

GROUND GAS MITIGATION MEASURES,
3rd PARTY INDEPENDENT INSPECTION, TESTING
& VALIDATION REPORT:

FOR MATERIALS INSTALLED AT:

DUKESBRIDGE HOUSE, 23 DUKE STREET,
READING, RG1 4SA

Document Reference No: MTS.VR.693-BA

Client: Landmark Developers Ltd

Dated: March 2021



Client Name: Landmark Developers Ltd
Reference: MTS.VR.693-BA
Issue: **FINAL**
Date: 29th March 2021

Approval Status: **PASS In FULL**

Prepared by: Debbie Duffin

Checked by: Barrie Ackroyd
Position: Managing Director

.....

This 3rd party ground gas mitigation, testing & validation report has been prepared by **MembraneTestingSolutions Ltd** with all reasonable skill, care & diligence within the terms of the contract with the client, incorporation of our General Terms & Conditions of Business & considering the resources devoted to us by agreement with the client.

We disclaim any responsibility to the client & others in respect of any matters outside the scope of the above.

This 3rd party ground gas mitigation, testing & validation report is confidential to our client & we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on this report at its own risk.



CONTENTS

EXECUTIVE SUMMARY

1.	LIMITATIONS	4
2.	BACKGROUND INFORMATION	5
3.	GROUND GAS MONITORING	5
4.	BS 8485:2015+A1:2019 COMPLIANCE	6
5.	VENTILATION SYSTEM	6
6.	DESIGN DRAWINGS	6
7.	MATERIAL SPECIFICATIONS	7
8.	ACCEPTED REMEDIATION STRATEGY DESIGN	7
9.	GAS MEMBRANE INSTALLATION CONTRACTOR	7
10.	APPROVED INSPECTION, TESTING & VALIDATION REGIME	7
10.1	Gas Membrane Inspection, Testing & Validation Method Statement	8
11.	MTS VALIDATION PROCESS	8
12.	INDICATIVE INSTALLATION & VALIDATION, TESTING PHOTOGRAPHS	9
13.	CONCLUSIONS & RECOMMENDATIONS	12
14.	APPENDICES	13

Appendix A – Validation Surveyors Certificates of Competence

Mr Barrie Ackroyd (MTS Ltd)
Mr Michael A Smith (MTS Ltd)

Appendix B – Design Drawings

Cubic Building Surveying Ltd Drawings:

- C14162-300d Proposed LG Layout
- C14162-301d Proposed UG Layout
- C14162-330a Existing & Proposed Lower Ground Floor Section
- C14162-331a Proposed Gas Barrier

Appendix C – Material Specifications

- Visqueen Gas Barrier
- Visqueen GR SAM
- Visqueen HP Tanking Primer

Appendix D – Project Survey Sheets

Gas Protection Inspection & Validation Record
Independent Inspection, Testing & Validation - Certificate of Conformance

Appendix E – Digital Copy of this Report & Site Photographs

(All contained on USB Storage Device)



EXECUTIVE SUMMARY

1. LIMITATIONS

MembraneTestingSolutions Ltd (MTS Ltd) have prepared this 3rd party ground gas mitigation strategy design, independent inspection, testing, & validation Report in accordance with the instructions of Landmark Developers Ltd (The Client) under the terms of the appointment for the 3rd party mitigation design strategy, independent inspection, testing & validation process.

This 3rd party ground gas mitigation strategy, independent inspection, testing & validation report is limited to the proposed ground gas protection measures to be installed to the building meeting the specification and current best practices. MTS Ltd have not performed any remediation design work in respect of the ground gas protection measures prescribed for this site, therefore Professional Liability is limited in the sum of £2M in respect of the gas protection suitability of any specified components to protect against site specific contaminants.

This 3rd party ground gas mitigation strategy, independent inspection, testing & Validation Report has been prepared in accordance with the information currently received, along with industry best practices and in conjunction with the relevant best practice & guidance documents listed below, of which the author of the report was a contributor and member of the steering committee for the CIRIA C735 publication “Good practice on the testing and verification of protection systems for buildings against hazardous ground gas” (2014). MTS Ltd also sat on the steering committee for the new CIRIA 795 project, Retrospective Fitting of Gas Protective Measures to Existing Buildings released in December 2020.

Membrane Testing Solutions Ltd are members of the British Geomembrane Association (BGA) & we are pleased to advise we are registered with Constructionline, CQMS/SSIP, the British Verification Council (BVC) of which Mr Ackroyd is the Vice Chairman, The Radon Council, the PCA & CL:Aire.

Mr Ackroyd has achieved the Level 3 Assessors Award for the NVQ Level 4 qualification in Validation of Ground Gas Protection Systems, we are also pleased to advise that our Managing Director Mr Barrie Ackroyd has successfully achieved CL:Aire accreditation as a Specialist in Gas Protection Validation (SGPV), & our Senior Validation Surveyor Mr Michael Anthony Smith has qualified in the NVQ Level 4 for Verification of Ground Gas Protection Systems (assessed by others).



Guidance Reference Documents:

Ground gas/vapour Handbook “NHBC Guidance on evaluation of development proposals on sites where methane & carbon dioxide are present” (2007)
 Ciria C665 “Assessing risks posed by hazardous ground gas to buildings” (2007)
 Ciria C716 “Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination” (2012)
 Ciria C735 “Good practice on the testing and verification of protection systems for buildings against hazardous ground gas (2014)
 Ciria C748 “Guidance on the use of plastic membranes as VOC vapour barriers” (2014)
 BS 8485:2015+A1:2019 “Code of practice for the design of protective measures for methane & carbon dioxide ground gas for new buildings” (2019)
 Ciria C795 “Retrofitting hazardous ground gas protection measures in existing or refurbished buildings” (2020)



2. BACKGROUND INFORMATION

MembraneTestingSolutions Ltd (MTS Ltd) were initially approached by Mr Matt Hill on 3rd December 2020 via email. Mr Hill is the Chartered Building Surveyor of Cubic Building Surveying & Project Manager of this development on behalf of Landmark Developers Ltd. Mr Hill requested a quotation for the inspection, testing & validation of the installation of Visqueen Gas Barrier materials as per the manufacturer's installation guidance to a residential development.

The site location is as follows; Dukesbridge House, 23 Duke Street, Reading, RG1 4SA

The proposed works comprised a change of use of the building from offices to residential houses to comprise 76 dwellings.

Following discussions with the Client, receipt of Ground Investigation information & drawings, we understood that this project included the existing building change of use from industrial to residential. As a result of potential vapour/gas contamination there was a requirement to retrospectively install a gas barrier membrane/mitigation measures to the inside of the project.

Based on the information received we expected that 1no. site visit would be required if the whole basement area was made available for inspection. It was agreed that in certain cases, once we have inspected a specific detail on site, we may be able to validate follow on works involving that detail via photographic evidence. In this regard we would ensure that the methodology of installation is inspected in the first instance by an MTS Ltd site visit. Once we have confidence in the installation methodology of said details & installation operative's competence, we could validate the follow on/same detail via photographic validation.

Due to the Low risk, we allowed for a detailed visual inspection and seam pick testing of site seams & any repairs, etc.

Upon agreement of costs with the client, MTS Ltd were issued with an order for the provision of 3rd party installation inspection of the Gas Barrier Membrane system, with submission of a final sign off report upon completion of the gas membrane inspection & validation process.

The following is our report of the 3rd party independent inspection, testing & validation performed by MTS Ltd on this project.

3. GROUND GAS MONITORING

MTS Ltd received a Site Investigation Report for this project which was performed by JNP Group Consulting Engineers;

- Phase 1 Geo-environmental Desk Study Ref: C86080-JNP-XX-XX-RP-C-1001-S2P06 Dated: July 2020

The above referenced report included the following précis text;

Heavy metals, Volatile Organic Compounds, Semi Volatile Organic Compounds, hydrocarbons, asbestos and soil gas associated with a potentially significant depth of Made Ground may be present as a result of previous phases of development including imported and site generated fill materials.

