GeoEnginSeer

FREELANCE DILETTANTE GEOLOGIST

19A & B Burnside Close, Batley, West Yorkshire, WF17 0NS

Verification Completion Report for Basic Radon Ground Gas Protection System

Date	18.09.2024

Project Title	19A&B Burnside Close, Batley GESL Job Ref: 1672 Report 1779 V3
Date of Visit	31.07.2024 V3 dated: 27.9.24
Client	T Dunford
Weather	26oC cloudy no wind 0 kmph
Development Type	Residential
Foundation Type	Reinforced Slab
Plot Numbers	Whole foundation base liner (2 semi-detached properties)
Visit By	Ben Crowther

Report By	**Checked/Approved By**
Signature	*Signature*
Name: Mairead Morony	*Name: Ben Crowther*

Company Contact Details

Dunford Developments,
19a Burnside Close
Batley, West Yorkshire,
WF17 0NS

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
For and on behalf of geoenginseer.
www.Geoenginseer.co.uk 07817108921

1. GAS MEMBRANE

1.1 Condition Of Subgrade and Underside Of Gas Membrane

Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.

Subgrade appeared to have been clean rolled hardcore, no debris or sharp objects protruding into membrane.

1.2 Gas Membrane Type

Manufacturer and product specification, gauge, colour, brand/name, material batch/roll numbers.

Frank Mercer: Toughsheet: Radon Barrier. Details and link below.

[redacted] [redacted]

1.3 Laps, Welds and Joint Seals

Joints lapped and sealed in accordance with manufacturers requirements/specification. Minimum overlap insured? Welds complete? Appropriate joining/double sided tape used?

Joints had been taped together using Double Sided Jointing Tape.

1.4 Service Entries Seals

How many pipe penetrations? Top hats seal arrangements fixed around service entries? Use of jubilee clips? Etc.

No Penetrations, this is a Basic Radon protection with reinforced concrete slab.

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2. VENTILATION SYSTEMS

2.1 Subfloor Void

Is a check possible? Void former? Gravel (type/specification)? Height of void space? Is it clear?

NA

2.2 External Wall Airbricks

How many? Size? Positioning? Spacing? Etc.

NA

2.3 Active Venting

Type of air supply: mechanical, natural, combined? Location/condition/number of fans/vents? Location and size of inlets? Provision of air cleaning devices and air heaters? Supply and exhaust duct work? Alarm provision/installation? Gas monitoring system in under-floor void?

NA

2.4 Testing Of Air Flow

Is the air flowing sufficiently through ventilation? Anemometer reading? Smoke test? Tracer gas?

NA

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3. INSPECTION AND INTEGRITY DETAILS

Inspection and integrity test carried out on the Plot at the 19A&B Burnside Close site in Batley.

[redacted]

GeoEnginSeerLtd understands that gas risk assessment for this property revealed a CS1 report. Further to this GeoEnginSeerLtd understands that this site required Basic Radon Protection which was planned to be a Simple Radon Barrier underneath reinforced steel mesh concrete base. This is the plan to which GeoEnginSeerLtd conducted this verification visit.

No penetrations through the slab were planned or have been put in place all services will enter or exit the property above ground level.

Frank Mercer Toughsheet: Radon Gas Resistant Membrane had been installed on the plot base and silver Pro Detailing Strip was used to detail corners and pipes.

The gas membrane joins were fixed together with doubled sided tape. All taped seams were tested with an air lance at a constant 50psi.

[redacted]

One patch was needed while observing placement of steel. The steel placement which was done carefully and fully observed.

Overall, the installation was well installed. The plot passed inspection.

Please see photos.

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
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www.Geoenginseer.co.uk 07817108921

4. PHOTOGRAPHIC RECORDS

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
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Drainage photos conducted prior to slab with no penetrations installation.

