Elemental GI Ltd

REPORT: GROUND GAS PROTECTION MEASURES VERIFICATION PLAN FOR SITE OFF FLEET ROAD, HOLBEACH ('PHASE 2' AREA)

CLIENT: GEDA CONSTRUCTION

Project No: E23180
Ref No: E23180/G/0

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GROUND GAS PROTECTION MEASURES VERIFICATION PLAN: SITE OFF FLEET ROAD, HOLBEACH ('PHASE 2' AREA)

CONTENTS

SITE / PROJECT SUMMARY

1.0 INTRODUCTION
1.1 Report Status
1.2 Report Objectives
1.3 Previous Reports
1.4 Site Description

2.0 GROUND GAS CLASSIFICATION
2.1 Summarised Overview of Ground Gas Protection Measures
2.2 Radon

3.0 DESIGN OF STRUCTURES
3.1 Sub-Floor Voids

4.0 GROUND GAS MEMBRANE
4.1 Specification

5.0 FITMENT OF GROUND GAS PROTECTION MEASURES
5.1 Fitment Proposals
5.2 Comment

6.0 RISK ASSESSMENT OVERVIEW
6.1 Risk Assessment
6.2 Risk Assessment Comment

7.0 VERIFICATION PROPOSALS
7.1 Frequency of Inspections
7.2 Inspection Strategy
7.3 Independent Verification Inspections
7.4 Further Works

APPENDICES

I PROPOSED LAYOUT AND DESIGN DETAIL DRAWINGS

II SPECIFICATION & TECHNICAL DATA SHEETS

III VISUAL INSPECTION CHECKLIST SHEET

Site / Project Summary

The reader is referred to the terms and conditions which accompany this report (and all related reports). A copy of our terms and conditions are presented at the end of this document. Please refer to the terms and conditions shown at the end of this report for an important list of exclusions / assumptions etc.

Proposed Development	The Client intends to build residential dwellings at the site, including associated access roads, driveways, paths and public 'open space' areas.
Ground Gas Conceptual Site Model Summary	Potential sources of ground gas have been identified comprising 'gas generated from made ground or natural soils'. Ground gas from these sources may be able to migrate through soils and other preferential pathways. The main receptors identified comprise the future residents and their homes.
Ground Gas Classification	A 'CS2' classification has been confirmed for the site based on a ground gas monitoring programme completed by the third party.
Proposed Verification Summary	Please see Section 7.0 of this report.

1.0 INTRODUCTION

1.1 Report Status

This report has been written in accordance with the following guidance documents:

- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings (2007);
- NHBC Report Edition No: 4 Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007);
- CIRIA C735 Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases (2014); and
- British Standard 8485:2015+A1:2019: Code of practice for the design of proactive measures for methane and carbon dioxide ground gases for new buildings (2019).

Other guidance and 'best practice documents' have also been used where relevant (e.g. YALPAG Guidance).

1.2 Report Objectives

A third party (Ground Engineering Ltd) have undertaken site investigation works and have provided a ground gas classification for the site. Further discussion and / or assessment of the findings and classification is beyond the remit of this report, which is intended to provide a specification for ground gas protection measures and the verification thereof.

Elemental GI Ltd have been appointed to provide this pre-verification plan by the Client. This has been prepared in accordance with the reports listed in Section 1.1 above, and describes the site's ground gas classification, required gas protection measures and proposed steps for verification of the successful installation of these gas protection measures.

Should the development proposals alter, then the recommendations in this report may be subject to change. Whilst it may be utilised by others for reference purposes at the Client's discretion, it has not been prepared for any other purposes and therefore additional works may be required by third parties dependent upon their own requirements / works.

All recommendations are subject to the approval of the relevant Regulatory Authorities, and copies of this document should be submitted for approval by the Client before the start of any works on site.

1.3 Previous Reports

Elemental GI Ltd have been supplied with copies of the following document by the Client which relates to the subject site:

- Ground Engineering: Updated Ground Investigation Report, Phase 2- Land off Fleet Road, Holbeach (Ref. C15929A dated Sep. 2023)

The above referenced document has not been reproduced herein, and it must be referred to in full alongside this report.

In addition to the third party report referenced above, Elemental GI Ltd have undertaken an additional soil sampling exercise at the site which included a brief summary of the existing ground gas classification (Letter Report: E23180: Summary of Recent Supplementary Environmental Investigation Works at Site off Fleet Road, Holbeach ('Phase 2' Area) (Ref. E23180/STLR dated 3rd October 2023). Sections relating to ground gas are reproduced below:

"The third party noted the following with regards to the site's ground gas conceptual site model:

"According to the environmental database there are no landfills recorded within 250m of the site. The site is generally underlain by a thin layer of made ground, covering variable Tidal Flat Deposits and in turn Marine Sand at depth."

The monitoring undertaken by the third party was reported as follows:

> *"The results of soil gas monitoring of the installations within BH1 and BH2 during the return visits in April to June 2023, found up to 4.5% methane and up to 16.3% carbon dioxide, with locally reduced atmospheric oxygen levels. The in-situ measurements recorded flow rates of less than 0.1l/hr. The results are tabulated following the borehole records. These in-situ measurements indicate a gas screening value (GSV) of 0.0045l/h for methane, and 0.0163l/h for carbon dioxide.*
>
> *These GSVs fall within Characteristic Situation CS1 as defined by BS8485:2015+A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings', however with methane concentrations exceeding 1.0% volume on all four visits (BH1), and carbon dioxide exceeding 5.0% volume on the last two visits (BH2), it is recommended that Characteristic Situation CS2 is adopted. Based on these levels, gas protectionary measures are required for the proposed dwellings on this site. It is recommended that at least two additional gas monitoring visits are undertaken, preferably with at least one visit during a period of low and falling atmospheric pressure, to further characterise the gas regime on the site.*
>
> *These results indicate a low hazard potential, and that gas protection measures such as reinforced floor slabs and ventilation protection measures should be adopted, with further details provided in BS8485:2015."*