Based on information contained within the desk study, it is the opinion of jnp group that the potential site conditions provide a **MEDIUM environmental risk and dependent on the final development proposal for the site, further investigation and assessment are likely to be required.**



In consideration of the existing building and the proposed change of use from offices to residential, given the building is already constructed, the main issue is likely to relate to the potential for generation of hazardous ground gas due to the anticipated presence of deep Made Ground. It is unknown if the existing building has sufficient gas protection measures installed to protect a residential development. Should the ground investigation confirm the presence of ground gas then retro-fitting of gas protection measures are likely to be required.

End of précised text

Due to being installed above the slab the gas membrane was changed to a non-hydrocarbon resistant membrane (as per Drawing 331a).

Based on the above information received we have assumed to mitigate against a site Characteristic Situation 2, in accordance with the CIRIA C665.

4. BS 8485:2015+A1:2019 COMPLIANCE

MTS Ltd employed the indicated ground gas site Characteristic Situation CS2 'Low Risk' in accordance with the CIRICA C665 best practice document.

Using the tabled contents of the BS 8485:2015+A1:2019 document, a CS2 classification for this project was calculated by the following. However, it must be noted that as this is a change of use building from industrial to residential, the contents of the BS 8485:2015+A1:2019 do not necessarily apply.

<u>Table 3,</u> Building Type	<u>Table 4,</u> Gas Protection Score by CS and Type of Building	<u>Table 5,</u> Gas Protection Scores for the Structural Barrier	<u>Table 6,</u> Gas Protection Scores for Ventilation Protection Measures	<u>Table 7,</u> Gas Protection Score for the Gas Resistant Membrane
Type B = Private or commercial/ public, possible multiple	CS2 + Type B = 3.5 Points Required	Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement) = 0.5 Points	Grade 3 waterproofing Mechanical Ventilation System. = 1.0 points	= 2.0 Points

Total 'MINIMUM' Points Score Achieved from the Above = (T5 = 0.5 + T6 = 1.0 + T7 = 2.0) = **3.5 Points Achieved.**

5. VENTILATION SYSTEM

The Client has verified in writing to MTS Ltd that an ENVIROVENT MV-160/100 ventilation system with 100 solid ducting will be installed to all Apartments on the lower ground floor. MTS Ltd confirm that with this system installed to the project as part of the Grade 3 Basement Waterproofing System it will allow for mechanical ventilation of the internal spaces.

6. DESIGN DRAWINGS

MTS Ltd received the following structural engineer & architect's drawings for this project:



Cubic Building Surveying Ltd Drawings;

- C14162-300d Proposed LG Layout
- C14162-301d Proposed UG Layout
- C14162-330a Existing & Proposed Lower Ground Floor Section
- C14162-331a Proposed Gas Barrier

The drawings received are appended in Appendix. B of this report.

7. MATERIAL SPECIFICATIONS

The specified Visqueen ground gas protective materials are as follows;

Material Specifications

- Visqueen Gas Barrier
- Visqueen GR SAM
- Visqueen HP Tanking Primer

The above Material Specifications may be found appended in Appendix. C of this report.

8. ACCEPTED REMEDIATION STRATEGY DESIGN

Not applicable to this project

9. GAS MEMBRANE INSTALLATION CONTRACTOR

As the project has been classified as a CS2 'Low' gas risk MTS Ltd confirm that the gas barrier membrane was installed by a specialist NVQ Level 2 qualified gas membrane installation company who holds this qualification, which is in accordance with the CIRIA C716, C735 & C748 best practice documents.

The specialist contractor was namely;

Nevl Ground Gas Protection Ltd
Contact: Phil Neville
Email: phil@nevl.ggp.co.uk

The specialist NVQ Level 2 qualified operatives hold the following qualification;

Cskills Awards L2 NVQ Diploma in sub-structure work occupations (construction) – Installation of gas membranes: <http://tinyurl.com/lj8w7ay>

Installation measures included the Supply and installation of Visqueen Gas Barrier using the Full Lineout Methodology.

10. APPROVED INSPECTION, TESTING & VALIDATION REGIME

The installed gas protective materials were 3rd party independently inspected, tested, & validated in accordance with the Ciria C735 best practice document by a competent & qualified validation surveying company, namely Membrane Testing Solutions Ltd.

Due to the low risk associated with the gas protection system on this project, it was proposed that a low level of 3rd party inspection & testing would be appropriate in this instance.



The gas protective measures were validated during 1st site visit that met with the installation programme. It was agreed that photographic evidence would be provided for areas of installation where MTS were not present. However, this was not necessary for this project. It was proposed that our validation processes included 100% visual inspection & Testing of installed membranes submitted for inspection, all in accordance with the CIRIA C735 best practice document.

No membranes were validated & signed off by MTS Ltd until a minimum acceptable standard was achieved, ensuring the membrane installation was suitably managed to achieve maximum confidence to the suitability of the installed materials.

10.1 INSPECTION, VALIDATION & TESTING METHOD STATEMENT

1. The Validation Surveyor will be suitably experienced and qualified to carry out a detailed visual inspection and seam integrity testing of the installed gas membrane system.
2. All membrane areas will be subject to independent, inspection validation & seam integrity testing.
3. The Validation Surveyor will visually inspect 100% of the installed gas protection measures to the areas submitted for inspection.
4. Any faults/rips/tears/punctures or un-bonded seams will be “number marked” & recorded for repair. Repair methods will be agreed with the installation contractor.
5. All repairs will be re-inspected for suitability, with photographic evidence given in the final report provided at the end of the contract.
6. Upon completion of the test and re-test of any subsequent repairs found, the gas membrane area will be signed off & certified as integral.
7. The Validation Surveyor will complete an “Independent Inspection & Validation Certificate of Conformance” and photographic evidence will be taken. The project survey sheets & photographic logs will be incorporated in the final report submission.
8. Upon completion of the validation/integrity test inspection, a validation certificate stating starting the outcome of the inspection whether being a pass or fail will be issued. If the inspection test shows a pass, the membrane should be immediately protected using the manufacturers recommended system, otherwise follow on construction works are suitably risk assessed to ensure the geomembrane remains intact and undamaged during the construction phase. Should the inspection outcome prove a fail, the failure points are to be remediated in the agreed manner & re-inspected by the Validation Surveyor at a future agreed date/time.

The Validation Surveyor:

- Performed a detailed visual & intimate Inspections:
- Performed Seam Testing to 50% of site seams:
- Marked & identified any repairs required:
- Re-inspected & re-tested any repairs:
- Completed the project survey sheets:
- Took photographs for inclusion in the final validation report:
- Produced a final Validation Report at the end of the installation process:

11. MTS LTD VALIDATION PROCESS

MTS Ltd performed the following validation process at Dukesbridge House in accordance with the following;

Site Visit 1 of 1 – 15.03.2021

Continued overleaf...



MTS Ltd were requested to attend site to inspect / validate the above Visqueen Gas Barrier membrane installed as a full line throughout the basement area. On initial inspection our validator noticed that the membrane had been welded using a leister giving good strength. He performed a detailed visual/seam pick test, carefully picking/pulling at the leistered seams and the perimeter GR self-adhesive tape which was installed 150mm up the wall & 150mm out, checking all membrane for punctures, service entry/pillar sealing & associated detail work along with the required adhesion. There were 9 pillars, 17 service entries & 2 pits. All was installed very well however 15 defects were found, marked up and repaired. All repairs were inspected and proved good. Photo evidence of all the above has been taken to be included within the final report. All membrane has been installed to client specifications & standards set out in both the Ciria C735 & BS 8485 best practice documents and was fit for purpose at the time of inspection.