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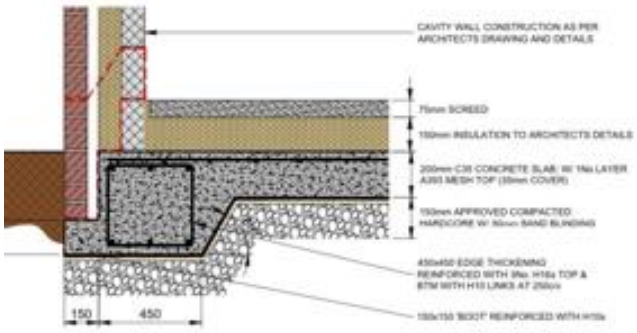
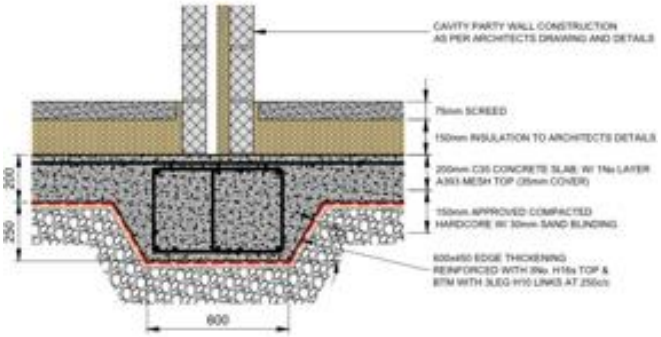
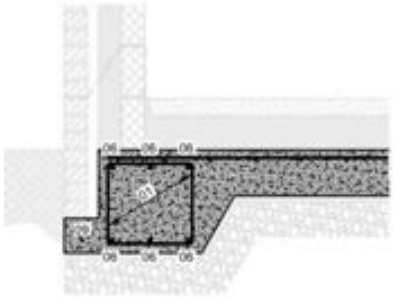
Foundation and Edge Details:



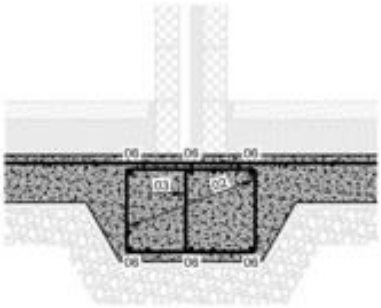
RAFT EDGE DETAIL
1:20



INTERNAL THICKENING DETAIL
1:20



SECTION A-A
RAFT EDGE RC DETAIL



SECTION B-B

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
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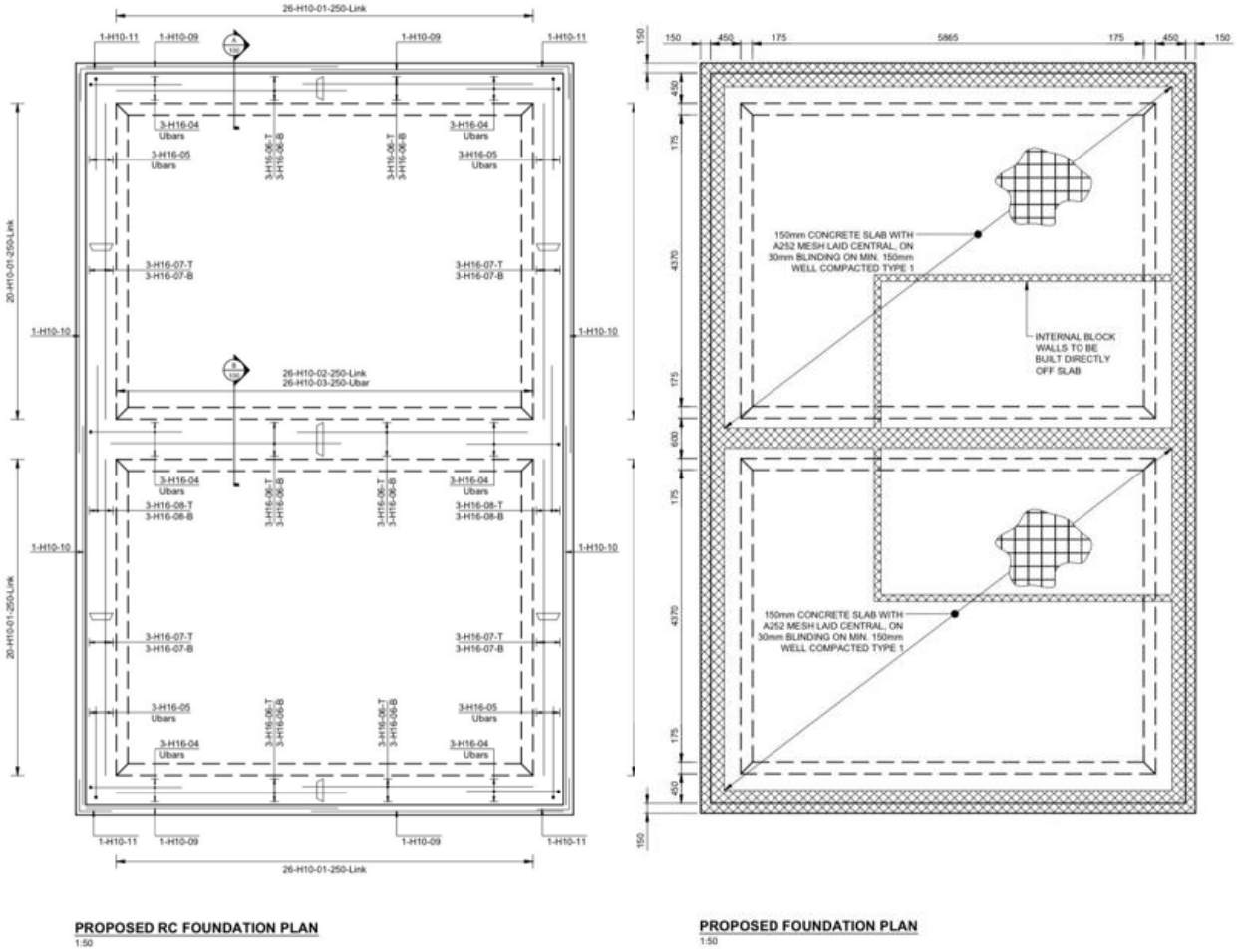
Foundation Detail: please note: no penetrations through the Slab



