[redacted]

3rd PARTY INDEPENDENT INSPECTION, TESTING AND VERIFICATION PLAN, FOR THE GROUND GAS MITIGATION MEASURES

PROPOSED TO BE INSTALLED AT:

PLOT No.2 TOWNHOUSE FARM, CHURCH LANE, ARDINGLEY, WEST SUSSEX, RH17 6UR

Document Reference No: MTS.VP.992-BA

Client: Benjamin Allen Construction Ltd

Dated: September 2024

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

Registered Office: 1, Second Avenue, Halstead, Essex. CO9 2SU • Company Registration Number: 8871015

Client Name: Benjamin Allen Construction Limited
Reference: MTS.VP.992.BA
Issue: **Preliminary**
Date: 17th September 2024

Approval Status: **For Approval**

Prepared by: **Barrie Ackroyd**
Position: **Managing Director**

[redacted]

Revisions: REV A - Revised Plan Drawings Added

This Ground Gas Membrane Inspection and Verification Plan Report has been prepared by MembraneTestingSolutions Ltd with all reasonable skill, care and diligence within the terms of the contract with the client, incorporation of our General Terms and Conditions of Business and considering the resources devoted to us by agreement with the client.

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

This Ground Gas Membrane Inspection and Verification Plan is confidential to our client and 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.

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Mr Anthony Smith (MTS Ltd)
Mr Robert Boosey (MTS Ltd)
Mr Carl Orr (MTS Ltd)

Appendix B – **Project Drawings**

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- 2269-0120 S4 Rev P9 -Plot 2 & 3 Block Plan
- 2269-0121 S4 Rev P11 - Plot 2 - Floor Plans

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EXECUTIVE SUMMARY

1. LIMITATIONS

MembraneTestingSolutions Ltd (MTS Ltd) have prepared this 3rd party, ground gas mitigation system, installation inspection, testing & verification plan report in accordance with the instructions of Benjamin Allen Ltd (The Client) under the terms of the appointment for the 3rd Party Ground Gas mitigation system installation inspection, testing, validation and reporting.

This 3rd party, ground gas mitigation system, installation inspection, testing & verification plan report is limited to the ground gas protection measures for the building meeting the specification and current best practices. MTS Ltd have not provided any ground gas mitigation design measures for this site and therefore professional Indemnity liability is limited to £2M for our validation works only, along with suitability of specified components to protect against site specific contaminants.

This 3rd party, ground gas mitigation system, installation inspection, testing & verification plan report has been prepared in accordance with the information currently received, along with industry best practices and in conjunction with the relevant best practice and 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 gases" (2014).

We are pleased to advise that our Managing Director Mr Barrie Ackroyd has successfully completed the Validation & Integrity Testing Course provided by the British Geomembrane Association for validation, which is also backed by the CITB. Membrane Testing Solutions Ltd are a member of the British Geomembrane Association and are pleased to advise we are registered with CQMS/SSIP, The Radon Council, The Property Care Association, CL:Aire and we are proud to be a founding member of the British Verification Council (BVC) of which Mr Ackroyd is Vice Chairperson.

Mr Ackroyd has achieved the NVQ Level 4 qualification in Validation of Ground Gas Protection Systems, we are also pleased to advise he 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) and has acheived CL:Aire TGPV accreditation.

Guidance Reference Documents:

Ground Gas Handbook "NHBC Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present" (2007)
Ciria C665 "Assessing risks posed by hazardous ground gases 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 gases (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 and carbon dioxide ground gasses for new buildings" (2019)
Ciria C795 "Retrofitting hazardous ground gas protection measures in existing or refurbished buildings" (2020)
Ciria C801 "Ground Gas – a site managers guide" (2021)

2. BACKGROUND INFORMATION

MembraneTestingSolutions Ltd received a telephone call from Mr Allen Dawson of Benjamin Allen Construction Ltd having been given our contact details by Mr Mike Dunn of Wykamol Group Ltd. The project comprises a new residential property, office/garage and a garden storage unit. Mr Dawson advised he had 1 year left on his previous approved planning permission and wants to progress on an urgent basis.

MTS Ltd requested project information which we subsequently received via email. It appears the local authority had been approached for clearing of pre commencement conditions, however their response was as the following precis of that document:

4 The Council's Contaminated Land Officer has considered the application and has provided the following comments:

'I have reviewed the remediation report and have some queries.

I see that two options are proposed for building design to address gas and vapour protection. However, it is unclear which option will be implemented at this stage. The remediation report should outline the specific remediation measures that will be undertaken.

It would be helpful to have details about the type of membrane to be installed, including a method statement, plan, or technical drawings showing how it will be installed. Additionally, the report should include ventilation calculations specific to the site to demonstrate the performance of the ventilation void.

The report mentions that the membrane will be installed and validated in accordance with CIRIA Report C735 (Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases) and BS 8485:2015 (Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings). However, please provide more details regarding the installers' responsibilities for sign-off, including the documentation required (sign-off sheets and photos for each plot) and the verification process, including its timing. Also, clarify how non-conformities will be addressed.

The plan indicates that all plots will be validated if the membrane is installed by general workers, but if specialists are involved, what percentage of plots will be validated?

Please include details on management measures proposed to prevent damage to the membrane both before and after floor installation.'

DECISION NOTICE Page 2

End of Precis.

Mr Dawson advised he had contacted Wykamol Group Ltd for a proprietary ground gas mitigation solution which was subsequently provided by Mr Chris Ingham their National Specification Manager. MTS Ltd received a copy of the proposed ground gas mitigation measures, which we provided a cost for 3rd party independent inspection, testing and validation, which was immediately accepted and is the basis of our proposed ground gas mitigation measures verification plan.

MTS Ltd have subsequently provided our verification plan and passive ventilation design calculations to prove the efficiency of the passive ventilation system in accordance with the local authority's request, which we offer for review and acceptance or comment, as necessary.

Our proposed ground gas mitigation verification plan is as follows;

3. GROUND GAS MONITORING AND (GSV)

MTS Ltd received a copy of the project phase 1 and phase two site investigation reports performed by ABG Environmental Ltd.

The document references are as follows;

- Phase 1 Geoenvironmental Desk Study, Ref No. P4270.1.1.1 dated 5th August 2022
- Phase 2 Site Investigation Report, Ref P4271.2.1 dated 5th August 2022

A precis of the Phase 2 Site investigation document is noted below;

Summary of Analysis, Screening and Monitoring Results
All samples submitted for various determinands were below their respective screening values.
No asbestos has been identified.

Ground gas monitoring results and subsequent classification indicate CIRIA 665 Characteristic Situation CS-3 is appropriate for the site based on monitoring undertaken. This category indicates that the following protective measures to be installed within the proposed structure (further details regarding ground gas protection measures are provided in BS:8485 *Code of practice for the design of protective measures for methane and carbon dioxide for new buildings*):

a) Reinforced concrete vast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM
or
b) Beam and block or precast concrete slab and minimum 2000 g DPM/reinforced gas membrane.
or
c) Possible underfloor venting or pressurisation in combination with a) and b) depending on use.

All joints and penetrations sealed.

All types of floor slab as above

Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressured underfloor subspace, oversite capping or binding and in-ground venting layer.

The maximum ground gas monitoring results were: 20.4% Carbon Dioxide, 0.1% Methane with flow rates of 0.6l/hr.

This provides a GSV calculation of 0.204 x 0.6 = 0.1224 for Carbon Dioxide which relates to a Site Characteristic Situation 2 (<0.7) however we note ABG Environmental have increased the site to a Characteristic Situation 3 (<3.5) which we are unsure how this has been derived.

However, as the Wykamol gas mitigation design has been developed to meet the CS3, MTS Ltd are pleased to maintain this criteria as it only serves to increase the actual safety of occupants from any elevated gas risk.

4. PASSIVE VENTILATION CALCULATIONS

In line with the local authority's request, MTS Ltd have provided passive ventilation design calculations based on the proposed Wykamol passive ventilation system for the house and office/garage buildings.

However the garden storage room does not have any passive ventilation included in the design, due to the design including a ground bearing slab.

MTS Ltd outsourced the passive ventilation system design calculations to our partnering company noted below;

MM-EC Geoenvironmental Ltd
Langshiel
Westerhill
Perth
PH1 1DH
Contact: Mr Scott McGregor
Tel: [redacted]
Email: [redacted]
Web: www.mm-ec.co.uk

The passive ventilation design calculations were based on 35% Carbon Dioxide concentration with an assumed 2 l/hr flow rate which proves a system performance of 1850% for the farm house and 3400% for the garage/office of that required to maintain Carbon Dioxide below 0.75% within the ventilated void to both properties.

Therefore, we are pleased to advise the passive ventilation system provides a performance rate of 'Very Good Performance.' A precis of the design letter is noted below;

MM-EC
geoenvironmental

MMEC Geoenvironmental Ltd
Langshiel
Westerhill
Perth
PH1 1DH

Our Ref: 13361.DL001.SM.BA

Date: 17th September 2024

Membrane Testing Solutions Ltd
The Studio
Parsonage House
Parsonage Street
Halstead
Essex
CO9 2JR

Dear Barrie,

PASSIVE VENTILATION DESIGN CALCULATIONS,
TOWNHOUSE FARMHOUSE & GARAGE, HAYWARDS HEATH

Introduction

MM-EC Ltd was commissioned by Membrane Testing Solutions Ltd to undertake performance design calculations to check the performance of the proposed passive ventilation proposed within two buildings identified as the Main House and also Office/Garage building. The Main House extends to 158 m^2 floor plan area and the Office/Garage extends to 86 m^2 floor plan area.

MM-EC Ltd understand that the soil gas monitoring has identified a maximum carbon dioxide concentration of 20.4% and a maximum gas flow of 0.6 l/hr, although the ground investigation report has classified the site as CS3 for gas risk. Therefore, for the purpose of our calculations we have used a gas flow of 2l/hr and a gas concentration of 35% by volume which would give a GSV corresponding with the CS3 designation. The ventilation performance calculations have been completed for these gas and flow values.

The gas protection measures proposed for the buildings will comprise the following:

- Both buildings will be constructed with beam and block flooring which will overlie a 250mm deep open void. The perimeter vents will comprise of 17No standard airbricks on the Main House and 12No airbricks for the Office/Garage.
- Internal party wall ventilation will be provided by a honeycomb matrix which it is understood will provide around 5 times the internal ventilation area compared to the perimeter vents.