Test Outcome = PASS in FULL

The Project Survey sheets can be found appended in Appendix. D of this report.

12. INDICATIVE INSTALLATION & VALIDATION TESTING PHOTOGRAPHS

MTS Ltd took a number of photographs throughout the duration of our validation process, the photos shown within this report are an excerpt of the photographs received & taken on site by MTS Ltd which are indicative of the installed membrane & validation processes performed by us on this project.



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2



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4



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7



8



9



10



11



12



13



14



15



16



17



18



19



20

INSTALLATION & VALIDATION PHOTOGRAPHS INDEX

No.	Description	No.	Description
1	Gas Membrane installation overview (1)	2	Gas Membrane installation overview (2)
3	Gas Membrane installation overview (3)	4	Gas Membrane installation overview (4)
5	Gas Membrane installation overview (5)	6	Gas Membrane installation overview (6)
7	Typical Edge sealing detail to basement walls using GR SAM (1)	8	Typical Edge sealing detail to basement walls using GR SAM (2)
9	Typical seal to concrete column using GR SAM	10	Typical corner sealing detail using GR SAM
11	GR SAM step sealing detail to large concrete column	12	Small pit wrapped with Gas Barrier Membrane & sealed on top corners using GR SAM
13	Typical sealing detail to pipe penetration using GR SAM	14	Sealing detail to curved pipe penetration



No.	Description	No.	Description
15	Puncture hole in Gas Barrier Membrane highlighted as defect no. '3' for remediation	16	Remediation patch applied to defect no. '3'
17	Defect in welded membrane seam highlighted as defect no. '13' for remediation	18	Remediation patch applied to defect no. '13'
19	Insufficient seal to basement wall GR SAM corner detail highlighted for remediation as defect no. '8'	20	Remediation patch applied to defect no. '8'

13. CONCLUSIONS & RECOMMENDATIONS

As a result of our 3rd party independent inspection, testing, & ground gas mitigation management operations performed by MTS Ltd, we conclude that whilst we did not inspect & validate every area of gas membrane installed, the materials we have inspected were installed to an acceptable standard, to such a degree we are satisfied that the installed ground gas mitigation measures were in accordance with the design, material specifications & industry installation best practices.

We confirm that the inspections & testing performed on the installed Visqueen Gas Barriers, has passed the 3rd party independent inspection, validation & testing process, which is all in accordance with the CIRIA C735 & BS 8485:2015 best practice documents.

MTS Ltd therefore recommend that in accordance with the inspection, testing & validation works performed & managed by ourselves on this project, the local authority/relevant project stakeholders to sign off this ground gas mitigation design strategy and validation sign off report as;

“APPROVED FOR SIGN OFF”

END OF REPORT



14. APPENDICES

Appendix A – Validation Surveyors Certificates of Competence

Mr Barrie Ackroyd (MTS Ltd)
Mr Michael A Smith (MTS Ltd)

Appendix B – Design Drawings

Cubic Building Surveying Ltd Drawings:

- C14162-300d Proposed LG Layout
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Appendix C – Material Specifications

- Visqueen Gas Barrier
- Visqueen GR SAM
- Visqueen HP Tanking Primer

Appendix D – Project Survey Sheets

Gas Protection Inspection & Validation Record
Independent Inspection, Testing & Validation - Certificate of Conformance

Appendix E – Digital Copy of this Report & Site Photographs

(All contained on USB Storage Device)



APPENDIX A

Validation Surveyors – Certificates of Competence



This is to certify that

Barrie Ackroyd

Has successfully attended a
Technical Course
in

Gas Membrane Installations

This in support of the Quality Controls
Of Inspection and Validation
Of Gas Membrane Installations

This certificate is awarded by:



Date: 30/10/14



Course content detailed overleaf

Gas Membrane Installation Technical Course for Inspectors & Validators

Training Modules Attended

Practical & Knowledge

- Components of Gas Protection Systems with Venting
- Verification
- Gas Membrane Installation Techniques
- Introduction to Integrity Testing (Practical)
- Introduction to Integrity Testing (Theory)
- Risk Assessment and Validation Plan
- Site Inspections and Pro-formas
- Validation Report
- On Site Assessment

CERTIFICATE of ACCREDITATION

This is to certify that

Barrie Ackroyd

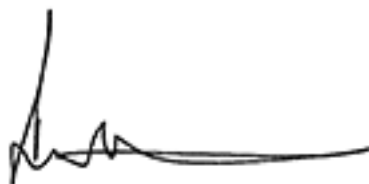
has been awarded the following accreditation

Gas Protection Verification Scheme (GPVS)
Specialist (SGPV)

Certificate No.: 435qQb4axS

Issued: 19 November 2020

Valid for 4 years from the above date



Richard Froggatt
CL:AIRE Chairman



Certificate of Achievement

(Full Award)

This is to certify that

Michael Anthony Smith

has been assessed as meeting the required level of competence for all
the units necessary to achieve the full award

**ABBE Level 4 NVQ Diploma in Verification of Ground Gas Protection
Systems**

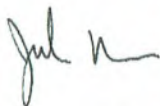
603/3266/9

Units achieved:

Mandatory Units

K/617/0687, M/617/0688, K/617/0690, M/617/0691,
A/617/0693, F/617/0694, J/617/0695

Signed :



Professor Julian Beer, Chair of ABBE Board

Date:

23/01/2020

Candidate Registration No : 0000036770 Certificate Issue No : 142188

ofqual
REGULATED
register.ofqual.gov.uk



00026189

Certificate of Unit Achievement

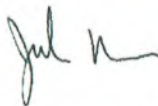
This is to certify that

Michael Anthony Smith

has been assessed as meeting the following units of competence
which form part of an accredited qualification

K/617/0687	Design Principles and Application for Construction in the Built Environment
M/617/0688	Materials for Construction in the Built Environment
K/617/0690	Health, Safety and Welfare in the Construction Environment
M/617/0691	Principles of Construction and Maintenance of Buildings
A/617/0693	Confirming Work Meets Quality Standards in the Workplace
F/617/0694	Verification and Inspection of Ground Gas Protection Systems
J/617/0695	Principles of Regulatory Control Procedures and Legislation

Signed :



Professor Julian Beer, Chair of ABBE Board

Date:

23/01/2020

Candidate Registration No : 0000036770 Certificate Issue No : 142185

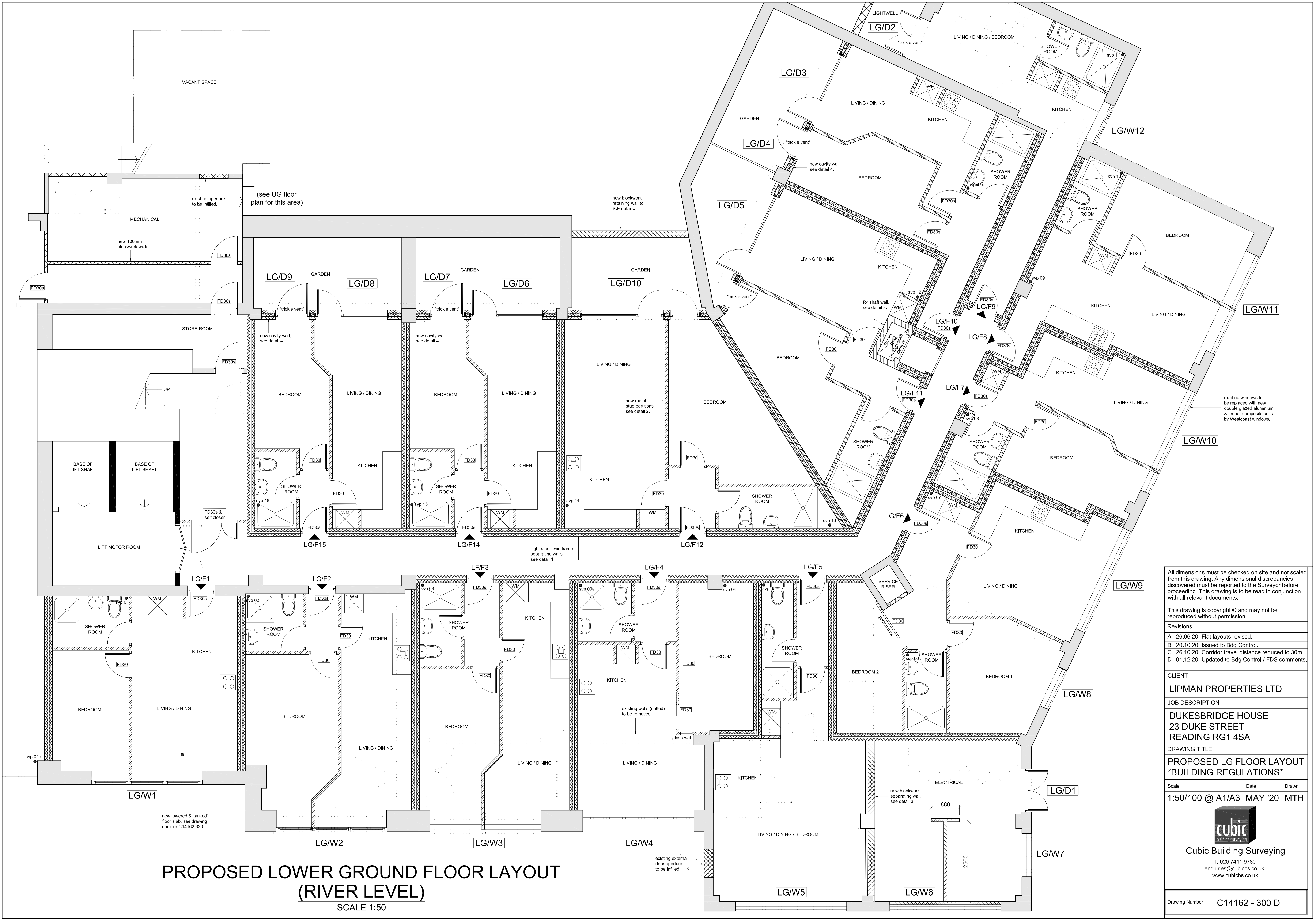


00026186



APPENDIX B

Design Drawings



**PROPOSED LOWER GROUND FLOOR LAYOUT
(RIVER LEVEL)**

SCALE 1:50

All dimensions must be checked on site and not scaled from this drawing. Any dimensional discrepancies discovered must be reported to the Surveyor before proceeding. This drawing is to be read in conjunction with all relevant documents.

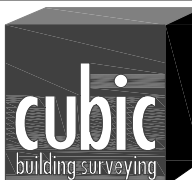
This drawing is copyright © and may not be reproduced without permission

Revisions	
A	26.06.20 Flat layouts revised.
B	20.10.20 Issued to Bdg Control.
C	26.10.20 Corridor travel distance reduced to 30m.
D	01.12.20 Updated to Bdg Control / FDS comments.

CLIENT
LIPMAN PROPERTIES LTD
JOB DESCRIPTION
DUKESBRIDGE HOUSE
23 DUKE STREET
READING RG1 4SA

DRAWING TITLE
PROPOSED LG FLOOR LAYOUT
BUILDING REGULATIONS

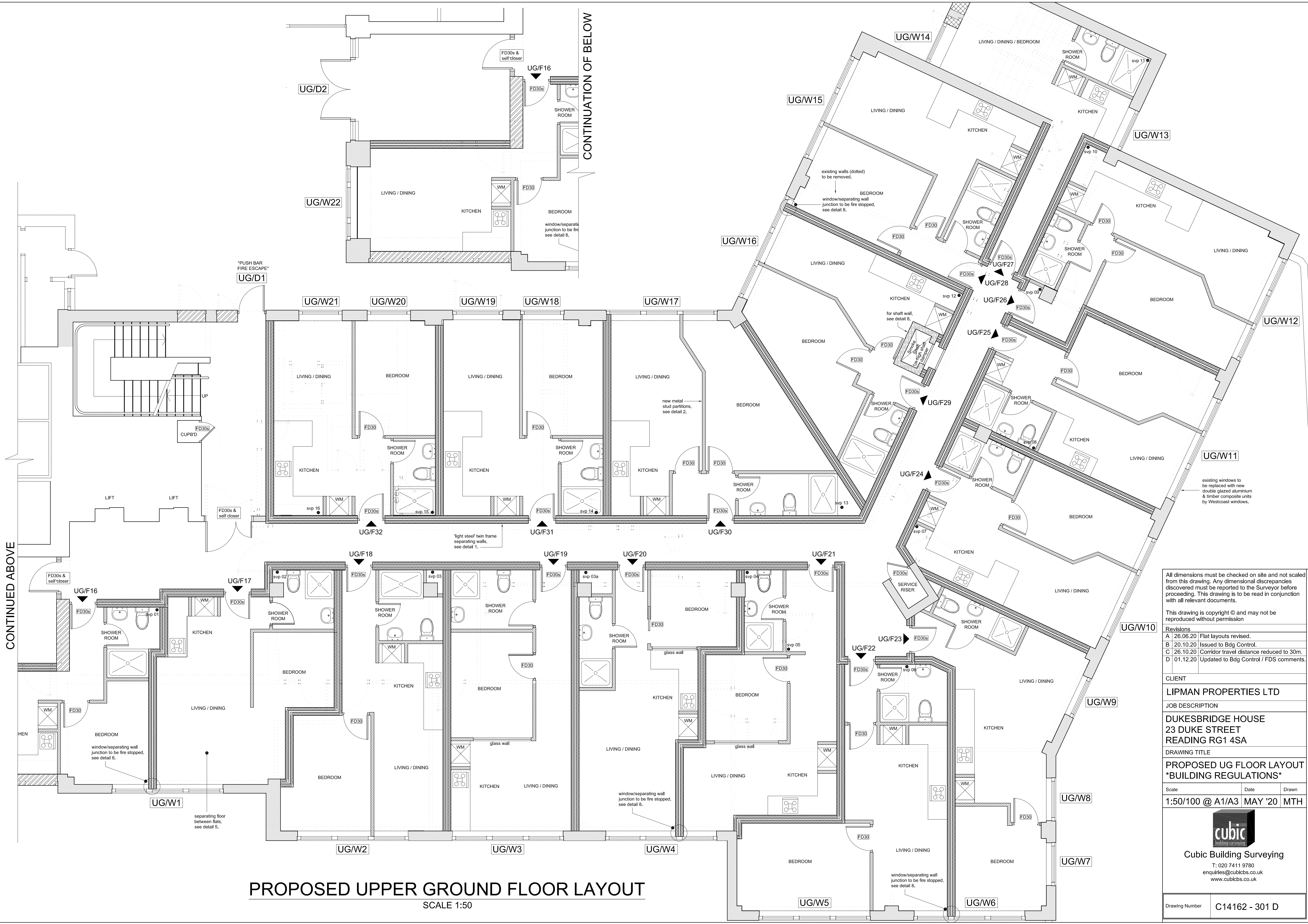
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1:50/100 @ A1/A3	MAY '20	MTH



Cubic Building Surveying

T: 020 7411 9780
enquiries@cubicbs.co.uk
www.cubicbs.co.uk

Drawing Number C14162 - 300 D



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Revisions
A 26.06.20 Flat layouts revised.
B 20.10.20 Issued to Bdg Control.
C 26.10.20 Corridor travel distance reduced to 30m.
D 01.12.20 Updated to Bdg Control / FDS comments.