PROPOSED RC FOUNDATION PLAN
1:50

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1:50

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Product Specification: Toughsheet Radon Barrier [Speciality Films (toughsheet.co.uk)]

Last Accessed September 2024

Frank Mercer & Sons Ltd
Chequerbent Works
Manchester Road
Chequerbent
Westhoughton
Bolton
Lancashire BL5 3JF

Tel: 01942 841111 Fax: 01942 842388
e-mail: sales@toughsheet.co.uk
website: www.toughsheet.co.uk

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
99/3603
Product Sheet 2 Issue 3

FRANK MERCER MEMBRANES

TOUGHSHEET RADON BARRIER

This Agrément Certificate Product Sheet[1] relates to Toughsheet Radon Barrier, for use as a low-density polyethylene (LDPE) radon barrier and damp-proof membrane (dpm) in concrete ground floors, above and below the slab not subject to hydrostatic pressure, to protect the building against moisture and radon from the ground.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production†
- formal three-yearly review†.

KEY FACTORS ASSESSED

Resistance to water and water vapour — the membrane provides an effective barrier to the passage of liquid water and water vapour from the ground (see section 6).

Resistance to underground gases — the membrane is capable of restricting the ingress of radon into the building (see section 7).

Resistance to puncture — the membrane has a high resistance to puncture and on a smooth or blinded surface will not be damaged by foot or site traffic (see section 8).

Durability — under normal service conditions, the membrane will remain effective against the ingress of water and water vapour, and will restrict the ingress of radon during the lifetime of the flooring construction in which it is installed (see section 12).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Third issue: 20 January 2021

Hardy Giesler
Chief Executive Officer

Originally certificated on 7 November 2016
Certificate amended on 2 May 2024 to remove NHBC Standards on Page 3.

The BBA is a UKAS accredited inspection body (No.4345).
This certificate has been amended on 2 May 2024 as part of a transition of The BBA Agrément Certificate scheme delivered under the BBA's ISO/IEC 17020 accreditation. Sections marked with the symbol † are not issued under accreditation.
Readers MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.
Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément
1st Floor, Building 3, Hatters Lane
Croxley Park, Watford
Herts WD18 8YG

tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk

Regulations

In the opinion of the BBA, Toughsheet Radon Barrier, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**C1(2)**	**Site preparation and resistance to contaminants**
Comment:		When properly installed in a correctly designed structure, the product forms an effective barrier to radon enabling compliance with this Requirement. See section 7.1 of this Certificate.
Requirement:	**C2(a)**	**Resistance to moisture**
Comment:		When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Requirement. See section 6 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is of an acceptable material. See section 12.1 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)**	**Durability, workmanship and fitness of materials**
Comment:		The product can contribute to a construction satisfying this Regulation. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.1	Site preparation — harmful and dangerous substances
Standard:	3.2	Site preparation — protection from radon gas
Comment:		The product will enable a floor to satisfy the requirements of these Standard, with reference to clauses 3.1.2[1][2], 3.1.6[1][2], 3.1.7[1][2], 3.1.8[1][2], 3.2.1[2] and 3.2.2[1][2]. See section 7.1 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Standard, with reference to clauses 3.4.2[1][2], 3.4.4[1][2] and 3.4.6[1][2]. See section 6 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(a)(i) (iii)(b)(i)	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	26	Site preparation and resistance to contaminants
Comment:		When properly installed in a correctly designed structure, the product forms an effective barrier to radon enabling compliance with this Requirement. See section 7.1 of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		When properly installed in a correctly designed structure, the product forms an effective barrier to the movement of water within the ground-floor slab, enabling compliance with this Regulation. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of this Certificate.

