Building Research Establishment BRE 414 "Protective measures for housing on gas contaminated land" and CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings", NHB C guidelines, and the Chartered Institute of Environmental Health Ground Gas Handbook. The product is not intended for use where there is a risk of hydrostatic pressure. **The membrane should be installed blue side up**

The membrane should be installed on a compacted sand blinding layer or smooth concrete float finish. In areas where high levels of unsupported membrane occur it is recommended that Visqueen Pre Applied Membrane is used. To avoid slip or shear planes and high compressive loadings it is not recommended

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to take the membrane through the wall. In order to provide a continuous barrier across the cavity Visqueen Gas Resistant 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.

Jointing and Sealing
Visqueen Gas Barrier should be overlapped by at least 150mm (Welded membranes can be by less than 150mm as long as the joint integrity is not compromised) and bonded with Visqueen Double Sided Tape. The joint should be secured with Visqueen Foil Backed Girth 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 Foil Backed Girth Jointing Tape is used to secured the joint

Punctures
If the membrane is punctured or perforated, then a patch of material with identical thickness should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Double Sided Jointing Tape and seal with Visqueen Foil Backed Jointing Tape. Alternatively a patch can be formed using Visqueen Detailing Strip and lapped at least 150mm beyond the limits of the puncture. External and Internal corners should be round and reinforced with Visqueen Detailing Strip. Where this is not possible and the 3 dimensional shapes are complex it is recommended a pre-formed unit is used.

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

Ventilation
When medium to high levels of ground gases are present or when the generation of gases still occurs, then an open void beneath the ground floor should be constructed, as ventilation beneath the ground floor will dilute and disperse the gases to atmosphere. Open voids are normally restricted to beam and block floors or other precast concrete floor systems, an alternative for providing ventilation to in situ concrete floor slabs is to install a Visqueen Ventilation System.

Covering
Visqueen Gas Barrier should be covered by a protective layer as soon as possible after installation. 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 contacting the barrier.

It is recommended that the barrier is covered with Visqueen Protection Boards or screed before positioning the reinforcement. When underfloor heating is being installed, it is recommended that the barrier is positioned between the blinded hardcore and insulation. This will protect the insulation from moisture and avoid any risk of overheating the membrane.

Storage and Handling
Visqueen Gas Barrier is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 1021973). The product is chemically inert and is not affected by acids and alkalis that may be present in the sub-soils. The material is not recommended for uses 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 CP102 1973. Care should be taken to avoid accidental damage when handling the membrane on site. When the weather is cold, Visqueen Double Sided Jointing Tape and Visqueen Foil Backed Girth Jointing Tape should be kept in a warm, dry place until needed. Installation is not recommended below 5°C.

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Visqueen Gas Barrier 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 Agrement performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control, and issued the certificate of constancy of conformity of the factory production control 0836–CPR–13/F060 applies.

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Product Data

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Product Data

heading	Characteristic	Test method	Units	Compliance criteria	Value or Statement
	Visible defects	EN 1850 -2	-	Pass/Fail	Pass
	Length	EN 1848-2	m	-0%/+10%	25 or 50
	Width	EN 1848-2	m	-0%/+10%	2
	Overall thickness including grid	EN 1849-2	mm		0.66
	Effective thickness in between scrim	EN 9863-1	mm		0.4
	Mass	EN 1849-2	g/m2	-0%/+5%	400
	Tensile Strength - MD	EN EN12311	N	MDV	391
	Tensile Strength - CD	EN EN12311	N/mm2	MDV	588
	Tensile Elongation - MD	EN EN12311	%	MDV	20
	Tensile Elongation - CD	EN EN12311	%	MDV	21
	Joint Strength	EN12317-2	N	>MLV	332
	Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
	Resistance to impact	EN 12691	mm	>MLV	200
	Dart Impact	BS 2782	g	MDV	731
	Low temperature flexibility	EN 495-5	oC	-40	Pass
	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	Pass 20
	Water vapour transmission - resistance	EN 1931	MNs/g	MDV	7000
	Water vapour transmission - permeability	EN 1931	g/m2/d	MDV	0.03
	Reaction to Fire	EN 13501-1	Class	MDV	F
	BS8485:2015 testing requirements				
	Mass	EN 1849-2	g/m2	Average >370	400
	Methane Permeability	ISO15105-1	mls/m2/d/atm	Pass/Fail	<40 Pass
	Puncture CBR	BS EN ISO 12236	N	MDV	1114
	Impact resistance	EN12691	mm	MDV	1000
	Tensiles Yield strength MD	ASTM D4885-01	kN/m	MDV	12.5
	Tensiles Yield strength CD	ASTM D4885-02	kN/m	MDV	7.3
	Yield elongation MD	ASTM D4885-03	%	MDV	18
	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

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Appendix A

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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
- Damp Proof Course
- Damp Proof Membranes
- Gas Protection and Gas Venting
- Vapour Control Layers
- Stormwater Protection

Download Library

- Technical Datasheet
- Standard Details
- Technical Service
- Visqueen Gas Protection Brochure
- NBS Clauses
- BBA Certificates
- 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.