CLIENT
LIPMAN PROPERTIES LTD

JOB DESCRIPTION
**DUKESBRIDGE HOUSE
23 DUKE STREET
READING RG1 4SA**

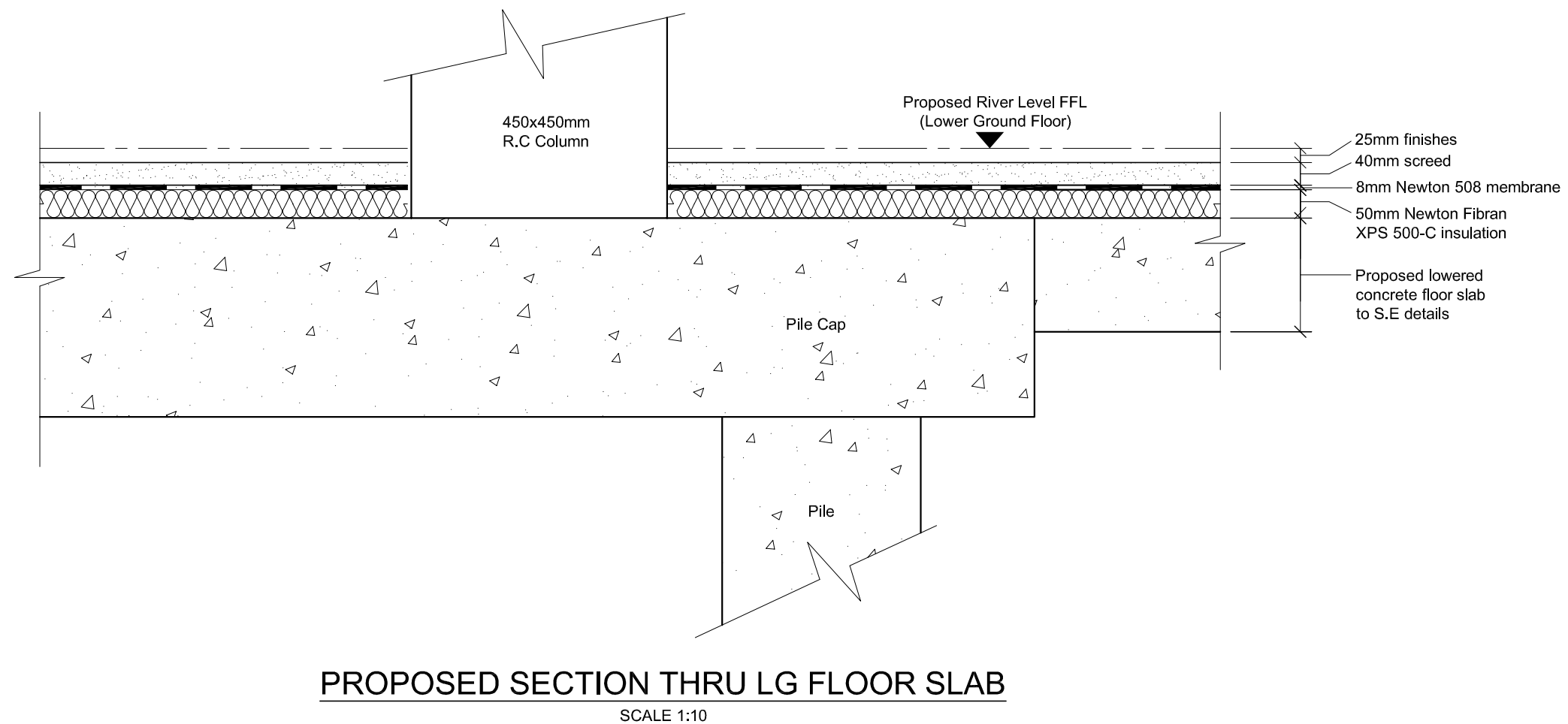
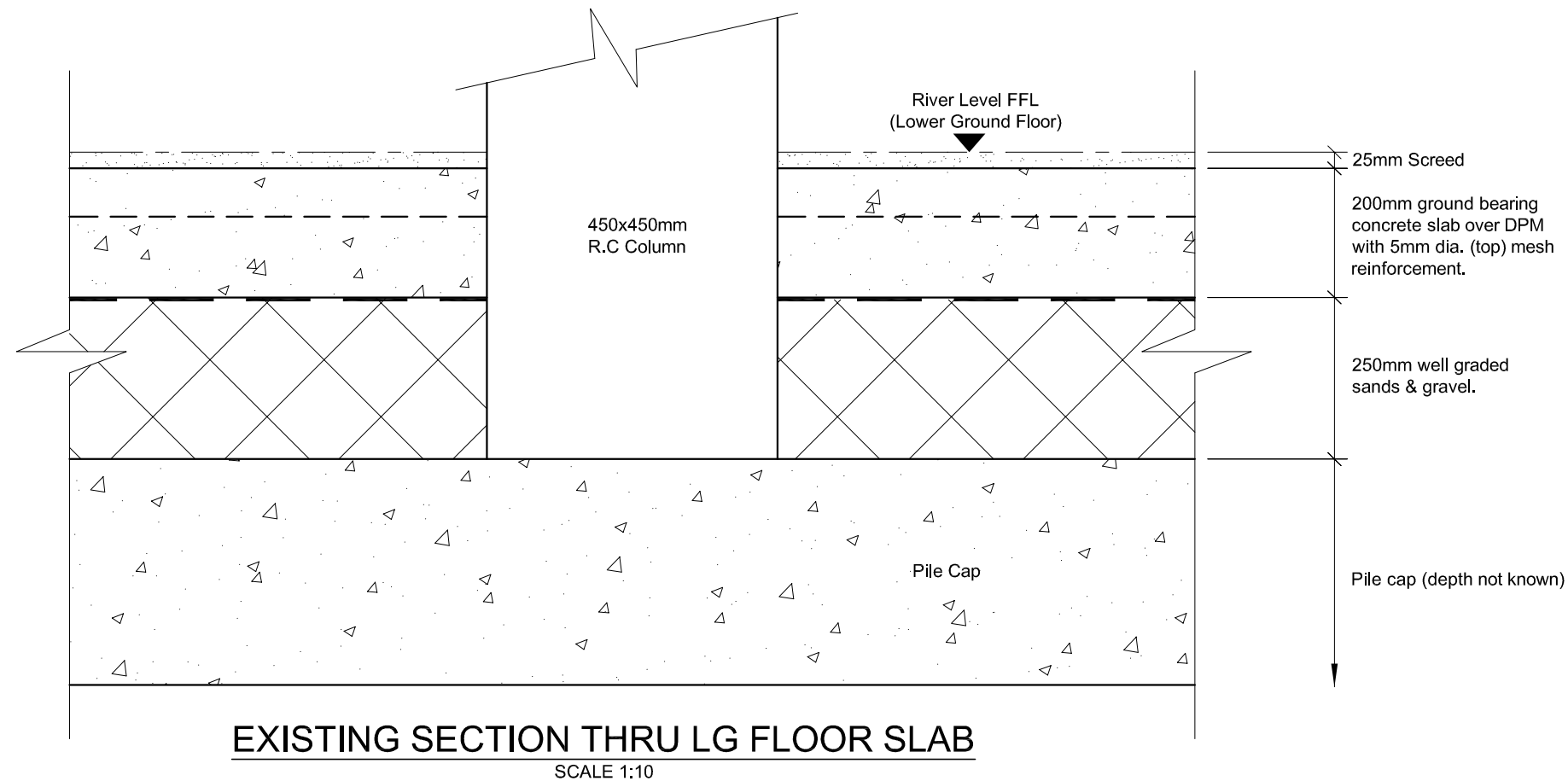
DRAWING TITLE
**PROPOSED UG FLOOR LAYOUT
*BUILDING REGULATIONS***

Scale	Date	Drawn
1:50/100 @ A1/A3	MAY '20	MTH



Cubic Building Surveying
T: 020 7411 9780
enquiries@cubicbs.co.uk
www.cubicbs.co.uk

Drawing Number C14162 - 301 D



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Revisions

A	20.10.20	Issued to Bdg Control.
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CLIENT

LIPMAN PROPERTIES LTD

JOB DESCRIPTION

DUKESBRIDGE HOUSE
23 DUKE STREET
READING RG1 4SA

DRAWING TITLE

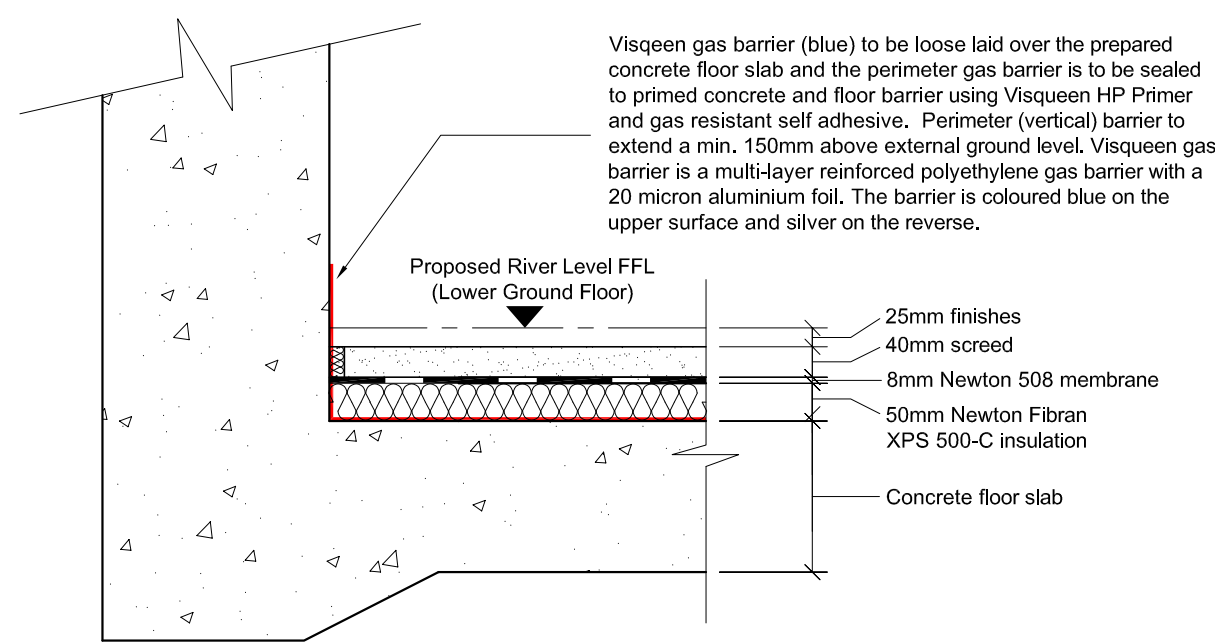
EXISTING & PROPOSED
LOWER GROUND FLR SECTION
BUILDING REGULATIONS

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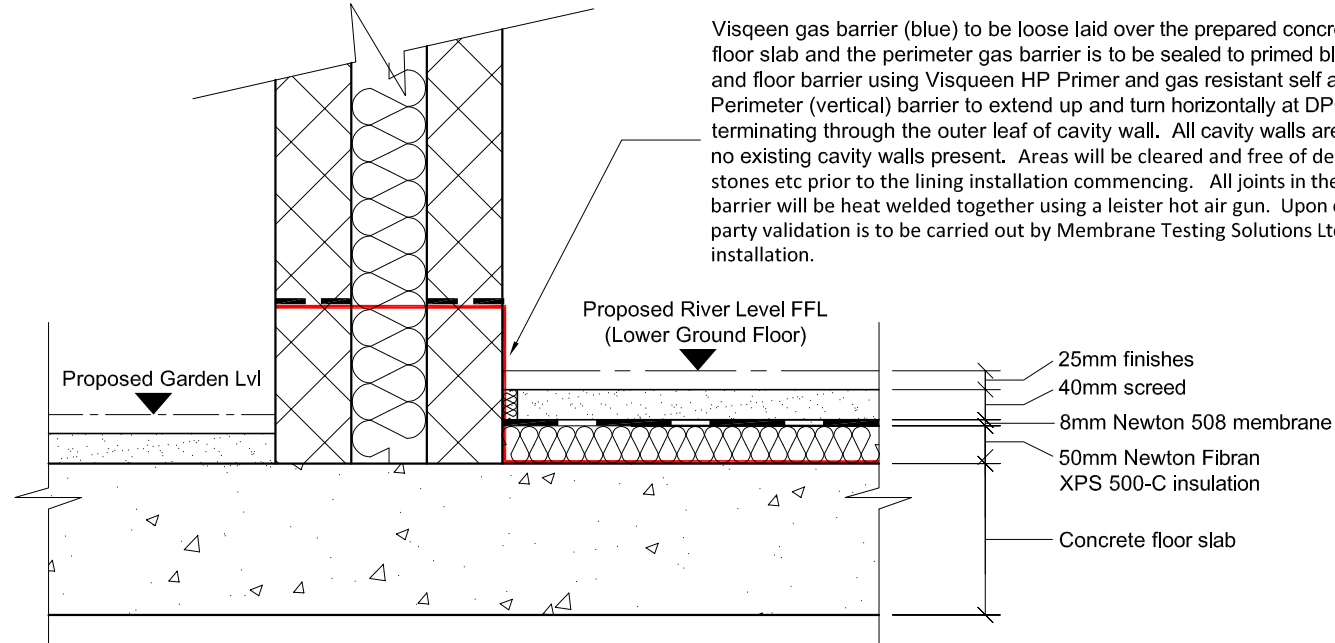


Cubic Building Surveying
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enquiries@cubicbs.co.uk
www.cubicbs.co.uk