- The building footprint areas extend to 158m² & 86m².

For the purpose of the calculations the following additional assumptions have been made:

- The maximum site gas concentrations for the purpose of the calculations =35% carbon dioxide
- We have assumed a target concentration in the vent layer of 0.75% carbon dioxide
- A worst case maximum gas flow from the ground of 2 l/hr has been adopted for the purpose of the calculations
- For the calculations were have assumed that the airbrick vent height will be 75mm above external ground level.
- We have assumed a wind speed at a height of 10m to be 4.0m/s, 80% of the time at the site.
- For the purpose of the calculations, we have also assumed a wind effect pressure coefficient of 0.6Pa in the open void, which is slightly lower than the calculated wind effect pressures expected on the proposed building type and thus takes in to account some resistance to air movement.

On the basis of the calculations enclosed, the proposed scheme will provide a calculated ventilation capacity of 1850% of that required to maintain carbon dioxide concentrations below 0.75% in the vent layer beneath the Main House and 3400% of that required to maintain carbon dioxide concentrations below 0.75% in the vent layer beneath the Office/Garage.

This is also based on a wind speed at the vents of 0.3m/s and would therefore attain very good ventilation performance and 2.5Points.

We trust the enclosed meets with your current requirements. Should you wish to discuss any matters arising please do not hesitate to contact us.

Yours sincerely

[redacted]

Scott McGregor
Director

End of precis;

A copy of the 13361.DL001.SM.BA – MM-EC Geotechnical Ltd letter is appended in Appendix. D of this report.

5. BS 8485:2015+A1:2019 COMPLIANCE

Wykamol Group Ltd have provided a ground gas mitigation design based on a Building 'Type A' being Private and in accordance with a CS3 'Moderate Risk' CIRIA C665 classification, the ground gas protection design measures would achieve a points score of 4.5 points in accordance with the BS 8485:2015+A1:2019 best practice document.

Therefore the proposed ground gas mitigation design for the house and office/garage would achieve the following;

[redacted]				
Type A Building Private	CS3 + Type A = 4.5 Points Required	Beam and Block Floor Slab Point Score of 0 .0 Points	Passive Ventilation to achieve 'Very Good Performance = 2.5 points	Gas membrane validated in line with CIRIA C735 = 2.0 Points

Total 'MAXIMUM' Points Score Achieved from the Above = (T6 = 2.5 + T7 = 2.0) = **4.5 Points**.

Therefore, MTS Ltd are satisfied the proposed passive ventilation system will perform as required.

6. PROJECT DRAWINGS

MTS Ltd were provided with revised and updated project drawings, copies of which are appended in Appendix. B of this report.

Cowan Architects

- 2269 0120 S4 Rev P9 - Plot 2 & 3 Block Plan
- 2269 0121 S4 Rev P11 - Plot 2 - Floor Plans

Wykamol Group Ltd

- 06 – Setting Out Details
- WYK-GB-BB-Pipe Penetrations – Suspended Block & Beam – Pipe Penetration – Gas Barrier
- WYK-GB-BB- Telescopic Vents – Suspended Block & Beam – telescopic Vents – Gas Barrier

7. GAS PROTECTIVE MATERIAL SPECIFICATIONS

The ground gas mitigation measures have been specified by the following company;

Wykamol Group Ltd
Unit 3
Boran Court
Hapton
Burnley
BB11 5TH
Tel: [redacted]

Contact: Mr Chris Ingham
Email: [redacted]
Web: www.wykamol.com

The materials specified for this project are;

- Timloc Telescopic Vents
- Wykamol Gas Barrier Membrane
- Gas Tape (if joints not hot welded)
- GR Foil Tape (if joints not welded)
- Wykamol GR Foil Membrane

The proposed material specifications are appended in Appendix. B of this report.

8. GAS MEMBRANE INSTALLATION COMPANY

MTS Ltd confirm as the project has been classified as a CS3 'Moderate Risk' we recommended to the client it would be best practice to have the materials installed by an NVQ Level 2 qualified operative for gas membrane installations.

The client requested names of recommended companies which we provided, with the list as below:

GB Lining Services Limited

Contact Brett Bowles [redacted]
Contact George Beckwith [redacted]

MB Membranes Ltd

Contact Neil McNamara [redacted]
Contact Steve Benson [redacted]

Prestige Air Technology Limited

Contact Andy Collins [redacted]

MTS Ltd confirm these companies have installed gas mitigation measures to many and varying projects, and all of their operatives hold the NVQ Level 2 qualification for gas membrane installations.

At the current time, the client has not appointed an installer, therefore should the client wish to appoint any alternative installation company, MTS Ltd reserve the right to consider and approve any alternative company to ensure the level of installation quality is maintained throughout this project duration.

Details of the appointed installation contractor will be included within our final sign off validation report at the end of the installation and validation process.

9. GAS MEMBRANE INSPECTION METHOD STATEMENT

The client has indicated their preferred installation process will be the perimeter and infill basis, where the DPC will be installed first and the building constructed. Immediately prior to insulation and screed, the gas membrane infill will be installed and subsequently verified and upon passing the inspection the insulation and screed will be applied.

This will limit the potential of damage of the gas membrane, post installation.

The client has also suggested both buildings gas mitigation measures will be installed at the same time.

MTS Ltd have allowed for 2no site inspection visits, 1no for the perimeter and internal wall DPC's and 1no for the gas membrane infill to both plots at the same time.

The 3rd party inspection, validation and testing method statement is as follows;

1. The client will issue MTS Ltd photographic evidence of construction of 4-5 times ventilation in all obstructive walls within the underfloor void, in line with the Wykamol gas mitigation design. The photographs will be included within the MTS Ltd final sign off validation report.
2. MTS Ltd will attend site on two occasions, 1no for the gas resistant DPC's and 1no for the gas membrane infill.
3. MTS Ltd will perform 3rd party independent inspections and testing of site seams to all membrane seams and detailing using either NVQ Level 4 qualified or CL:Aire GPVS accredited validation surveyors.
4. The area presented for inspection and validation is to be classified as the test zone.
5. The gas membrane installation zone shall be 100% visually inspected for any defects, inclusive of material manufacturing faults, localised mechanical damage, installation process imperfections, seam imperfections and the like. Any defects will be marked on the gas membrane using spray line marker paint and sequentially numbered.
6. Upon completion of the visual inspections, 50% of the gas membrane site installation seams are subjected to seam pick/probe testing which meets the ASTM D4437-2018 test criteria as noted within the CIRIA C735 best practice document.
7. Seam pick/probe testing includes the use of a hand-held implement which is approximately 250mm in length, with a wooden handle incorporating a 6mm steel shaft terminating in a sharpened point, which is been bent at 90° to the main shaft. Seams are tested using this implement by drawing the point down the length and immediately adjacent to the welded/taped seam, searching for any de-bonding of the seams or hollows/voids within the seams etc. If a seam defect is suspected, the point of the implement will enter the seam and may be moved around to identify the extent of the de-bonding etc.
8. Any seam defects will be marked on the gas membrane and sequentially numbered.
9. Any material/seam defects are to be repaired by the installation contractor using the manufacturers recommended repair methods, with the repairs visually re-inspected and seam pick tested by the validation surveyor.
10. Upon completion of the inspections and re-test of any repairs the gas membrane test area will be signed off and certified as integral.
11. Protective cover material may then be applied to the surface of the membrane as indicated by the specification or materials manufacturer prior to follow on construction works commencing.
12. Upon satisfactory completion of the inspection works, MTS Ltd will provide an area sign off certificate being signed by the client's responsible person or someone acting on their behalf.
13. We will also inspect and survey the installed ventilation periscopic ventilation outlet sets and record on a layout plan to ensure compliance with the Wykamol design.
14. Upon completion of the inspection works for the project, MTS Ltd will prepare and complete a Final Sign Off Report inclusive of photographic record for the client's submission to the local authority for clearing of the planning conditions pertaining to ground gas contamination.

The Validation Surveyor Will:

- Perform all visual detailed and intimate Inspections:
- Perform seam pick testing to 50% of site seams:
- Mark and identify all repairs required: (if necessary)
- Verbally Inform the Installation Contractor of any required repairs: (if necessary)
- Observe any repairs and re-inspect/re-test the repairs: (if necessary)
- Complete the project survey sheets:
- Take photographs for inclusion in the final validation report:

- Receive photographic evidence of the underfloor ventilation system from the main contractor for inclusion within our final sign off validation report:
- Produce a final validation report at the end of the installation and testing process:
- Include a CL:Aire Residential Declaration of Conformance within the final validation report.

10. CONCLUSION & RECOMMENDATIONS

As a result of the proposed 3rd party independent inspections, testing and validation operations to be performed to the various areas of this site, MTS Ltd conclude that the ground gas mitigation measures to be installed to this project, will be in accordance with the design, material specifications and industry installation best practices for this "CS3" Moderate Risk site.

We confirm that the inspections and testing to be performed on the gas membrane, will be sufficiently managed, tested and validated and meet the 3rd party independent inspection, validation and testing process in accordance with the CIRIA C735 and BS 8485:2015+A1:2019 best practice documents.