A copy of the third party's ground gas records is presented within their report, which should be referred to in full…

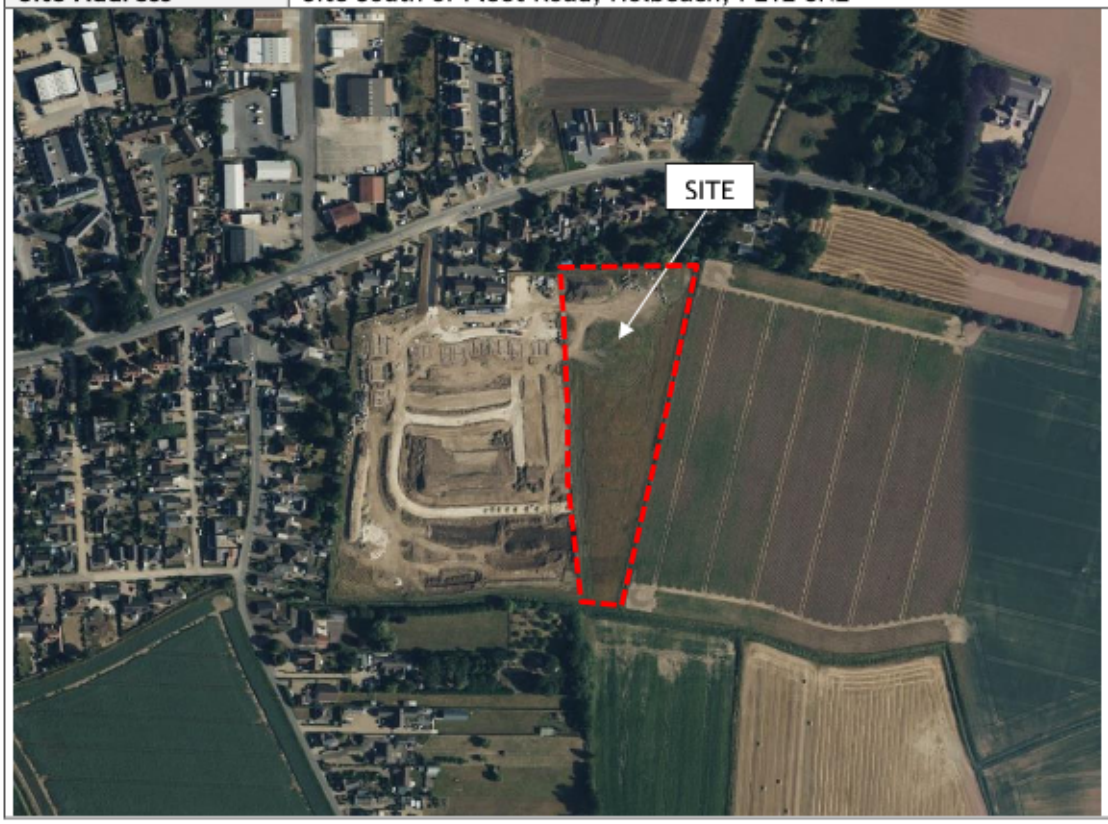
It is recommended that a ground gas verification plan is prepared for the plots at 'Phase 2' which will confirm the details of the required protection measures alongside the proposals for verification. Please send us copies of the design details (inc. floor slab cross-sections, membrane specifications and fitter appointment / selection details) so that this may be drafted in advance of construction works."

1.4 Site Description

Reference should be made to the previous reports relating to this site for a full description of its geo-environmental setting, ground conditions and surroundings. However, the address and location of the subject site are shown in Table 1.0 below:

Table 1.0: Site Location and Dimensions

Site Address	Site South of Fleet Road, Holbeach, PE12 8NZ



2.0 GROUND GAS CLASSIFICATION

2.1 Ground Gas Monitoring

The previous third party report for the site has defined a CS2 classification.

It is understood that this is based on the following results which were recorded at the site during their four ground gas monitoring visits at their installations 'BH1 and BH2':

- Ground Gas Flow Rates (Max) = <0.1 l /hr;
- Carbon Dioxide Concentration (Max) = 16.3 %v/v;
- Methane Concentration (Max) = 4.5 %v/v.

A review of the results obtained by the third party throughout their monitoring visits indicated the following additional trends / observations:

- Methane was not generally recorded above 0.1% v/v in monitoring well BH2;
- During the first 2 No. visits, elevated carbon dioxide was not recorded within monitoring well BH2, after which it was recorded at concentrations between 10.8%v/v and 16.3% v/v. This pattern was also noted for oxygen within this monitoring well, which was around 13 to 14% v/v during the first 2 No. visits and subsequently 'fell' to less than 1.0% v/v;
- The fourth / final visit by the third party recorded the highest concentrations of methane and carbon dioxide from all 4 No. visits, and also recorded the lowest oxygen concentrations;
- Water levels within the monitoring wells generally 'fell' over the duration of the visits, being typically 0.90m deeper on the fourth visit compared to the first; and
- The water levels during the first monitoring visit were just below 1.00m depth. The response zones for the installations were 1.00m to 6.00m for 'BH1' and 1.00m to 6.00m for 'BH2'.

2.2 Summarised Overview of Ground Gas Protection Measures

The following protection measures / steps are being incorporated into new dwellings at the site to reduce / mitigate the risks associated with the ingress of gas into buildings from the ground:

- Presence of sub-floor voids;
- Venting of sub-floor voids;
- Presence of ground gas membrane beneath floor;
- Presence of membrane extended through cavity;
- Presence of bespoke details around service penetrations / thresholds etc.

The specification / details of each of the above are presented in the subsequent sections of this report.

2.3 Radon

The third party report stated that:

"The property is not in a Radon Affected Area, as less than 1% of properties are above the action level.

No Radon Protective Measures are required for new properties or extensions."

3.0 DESIGN OF STRUCTURES

3.1 Sub-Floor Voids

Elemental GI Ltd have been sent representative design detail drawings by the Client. A copy of these drawings is presented in Appendix II.

The drawings which have been provided have been reviewed and the following is noted:

- A continuous barrier is shown across the floor area which extends through the cavity;
- Sub-floor voids are shown which are vented to external areas through periscope venting;
- A selection of recognised brand products are to be chosen for selection / installation within the construction relating to the ground gas protection measures.

4.0 Ground Gas Membrane

4.1 Specification

Elemental GI Ltd have been informed that a combination of products shall be used within the construction of the plots at the subject site, including the following:

- JUTA 'GP1' membrane;
- Visqueen Double Sided Tape (10mm x 50mm) or similar;
- Visqueen Zedex CPT DPC site formed cavity tray or similar.

Specification / technical data sheets for these products (where available) are presented in Appendix III.

5.0 FITMENT OF GROUND GAS PROTECTION MEASURES

5.1 Fitment Proposals

The Client has informed Elemental GI Ltd that a specialist fitter has been appointed to fit all gas protection measures at the site. This is:

- Omega Lining Solutions Limited.

It is understood that the fitters shall hold sufficient qualifications (NVQ or similar) and be sufficiently experienced.

It is also understood that the specialist fitters shall keep a record of their own works including (but not limited to) daily site record sheets, a photographic record of their works and listed records of any defects noted before, during or after installation.

5.2 Comment

Elemental GI Ltd are aware of Omega Lining Solutions Ltd as a reputable and well-established specialist fitter, and at this stage we have no concerns relating to their competency or capability to install ground gas protection measures at the subject site.

6.0 RISK ASSESSMENT OVERVIEW

6.1 Risk Assessment

In accordance with our standard risk assessment methodology the following potential risks have been identified at this stage in relation to the installation of ground gas protection measures:

Table 6.1: Risk Assessment (Protection Measures)

Potential Risk	Specific Concern	Potential Impacts	Comment / Risk Rating
Incorrect Ground Gas Classification	• Potential Ground Gas Monitoring / Classification Inadequacies	• Inaccurate estimate of risks from ground gas	Risks VERY LOW Our Review Indicates That the Classification is Conservative
Incorrect Installation of Protection Measures	• Potential Ground Gas Migration Pathways Present	• Ground Gas Migration Risks Increase	Risks LOW A Specialist Fitter Has Been Appointed
Incorrect / Inadequate Structural Mitigation	• Incorrect Installation of Venting	• Accumulation of Ground Gas • Ground Gas Migration Risks Increase	Risks LOW A Specialist Fitter Has Been Appointed, Venting Present / Designed
Venting Blockages	• Blockage of External Vents	• Accumulation of Ground Gas • Ground Gas Migration Risks Increase	Risks LOW Designs Indicate That Extensive External Venting Will Be Present Around Plots
Damage After Installation	• Damage to Membrane etc. From Building Works	• Ground Gas Migration Risks Increase	Risks LOW to MODERATE Site Managers to Maintain Signage and Regular Inspections

6.2 Risk Assessment Comment

The original ground gas monitoring and classification has been received. If the Client has not done so already it is recommended that they forward copies of this to the regulators / warranty providers to confirm their approval.

The appointment of specialist fitters significantly reduces the risks associated with incorrect installation of the ground gas protection measures.

There is a residual risk of damage to ground gas protection measures after inspections, and therefore it is reiterated that all ground gas protection measures must be thoroughly and comprehensively protected from damage after installation. Any damage that occurs must be notified to the specialist fitter and to Elemental GI Ltd immediately and prior to the completion of any further construction works.

7.0 VERIFICATION PROPOSALS

In accordance with the latest NHBC guidance, BS 8485:2015 and CIRIA C735, appropriate verification should be undertaken to ensure that the required ground gas protection measures have been correctly installed and maintained (i.e. to prevent damage etc.) for all required structures at the site. It is recommended that site staff develop, maintain and update an appropriate installation and verification site record folder in accordance with the aforementioned guidance documents to complement this.

The following verification proposals are recommended for the site in accordance with the guidance documents listed in Section 1.1 of this report:

- NHBC General Requirements:
  - Verification (Construction Drawings) – Showing position of membrane; sealing details and ventilation points to be provided.
  - Verification (Membrane Specification) – Technical data sheet(s) for gas membrane (including gas permeability data) to be provided.
  - Verification (Installation) – Photographic evidence of installed membrane may be requested.
- CIRIA C735 Requirements (assuming that the gas protection measures and most importantly the membrane were installed by a qualified and experienced installer):
  - Verifier (consultant or third party qualified and experienced installer) to conduct a thorough visual verification inspection prior to 25% - 50% of concrete pours (min. one visit, installer to supply sign-off sheets (verification evidence) including photographs to independent verifier for other pours.

7.1 Frequency of Inspections

Based on the above it is recommended that an independent engineer is invited to site to inspect the gas protection measures prior to the pouring of concrete / 'screed' for the very first plots, and then for at least 50% of the remaining plots at regular and representative intervals.

For clarity the engineer should **not** be invited solely for the very first and very last plots, and they must attend the site at regular intervals during the construction works.

7.2 Inspection Strategy

As outlined in previous sections of this report, the following personnel shall be responsible for the inspection of ground gas protection measures:

- Site Manager / Site Team: Regular Inspections of Structural Components:
  - Thickness of sub-floor void;
  - Absence of debris / rubbish etc. in sub-floor void (i.e. any materials which may inhibit ventilation);
  - Correct installation of periscope venting;
  - Presence of signage and inclusion of membrane protection awareness and defect / damage reporting within site inductions and on site notice boards;
  - Completion of inspections to identify damage / defects following installation.
- Specialist Fitters: Inspection of Protection Measure Materials;
  - Record of works on daily site sheets;
  - Record of deviations / defects / damage;
  - Pre-Inspection of membrane across flooring areas (absence of defects / damage, correct spec. of membrane and associated tapes etc.);
  - Placement of warning signs around works areas after fitting is complete;
- Independent Verification Engineer: Inspection Of Ground Gas Protection Measures After Installation.
  - Inspection of sub-floor void (in representative plots / areas of site);
  - Inspection of venting (correct construction, absence of blockages etc.);
  - Inspection of membrane across flooring areas (absence of defects / damage);
  - Inspection of cavity details void (in representative plots / areas of site);
  - Inspection of corner and threshold details;
  - Inspection of service penetrations / exit details;
  - Record of works on site visit sheets.

7.3 Independent Verification Inspections

A copy of Elemental GI Ltd's visual inspection checklist sheet is presented in Appendix IV.

7.4 Further Works

The Client must send a copy of this report to the regulators (Council, warranty providers etc.) ***in advance of the start of construction / fitting works*** to confirm that they are satisfied with the steps recommended herein.

Terms and Conditions

We have obtained and reviewed information relating to the site, but this may not be complete, and liability cannot be accepted for information not available to Elemental GI Ltd at the time of writing this report. This report has been written in consideration of construction / development proposals (or similar) as described in Section 1.0 of this report. If any of these proposals change (e.g. layout), then this report may be subject to change.

This report has been prepared for the sole use and reliance of the Client. No other third party may rely upon or reproduce the content of this report without our prior written approval. If any unauthorised third party comes into possession of this report, they rely upon it entirely at their own risk and the authors do not owe them any warranty, duty of care or skill.

Our report, including the conclusions and recommendations, are considered reasonable based on the findings of the previous reports. However, these cannot be guaranteed to gain regulatory approval and therefore the Client should submit it to them (as necessary) for their comments and approval prior to undertaking any irrecoverable works associated with the subject site.

The conclusions and recommendations presented herein are considered reasonable based on the assessments of the site undertaken by Elemental GI Ltd. However, these cannot be guaranteed to gain regulatory approval and therefore copies of this report should be sent to the appropriate regulatory authorities and / or other organisations (as appropriate) by the Client for their comments and approval prior to undertaking any irrecoverable works associated with the site.

The possibility of significant variation in ground conditions existing between / beneath test locations / depths cannot be discounted and must be considered within the design proposals for the subject site. All soakaway designs should be approved by the relevant statutory authority prior to implementation and must adhere to the standard design and ground setting requirements, upon which your appointed drainage design engineers should advise you. Where comments / recommendations have been made relating to specific depths it cannot be guaranteed that ground conditions shall be similar at surrounding / underlying depths, which should be taken into consideration as necessary by other.

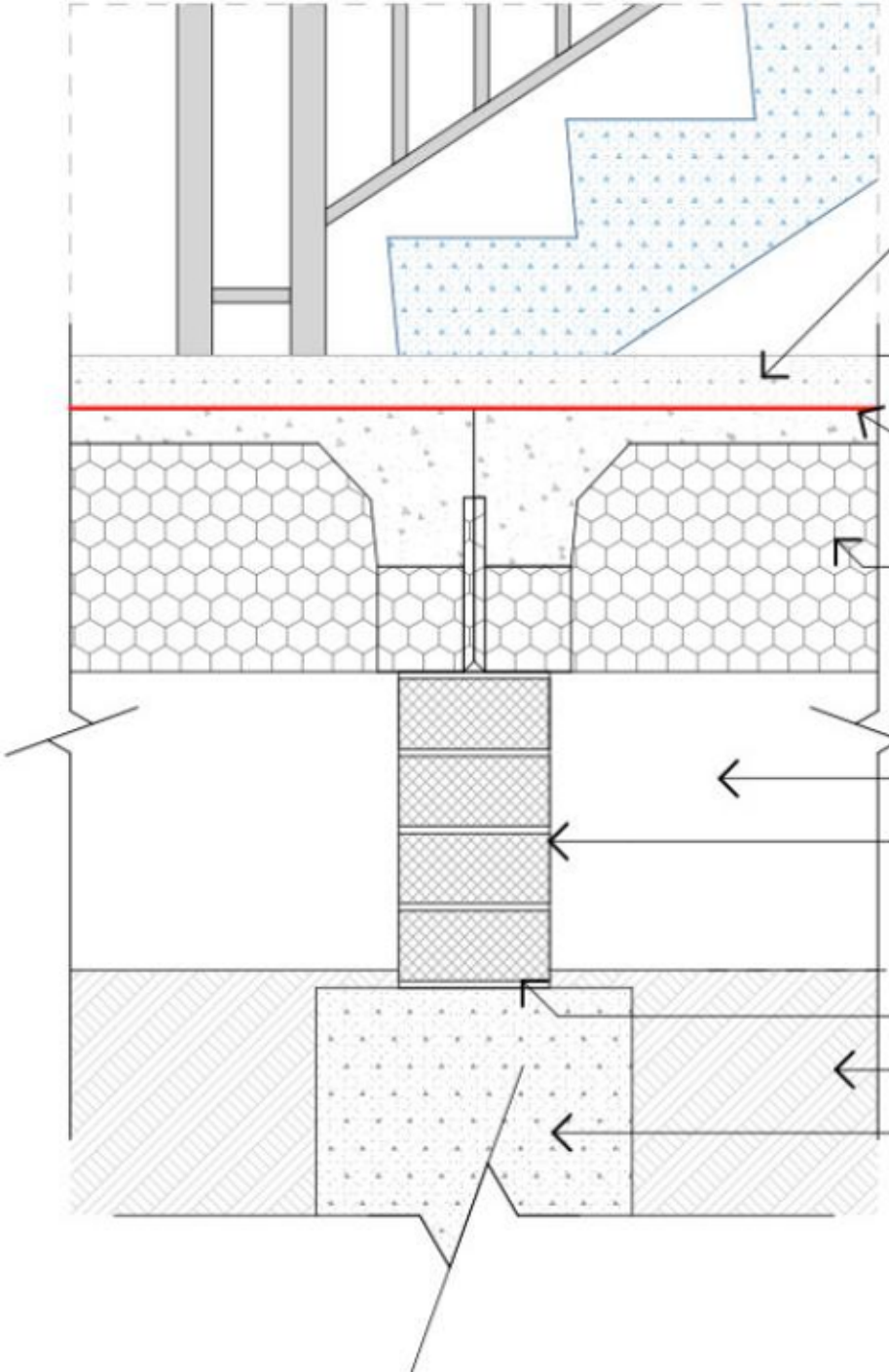
With respect to the document to which this sheet is appended, the warranty provided with our works / reports etc. shall only apply once all invoices that we have sent in relation to the same site / project discussed herein (i.e. the site discussed within this document) have been paid by the Client.

APPENDIX I

PROPOSED LAYOUT AND DESIGN DETAIL DRAWINGS



CLIENT:	TITLE:	DATE:	SCALE@SIZE:	
GEDA	Proposed Site Layout Plan	Sep. 2023	NOT TO SCALE	Elemental GI Ltd
		DRAWING No: E23180_001	DESIGN/DRAWN: JR	



75mm cement/sand screed above precast floor unit above **gas membrane (DPM)** as per floor supplier's requirements

SEE ELEVATIONS FOR LEVEL AOD
FFL - TOP OF SCREED

Gas membrane (DPM) between precast floor unit and screed. Membrane to comply with CS2 gas ground protection measures as stipulated by NHBC. To be linked to external wall **primary DPC** via **cavity tray**. Lap tape to be installed as per supplier's specification. All to be certified and installed as per manufacturer's instructions. To be verified in accordance with CIRIA C735

Nuspan NU G375 (or similar approved) insulated precast unit floor system installed in accordance with manufacturers details, to achieve a target U-Value of 0.11W/m^2K as per SAP assessment

Min. 150mm ventilation void below precast unit floor system to comply with NHBC Standards

Blockwork strengths and density to be in strict accordance Structural Engineer's detail drawings and recommendations

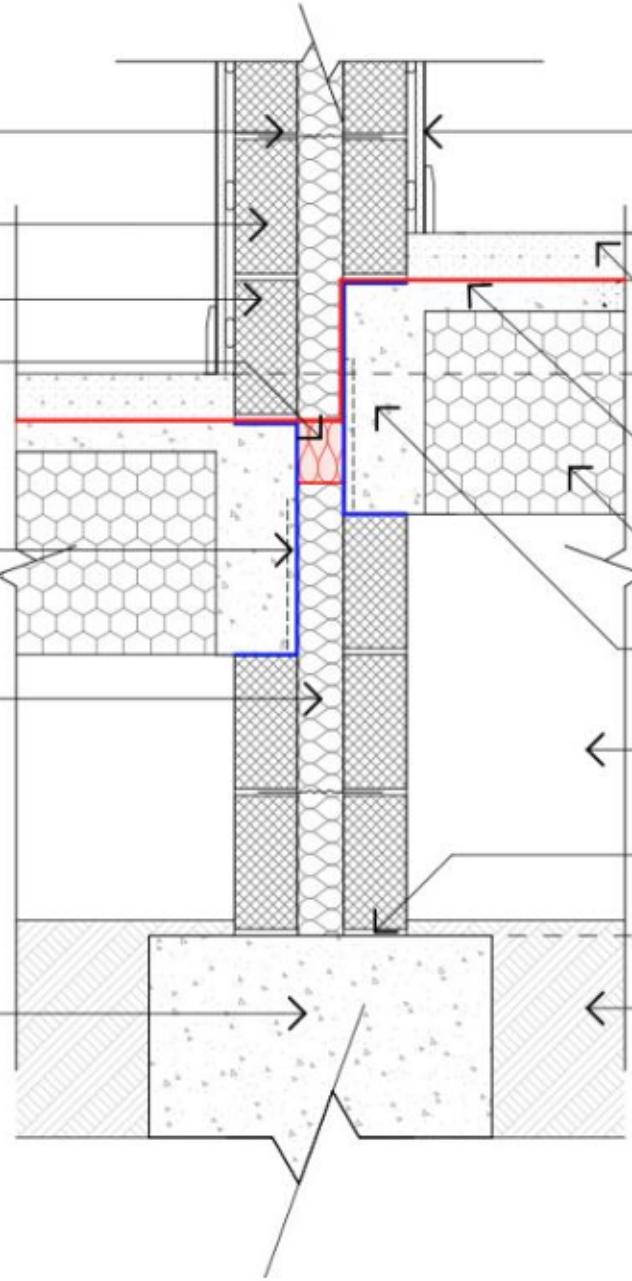
SEE ELEVATIONS FOR LEVEL AOD
TOP OF GROUND BEAM

All mortar joints below ground to be 10mm thick as standard for Party Walls

Earth

Ground beam and pile shown indicatively. Foundations to be in strict accordance with Structural Engineer's details and recommendations

PARTY WALL TYPE A



Cavity wall ties to Structural Engineer's details and recommendations - vertical setting out of ties shown indicatively

Party Wall Type A to be Robust Detail E-WM-17. 75mm wide cavity to be fully filled with Isover RD Party Wall Roll insulation ***ONLY***. To be in strict accordance with Robust Details' specification and recommendations - refer to wall legend

Blockwork strengths and density to be in strict accordance Structural Engineer's detail drawings and recommendations

Proprietary insulated fire stop to close cavity. To be installed in line with separating floor for compartmentation as per Robust Details guidance

DPC laid under floor unit to be continued up cavity and lapped with **DPM**

Insulation below **DPC** to be suitable for below ground use

Ground beam and pile shown indicatively. Foundations to be in strict accordance with Structural Engineer's details and recommendations

NOTE:
Detail applies to all other party wall types where applicable

12.5mm plasterboard (nominal 8kg/m²) mounted on dabs with 2.5mm skim finish

SEE ELEVATIONS FOR LEVEL AOD
FFL - TOP OF SCREED (UPPER)

75mm cement/sand screed above precast floor unit above **gas membrane (DPM)** as per floor supplier's requirements

SEE ELEVATIONS FOR LEVEL AOD
FFL - TOP OF SCREED (LOWER)

Gas membrane (DPM) between precast floor unit and screed. Membrane to comply with CS2 gas ground protection measures as stipulated by NHBC. To be linked to external wall **primary DPC** via **cavity tray**. Lap tape to be installed as per supplier's specification. All to be certified and installed as per manufacturer's instructions. To be verified in accordance with CIRIA C735

Nuspan NU G375 (or similar approved) insulated precast unit floor system installed in accordance with manufacturers details, to achieve a target U-Value of 0.11W/m²K as per SAP assessment

Floor unit and masonry party wall to be laid in accordance with Appendix A2 of the Robust Details Handbook

Min. 150mm ventilation void below precast unit floor system to comply with NHBC Standards

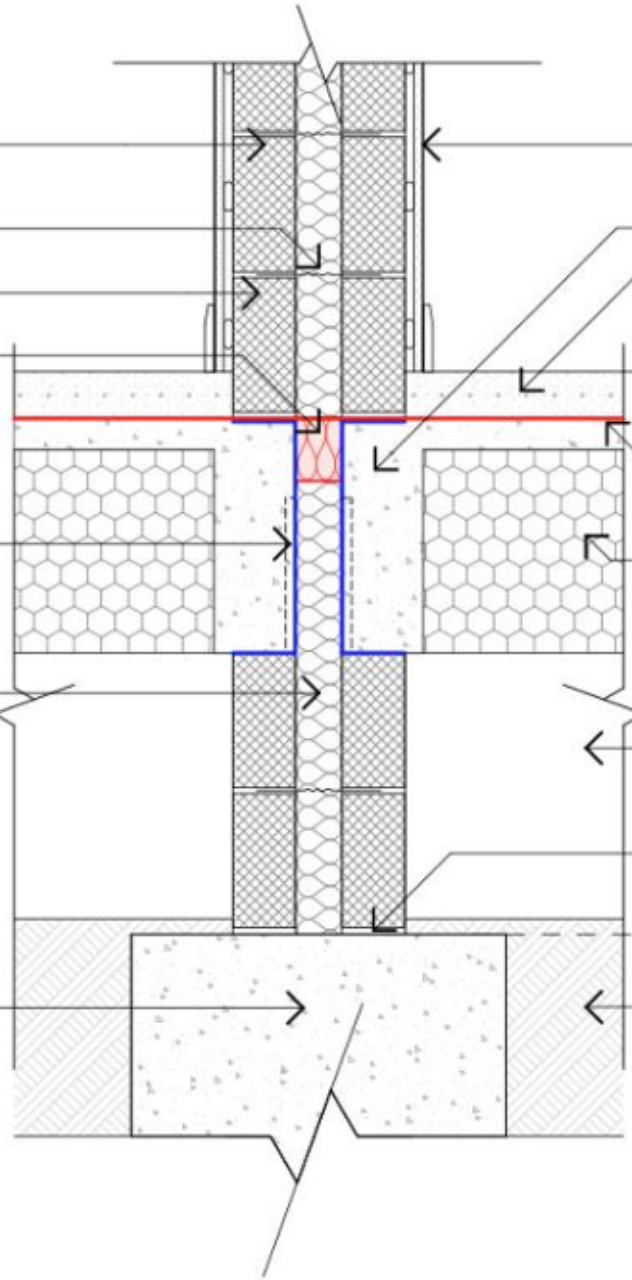
All mortar joints below ground to be 10mm thick as standard for Party Walls

SEE ELEVATIONS FOR LEVEL AOD
TOP OF GROUND BEAM

Earth

Scale

Pparty wall type a



Party Wall Type A to be Robust Detail E-WM-17. 75mm wide cavity to be fully filled with Isover RD Party Wall Roll insulation ***ONLY***. To be in strict accordance with Robust Details' specification and recommendations - refer to wall legend

Cavity wall ties to Structural Engineer's details and recommendations - vertical setting out of ties shown indicatively

Blockwork strengths and density to be in strict accordance Structural Engineer's detail drawings and recommendations

Proprietary insulated fire stop to close cavity. To be installed in line with separating floor for compartmentation as per Robust Details guidance

DPC laid under floor unit to be continued up cavity and lapped with **DPM**

Insulation below **DPC** to be suitable for below ground use

Ground beam and pile shown indicatively. Foundations to be in strict accordance with Structural Engineer's details and recommendations

NOTE:
Detail applies to all other party wall types where applicable

12.5mm plasterboard (nominal 8kg/m^2) mounted on dabs with 2.5mm skim finish

Floor unit and masonry party wall to be laid in accordance with Appendix A2 of the Robust Details Handbook

75mm cement/sand screed above precast floor unit above **gas membrane (DPM)** as per floor supplier's requirements

SEE ELEVATIONS FOR LEVEL AOD
FFL - TOP OF SCREED

Gas membrane (DPM) between precast floor unit and screed. Membrane to comply with CS2 gas ground protection measures as stipulated by NHBC. To be linked to external wall **primary DPC** via **cavity tray**. Lap tape to be installed as per supplier's specification. All to be certified and installed as per manufacturer's instructions. To be verified in accordance with CIRIA C735

Nuspan NU G375 (or similar approved) insulated precast unit floor system installed in accordance with manufacturers details, to achieve a target U-Value of 0.11W/m^{2}K as per SAP assessment

Min. 150mm ventilation void below precast unit floor system to comply with NHBC Standards

All mortar joints below ground to be 10mm thick as standard for Party Walls

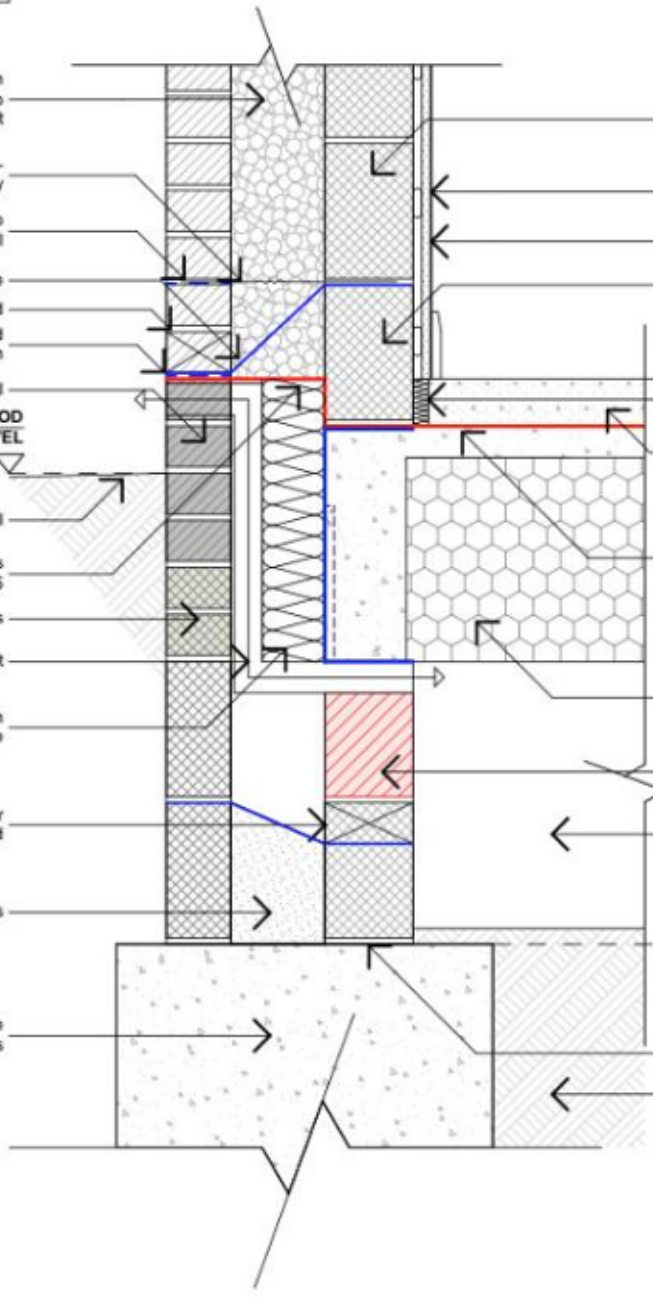
SEE ELEVATIONS FOR LEVEL AOD
TOP OF GROUND BEAM

Earth

Scale

EXTERNAL WALL TYPE A

NOTE:
Detail applies to all other external wall types where applicable



External Wall Type A - refer to wall legend. 150mm wide cavity to be fully filled with Springvale Ecobead Platinum insulation (0.033W/m²K) or similar approved. To achieve a target U-Value of 0.23 W/m²K as per SAP assessment

Proprietary cavity wall ties to Structural Engineer's details and specification - vertical setting out of ties shown indicatively

Secondary **DPC** level, to extend min of 1m either side beyond window / door to ensure min. 150mm from ground to DPC level

2000 gauge polythene **cavity tray** to direct water/moisture to weephole

Weephole at every third perpend

Continuous **primary DPC** set a minimum height of 150mm above finished ground level. **Gas membrane** to taken through wall to be linked to **DPC** as shown

Minimum 4no. red engineering brick courses below DPC to external wall

SEE ELEVATIONS FOR LEVEL AOD
GROUND LEVEL

All ground to be laid to fall away from building at 1:40 minimum fall

Gas membrane (DPM) to be continuous and form drip. All in accordance with gas membrane specialist details and verified in accordance with CIRIA C735

1no. x 140mm coursing block or 2no. x 65mm coursing blocks

Periscopic vent

High performance rigid insulation to continue behind periscopic vent. Insulation below **DPC** to be suitable for below ground use

Weephole at every third perpend to allow moisture to drain from cavity into sub-floor void

Lean mix to cavity laid to fall to inner leaf to allow cavity to drain through weepholes

Ground beam and pile shown indicatively. Foundations to be in strict accordance with Structural Engineer's details and recommendations

Inner leaf blockwork to be 140mm wide. Mortar joints to be 10mm thick to facilitate coursing with outer leaf brick masonry. Blockwork strengths and density to be in strict accordance Structural Engineer's detail drawings and recommendations

Any additional voids in external walls (e.g. for services) tbc by specialist M&E designer

12.5mm plasterboard (nominal 8kg/m²) mounted on dabs with 2.5mm skim finish

First block course to be laid on 10mm mortar joint, followed by 10mm joints between blocks to facilitate coursing with outer leaf brickwork

SEE ELEVATIONS FOR LEVEL AOD
FFL - TOP OF SCREED

25mm thick perimeter insulation strip to reduce potential cold bridge

75mm cement/sand screed above precast floor unit above **gas membrane (DPM)** as per floor supplier's requirements

Gas membrane (DPM) between precast floor unit and screed. Membrane to comply with CS2 gas ground protection measures as stipulated by NHBC. To be linked to external wall **primary DPC** via **cavity tray**. Lap tape to be installed as per supplier's specification. All to be certified and installed as per manufacturer's instructions

Nuspan NU G375 (or similar approved) insulated precast unit floor system installed in accordance with manufacturers details, to achieve a target U-Value of 0.11W/m²K as per SAP assessment

Cut blocks as necessary below side of periscopic vent

Min. 150mm ventilation void below precast unit floor system to comply with NHBC Standards.

SEE ELEVATIONS FOR LEVEL AOD
TOP OF GROUND BEAM

All mortar joints to be below ground to be 10mm thick to underside of floor unit

Earth

Scale

APPENDIX II

SPECIFICATION & TECHNICAL DATA SHEETS

GROUND GAS PROTECTION
GP®1 TECHNICAL DATA SHEET

JUTA | TITANTECH



GP®1

GP®1 proprietary gas resistant damp proof membrane (DPM) is a multi-layer, low density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil. GP®1 is specifically designed and manufactured to perform as a methane, carbon dioxide, radon, ground gas, air & moisture protection system.

Thickness	0.6 mm
Width	Various m
Length	Various m
Weight	370 g/m²

TITANTECH®
For developers of brownfield and contaminated sites the TITANTECH® family of products represent a major step forward in safeguarding projects against gaseous and chemical contamination.

Handling
Roll weights can be in excess of 20 kg and hence appropriate care and equipment is required for unloading and handling.

Storage
Rolls of GP®1 should be stored on stable/level ground and stacked not more than five rolls high, with no other material stacked on top. The rolls can be stored outdoors when packaged, but should be protected from exposure to UV.

Installation
GP®1 should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015.

BBA
CE UK CA

GROUND GAS PROTECTION
GP®1 TECHNICAL DATA SHEET

GP®1

Feature	Characteristics	Test Method	GP®1
Physical Properties	Thickness	EN 1849-2	0.6 mm
	Thickness - between Scrim	BS EN ISO 9863-1:2016	0.4 mm
	Width	EN 1849-2	Various m
	Length	EN 1849-2	Various m
	Weight	EN 1849-2	370 g/m²
Hydraulic Press	Water Column	EN 20811	> 300
	Resistance to Water Penetration	EN 13967, EN 1928	Pass
	Water Tightness	EN 11296, EN 1367, EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	20 kg
	Tensile Strength (MD)	EN 12311-1	600 N/50mm
	Tensile Strength (CMD)	EN 12311-1	480 N/50mm
	Tensile Elongation (MD)	EN 12310-1	20%
	Tensile Elongation (CMD)	EN 12310-1	20%
	Puncture Resistance	EN 12236	1.25 kN
	Resistance to Tearing (Nail Shank) MD	EN 12310-1	330 N
	Resistance to Tearing (Nail Shank) CMD	EN 12310-1	400 N
Durability and Chemical Resistance	Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	0.246 g/m²/h
	Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	0.571 g/m²/h
	Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	0.583 g/m²/h
	Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	0.135 g/m²/h
Gas Permeability	Methane Permeability	BS EN ISO 15105-1	< 0.09 ml/m²/day/atm
	Carbon Dioxide Permeability	BS EN ISO 15105-1	< 0.09 ml/m²/day/atm
	Radon Permeability	K124/02/95	8.0 x 10^{-15} m²/s
Compliance and Certification	CE Mark - EN13967:2012 (A1 2017)		
	NHBC Standards Compliant		
	Conforms to BS 8485:2015 + A1 2019		
	BBA Certified - Certificate No. 20/5728		

JUTA UK

Please contact JUTA UK Directly for more information on GP®1

Jointing and Sealing

It is recommended GP®1 be heat welded where possible, with welding carried out by competent personnel with suitable qualifications in accordance with best practice, and guidance contained within BS 8485:2015.

Accessory Products

- GP®1 Starter Band
- GP® Tape
- GP® Self Adhesive Membrane
- GP® Primer
- GP® Top Hats and Preformed Corners
- GP® Protection Fleece
- GP® Void Vent (24/40mm)

APPENDIX III

VISUAL INSPECTION CHECKLIST SHEET

Elemental GI Ltd

VISUAL INSPECTION OF GROUND GAS PROTECTION MEASURES

Site Name:	
Project Code:	
Date of Visit:	
Name of Engineer:	
Weather:	
Gas Characteristic Situation:	
Type of Development / Building and Foundation:	
Who Fitted the Gas Protection Measures?:	
Gas Protection Measures:	

Please see sheet 3 for notes / reminders for Items 1.1 to 2.3

No.	Item:	Comments:
1: Gas Membrane		
1.1	Condition of Sub-Grade/Underside of Membrane	
1.2	Gas Membrane Type	
1.3	Gas Membrane Condition	
1.4	Joining Tape Product	
1.5	Lapping Design	
1.6	Laps / Welds / Joint Seals	
1.7	Service Entry Seals	
2: Passive Venting		
2.1	Sub-Floor Void	
2.2	External Air-Bricks	
2.3	Internal Sleeper Walls	
2.4	External Vent Trenches / Ducts	

Photographic Record	
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:
Ref:	Note for Comment / Record:

Inspection Summary	
The Gas Protection Measures Inspected During This Visit Are:	
Are Acceptable and Comply with the Specification	
Are Acceptable But Attention Is Drawn to the Following Issues:	
Issues Noted here	
Are Not Due to the Following Issues:	
Issues Noted here	