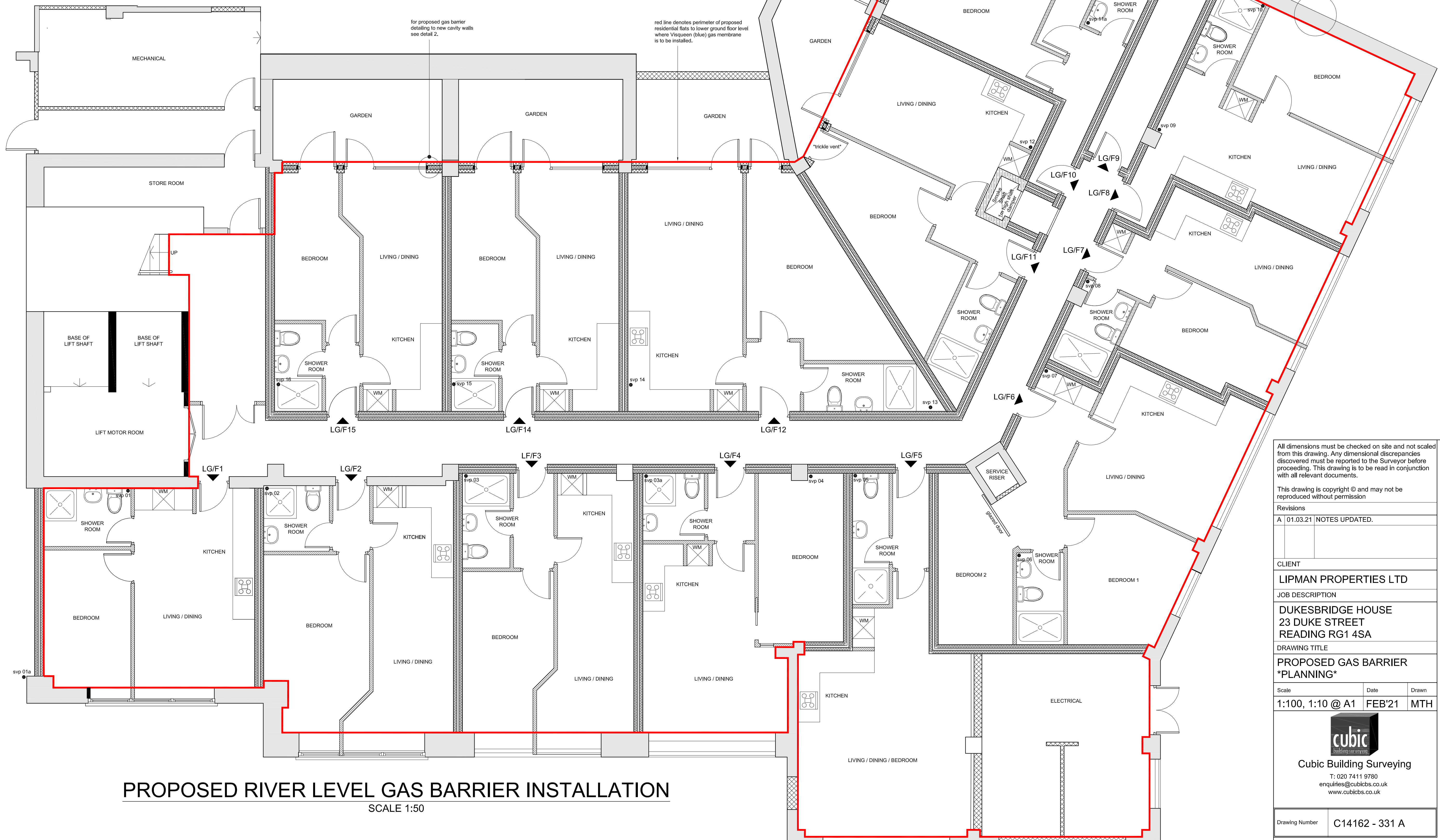
Drawing Number C14162 - 330 A



PROPOSED DETAIL 1
GAS BARRIER INSTALL - EXISTING WALLS/COLUMNS
SCALE 1:10



PROPOSED DETAIL 2
GAS BARRIER INSTALL - NEW CAVITY WALLS
SCALE 1:10



PROPOSED RIVER LEVEL GAS BARRIER INSTALLATION
SCALE 1:50

All dimensions must be checked on site and not scaled from this drawing. Any dimensional discrepancies discovered must be reported to the Surveyor before proceeding. This drawing is to be read in conjunction with all relevant documents.

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Revisions

A 01.03.21 NOTES UPDATED.

CLIENT

LIPMAN PROPERTIES LTD

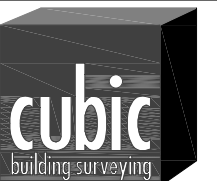
JOB DESCRIPTION

DUKESBRIDGE HOUSE
23 DUKE STREET
READING RG1 4SA

DRAWING TITLE

PROPOSED GAS BARRIER
PLANNING

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1:100, 1:10 @ A1	FEB'21	MTH



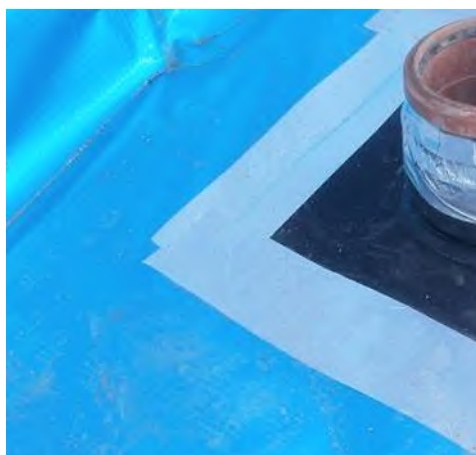
Cubic Building Surveying
T: 020 7411 9780
enquiries@cubicbs.co.uk
www.cubicbs.co.uk

Drawing Number C14162 - 331 A



APPENDIX C

Material Specifications



VISQUEEN
BUILDING PRODUCTS



- 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", NHBC 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 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.

Technical Data and CE Mark

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 Agreement 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.



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
	Thickness	EN 1849-2	mm	-10%/+10%	0.52
	Mass	EN 1849-2	g/m2	-7%/+7%	400
	Tensile Strength - MD	EN EN12311	N	>MLV	350
	Tensile Strength - CD	EN EN12311	N/mm2	>MLV	350
	Tensile Elongation - MD	EN EN12311	%	>MLV	17
	Tensile Elongation - CD	EN EN12311	%	>MLV	15
	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





Visqueen Building Products

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.

System Accessories

To ensure full waterproofing protection please use the following certified system components:

- Visqueen High Performance (HP) Tanking Primer
- Visqueen TreadGUARD1500
- Visqueen Protect&Drain
- Visqueen Top Hat Unit

Downloads Library

- Technical Datasheet
- Declaration of Performance
- Visqueen's Guide to CE Marking

Find your local stockist

Search our directory of Visqueen specification Stocking Centres to locate your nearest Visqueen Partner.

Distributor Support

Our specification Stocking Centres can access a free library of sales support tools, bespoke catalogues and more, [click here](#).

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



Gas Resistant Self Adhesive Membrane

CE Mark to EN 13969

Page 1



- Self-adhesive membrane for above and below ground application
- Superior adhesion and waterproofing qualities
- Integral aluminium foil for resistance to methane, radon and carbon dioxide

Description

Visqueen Gas Resistant (GR) Self Adhesive Membrane is designed to prevent the transmission of carbon dioxide, radon and methane gases in tanking applications or where hydrostatic pressure is present.

Resistance to gas is achieved by an integral aluminium film. Substrates should be primed with Visqueen HP Tanking Primer prior to application. Visqueen Gas Resistant (GR) Self Adhesive Membrane is compatible with Visqueen Gas Resistant (GR) DPC and other Visqueen Gas Membranes.

Application

Visqueen Gas Resistant (GR) Self Adhesive Membrane should be used on any site where carbon dioxide, radon or methane is a problem. Methane and carbon dioxide will occur on any sites previously used for landfill as a result of bacteriological conditions. Such conditions can exist on household, commercial and industrial sites. Adequate ventilation must be ensured at all times during application.

Visqueen Gas Resistant Self Adhesive Membrane is not suitable for any roofing or podium applications.

Additionally radon has been identified as being present in some 21 counties in England by the National Radiological Protection Board.

Storage & Handling

Visqueen Gas Resistant (GR) Self Adhesive Membrane should be stored in cartons, on end and kept dry above 10°C. Visqueen Gas Resistant (GR) Self Adhesive Membrane is classified as nonhazardous when used in accordance with the relevant British Standards.

Visqueen HP Tanking Primer should be stored in original unopened containers in a cool dry area. Suitable Personal Protective Equipment (PPE) should be worn when using in line with our health and safety datasheet.

Installation Instructions

Ensure that the surface to be treated is free from loose particles, dry and frost free. Installation should be in accordance with BS 8102:2009. All surfaces should be sealed using Visqueen HP Tanking Primer and allowed to dry thoroughly.

A suitable drainage system should be designed and incorporated in accordance with the requirements of BS8102:2009. All surfaces should be free from ice, frost or condensation.

Slabs must be surface dry, free from sharp protrusions and any hollows filled with high strength mortar. All surfaces should be primed using Visqueen HP Tanking Primer applied by brush or roller and allowed to dry before the application of Visqueen Gas Resistant Self Adhesive Membrane.