MTS Ltd therefore recommend that in accordance with the proposed inspection and validation works to be performed by MTS Ltd on this project, the local authority move to sign off this gas mitigation measures verification plan as;

"Approve For Construction"

END OF REPORT

11. APPENDICES

Appendix A – MTS Ltd Certificates of Competence
Mr Barrie Ackroyd (MTS Ltd)
Mr Anthony Smith (MTS Ltd)
Mr Robert Boosey (MTS Ltd)
Mr Carl Orr (MTS Ltd)

Appendix B – Project Drawings

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Appendix D – Project Survey Sheets

Gas Protection Inspection & Validation Record (Pro-Forma)
Independent Inspection & Validation - Certificate of Conformance (Pro-Forma)
CL:Aire Residential Declaration of Conformance (Example)
13361.DL001.SM.BA – MM-EC Passive Ventilation Calculations

APPENDIX A

MTS Ltd Certificates of Competence

BGA
British Geomembrane Association

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: BGA British Geomembrane Association Date: 30/10/14

citb

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.: [redacted]

Issued:19 November 2020

Valid for 4 years from the above date

[redacted]

CL:AIRE Chairman

Gas Protection Verification

CL:AIRE is a Charitable Company Limited by Guarantee
Registered in England 3740059 / Entrust Enrolment No. 119820 / Registered Charity No. 1075611
Chiltern House, Haddenham Business Centre, Thame Road, Haddenham, Buckinghamshire, HP17 8BY
Telephone: +44 (0)1844 296112 | Email: enquiries@claire.co.uk | Website: www.claire.co.uk

ABBE
Quality Accredited

Certificate of Achievement

(Full Award)

This is to certify that

Barrie Anthony Ackroyd

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 : [redacted]

[redacted] Chair of ABBE Board

ofqual REGULATED register.ofqual.gov.uk

Date: 17/01/2023

Candidate Registration No : [redacted] Certificate Issue No : [redacted]

Scan code on reverse to authenticate that this is a genuine paper

ABBE
Quality Accredited

Certificate of Unit Achievement

This is to certify that

Barrie Anthony Ackroyd

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

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

Signed : [redacted]

[redacted] Chair of ABBE Board

Date: 17/01/2023

Candidate Registration No : [redacted] Certificate Issue No : [redacted]

Scan code on reverse to authenticate that this is a genuine paper

ABBE
Quality Accredited

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 : [redacted]

[redacted] Chair of ABBE Board

Date: 23/01/2020

ofqual
REGULATED
register.ofqual.gov.uk

Candidate Registration No : [redacted] Certificate Issue No : [redacted]

00026189

ABBE
Quality Accredited

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 : [redacted]

[redacted] Chair of ABBE Board

Date: 23/01/2020

Candidate Registration No : [redacted] Certificate Issue No : [redacted]

00026186

CERTIFICATE of ACCREDITATION

This is to certify that

Michael Smith

has been awarded the following accreditation

Gas Protection Verification Scheme (GPVS)

Technician (TGPV)

Certificate No.: [redacted]

Issued: 8 April 2021

Valid for 4 years from the above date

[redacted]

CL:AIRE Chairman

Gas Protection Verification

CL:AIRE is a Charitable Company Limited by Guarantee
Registered in England 3740059 / Entrust Enrolment No. 119820 / Registered Charity No. 1075611
Chiltern House, Haddenham Business Centre, Thame Road, Haddenham, Buckinghamshire, HP17 8BY
Telephone: +44 (0)1844 296112 | Email: enquiries@claire.co.uk | Website: www.claire.co.uk

Certificate of Attendance

Continuing Professional Development

This is to certify that

Robert Boosey

Has attended and passed the course
Verification of Gas Protection Systems

on

26th February 2019

at

Doncaster Membrane Installations Limited, Adwick Park, Manvers, S63 5AB

Contact time: 6.5 hours

Trainers: [redacted]

[redacted] CL:AIRE Chairman

CL:AIRE TRAINING

CL:AIRE
Registered address: 32 Bloomsbury Street, London, WC1B 3QJ
Telephone: +44 (0)2072 964250
Email: enquiries@claire.co.uk Website: www.claire.co.uk
CL:AIRE is a Charitable Company Limited by Guarantee / Registered in England No. 3740059 / Entrust Enrolment No. 118020 / Registered Charity No. 1075811

Certificate of Attendance

Continuing Professional Development

This is to certify that

Carl Orr

Has attended and passed the course
Verification of Gas Protection Systems

on

8th October 2019

at

Doncaster Membrane Installations Limited, Adwick Park, Manvers, S63 5AB

Contact time: 6.5 hours

Trainers: [redacted]

[redacted] CL:AIRE Chairman

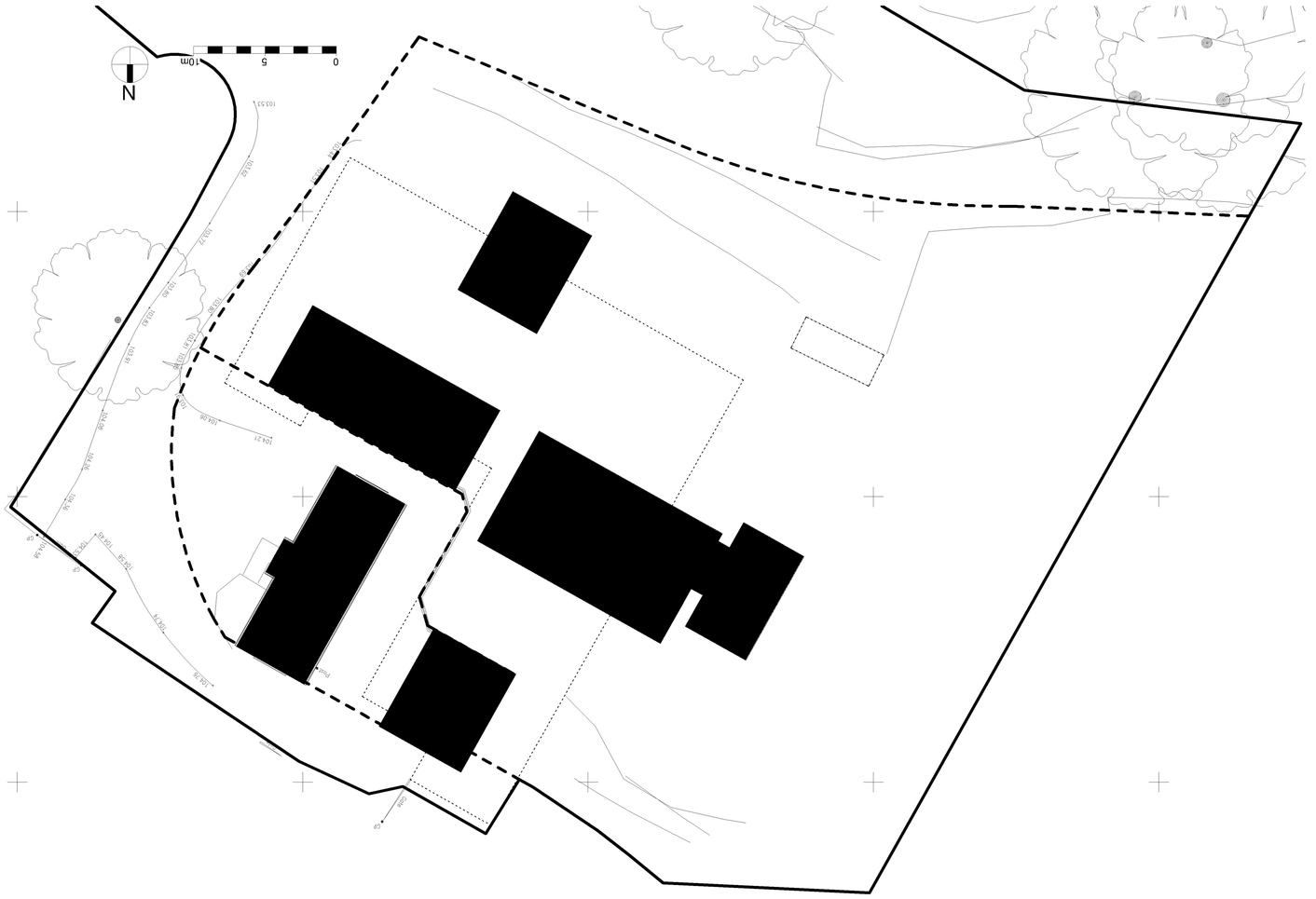
CL:AIRE
Registered address: 32 Bloomsbury Street, London, WC1B 3QJ
Telephone: +44 (0)2072 894200
Email: enquiries@claire.co.uk Website: www.claire.co.uk
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CL:AIRE TRAINING

APPENDIX B

Project Drawings

DRAWINGS CAN BE SCALED FOR PLANNING ONLY. DO NOT SCALE FOR ANY OTHER PURPOSE. ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPENCIES TO BE NOTIFIED TO THE ARCHITECT IMMEDIATELY



1 Plot 2 & 3 Block Plan - Existing

1 : 200

2 Plot 2 & 3 Block Plan - Proposed

1 : 200

P9	DRC	15/06/22	Reposition Garden Store
P8	DRC	09/06/22	Amend plot boundary
P7	DRC	08/06/22	Amend plot boundaries and outbuilding layouts
P6	DRC	07/06/22	Amend plot boundaries and outbuilding layouts
P5	DRC	24/03/22	Amendments post planning feedback
P4	DRC	28/01/22	Planning Re-Issue
P3	DRC	03/06/21	Issued for client comment
P2	DRC	22/03/21	Amended following Client feedback
P1	DRC	Feb '21	Initial Issue

Revision Schedule

COWAN ARCHITECTS
West Stanley | Leeson | Dublin
T: 01 662 4064
info@cowan-architects.co.uk | www.cowan-architects.co.uk

Job: *Townhouse Farm*
Client: *Balcombe Estate*
Address: *Townhouse Farm, Church Lane, Ardingly*