Additional Information

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard EN 13967 : 2012.

Technical Specification

1 Description

1.1 Toughsheet Radon Barrier is a blown film of extruded LDPE.

1.2 The membrane has the following nominal characteristics:

Thickness (mm)	0.4, 0.5
Roll length (m)	20, 12.5
Roll width (m)	4
Mass per unit area ($g \cdot m^{-2}$)	368, 460
Watertightness	pass
Durability (artificial ageing)	pass
Durability (alkali)	pass
Colour	yellow.

1.3 Ancillary products for use with the membrane, but outside the scope of this Certificate, include:

- double-sided butyl tape — for use in joints and laps
- jointing tape — for securing laps and joints.

2 Manufacture

2.1 The product is manufactured by an extrusion/coating process.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

2.3 The management system of Frank Mercer & Sons Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by ISOQAR (Certificate 2092 QM-001).

3 Delivery and site handling

3.1 Rolls of the membrane are packed in wrappers bearing labels with the product name and the BBA logo incorporating the number of this Certificate. Rolls are supplied shrink-wrapped and on pallets.

3.2 Rolls must be stacked on a flat surface, kept under cover and protected from sunlight and mechanical damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Toughsheet Radon barrier.

Design Considerations

4 Use

4.1 Toughsheet Radon Barrier is satisfactory for use as a gas-resistant barrier to restrict the ingress of radon into buildings from naturally occurring sources.

4.2 Buildings in areas of risk should be constructed in accordance with the recommendations of BRE Report BR 211 : 2015 and following the guidance set out in BS 8485 : 2015.

4.3 The product is also satisfactory for use as a dpm in accordance with CP 102 : 1973 Section 3, BS 8000-0 : 2014 and BS 8000-4 : 1989.

5 Practicability of installation

The membrane is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Resistance to water and water vapour

6.1 The membrane, including joints, provides an effective barrier to the passage of liquid moisture from the ground and will enable a floor to comply with the requirements of the national Building Regulations.

6.2 The membranes comply with the minimum sheet thickness detailed in the documents supporting the national Building Regulations.

7 Resistance to underground gases

7.1 The product will restrict the ingress of radon into buildings from naturally occurring sources.

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
For and on behalf of geoenginseer.
www.Geoenginseer.co.uk 07817108921

Kirklees Concerns:

1 of 2

Kirklees COUNCIL

Consultation Response from: KC Environmental Health (Pollution & Noise Control)		
2024/92370 - adj, 19, Burnside Close, Birstall, Batley, WF17 0NS		
Discharge of details reserved by conditions 7 and 8 (Remediation Strategy) on previous permission 2020/93274 for erection of 2 semi-detached dwellings		
Date Responded: 2nd September 2024	**Responding Officer:** NH	**Responding Ref:** WK/202427903

Conditions 8 – Verification Report

Condition 8 on previous permission 2020/93274 requires the submission of a verification report following the completion of any measures identified in the approved Remediation Strategy. The approved remediation strategy (authored by RB Geotechnical in February 2024, ref: RBG385) involved the removal of contaminated soils, the application of clean cover in soft landscaped areas and the installation of gas protection measures (a sub-floor void and gas protection barrier). Verification proposals were also provided.

A report titled, 'Verification Completion Report for Basic Radon Ground Gas Protection System' authored by GeoEnginSeer dated 31st July 2024 (ref: 1779) has been received in support of the application to discharge Condition 8. The report explains that a Visqueen gas resistant membrane has been installed across the plot base. Five photographs have been provided as a record of installation, and the installation is considered acceptable by the verifier.

We do not accept the report in support of the application. The reasons for this are detailed below and require attention:

1. The installation of a gas protection membrane does not give the necessary score for a CS2 site (as per BS8485:2015+A1:2019). Further evidence is required to confirm the installed measures will afford the necessary protection to occupiers.
2. It is unclear what type of membrane has been installed. We require additional information.
3. The photograph records are unclear and do not show details of service penetrations, joint seals, laps and welds etc. We expect photograph records to be in accordance with good practice guidance. Guidance can be found in C735 and the YALPAG Technical Guidance for Developers, Landowners and Consultants (Verification Requirements for Gas Protection Systems, December 2016).

In addition to the above, there is no information to confirm the removal of contaminated material and the installation of the clean cover system at this site. For these reasons, we recommend that Condition 8 remain until further notice.