VISQUEEN
BUILDING PRODUCTS



Gas Resistant Self Adhesive Membrane

CE Mark to EN 13969

Page 2

Visqueen Gas Resistant Self Adhesive Membrane should be laid by peeling back the protective silicone release paper and applying the self adhesive face onto the prepared surface.

The material should be brushed on to the surface to ensure good initial bond and remove any trapped air. Adjacent rolls are aligned and overlapped a minimum of 150mm at side and ends and the overlaps must be thoroughly rolled with a firm constant pressure to ensure a complete and continuous adhesion to achieve gas tight integrity between the layers.

To provide complete security of the system, care must be taken when detailing service penetrations and changes of levels. The use of angle fillets and reinforcing strips is essential. Visqueen Gas Resistant Self Adhesive Membrane is fully compatible with other elements of the Visqueen Gas Protection System.

After installation the membrane should be covered as soon as possible with Visqueen TreadGUARD1500/ Protect&Drain or other protective layer. Any punctures or damaged areas should be cleaned and patched with the membrane.

Visqueen Gas Resistant (GR) Self Adhesive Membrane must be continuous with the Visqueen Gas Resistant DPC in surrounding walls and all laps must be sealed.

Technical Data and CE Mark

Visqueen Gas Resistant Self Adhesive Membrane complies with the requirements and clauses of EN 13969.

British Board of Agreement 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/F062 applies.



Gas Resistant Self Adhesive Membrane

Product Data

CE Mark to EN 13969

Product Data

heading	Characteristic	Test method	Units	Compliance criteria	Value or statement
	Length	EN 1848-2	m	-0%/+5%	20
	Width	EN 1848-2	m	-5%/+5%	1
	Thickness	EN 1849-2	mm	-5%/10%	1
	Mass	EN 1849-2	g/m2/	-10%/10%	1100
	Watertightness	EN 1928	-	Pass/Fail	Pass 60Kpa
	Durability after artificial ageing)	EN 1847	-	Pass/Fail	Pass 60Kpa
	Durability against chemicals	EN 1847	-	Ps	Pass 60Kpa
	Resistance to tearing (nail shank) MD	EN 12310-1	N	>	100
	Resistance to tearing (nail shank) CD	EN 12310-1	N	>	100
	Water vapour transmission properties	EN 1931	g/m2/d	MDV	0.013
	Resistance to static loading	EN 12730	Kg	>MLV	20
	Resistance to Impact	EN 12691	mm	>	500
	Reaction to fire	EN 13501-1		Class	F
	Joint Resistance	EN 12317-1	N	>	30
	Tensile properties - MD	EN 12311-2	N/mm2	>	2
	Tensile properties - CD	EN 12311-2	N/mm2	>	2
	Tensile Elongation - MD	EN 12311-1	%	>	130
	Tensile Elongation - CD	EN 12311-2	%	>	130
	Reaction to Fire	EN 13501-1	Class	MDV	F
	Methane permeability	Rilem Report 12	ml/m2/d	MDV	<0.001
	Radon Diffusion		m2/d		5.0 x 10 ⁻¹⁴



Gas Resistant Self Adhesive Membrane

CE Mark to EN 13969

Appendix A



Visqueen Building Products

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System Accessories

To ensure full waterproofing protection please use the following certified system components:

- Visqueen High Performance (HP) Tanking Primer
- Visqueen TreadGUARD1500
- Visqueen Protect&Drain
- Visqueen Top Hat Unit

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



Visqueen HP Tanking Primer, 5L

Features and benefits

- No mixing required - use straight from the tin
- Rapid cure - quick and easy to install in one coat application
- Formulated primer - for below ground waterproofing membranes
- Adaptable - designed for horizontal and vertical applications
- Versatile - suitable for damp surfaces and green concrete

Product description

Visqueen High Performance (HP) Tanking Primer is a black elastomeric bituminous priming solution. The product is supplied in a 5 litre tin.

Approvals and standards

- BBA Certified with Visqueen Self Adhesive Membranes and TorchOn Tanking Membrane
- Quality Management System ISO 9001:2015
-

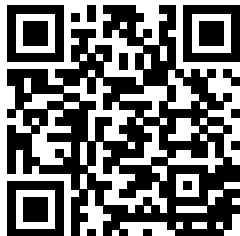
Usage

The primer can be used to prepare a variety of substrates including concrete, metal and masonry. It significantly improves the bond of the applied membrane.

It is designed to prepare surfaces prior to the applications of the Visqueen Self Adhesive Membranes and the Visqueen TorchOn Tanking Membrane.

System components

Find your local stockist





Visqueen HP Tanking Primer, 5L

Storage and handling

Store in an upright position, under cover and away from frost. Keep only in original container, in a cool, well ventilated space, away from heat sources. Keep the container closed when not in use.

Preparation

Inspect concrete surfaces for honeycombed areas and holes, if required bag-rub any irregularities or fill the surface with a suitable filler such as 3:1 mortar mix. All surfaces should be frost free, dry, smooth, clean, and free from oils, grease, condensation and other contamination. Remove areas of laitence or deleterious matter.

Installation

The High Performance Tanking Primer can be applied directly from the tin using a brush, or transferred to another suitable container and then applied by roller. Do not pour directly onto the surface.

Apply 1 coat of Visqueen High Performance Tanking Primer at a coverage of 6/8m² per litre depending on the porosity of the surface. The primer will dry in 2-8 hours depending upon temperature, the primer should be covered by the membrane within 24 hours.

Usable temperature range

It is recommended that the Visqueen High Performance Tanking Primer is used above 5°C.

Additional information

Use gloves and suitable PPE during the application in a well ventilated area.

Health and safety information

Please refer to material safety datasheet.

Visqueen HP Tanking Primer, 5L

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 D

Project Survey Sheets

INDEPENDENT INSPECTION & VALIDATION CERTIFICATE OF CONFORMANCE

DATE: 15-3-2021

PROJECT NAME: DUKESBRIDGE HOUSE & ROADWAY

CONTRACT NO: C693 - BASEMENT AREA - Full Line Out.

INSPECTION & VALIDATION DETAILS:

MTS Ltd were requested to attend site to inspect / validate the above Visqueen Gas Barrier membrane installed as a full line throughout the basement area. On initial inspection our validator noticed that the membrane had been welded using a leister giving good strength. He performed a detailed visual/seam pick test, carefully picking/pulling at the leistered seams and the perimeter GR self-adhesive tape which was installed 150mm up the wall & 150mm out, checking all membrane for punctures, service entry/pillar sealing & associated detail work along with the required adhesion. There were 9 pillars, 17 service entries & 2 pits. All was installed very well however 15 defects were found, marked up and repaired. All repairs were inspected and proved good. Photo evidence of all the above has been taken to be included within the final report. All membrane has been installed to client specifications & standards set out in both the Ciria C735 & BS 8485 best practice documents and was fit for purpose at the time of inspection.

MembraneTestingSolutions Ltd do hereby confirm that the elements of the project detailed above have been inspected and validated by a suitably qualified independent consultant in accordance with industry requirements, with the test result noted below:

CONCLUSION (PASS/FAIL)

Pass In Full

Where the conclusion above indicates a Pass, the construction activities may proceed subject to suitable protection measures of the membrane being applied in accordance with the manufacturers recommendations.

Signed for on behalf of **MembraneTestingSolutions Ltd**:

Name:

Michael A. Smith

Dated:

15-03-2021

Signed for on behalf of The Client:

Name:

S. TURNBULL

Dated:

18/03/2021

Membrane Testing Solutions Limited • The Studio, Parsonage House, Parsonage Street, Halstead, Essex CO9 2JR

Telephone: 0844 557 3786 • email: sales@mtsltd.net • www.mtsltd.net



APPENDIX E

Digital Copy of this Report & Site Photographs
(All Contained on USB Storage Device)