Drawing: *Plot 2 & 3 Block Plan*

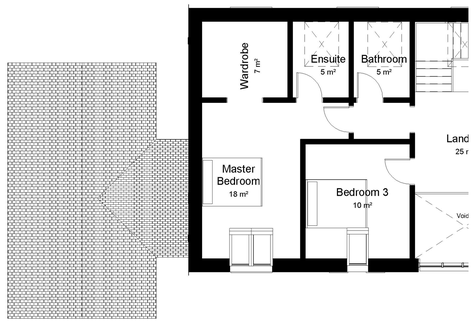
PLANNING

Project Ref.	Dwg No.	Suitability	Rev.
2269	0120	S4	P9

Size:	Scale:	Drawn:	Checked:	Date:
A1	As indicated	DRC	NM	16/02/21

BIM Ref.: 2269-CAL-XX-XX-DR-A-0120_S4-P9

© COWAN ARCHITECTS LTD



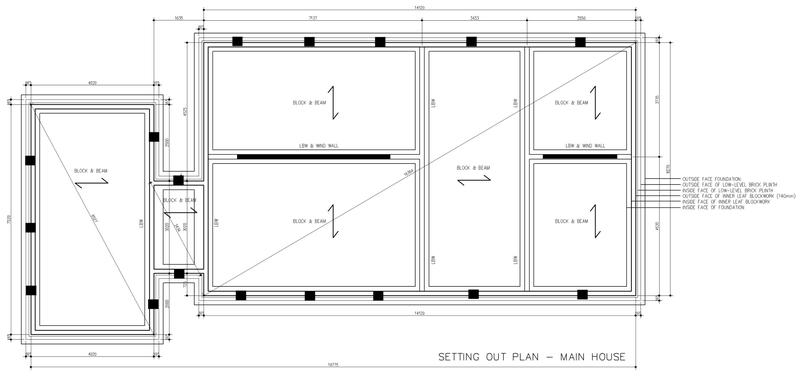
2 L1 First Floor Proposed

1 : 100

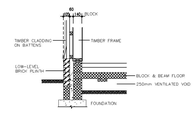
0 1

DO NOT SCALE FROM THIS DRAWING

DRAWINGS TO BE READ IN CONJUNCTION WITH ENGINEERS DETAILS



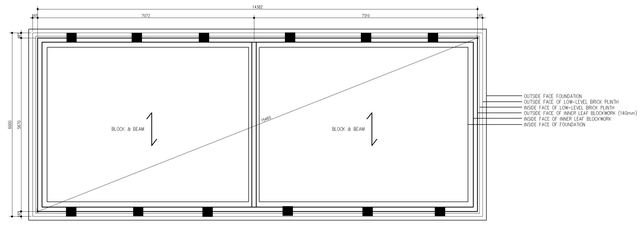
SETTING OUT PLAN – MAIN HOUSE



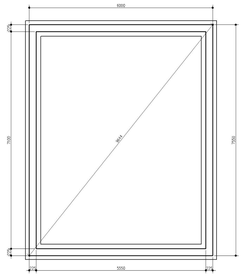
TYPICAL SECTION DETAIL – SOLE PLATE

NOTE: HEIGHT OF BLOCK UPSTAND SUBJECT TO REQUIRED LEVEL OF FLOOR INSULATION + 65-75mm SCREED

NOTE: FULL-HEIGHT BLOCK OPTION IS AVAILABLE WITH ADDITIONAL INSULATION/SCREED IN PRODUCED



SETTING OUT PLAN – HOME OFFICE/GARAGE



SETTING OUT PLAN – GARDEN STORE

NOTE: FOUNDATION DEPTH,WIDTH & DESIGN TO BE AGREED ON SITE WITH LOCAL AUTHORITY BUILDING CONTROL OFFICER/NHBC SUBJECT TO PREVALENT SOIL CONDITIONS & TYPE/PROXIMITY TO TREES ETC.

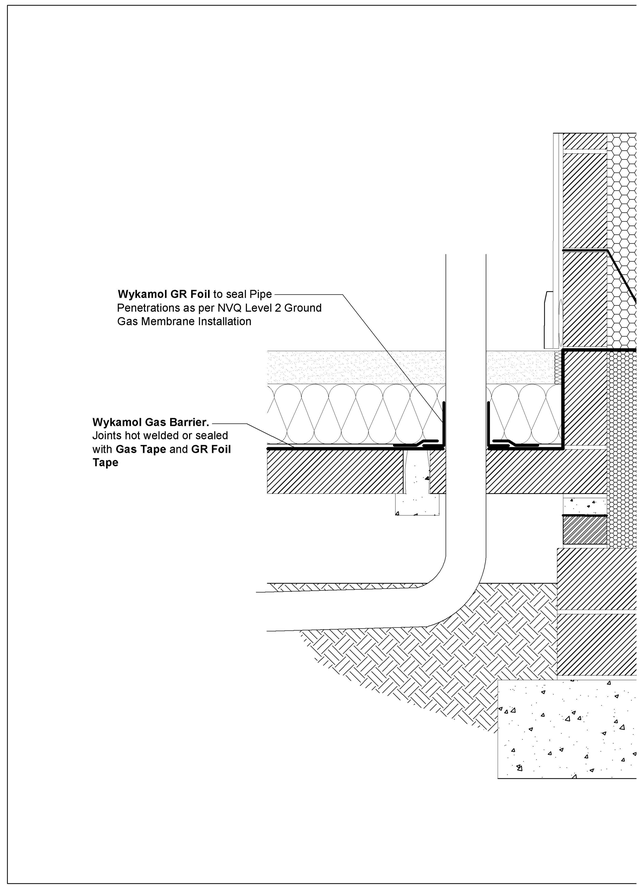
[redacted]

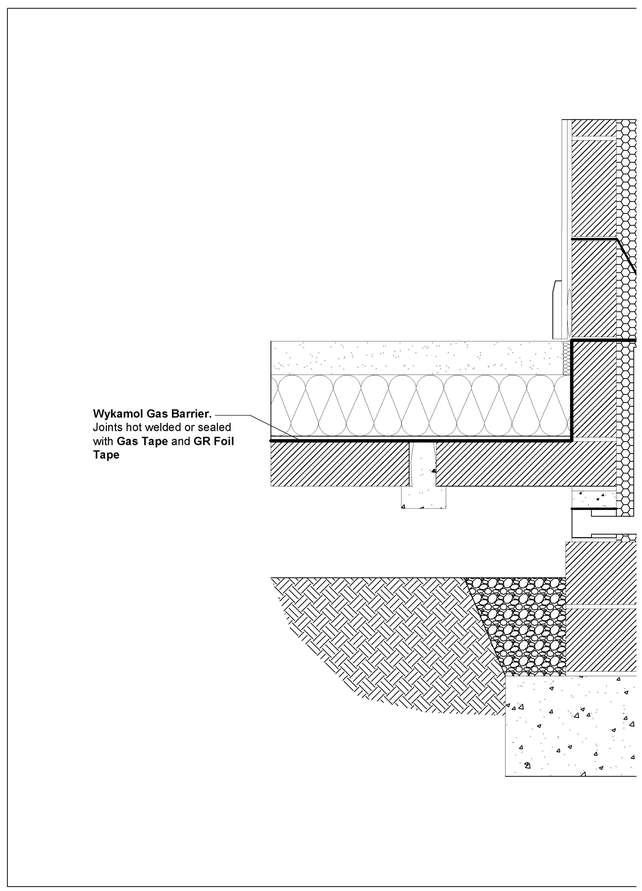
FOR
MR & MRS DAWSON

SITE
TOWNHOUSE FARM,
CHURCH LANE,
ARDINGLY,
HAYWARDS HEATH. RH17 6UR

TITLE
SETTING OUT DETAILS
[redacted]

SCALE	DRAWN	DRAWING NO.
1:50 @ A1	AH 09/24	06 REV.


Wykamol GR Foil to seal Pipe Penetrations as per NVQ Level 2 Ground Gas Membrane Installation
Wykamol Gas Barrier. Joints hot welded or sealed with **Gas Tape** and **GR Foil Tape**


Wykamol Gas Barrier.
Joints hot welded or sealed
with **Gas Tape** and **GR Foil**
Tape

APPENDIX C

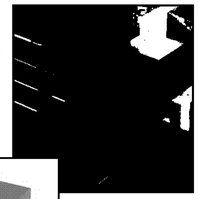
Material Specification Sheets

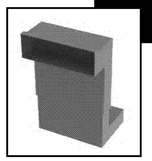
1201 telescopic underfloor vent

Adjustable ventilator for ground floors up to 5 brick courses incorporating vermin grille

Horizontal and vertical extension accessories available







Incorporates vermin grille

Use

- To provide ventilation below suspended ground floors

Features and benefits

- Telescopic and adjustable for a step of 3, 4 or 5 brick courses
- Horizontal and vertical extension accessories available
- Equivalent of 6000mm2 per unit
- Special grille included to prevent entry of vermin
- Durable, robust and totally resistant to decay

Quality

- Satisfies all NHBC requirements
- Manufactured to BS EN ISO 9001 and BS EN ISO 14001
- Complies with all relevant Building Regulations
- Meets all relevant British Standards

Material and colour choice

- Manufactured by injection moulding in polypropylene
- Available in black only in packs of 20

Products in the

- 1201 telescopic underfloor ventilator
- Matching airbrick and a range of accessories - see pages 11, 13, 14 & 108

Installation advice

- Always use in conjunction with a Timloc airbrick
- The airbrick and upper front opening of the telescopic underfloor ventilator must be positioned above the finished external ground level - usually at the same level as the ground level DPC
- The lower rear opening of the product must project down to the level of the underfloor void and must not be obstructed by the floor construction. A vertical extension sleeve is available to fit with this product if the standard 5 course step is not adequate
- Building Regulations require a free airflow below suspended ground floors of at least 1500mm2 per metre run of wall. This can be achieved by spacing the ventilators at 4m centres, however, such a wide spacing is not recommended as stagnant air pockets could form in the underfloor void. Timloc recommend a spacing of not more than 2m centres to comply with NHBC standards.
- The NHBC recommend that underfloor ventilators are spaced at a maximum of 2m centres, with ventilators also positioned not more than 450mm from the ends of the wall

- As a minimum requirement ventilators should be positioned down two opposite sides of the building so as to create a cross flow ventilation action. It is good practice to position ventilators around the full perimeter of the building, particularly with complex building designs
- If the underfloor void is separated by dividing walls, openings must be provided to allow a free flow of air around the underfloor void
- The standard ventilator will fit into a cavity wall with an external leaf of 100-102.5mm, a minimum cavity width of 50mm and a cross cavity of 100mm. External and internal horizontal extension sleeves are available to accommodate thicker walls or wider cavities
- To be installed with a DPC Cavity tray and wall weeps to collect any water ingress. We recommend Timloc's IL4 and 2 weeps (Invisiweep or 1143)

Bill of quantity

F30 Accessories/sundry items for brick/block/stone walling
Clause
160 | AIR BRICK

- To BS493, Class 1, built in as the work proceeds.
- Manufacturer: Timloc Building Products, Timloc House, Ozone Park, Howden, East Yorkshire, DN14 7SD. Tel: 01405 765567, Web: www.timloc.co.uk
- Reference: 1201 Telscopic Cranked Under Floor Vent (6,000mm2)
- Design: Rectangular
- Work size: Each unit 225/375mm coursing x 220mm,
- (6,000mm2 equivalent area)
- Material: Thermoplastic
- Colour:..... Black
- Optional Accessories:.....1204 Vertical Extension Sleeve (additional 2 brick courses)
- 1205 Duct Adaptor (suits 110mm diameter duct)

Product codes

Telescopic underfloor vent

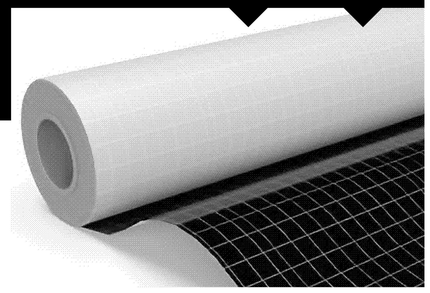
Equivalent area	Product code
6000mm²	1201

Timloc Building Products, Timloc House, Ozone Park, Howden, East Yorkshire, DN14 7SD
T: 01405 765 567 **E:** sales@timloc.co.uk **W:** www.timloc.co.uk **Technical | E:** technical@timloc.co.uk

WYKAMOL GAS BARRIER

Gas barrier membrane

Virgin polymer, reinforced, multi laminate membrane with aluminum core



Wykamol Gas Barrier is a high quality, virgin polymer, reinforced multi-layered gas membrane manufactured with an aluminum core.