Recommendations

Condition 7 relates to remediation of the site and unexpected contamination. Condition 8 must be satisfied in full before Condition 7 can be removed.

Conditions 8 – Verification Report

We do not accept the report titled, 'Verification Completion Report for Basic Radon Ground Gas Protection System' authored by GeoEnginSeer dated 31st July 2024 (ref: 1779) and expect a revised report to address the points raised in this response. We recommend Condition 8 remain until further notice.

THE RADON COUNCIL

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www.Geoenginseer.co.uk 07817108921

5. CONCLUSION OF SITE VISIT

5.1 Details Of Installers

Are the installers suitably qualified / trained? Names of installers / company details?

Dunford Developments

5.2 Pass / Fail?

Are the measures inspected acceptable / NOT acceptable? Do they comply with the specifications? Is attention required to specific issues?

PASS

5.3 Additional notes

Remedial actions to be taken? Re-visit to be arranged?

A further report to determine the satisfactory installation of clean garden cover system or hard standing will be submitted following the completion of those works.

If you have any queries about the above informaiton please do not hesitate to contact the below verificaiton specailist;

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
For and on behalf of GeoEnginSeer Ltd.
geoenginseer@gmail.com **07817 108921** www.GeoEnginSeerLtd.co.uk

6.0 Limitations and Challenges of Verification Reporting

This report is based on the information that has been made available to us from the client, contractor and architect regarding the site. The conclusions drawn in the report are considered correct although any subsequent additional information or actions may allow refinement of the conclusions. It should be noted that: The report has been prepared under the express instructions and solely for the use of the Client.

The findings of this report represent the professional opinion of experienced Ground Gas System Surveyors. GeoEnginSeerLtd does not provide legal advice and the advice of lawyers may also be required.

All work carried out in preparing this report has utilised and is based upon understanding of current relevant UK standards and codes, technology, and legislation. (BS8485:2015+A1:2019 & CIRIA 735).

Changes in this legislation and guidance may occur at any time in the future and cause any conclusions to become inappropriate or incorrect.

The report is limited to the boundaries identified by the Client on this site and confirmed within this document.

Should additional services be introduced, or service conduits are not sealed or have services provided through them at a later date that are not sealed to the conduit and or gas protection system, a retrospective fit may be required.

If a site is left open for prolonged periods following verification or works are conducted that may damage the integrity of the installation by follow on trades repairs may be needed, the standards observed in a positive verification report may be compromised. Intellectual rights to this document may be rescinded.

Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT, SGPV
For and on behalf of geoenginseer.
www.Geoenginseer.co.uk 07817108921

Qualified Gorund Gas Specialist Ben Crowther details:

Geological Services: Verification and Gas Risk Assessment Specialist: Freelance Geologist

Ben Crowther trading as GeoEnginSeer Ltd; Independent Geological Services

CSCS MAP: 06010225 exp 09/2027

Telephone: 07817 108921

Email: geoenginseer@gmail.com Website: www.GeoEnginSeerLtd.com

Qualifications: B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT (CSSW) SGPV (CL:AIRE) 004

NVQL3 Assessor of: Verification of Gas Protection Measures (NVQL4)

Confined Spaces L2, IPAF Harness Trained, Operator Licence: OP/2157339 to 2027

Cradle Safety Trained.

PCA Qualified Technician in structural waterproofing, October 2020

Experience Summary:

15 years local authority regulation

15 years site investigation, site supervision, construction quality assurance and verification

Previous Secretary of, and founder member of the British Verification Council

Attendee of CIRIA Research Group 'Remedial Measures for Proprietary Gas Protection Measures'

Assessor for: NVQL4 Verification of Gas Protection Systems

CL:AIRE GPVS Assessor, SGVP certificate holder No.004, Member of the Radon Council

Climber, Fell Runner, Wild Swimmer, Ex Royal Marine Commando Diver (3 years), Salsa Dancer

CPD Summary:

GGS 2 Day A-Z of Ground Gas August 2017

CIRIA Verification Training Event October 2017

PCA Structural Waterproofing Conference 2018, 2019

CIRIA Technical Meeting for Retrospective Fitting of Gas Resistant Membranes 2019

Brownfield Summit Attendance 2018, 2019, 2020, 2021, 2022, 2023

DoWCoP CL:AIRE Training March 2021

Appeared on: Gassing On! with Neil Salvidge.

Associate Member of BGA

HS2 Align Training for Tunnel Shaft H&S Green Tunnels and Shaft Work: C1 and C2

Trained in Recent BR211 Changes, and Building Safety Act 2023; at PAG Corby, November 2023

Signature: