

Remediation Statement & Validation Proposal Sheets

To be approved by Rochdale Borough Council

Project reference: 25-446

Site: Queens Drive, Rochdale

Carried out by Stephen Donald



Section A – Site Investigation Works

This Remediation Statement should be read in conjunction with the following reports produced for the site:

- Phase 1 Desk Top Study Report undertaken by Arc Environmental Ltd (Ref. 25-446, July 2025)
- Phase 2 Ground Investigation Report undertaken by Arc Environmental Ltd (Ref. 25-446, November 2025)

Section B - Summary of Site Investigation & Risk Assessments

Ground Contamination Risk Assessment

Variable made ground materials were encountered across the site to depths of between c.0.60m and c.1.500m. These materials generally comprised a combination of sandy clayey gravel and localised areas of gravelly sand with moderate cobble content. Natural Glacial Till deposits were encountered from c.0.60m and c.1.50m to a depth of c.6.45m generally comprising very sandy slightly gravelly clay and slightly gravelly silty sand. No natural solid geology was encountered during the course of the investigation.

From the results of the contamination screening carried out on the made ground materials recorded below the site, **these do not represent a significant risk to the end users, and can therefore remain on site with no further assessment and / or remedial measures required.**

When considering the risks to any future maintenance or construction workforce, appropriate PPE should be provided to protect against the levels of potential contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations. For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40/2005 (2nd Edition, 2011) Workplace exposure limits.

Hazardous Ground Gas Risk Assessment & Provision of Gas Protection Measures

From the ground gas monitoring undertaken, no levels of Methane (CH₄) have been recorded during the monitoring period. However, detectable concentrations of Carbon Dioxide (CO₂) have been recorded, up to a maximum recorded level of 13.3% v/v, with associated Oxygen (O₂) concentrations (minimum 11.1% v/v). A negligible flow rate of <0.1l/hr has been recorded during the monitoring period undertaken.

When considering these results, based on the guidance given in CIRIA C665, it can be seen that the highest GSV value (for CO₂) is below the assessment GSV of 0.7 l/hr, which would place this site within a Characteristic Situation 1 (CS1). **However, as the readings are greater than 5%, it is recommended that the classification be increased by an order of 1 to Characteristic Situation 2 (CS2) meaning gas protective measures are required within the new development.**

In accordance with BS8485:2015+A1:2019 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings', the proposed development has been assessed as a Type D building (Table 3) and therefore the gas protection measures should meet a minimum gas protection score of **1.5 points** (Table 4).

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Section C - Remediation Strategy

Unforeseen Contamination

If during the groundworks phase, visual and / or olfactory evidence of unidentified grossly contaminated materials or 'hot spots' are identified then site works in the affected area should cease and site should notify Arc Environmental Ltd (ARC) and the Local Authority as soon as it is possible. A reassessment of the ground contamination risk assessment will need to be made, and the requirement for any further sampling and screening to be undertaken should be determined. Details of the appropriate course of action undertaken to deal with these materials should be provided to and agreed with the Local Authority prior to carrying out any remediation. Further remediation and validation works may then be necessary.

Provision of Gas Protection Measures

To achieve the required gas protection score, a combination of protection elements taken from Tables 5, 6 & 7 (contained within BS8485) should be implemented as per the following examples;

Table 5 – Structural Barrier – Depending upon the foundation type, floor type and the quality of the design & construction, a number of points can be achieved, for example provision of an insitu cast reinforced concrete slab (ground bearing or suspended) will achieve between 0.5 & 1.5 points and a raft can achieve **1.5 points**. It should be noted that a suspended block and beam floor will achieve **0 points** and therefore alternative measures from Tables 6 & 7 will need to be adopted (see below).

Table 6 – Ventilation Protection Measures – Where sub-floor ventilation is provided this should comprise either a min. 150mm clear void, void former blanket or gas drains, with ventilation from the sub-floor ventilation through the internal wall to the external wall using telescopic swan neck vents with air bricks providing 1500mm²/m run void ventilation spaced at maximum 2.0m centres will achieve **1.5 points**. In addition, cross ventilation will need to be incorporated into sleeper walls / party walls.

Table 7 – Gas Resistant Membrane - The final element of the gas protection measures is the provision of a suitable gas resistant barrier membrane, which should comply with the criteria listed in Table 7. There is also the requirement for the verification of the gas barrier membrane installation, undertaken in accordance with CIRIA C735. The implementation of gas resistant barriers will achieve **2.0 points**. Notes on the installation of gas barrier membranes is given below:

- The performance of the gas barrier membrane is dependent on the quality and design of the installation, and therefore guidance suggests that suitably qualified / experienced contractors should carry out the construction / installation of the gas barrier membrane.
- The gas barrier membrane will need to be installed in accordance with the manufacturer's details.
- Either, a blinding layer of soft sand should be applied to the floor construction, or the surface should be adequately cleaned, to prepare a smooth surface free from sharp debris, which may damage the laid membrane.
- The membrane should be installed in a logical sequence across the footprints of the buildings, to achieve a minimum number of joints. A minimum overlap of 150mm is recommended where membranes sections are joined. A combination of thermal welding and butyl double-sided jointing tape can be used for joining gas barrier membranes together. The top lapped edges, where the membrane has been jointed using double-sided jointing tape, should be further protected by the application of gas resistant self-adhesive membrane, to prevent dirt and moisture ingress.
- Where steel stanchions and service entries / ducts penetrate the floor construction these should be suitably sealed, using a pre-formed top-hat or wrapped in gas resistant self-adhesive membrane. Where ducts are used to feed in services, the top of the duct and service should be appropriately sealed, using closed celled foam inside the duct and / or appropriate gas resistant products (i.e. gastite tape or GR SAM) wrapped around the duct and service.

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Section C - Remediation Strategy (Cont'd)

Provision of Gas Protection Measures (Cont'd)

- Following validation of the gas barrier membrane, it is the responsibility of the main contractor / groundworks contractor to protect the gas barrier membrane from damage by follow-on trades or during the construction of subsequent final floor layers, to maintain the integrity of the gas barrier membrane.

The design team should provide design drawings showing the proposed installation / construction of the protection measures to be adopted and also the specification of the chosen gas / vapour membrane products to be used. These should be forwarded to Arc Environmental Ltd for review and approval to ensure they meet the BS8485 guidance, prior to work commencing.

Section D: Validation of Remediation Strategy:

To ensure all elements of this Remediation Statement are correctly implemented, Validation works resulting in a final Validation Report will be prepared by ARC, verifying that the remediation works have been completed and will comprise:

- Validation of the installation of gas protection measures

Validation of Gas Protection Measures

For this site, the implementation of CS2 gas protection measures must be witnessed, photographed and validated by an experienced and suitably qualified Engineer to ensure that all works are being completed in strict accordance with this Remediation Strategy, the proposed design details, BS8485 & CIRIA C735.

Each site visit should validate the construction and emplacement of each element of the gas protection measures within the proposed buildings, as well as confirming that all installation requirements have been met. Typical inspection should follow the criteria set out in CIRIA C735, and the procedure for inspection / validation of the gas protection measures is outlined on the following page:

- The verification of each unit will be recorded visually using the proforma outlined in Appendix A5 of CIRIA C735 to verify that the works have been carried out in full accordance with the submitted design drawing and product specifications.
- The visual inspection will be accompanied by a full photographic record. The inspected / photographic record will include (as a minimum) the verification of the following construction details if present:-
 - Passive sub-floor dispersal ventilation: Inspection of sub-floor ventilation, presence of cross ventilation in sleeper / party walls and installation of telescopic swan-neck vents.
 - External wall vents: to assess the number and size of telescopic swan-neck vents and airbricks around the perimeter of the building, including spacing of side ventilation, and to assess that vents are free from debris and extend beneath the gas protection membrane into the passive sub-floor dispersal ventilation below the floor slab.
 - Construction of structural barrier: confirmation of the construction of any insitu cast reinforced concrete slabs / rafts.
 - The underside of the gas barrier membrane: to assess that no uneven / rough surfaces are present.
 - Gas barrier membrane type: full product / manufacturers specification, gauge, colour, batch/roll number.

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Section D: Validation of Remediation Strategy:

Validation of Gas Protection Measures

- Gas barrier membrane condition: to assess that there are no punctures, tears, rips or other defects to the membrane.
- Joining tape: to assess product type, brand, thickness, material, width and colour.
- Lapping design: to assess whether joints are lapped and sealed in accordance with the manufacturer's specifications (including double taping and correct overlapping)
- Laps and sealed joints: to assess double sided tape has been used and welds are undertaken correctly.
- Service entries: to assess whether service entries have been appropriately sealed i.e. assessing top hat arrangements with the use of Jubilee clips, use of GR SAM and sealing of ducts used for service feeds with a closed cell foam such as FiloSeal or FiloForm.
- The completed inspection record sheets will be submitted to the LA within the final Validation Report, as well as a record of the approved contractors' qualifications, which should include as a minimum an NVQ Level 2 in gas protection installation, and product specification / datasheets.

Section E - Action Items & Persons Responsible

- Collection and provision of all documentation relating to waste disposal: - as a minimum, provision of total volumes excavated and removed to tip, waste consignment / transfer notes, landfill tip receipts – Main Contractor.
- Construction & installation of gas protection measures – Main Contractor.
- Validation of installation of gas protection measures – Arc Environmental Ltd.
- Completion of final Validation Report incorporating all the above – Arc Environmental Ltd.

This document has been completed by Stephen Donald of Arc Environmental Ltd, for and on behalf of Adept Consulting Engineers.

Signed:

A handwritten signature in black ink, appearing to read 'S. Donald'.

For and behalf of Arc Environmental Ltd.

Stephen Donald
Senior Geo-Environmental Engineer

Date: 4th February 2026