Wykamol Gas Barrier is designed to resist Radon, CO2, and Methane. Wykamol Gas Barrier also acts as a DPM. Wykamol Gas Barrier will prevent these harmful ground gases from entering the structure when fully sealed.

BENEFITS

- Designed to resist Radon, CO2, Methane
- Prevents build up moisture entering the building. Acts as a DPM
- Complies with CS2 and above in accordance with BS8485:2015+A1:2019.
- Achieves 2 points for the ground gas membrane in accordance with CIRIA 735 when independently verified.
- Loose- laid membrane that is quick and easy to install.

LIMITATIONS

- Must not be used in waterproofing applications or in the presence of hydrostatic pressure. In the event waterproofing and gas protection are required, please refer to **Wykamol Quadproof Ultra** Membrane PDS

TECHNICAL DATA

Confirms to BRE211 (2023), NHBC Technical Guidance and BS8485:2015+A1:2019

INSTALLATION

Prior to installation, ensure the substrate is smooth and free from sharp materials in the ground that may puncture the membrane. Suitable substrates include, smooth compressed earth, 50mm sand blinding, 50mm concrete blinding with a smooth float finish, clean suspended block and beam floor, concrete raft slab or floor insulation.

Wykamol Gas Barrier can be taped or hot welded:

- Taped Joints to be sealed with **Wykamol Gas Tape** (50mm x 10M Rolls) inside the joint and **Wykamol GR Foil Tape** on the overlap(s). Ensure that all gas tapes form a continuous tight seal between each piece of tape to prevent any gas permeating the system.
- For heat welding, **Wykamol Gas Barrier** can be welded using a Leister Triac or similar heat gun appliance. Ensure minimum 100mm overlap in between the sheets of membrane prior to heat welding.

Note: Installation and hot welding should be carried out as per NVQ Level 2 Ground Gas Membrane Installation.

When installing **Wykamol Gas Barrier** membrane where Pipe Penetrations, Internal/External Corner, Door Thresholds, Window Bays, and Steel Stanchions are present, these must be reinforced and sealed using **Wykamol GR Foil** as per the requirements of NVQ Level 2 Ground Gas Membrane Installation.

During the installation and post completion, ensure the membrane is protected from damage. This can be in the form of preventing access to the area of the installation, covering with insulation or screed before allowing foot traffic into the area. If in the event the membrane does become damaged, it must be removed and replaced.

Installation should be carried out to meet the requirements of CIRIA 735. If a planning condition attached to your project requires a ground gas protection system installed, ensure Independent Verification is carried out as per CIRIA 735. Wykamol Group can provide contact details for independent validators if necessary.

PHYSICAL PROPERTIES

Product 2m wide single wound membrane to ensure there are no folds within the membrane.

Thickness	0.4mm

HEALTH AND SAFETY

Please refer to **Wykamol Gas Barrier** MSDS for further information on health and safety.

For technical support please contact our technical team at info@wykamol.com or info@tritonsystems.co.uk.

Alternatively, please contact your local technical sales representative.

SPECIFICATION

TEST NAME	TEST METHOD	PARAMETER	VALUE	UNIT
		PE	15	gr/m²
		PE	25	gr/m²
		Coex Foil	138	gr/m²
		PE	25	gr/m²
		Total Weight	**424**	**gr/m²**

TEST CERTIFICATE

TEST NAME	TEST METHOD	PARAMETER	VALUE	UNIT
Tensile Strength	NEN 12311	Elongation CD	20.6	%
		Elongation MD	19.4	%
Nail Tear	NEN 12310	Tear Strength CD	504	N
Thickness	ISO 2286-3	Overall Thickness	0.56	mm

COMPLIES WITH BS8485: 2015+A1:2019

Test	Value	Pass/Fail
Single wound (no folds)		Pass

Roll Size: 2 x 50m

The information in this technical datasheet is given in good faith and was correct at the time of publication, but does not purport to be all inclusive. We reserve the right to update this information at any time without prior notice. All data is obtained through extensive testing in stringent laboratory conditions, however as we have no control over site conditions or work executed we accept no liability for incidental and/or consequential property damage arising out of the use of this product. The Wykamol Groups standard terms and conditions of sale apply.

WYKAMOL GR FOIL

High performance self-adhesive bituminous waterproofing membrane that prevents Radon, Methane, Carbon Dioxide, and vapour entering the structure



Wykamol GR Foil high performance self-adhesive bituminous waterproofing membrane that prevents Radon, Methane, Carbon Dioxide, and vapour entering the structure. The polyester reinforced aluminum layer provides a robust gas protection system suitable for CS2 and above in accordance with BS8485:2015+A1:2019.

Wykamol GR Foil can you be used in below ground waterproofing applications and is classed as a Type A post-applied barrier system in accordance with BS8102:2022.

USES

- Where protection from Radon, Methane or Carbon Dioxide is required, above or below ground.
- Sealing of internal/external corners, pipe penetrations, door thresholds, window bays, and steel stanchions.
- Can be used in conjunction with **Wykamol Gas Barrier** for site specific detailing.
- Below Ground Waterproofing membrane to retaining walls, basements, lift pits, and foundations.

PHYSICAL PROPERTIES

- 1m wide rolls with no folds.
- Dimensions: 25m x 1m (25m²) Thickness: 1.2mm
- Product Colour: Silver/Black

INSTALLATION

Prior to installation of **Wykamol GR Foil**, ensure the substrate is dry and clear of dust, debris, dirt and other impurities. When installing directly onto a concrete, concrete block or brick (both with flush finished pointing), apply **Wykamol Gas Primer** to the surface and allow the product to turn tacky before installing **Wykamol GR Foil**. Subject to weather conditions, **Wykamol Gas Primer** can take 30 minutes to 2 hours to become tacky / sticky.

Wykamol GR Foil should be installed by laying the rolls from the highest point of the building and working your way downwards, whilst being careful not to create counter-gradient overlaps. Ensure the release paper on the back of the membrane is removed, exposing the bituminous adhesive backing before applying the **Wykamol GR Foil**. Install black side down.

Wykamol GR Foil must be overlapped at the edges by at least 100mm (minimum). A primer is not required to stick down membrane overlaps but the membrane must be clean and dry.

Note: Post installation, ensure the membrane overlaps are pressed down firmly, whilst being very careful to ensure all air bubbles and creases are removed as pressure is placed on top of the system.

Wykamol GR Foil must be protected before being backfilled, using **Wykamol Sheet Drain**, **Wykamol CM8** or **CM20 Geotextile,** Insulation, or other protection board(s). In the event **Wykamol GR Foil** becomes damaged the membrane must be replaced or suitably patch repaired.

Wykamol GR Foil can also be cut down to seal internal/external corners, pipe penetrations, site specific detailing in accordance with NVQ Level2 Ground Gas Membrane Installation.

In accordance with NVQ Level 2 Ground Gas Membrane Installation, extra heat can be applied to improve the bonding of **Wykamol GR Foil**.

ANCILLARY PRODUCTS

- **Wykamol Gas Primer -** To prepare concrete, block, brick, steel or other non-membrane materials.
- **Wykamol Gas Barrier -** Sealing site specific detailing, such as corners, pipe penetrations and steel stanchions when used in accordance with NVQ Level 2 Ground Gas Membrane Installation.

STORAGE

Wykamol GR Foil must be stored in the original unopened package, in a dry / well-ventilated space at temperatures between +5 Degrees and 40 Degrees. Storage over 50 Degrees may lead to difficulty in removing the release protective lining of the self-adhesive material.

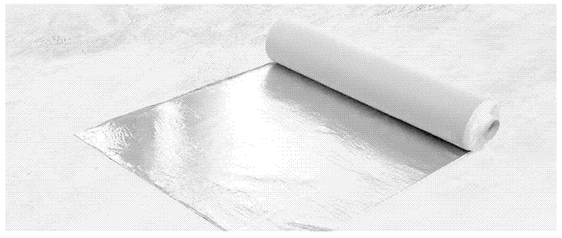
Wykamol GR Foil has a minimum shelf life of 12 months from the date of production.

HEALTH AND SAFETY

Please refer to **Wykamol GR Foil** MSDS for further information on health and safety.

For technical support please contact our technical team at info@wykamol.com or info@tritonsystems.co.uk.

Alternatively, please contact your local technical sales representative.



CHARACTERISTICS	VALUES	TEST
Thickness	1.2 mm	N 1849-1
Elongation at Break	Long. 10% | Trans. 20%	EN 12311-1
Tear Resistance	Long. 45 N | Trans. 45 N	EN 12310-1
Shear Resistance of Joints	Long. 220 N/50mm | Trans. 260 N/50mm	EN 12317-1
Water Vapour Impermeability	Pass (Sd ≥ 1500 m)	ISO EN 12572
Permeability to Radon Gas	0.56 x 10-12 m2/s	Testing & Research Institute
Application Temperature	0°C * / +30°C	-

* For temperatures below 5 °C, it is recommended to use special and additional precautions to facilitate adhesion (for example a specific primer for low temperatures).

TEST
Complying with: EN 13969 type A e T; EN 13970; EN 13707
Classification for transport: Not Applicable

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Wykamol

SUSTAINABLE
WATERPROOFING
& PRESERVATION

ECO



EXPERTS IN PROPERTY PRESERVATION

Company Name:	Simply Ponds Ltd
Prepared for:	Allen Robert Dawson
For the Attention of:	Allaen Robert Dawson
Email:	allenrobertdawson@gmail.com
Site Address:	Townhouse Farm, Church Lane, Ardingly, Haywards Heath, RH17 6UR
Prepared By:	Chris Ingham
Telephone:	07919064450
Email:	Chris.Ingham@Wykamol.com
Technical Contact:	Technical@Wykamol.com

Wykamol Group
Unit 3, Boran Court, Network 65 Business Park, Hapton, Burnley, Lancashire BB11 5TH
t: +44 (0)1282 473 100

www.wykamol.com **e:** info@wykamol.com
Registered in England No.134887

Wykamol Group Ltd
Unit 3
3 Boran Court
Hapton
Burnley
BB11 5TH

Mr Allen Robert Dawson
56 Lewis Road
Ditchling
Hassoscks
Sussex
BN6 8TU

5th September 2024

Reference: WYK/SW/AD/TF

Wykamol are providing a Ground Gas Protection System design for the project located at Townhouse Farm, Church Lane, Ardingly, Haywards Heath, RH17 6UR

The site has been confirmed as CS3 and will be used for residential purposes. In accordance with BS8485:2015 +A1:2019 4.5 Points are required from the ground gas protection system.

Please see Table 4 from BS8384:2019 below:

Table 4 — *Gas protection score by CS and type of building*

CS	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5 [A)]	5.5 [A)]	4.5	3.5
5	— [B)]	[Not] 6 [Ak] [A)]	5.5	4.5
6	— [B)]	— [B)]	[Not] — [B)] [Ak]	[Not] 6 [Ak]

[A)] Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

[B)] The gas hazard is too high for this empirical method to be used to define the gas protection measures.

This will be achieved by installing a ground gas membrane that complies with Table 7 of BS8485:2019 (2.0 Points) and Ventilation to the sub floor void (2.5 Points for excellent).

Please refer to the specification below and the drawings in Appendix 01.

Wykamol – Specification

Ventilation:

The sub floor void ventilation will include Timloc Telescopic Vents to the perimeter walls as shown on plan in Appendix 01. Also highlighted on plan are the sleeper walls blocking cross ventilation. These should be constructed to create a honey-comb structure creating 4-5 times area of ventilation than the number of telescopic vents in the adjacent walls for that contained section. Alternatively spaces can be left between blocks, but 4-5 times area of ventilation must be achieved to obtain 2.5 Points for excellent ventilation. Structural Engineer to confirm design prior to construction.

Timloc Telescopic Vents achieve 6000mm^2 ventilation per unit. In accordance with BS8485:2019 Section B.6 – 2000mm^2/m run of wall will provide sufficient ventilation. Please refer to ventilation layout in Appendix 01 for ventilation layout suitable for this structure.

Ground Gas Membrane:

Wykamol Gas Barrier is to be installed across the top of the suspended block and beam as shown in Appendix 01. Joints are to be hot welded or sealed with Gas Tape inside the joints and GR Foil Tape to the overlap.

Corner Details and Pipe Penetrations are to be sealed with Wykamol GR Foil membrane as per NVQ Level 2 Ground Gas Membrane Installation.

If the installation is to be carried out over winter, we recommend installing the membrane through the perimeter walls first leaving a 300mm tail at the base of the inner leaf extending across the block and floor. Once the building is watertight, complete the installation be cleaning down the block and beam floor, patch repairing the tail and extending the Wykamol Gas Barrier through each room. Joints to be hot welded or sealed with Gas Tape and GR foil Tape.

As the site is CS3 we recommend the ground gas membrane is installed by an NVQ Level 2 Ground Gas Membrane Installer. Contact details can be given is required.

The membrane should always be protected from damage by follow on trades. Independent Verification of the Ground Gas Membrane will be required to ensure 2.0 Points are achieved and that the attached planning condition is discharged.

Wykamol Group
Unit 3, Boran Court, Network 65 Business Park, Hapton, Burnley, Lancashire BB11 5TH
t: +44 (0)1282 473 100

www.wykamol.com **e:** info@wykamol.com
Registered in England No.134887

Materials included in the Specification:

- **Timloc Telescopic Vents**
- **Wykamol Gas Barrier**
- **Gas Tape (if joints not hot welded)**
- **GR Foil Tape (if joints not hot welded)**
- **Wykamol GR Foil**

Final Guidance & Recommendations

This specification follows the requirements of BS8485:2015+A1:2019. Any questions please contact your local Wykamol Rep Steve West on [redacted]

For and on behalf of The Wykamol Group

Chris Ingham B.Sc. Eng. CSSW
National Specification Manager
[redacted]

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t: +44 (0)1282 473 100

www.wykamol.com **e:** info@wykamol.com
Registered in England No.134887

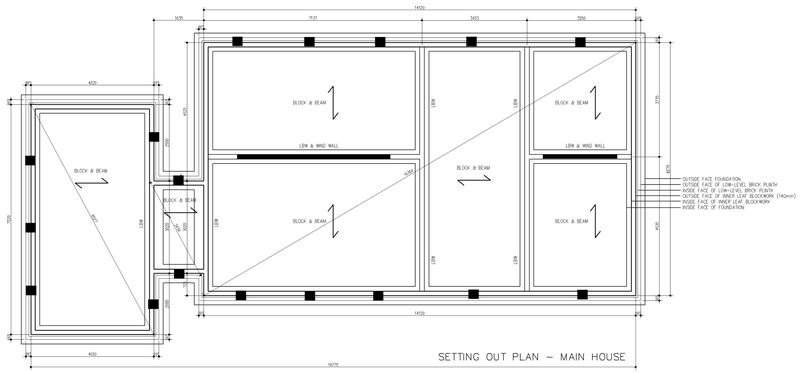
APPENDIX 01

Wykamol Group
Unit 3, Boran Court, Network 65 Business Park, Hapton, Burnley, Lancashire BB11 5TH
t: +44 (0)1282 473 100

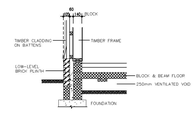
www.wykamol.com **e:** info@wykamol.com
Registered in England No.134887

DO NOT SCALE FROM THIS DRAWING

DRAWINGS TO BE READ IN CONJUNCTION WITH ENGINEERS DETAILS



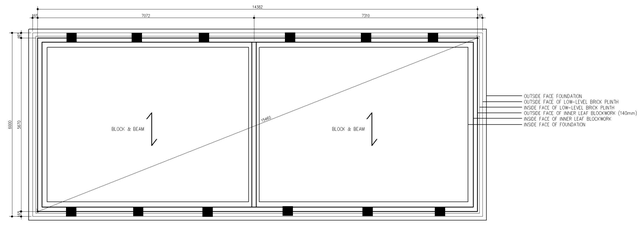
SETTING OUT PLAN – MAIN HOUSE



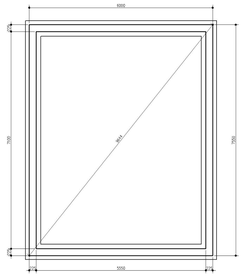
TYPICAL SECTION DETAIL – SOLE PLATE

NOTE: HEIGHT OF BLOCK UPSTAND SUBJECT TO REQUIRED LEVEL OF FLOOR INSULATION + 65-75mm SCREED

NOTE: FULL-HEIGHT BLOCK OPTION IS AVAILABLE WITH ADDITIONAL INSULATION/SCREED IN PRODUCED



SETTING OUT PLAN – HOME OFFICE/GARAGE



SETTING OUT PLAN – GARDEN STORE

NOTE: FOUNDATION DEPTH,WIDTH & DESIGN TO BE AGREED ON SITE WITH LOCAL AUTHORITY BUILDING CONTROL OFFICER/NHBC SUBJECT TO PREVALENT SOIL CONDITIONS & TYPE/PROXIMITY TO TREES ETC.

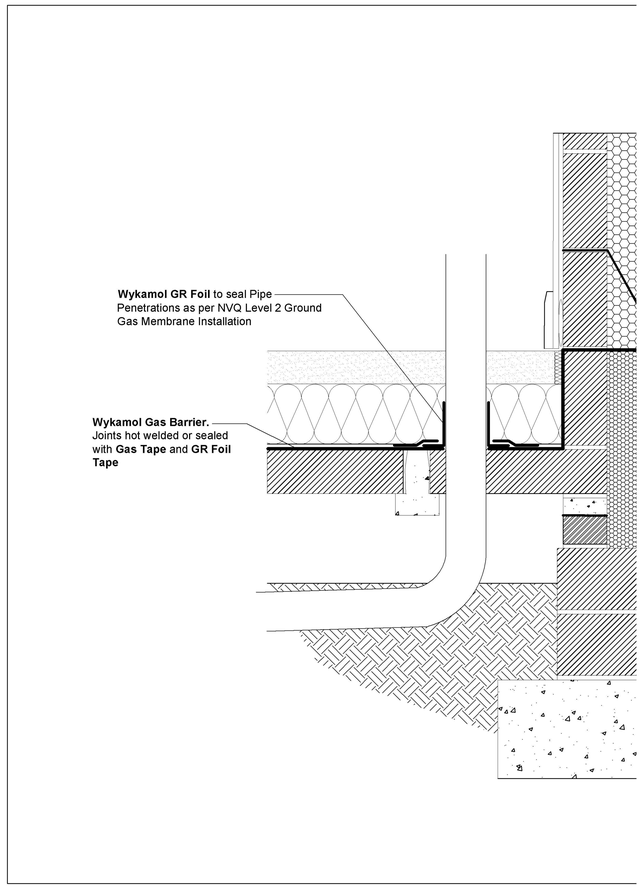
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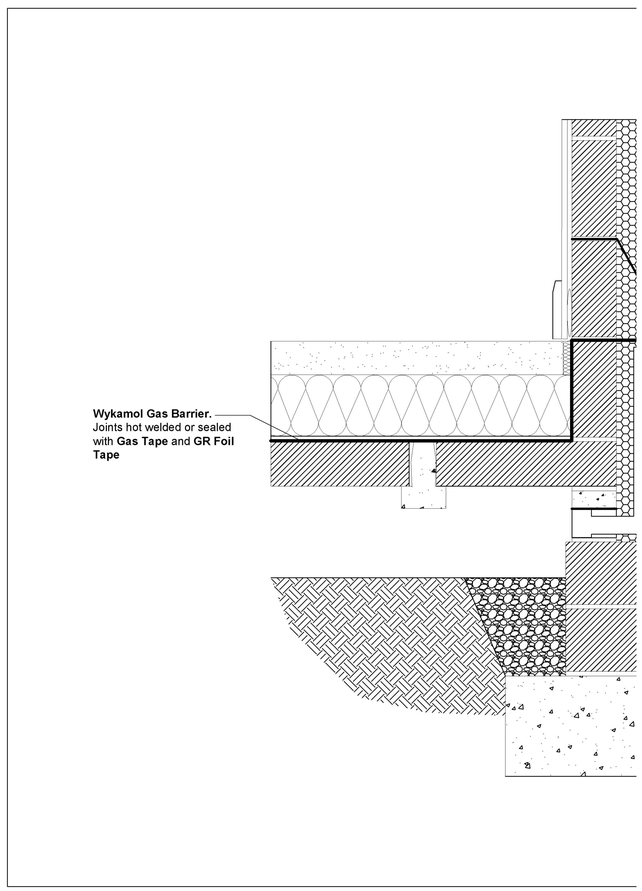
FOR
MR & MRS DAWSON

SITE
TOWNHOUSE FARM,
CHURCH LANE,
ARDINGLY,
HAYWARDS HEATH. RH17 6UR

TITLE
SETTING OUT DETAILS
[redacted]

SCALE	DRAWN	DRAWING NO.
1:50 @ A1	AH 09/24	06 REV.


Wykamol GR Foil to seal Pipe Penetrations as per NVQ Level 2 Ground Gas Membrane Installation
Wykamol Gas Barrier. Joints hot welded or sealed with **Gas Tape** and **GR Foil Tape**


Wykamol Gas Barrier.
Joints hot welded or sealed
with **Gas Tape** and **GR Foil**
Tape

APPENDIX D

Project Survey Sheets

MembraneTestingSolutions Ltd

Gas Protection Inspection & Validation Record

One record sheet to be completed for each plot inspected by a SUITABLY QUALIFIED independent consultant/engineer

[redacted]		[redacted]		[redacted]		Y/N					
		Residential		Commercial		Other (Describe)					
		[redacted]		Detached		Semi-Detached		Terrace		Apartment Block	
		Active/Passive		[redacted]		spended Floor/Raft/Other					
[redacted]						[redacted]		Y/N			

	Y/N	Notes/Recommendations (see guide below)
Void Former Type		1.
Height of Void Space		2.
Venting Media		3.
Pipe Size & Spacing		4.
External Wall Airbricks		5.
Internal Sleeper Walls		6.
External Vent Trenches/Ducts		7.

[redacted]		[redacted]		[redacted]	Y/N	

	Y/N	Notes/Recommendations
Membrane Type		8.
Extent of Coverage		9.
Underside of Membrane		10.
Slab/Membrane Condition		11.
Laps & Joints		12.

Signed:

Date:

EXAMPLE

[redacted]

INDEPENDENT INSPECTION & VALIDATION
CERTIFICATE OF CONFORMANCE

DATE:

PROJECT NAME:

CONTRACT NO:

INSPECTION, VALIDATION & INTEGRITY TESTING DETAILS:

EXAMPLE

MembraneTestingSolutions Ltd 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) .....

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: ----------

Dated: ----------

Signed for on behalf of The Client: **Name:** ----------

Dated: ----------

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

Registered Office: 1, Second Avenue, Halstead, Essex. CO9 2SU • Company Registration Number: 8871015

Gas Protection Verification Declaration

Site

Site Name	test2
Site Address	2 Test Street, Exampleville
GPVS Declaration Reference	0420-C5395

Brief Description of Site
Site description goes here.

Site Type	Residential
Plot Number(s)	456 - 458

Document

Verification Report Title	test2
Verification Report Identifier	N/A
Named Client	N/A

Gas Protection Verification
EXAMPLE

GPVS Declaration

SGPV Details

SGPV Name	Helen McLennan
SGPV Accreditation No.	SGPV0000
Telephone	05 55 69 72 43
Email	helen.mclennan@claire.co.uk
Organisation	Testers Ltd
Address	10 Testing Road, Little Testing, TF5 1GR

Declaration

I, Helen McLennan, confirm that I am the person described in the SGPV Accredited Person details section and hold a current valid registration as a SGPV Accreditation No. SGPV0000 under the Gas Protection Verification Accreditation Scheme.

I have reviewed the verification report described in the Document Details section and I am satisfied that:

1. The work has been carried out to an acceptable standard.
2. The work has been verified by suitably experienced and qualified personnel.
3. The level of verification is proportionate to the level of risk identified in the Site Investigation report/Gas risk assessment.
4. The interpretations and conclusions are reasonable.
5. The verification strategy is in line with industry guidance.
6. I am competent to sign this Declaration and that:
    a. I am fully aware and comply with the Scheme's Code of Conduct
    b. The work of this review and Declaration are within the limits of my knowledge, competence and professional capacity.

Note: The document that has been reviewed was prepared by the organisation named for the benefit of the named Client who has reliance upon it. Any professional liability arising from any part of the report or omission by the Company carrying out the work and publishing the document rests with that Company and not with the GasA Registered Person or the GPVS.

EXAMPLE

Signed:

Date:

Name:
[Block capitals]

0420-C5395

MMEC Geoenvironmental Ltd
Langshiel
Westerhill
Perth
PH1 1DH

Our Ref: 13361.DL001.SM.BA

Date: 17th September 2024

Membrane Testing Solutions Ltd
The Studio
Parsonage House
Parsonage Street
Halstead
Essex
CO9 2JR

Dear Barrie,

PASSIVE VENTILATION DESIGN CALCULATIONS,
TOWNHOUSE FARMHOUSE & GARAGE, HAYWARDS HEATH

Introduction

MM-EC Ltd was commissioned by Membrane Testing Solutions Ltd to undertake performance design calculations to check the performance of the proposed passive ventilation proposed within two buildings identified as the Main House and also Office/Garage building. The Main House extends to 158 m^2 floor plan area and the Office/Garage extends to 86 m^2 floor plan area.

MM-EC Ltd understand that the soil gas monitoring has identified a maximum carbon dioxide concentration of 20.4% and a maximum gas flow of 0.6 l/hr, although the ground investigation report has classified the site as CS3 for gas risk. Therefore, for the purpose of our calculations we have used a gas flow of 2l/hr and a gas concentration of 35% by volume which would give a GSV corresponding with the CS3 designation. The ventilation performance calculations have been completed for these gas and flow values.

The gas protection measures proposed for the buildings will comprise the following:

- Both buildings will be constructed with beam and block flooring which will overlie a 250mm deep open void. The perimeter vents will comprise of 17No standard airbricks on the Main House and 12No airbricks for the Office/Garage.
- Internal party wall ventilation will be provided by a honeycomb matrix which it is understood will provide around 5 times the internal ventilation area compared to the perimeter vents.

- The building footprint areas extend to 158m^2 & 86m^2.

For the purpose of the calculations the following additional assumptions have been made:

- The maximum site gas concentrations for the purpose of the calculations =35% carbon dioxide
- We have assumed a target concentration in the vent layer of 0.75% carbon dioxide
- A worst case maximum gas flow from the ground of 2 l/hr has been adopted for the purpose of the calculations
- For the calculations were have assumed that the airbrick vent height will be 75mm above external ground level.
- We have assumed a wind speed at a height of 10m to be 4.0m/s, 80% of the time at the site.
- For the purpose of the calculations, we have also assumed a wind effect pressure coefficient of 0.6Pa in the open void, which is slightly lower than the calculated wind effect pressures expected on the proposed building type and thus takes in to account some resistance to air movement.

On the basis of the calculations enclosed, the proposed scheme will provide a calculated ventilation capacity of 1850% of that required to maintain carbon dioxide concentrations below 0.75% in the vent layer beneath the Main House and 3400% of that required to maintain carbon dioxide concentrations below 0.75% in the vent layer beneath the Office/Garage.

This is also based on a wind speed at the vents of 0.3m/s and would therefore attain very good ventilation performance and 2.5Points.

We trust the enclosed meets with your current requirements. Should you wish to discuss any matters arising please do not hesitate to contact us.

Yours sincerely

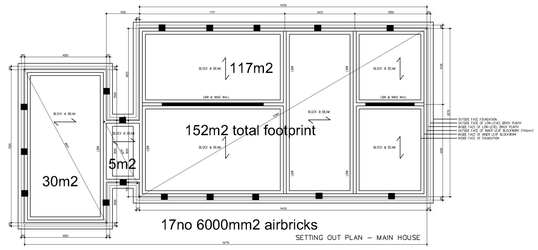
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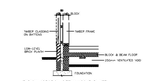
Scott McGregor
Director

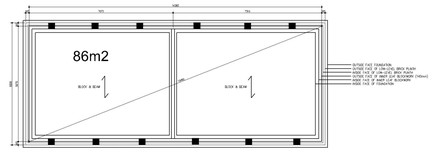
APPENDIX A- PLANS OF PROPOSED GAS PROTECTION/

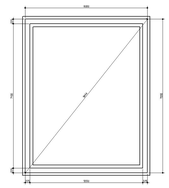
DO NOT SCALE FROM THIS DRAWING

DRAWINGS TO BE READ IN CONJUNCTION WITH ENGINEERS DETAILS









[redacted]

FOR
MR & MRS DAWSON

SITE
TOWNHOUSE FARM,
CHURCH LANE,
ARDINGLY,
HAYWARDS HEATH. RH17 6UR

TITLE
SETTING OUT DETAILS

SCALE	DRAWN	DRAWING NO.
1:50 @ A1	AH 09/24	06 REV

APPENDIX B. VENTILATION PERFORMANCE CALCULATIONS

MM-EC

Methodology for the design of gas protection measures

Reference has been made to the following documentation in the conception of gas protection
BS 5925: 1991 Code of Practice for Ventilaion principles and designing for natural ventilation
CIRIA Report 152 Risk Assessment for methane and other gases from the ground
CIRIA Report 130 Methane: Its Occurrence and Hazards in Construction
CIRIA Report 131 The Measurement of Methane and other Gases from the ground
CIRIA Report 149 Protecting Development from methane
CIRIA Report 659 Assessing Risks Posed by Hazardous Ground Gases to Buildings
DETR Research Report 'Passive venting of soil gases beneath buildings

Details to be completed for each assessment

Project Title: [redacted] Farm, Haywards Heath - Main House
Project No:

Completed by: Scott McGregor
Date: [redacted]

Design Gas: [redacted]xide
Maximum Concentration: [redacted]ane
Target Concentration:

Prepared by: Scott McGregor [redacted]
Date: 17-Sep-24

Checked by: David Moore
Date: 17-Sep-24

MM-EC

Site Name [redacted] Farm, Haywards Heath - Main House

Contaminant Gas C[redacted]de
Target concentration C_T [redacted]

Input Parameters	Variable	Value	Unit	Source of parameter value, or formula
Gas Flow	G_F	[redacted]	l/hr	
Flow from borehole	F_R		m^3/s	Flow (l/hr)(60*60*1000)
Gas Concentration	G_c			
Area of Influence	I_A	10	m^c	Peckson, 1986 - CIRIA Report 149
Emmision Rate	q		$m^3/m^2/s$	Flow from Borehole*Gas Concentration/Area of Inf
Equilibrium gas concentration	C_E			Target Concentraion
Rate of Airflow for Equilibrium	Q		$m^3/m^c/s$	Q = q ((1-C_E)/C_E) BS5925:1991, Appendix B, equ
Area of Building Footprint	A		m^2	
Rate of Flow for Building	Q_T		m^3/s	Q_T = Q*A
Assumed Wind Speed	U_{50}		m/s	Figure 5, BS 5925:1991, pg.20
Ratio for 80% Wind	R			Table 9 (exposed (0.56),sheltered (0.46)), BS5925
Wind Speed 80% of time	U_m		m/s	Um = U_{50} * Ratio
Constant	k	0.35	Urban	Constant depending on terrain. Table 8, BS5925:1
Constant	a	0.25	Urban	Constant depending on terrain. Table 8, BS5925:'
Height of Vents Above Ground Level	Z		m	
Wind Speed at Height of Vents	U		m/s	U/Um = kZ^a (BS5925:1991, Equation 5,pg.18)
Surface 'A' (Vent Inlet)	S_A		Pa	BS 5925:1991, Table 13,pg.38
Surface 'B' (Vent Outlet)	S_B		Pa	BS 5925:1991, Table 13,pg.38
Pressure Coefficient	ΔC_p		Pa	$\bigtriangleup$Cp = 'A' + 'B' (0.6Pa stated in Gasflow 25 data s

Prepared by: [redacted] Scott McGregor **Checked by:** David Moore
Date: 17-Sep-24 **Date:**

MM-EC

Summary Table [redacted] Farm, Haywards Heath - Main House

		$A_{(inlet)}$	A_W	C_d	$Q_{W\,(individual)}$	No of Strips	Q_w (Total)
Airbrick		0.006	0.004242641	0.61	0.0006756	8	0.0054
Vent Box		0.006	0.004242641	0.61	0.0006756		0.0000
100mmϕPipe		0.0063	0.004454773	0.61	0.0007094		0.0000
110mmϕPipe		0.0095	0.006717514	0.61	0.0010697		0.0000
150mmϕPipe		0.01767	0.012494577	0.61	0.0019897		0.0000
250mm Void		4.94	3.493107499	0.61	0.5562482	1	0.5562
Gasflow 6mm	4.4 m wide	0.0132	0.00933381	0.61	0.0014863		0.0000
Gasflow 12mm	1.1m wide	0.0066	0.004666905	0.61	0.0007432		0.0000
Gasflow 12mm	4.4 m wide	0.0264	0.018667619	0.61	0.0029727		0.0000
Gasflow 25mm	0.45m wide	0.00585	0.004136575	0.61	0.0006587		0.0000
Gasflow 25mm	0.6m wide	0.0078	0.005515433	0.61	0.0008783		0.0000
Gasflow 25mm	0.900m wide	0.0117	0.008273149	0.61	0.0013174		0.0000
Gasflow 25mm	4.4m wide	0.0572	0.040446508	0.61	0.0064408		0.0000
Gasflow 50mm	0.45m wide	0.01485	0.010500536	0.61	0.0016721		0.0000
Gasflow 50mm	0.6m wide	0.0198	0.014000714	0.61	0.0022295		0.0000
Gasflow 50mm	0.915m wide	0.030195	0.021351089	0.61	0.0034		0.0000
System			0.047320634	0.61	0.0075354	1	0.0075

$Qw = Cd * Aw * U\ (\Delta Cp)^{0.5}$ BS 5925:1991, Section A, Table 11

Q_T/Q_W limiting factor

Notes

$A_{(inlet)}$ =	the open void area of the vent components supplied by Landline Ltd
A_W =	the effective equivalent area of single opposing vent components
C_d =	0.61 constant
$Q_{W\,(individual)}$ =	the calculated ventilation rate for single opposing vent component sets
No of Strips =	Input column for either number of components or ventilation provided by a number of component sets
Q_w (Total) =	Provide total ventilation rate for individual components (when 1 inserted in previous column) or for total system when total number of components
Q_T/Q_W =	Rate of flow required to maintain target gas levels divided by rate of flow provided by system (#DIV/0! = N/A)

Prepared by: Scott McGregor
Date: 17-Sep-24

[redacted]

Checked by: David Moore
Date: 17-Sep-24

MM-EC

Methodology for the design of gas protection measures

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CIRIA Report 659 Assessing Risks Posed by Hazardous Ground Gases to Buildings
DETR Research Report "Passive venting of soil gases beneath buildings

Details to be completed for each assessment

Project Title: [redacted] Farm, Haywards Heath - Office
Project No:

Completed by: Scott McGregor
Date: [redacted]

Design Gas: [redacted]xide
Maximum Concentration: [redacted]me
Target Concentration:

Prepared by: Scott McGregor [redacted]
Date: 17-Sep-24

Checked by: David Moore
Date: 17-Sep-24

MM-EC

Site Name [redacted] Farm, Haywards Heath - Office

Contaminant Gas C[redacted]de
Target concentration C_T [redacted]

Input Parameters	Variable	Value	Unit	Source of parameter value, or formula
Gas Flow	G_F	[redacted]	l/hr	
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Gas Concentration	G_c			
Area of Influence	I_A	10	m^c	Peckson, 1986 - CIRIA Report 149
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Equilibrium gas concentration	C_E			Target Concentraion
Rate of Airflow for Equilibrium	Q		$m^3/m^c/s$	Q = q ((1-C_E)/C_E) BS5925:1991, Appendix B, equ
Area of Building Footprint	A		m^2	
Rate of Flow for Building	Q_T		m^3/s	Q_T = Q*A
Assumed Wind Speed	U_{50}		m/s	Figure 5, BS 5925:1991, pg.20
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Wind Speed 80% of time	U_m		m/s	Um = U_{50} * Ratio
Constant	k	0.35	Urban	Constant depending on terrain. Table 8, BS5925:1
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Surface 'A' (Vent Inlet)	S_A		Pa	BS 5925:1991, Table 13,pg.38
Surface 'B' (Vent Outlet)	S_B		Pa	BS 5925:1991, Table 13,pg.38
Pressure Coefficient	ΔC_p		Pa	$\sum$Cp = 'A' + 'B' (0.6Pa stated in Gasflow 25 data s

Prepared by: [redacted] Scott McGregor **Checked by:** David Moore
Date: 17-Sep-24 **Date:**

MM-EC

Summary Table [redacted] Farm, Haywards Heath - Office

		$A_{(inlet)}$	A_W	C_d	$Q_{W\,(individual)}$	No of Strips	Q_w (Total)
Airbrick		0.006	0.004242641	0.61	0.0006756	6	0.0041
Vent Box		0.006	0.004242641	0.61	0.0006756		0.0000
100mmϕPipe		0.0063	0.004454773	0.61	0.0007094		0.0000
110mmϕPipe		0.0095	0.006717514	0.61	0.0010697		0.0000
150mmϕPipe		0.01767	0.012494577	0.61	0.0019897		0.0000
250mm Void		3.575	2.527906743	0.61	0.402548	1	0.4025
Gasflow 6mm	4.4 m wide	0.0132	0.00933381	0.61	0.0014863		0.0000
Gasflow 12mm	1.1m wide	0.0066	0.004666905	0.61	0.0007432		0.0000
Gasflow 12mm	4.4 m wide	0.0264	0.018667619	0.61	0.0029727		0.0000
Gasflow 25mm	0.45m wide	0.00585	0.004136575	0.61	0.0006587		0.0000
Gasflow 25mm	0.6m wide	0.0078	0.005515433	0.61	0.0008783		0.0000
Gasflow 25mm	0.900m wide	0.0117	0.008273149	0.61	0.0013174		0.0000
Gasflow 25mm	4.4m wide	0.0572	0.040446508	0.61	0.0064408		0.0000
Gasflow 50mm	0.45m wide	0.01485	0.010500536	0.61	0.0016721		0.0000
Gasflow 50mm	0.6m wide	0.0198	0.014000714	0.61	0.0022295		0.0000
Gasflow 50mm	0.915m wide	0.030195	0.021351089	0.61	0.0034		0.0000
System			0.04731866	0.61	0.0075351	1	0.0075

$Qw = Cd * Aw * U\ (\Delta Cp)^{0.5}$ BS 5925:1991, Section A, Table 11

Q_T/Q_W limiting factor

Notes

$A_{(inlet)}$ =	the open void area of the vent components supplied by Landline Ltd
A_W =	the effective equivalent area of single opposing vent components
C_d =	0.61 constant
$Q_{W\,(individual)}$ =	the calculated ventilation rate for single opposing vent component sets
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Q_T/Q_W =	Rate of flow required to maintain target gas levels divided by rate of flow provided by system (#DIV/0! = N/A)

Prepared by: Scott McGregor
Date: 17-Sep-24

[redacted]

Checked by: David Moore
Date: 17-Sep-24