

Date: 15th August 2025
Reference: 12-969-V1

GAS MEMBRANE VALIDATION – DRAW WELL ROAD

Project Name:	Draw Well Road, Knowsley
Project Number:	12-969
Client:	Acornfield Properties Ltd
Date:	06-08-2025/ 07-08-2025
Project Manager & Qualifications:	R. Horseman
E3P Engineer & Qualifications:	J. Newall
Gas Membrane Installers Name & Qualifications:	Hydro WMS
Ground Gas Risk Assessment	CS2
Plots:	Unit 2 & 3

The gas mitigation measures validation site inspection record and associated photographs are enclosed within this letter as a Controlled Quality Assurance (CQA) site data capture record.

FINAL QUALITY ASSURANCE

E3P SITE VALIDATION CQA	QUALIFICATIONS	POSITION
Joe Newall	CL:AIRE Course – Verification of Gas Protection Measures	Technician

PREPARED BY	QUALIFICATIONS	POSITION
Harriet Mason	BSc (Hons), FGS	Project Manager

AUTHORISED BY	QUALIFICATIONS	POSITION
Rob Horseman	BSc (Hons), MEnvSci, CEnv	Associate Director

Table 1 Validation Letter References

PLOT NUMBER	DATE	REPORT REFERENCE
Unit 2 and 3	06-07/ 08-2025	V1





GROUND GAS MITIGATION DESIGN

The Ground Gas Risk Assessment for the site determined that the site should be classified as Characteristic Situation 2 in accordance with BS8485 2015 (+A1 2019). In this instance, the proposed development is classified as a Type C Building (offices) and Type D Warehousing.

Based on the ground gas risk assessment and the proposed Type C / D Building, it is envisaged that a point score of 2.5 will be required for the office sector and 1.5 for the main warehouse building, as per the below.

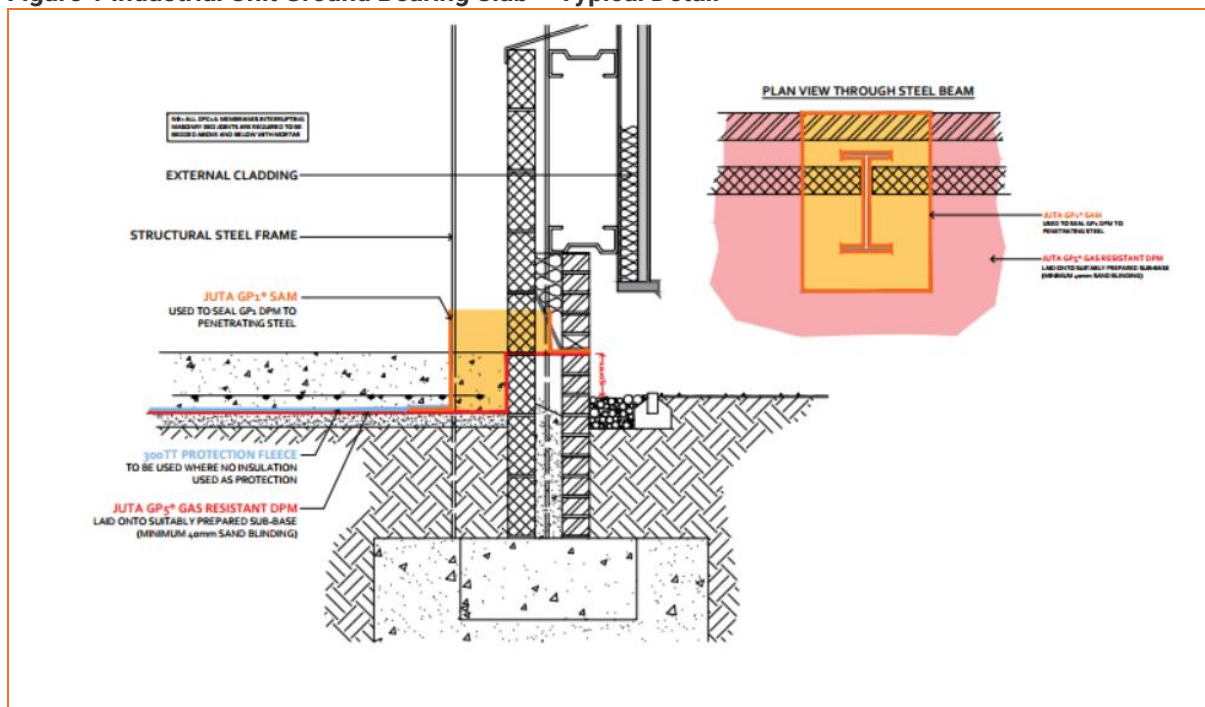
- ✳ Cast In-Situ Monolithic Reinforced Ground-Bearing slab– 1.5 points
- ✳ Specialist Membrane installed and validated in accordance with C735 – 2.0 points

OVERVIEW OF GROUND GAS MITIGATION DESIGN & CONSTRUCTION REQUIREMENTS

Characteristic Situation 2 – Design Mitigation Requirements.

- ✳ Cast In-Situ Monolithic Reinforced Ground-Bearing Raft or Reinforced Cast In-Situ Suspended Floor Slab With Minimal Penetrations.
- ✳ Lapped and taped / sealed gas resistant membrane in the floor slab construction which meets all the criteria as set out in Table 7 of BS8485:2015 (+A1 2019) and Verification in Section 3.2.2 of CIRIA 735³³

Figure 1 Industrial Unit Ground Bearing Slab – Typical Detail



[illegible]



SUMMARY OF VALIDATION INSPECTION & APPROVAL

GAS RESISTANT MEMBRANE

The membrane utilised on-site comprises: Juta GP5 resistant to Carbon Dioxide, Methane and Radon

It has been confirmed as part of the validation that the membrane utilised in the units (office areas) discussed herein matches that of **Figure 1-2**.

The E3P Technician has inspected the installation of this membrane in line with the specifications in terms of placement and position (**Figure 1-2**), and the manufacturer's detail in terms of the workmanship. **Figure 3** illustrates the ground floor layout for the unit numbers validated within this letter.

E3P can confirm that sand blinding has been utilised to protect the membrane and there were no holes or rips at the inspection time.

Where any rips or tares have been noted patches have been applied in line with the manufacturer's detail with sufficient overlap to ensure long-term performance of the membrane.

E3P inspected all joints including corner details, and can confirm that the membrane was overlapped in accordance with the manufacturer's specification and heat welded.

Where any penetration or service duct is present within the floor area E3P inspected each one in turn and can confirm that rigid black polyethylene top hat units have been adequately sealed against the membrane with double-sided jointing tape at both the base and the protruding pipe as well as being secured against the pipe with a metal jubilee clip.

Based on the information provided within this report, the site inspection and validation checklists, E3P can confirm that Units 2&3 have been installed with gas protection measures in accordance with the detailed structural design and the requirements of BS8485 Characteristic Situation 2 to an acceptable level of workmanship.

E3P ENGINEER'S SITE CHECK SHEET

The engineer check sheet completed whilst on-site during the validation on a plot-by-plot basis is attached, and a complete set of images is presented as evidence. Larger images are presented at the rear of this section.

All information provided within this validation letter report was accurate at the time of construction. E3P operates under the assumption that all data provided by installers is reliable.



WELDED GAS MEMBRANE VALIDATION

Complete

Score	24 / 24 (100%)	Flagged items	0	Actions	0
Site Name	Draw well road				
Location	11 Draw Well Road Liverpool England L33 7BJ United Kingdom (53.4812301160277, - 2.850624691360442)				
Project Manager	RH				
Project number	12969				
Developer	Acornfield properties				
Site representative Signature	 6 Aug 2025 1:32 PM BST				
Conducted on	6 Aug 2025 1:24 PM BST				
Prepared by	Joe Newall				
Have you got the correct Gas Membrane detail (attached to the job in synergist)?	Yes				



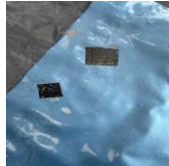
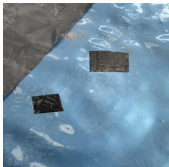
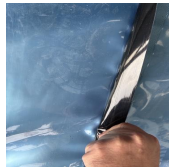
Gas Membrane Inspection	23 / 23 (100%)
Plot Inspection	23 / 23 (100%)
Plot Inspection 1	12 / 12 (100%)
Plot Number	Unit 3
Type of Development: if other add Note	Commercial
Floor Slab Type	Raft
Are telescopic vents present?	N/A
Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos where possible showing Label)	Gp5 Juta
Installer's name, company and qualification	Hydro wms
Gas Membrane Condition: Open punctures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to laid gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED	Pass       
Are welds complete?	Yes   
Are Joints lapped and sealed in accordance with manufacturer's requirements/ specification?	Yes



Photo 11



Photo 12

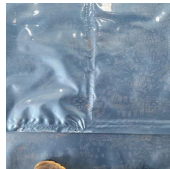


Photo 13

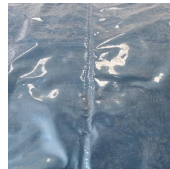


Photo 14



Photo 15

Service entries seals: Top hats seal arrangements fixed around service entries? Use of Jubilee clips or Bitumastic Sealant

Pass

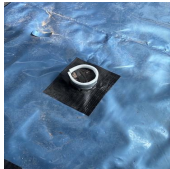


Photo 16

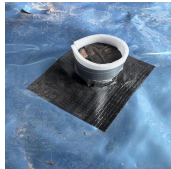


Photo 17



Photo 18

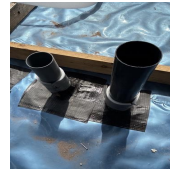


Photo 19



Photo 20

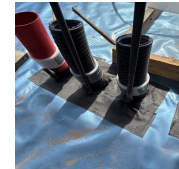


Photo 21

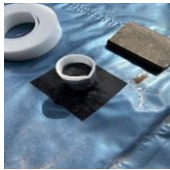


Photo 22

Corners / Internal joints: Check all corners are correctly formed or contractor has used preformed corners.

Pass



Photo 23



Photo 24



Photo 25

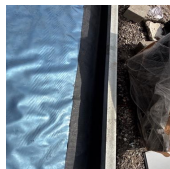


Photo 26



Photo 27



Photo 28



Photo 29



Photo 30

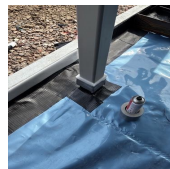


Photo 31



Photo 32



Photo 33



Photo 34

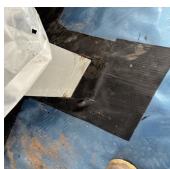


Photo 35

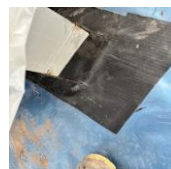


Photo 36



Photo 37



Photo 38



Photo 39



Photo 40



Photo 41



Photo 42

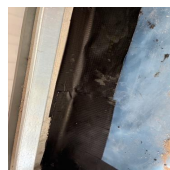


Photo 43



Photo 44



Are folds running in line with joints? (no joints cutting across folds)

Pass



Photo 45



Photo 46



Photo 47



Photo 48

**Extent of Coverage: Is the membrane covering the entire plot?
Does membrane span over outside walls?**

Yes

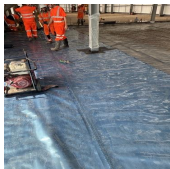


Photo 49



Photo 50



Photo 51

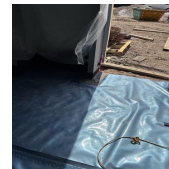


Photo 52



Photo 53

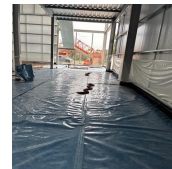


Photo 54



Photo 55

Sealant to the underside of the membrane at the sole plate position (Check with PM if not noted on schedule)

N/A

Condition of sub-grade 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. (Lift back the membrane and photo the subfloor)

Pass

Slab / membrane condition (is membrane clear of snow, standing water, debris or insulation): Can membrane be fully seen and photographed – ask contractor to remove any debris so membrane can be fully seen and inspected – this is a requirement of NHBC and local authorities.

Pass

External Wall Air bricks: Numbers, size, positions as design drawing? (Minimum of 3 walls)

Pass

Plot Inspection 2

11 / 11 (100%)

Plot Number

Unit 2

Type of Development: if other add Note

Commercial

Floor Slab Type

Raft



Are telescopic vents present?

No

Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos where possible showing Label)

Gp5 Jura

Installer's name, company and qualification

Hydro wms

Gas Membrane Condition: Open punctures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to laid gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED

Pass



Photo 56



Photo 57



Photo 58



Photo 59

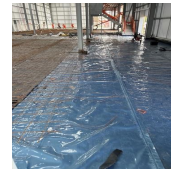


Photo 60



Photo 61



Photo 62



Photo 63



Photo 64

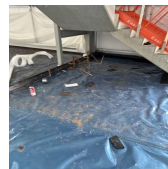


Photo 65



Photo 66



Photo 67

Are welds complete?

Yes

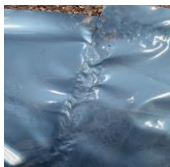


Photo 68



Photo 69



Photo 70

Are Joints lapped and sealed in accordance with manufacturer's requirements/ specification?

Yes



Photo 71



Photo 72



Photo 73

Service entries seals: Top hats seal arrangements fixed around service entries? Use of Jubilee clips or Bitumastic Sealant

Pass



Photo 74



Photo 75



Photo 76



Photo 77



Corners / Internal joints: Check all corners are correctly formed or contractor has used preformed corners.

Pass



Photo 78



Photo 79

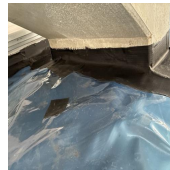


Photo 80



Photo 81

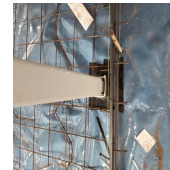


Photo 82



Photo 83



Photo 84



Photo 85



Photo 86



Photo 87



Photo 88



Photo 89



Photo 90



Photo 91



Photo 92



Photo 93



Photo 94



Photo 95



Photo 96



Photo 97

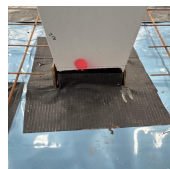


Photo 98



Photo 99



Photo 100



Photo 101



Photo 102



Photo 103



Photo 104

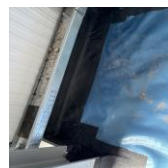


Photo 105



Photo 106



Photo 107



Photo 108



Photo 109

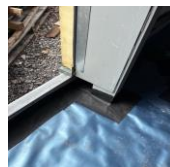


Photo 110



Photo 111

Are folds running in line with joints? (no joints cutting across folds)

Pass



Photo 112

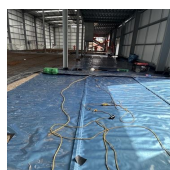


Photo 113

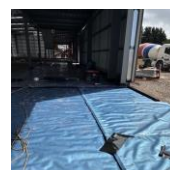


Photo 114

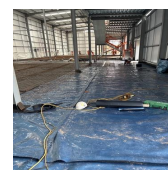


Photo 115



Photo 116

**Extent of Coverage: Is the membrane covering the entire plot?
Does membrane span over outside walls?**

Yes

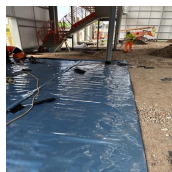


Photo 117



Photo 118



Photo 119

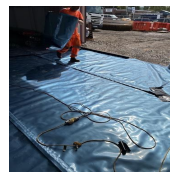


Photo 120

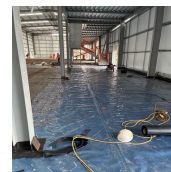


Photo 121



Photo 122



Photo 123



Photo 124



Photo 125



Photo 126

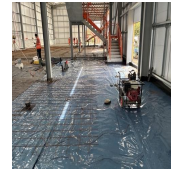


Photo 127

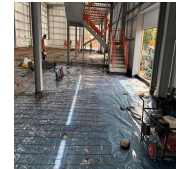


Photo 128

Sealant to the underside of the membrane at the sole plate position (Check with PM if not noted on schedule)

N/A

Condition of sub-grade 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. (Lift back the membrane and photo the subfloor)

Pass



Photo 129



Photo 130



Photo 131

Slab / membrane condition (is membrane clear of snow, standing water, debris or insulation): Can membrane be fully seen and photographed – ask contractor to remove any debris so membrane can be fully seen and inspected – this is a requirement of NHBC and local authorities.

Pass

External Wall Air bricks: Numbers, size, positions as design drawing? (Minimum of 3 walls)

N/A

Passive Venting

Sub-floor Void: Is a check possible on future plots (insert Plot number or NO in text box)

No



Media summary



Photo 1



Photo 2



Photo 3



Photo 4

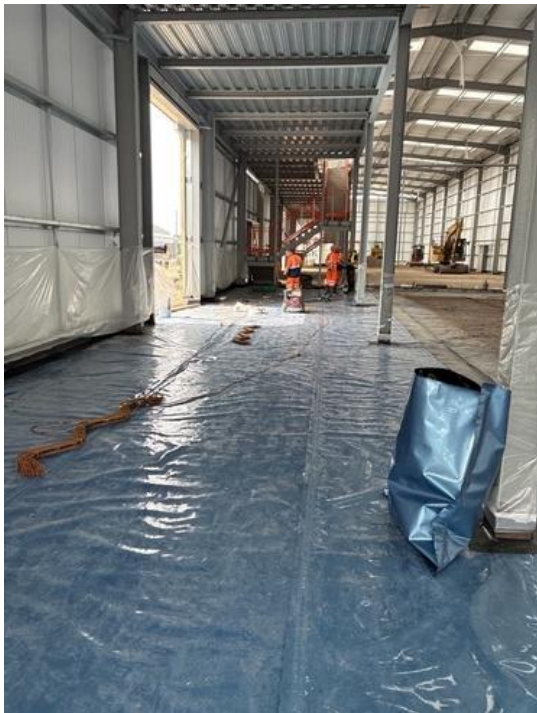


Photo 5

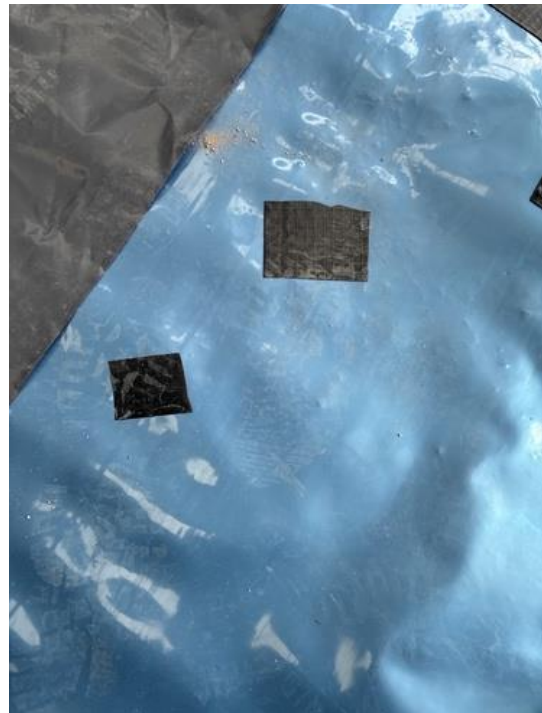


Photo 6

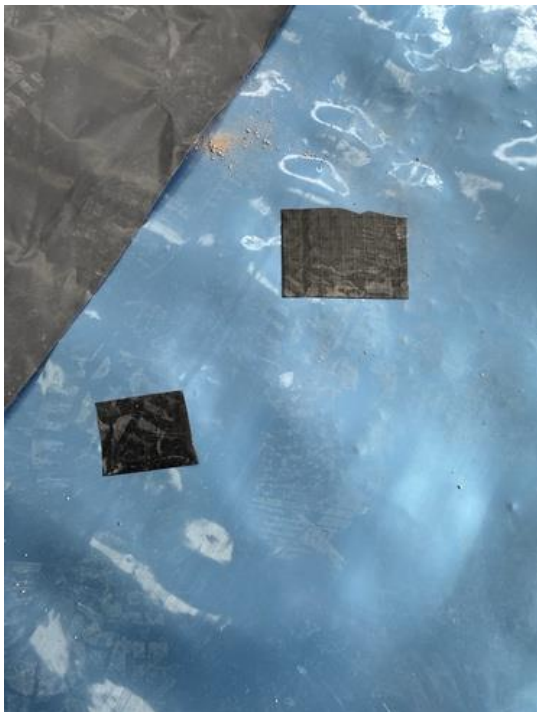


Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16

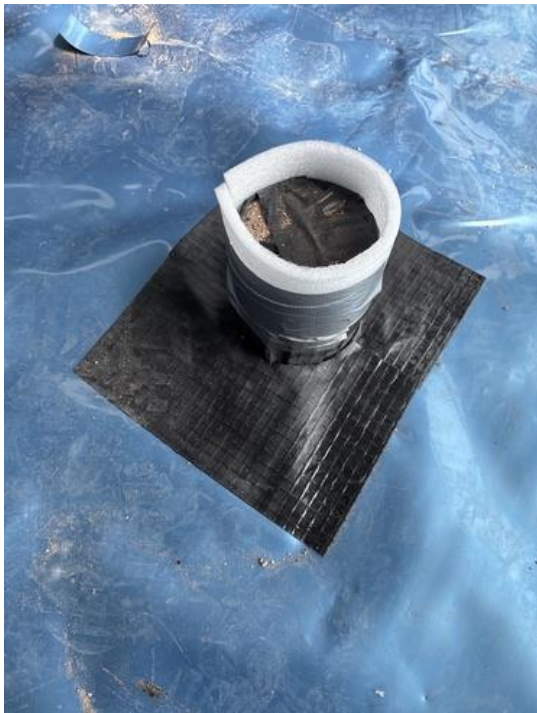


Photo 17



Photo 18



Photo 19



Photo 20



Photo 21

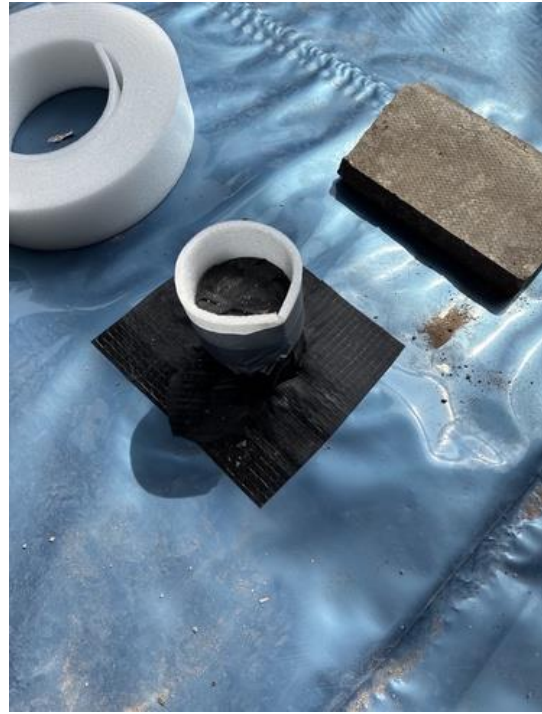


Photo 22



Photo 23



Photo 24



Photo 25



Photo 26



Photo 27

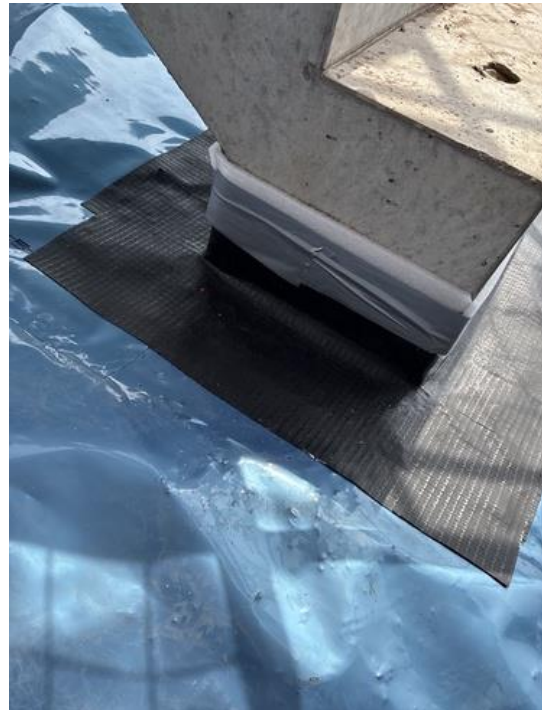


Photo 28

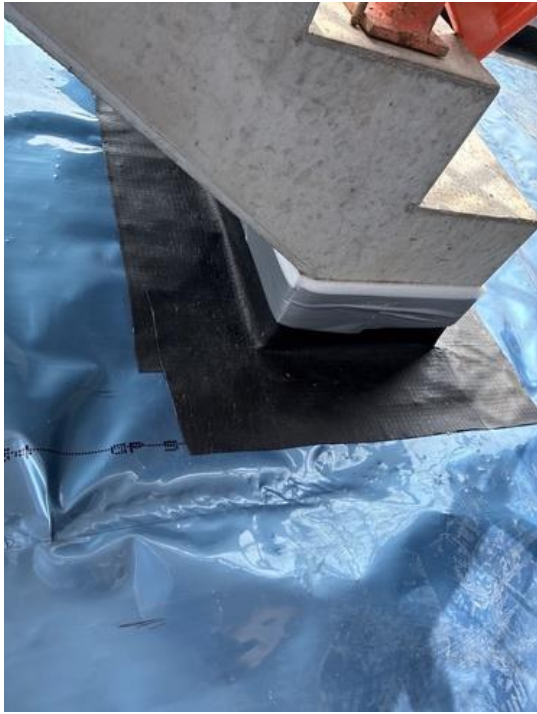


Photo 29



Photo 30

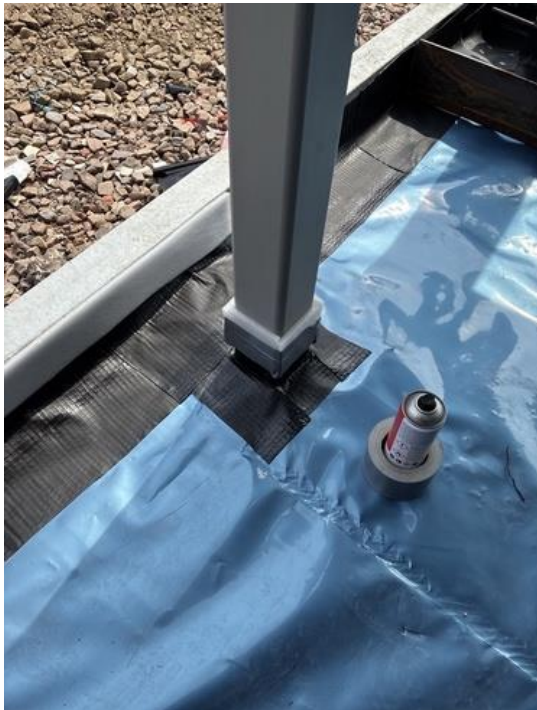


Photo 31

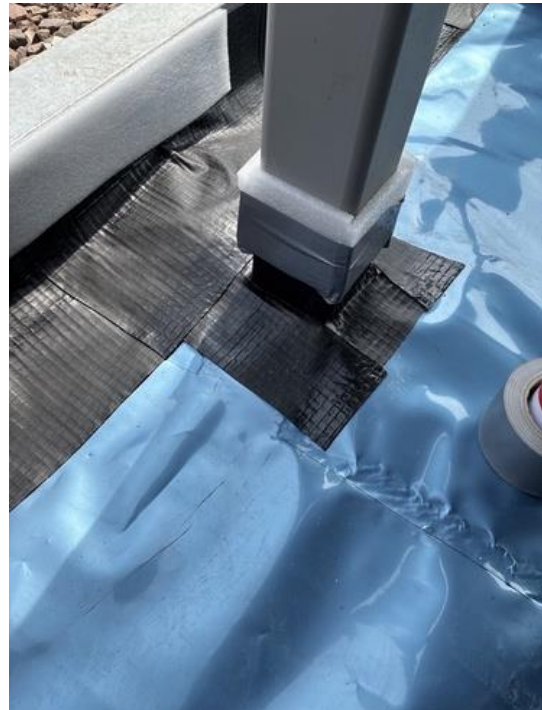


Photo 32



Photo 33



Photo 34

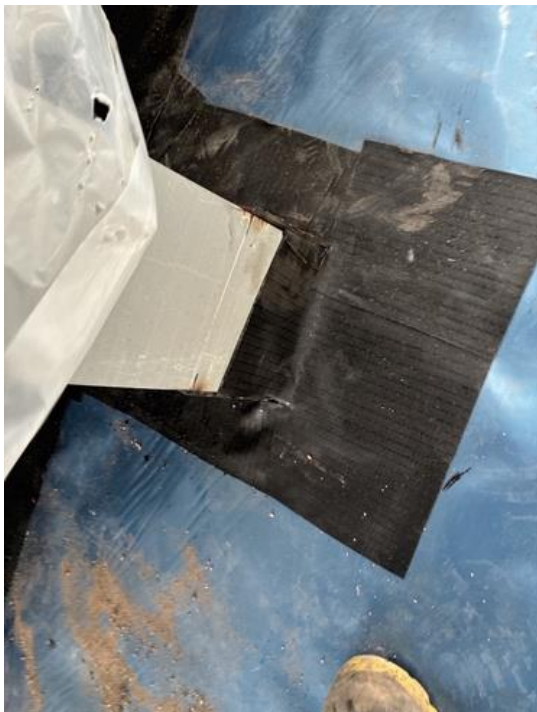


Photo 35



Photo 36



Photo 37



Photo 38



Photo 39



Photo 40



Photo 41



Photo 42



Photo 43



Photo 44



Photo 45



Photo 46



Photo 47

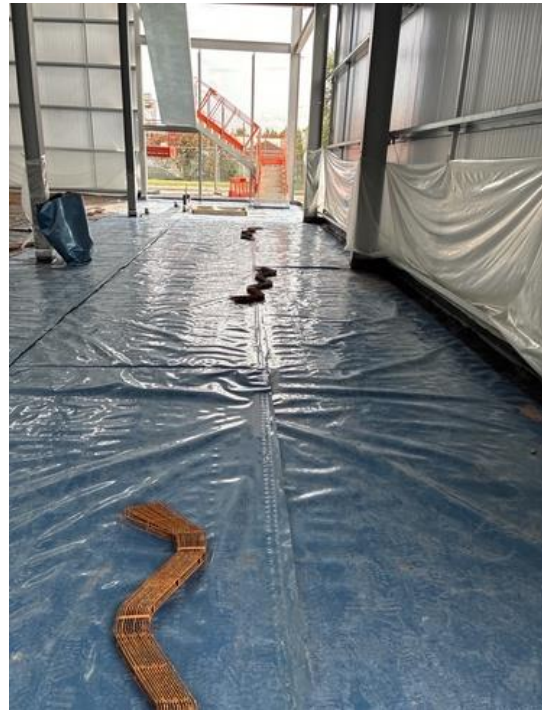


Photo 48



Photo 49

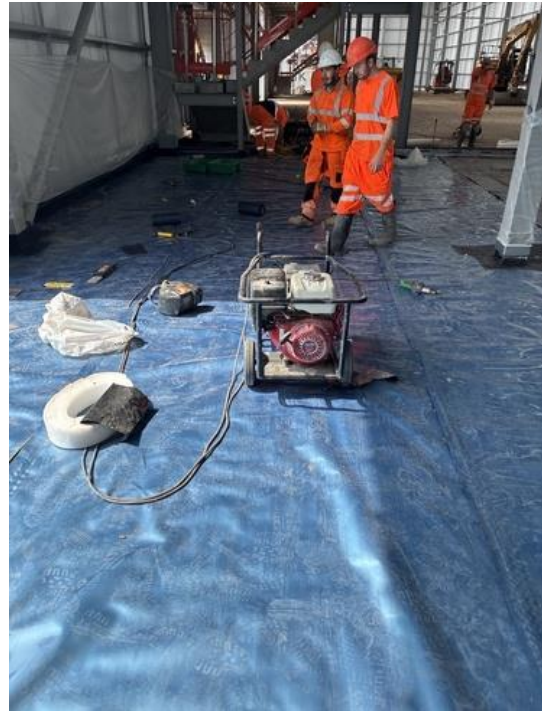


Photo 50



Photo 51

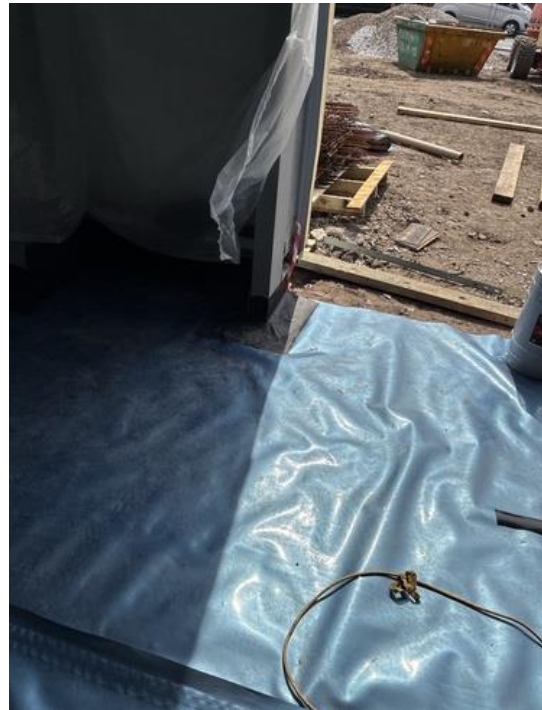


Photo 52



Photo 53



Photo 54



Photo 55



Photo 56



Photo 57



Photo 58



Photo 59



Photo 60



Photo 61



Photo 62



Photo 63



Photo 64



Photo 65



Photo 66



Photo 67

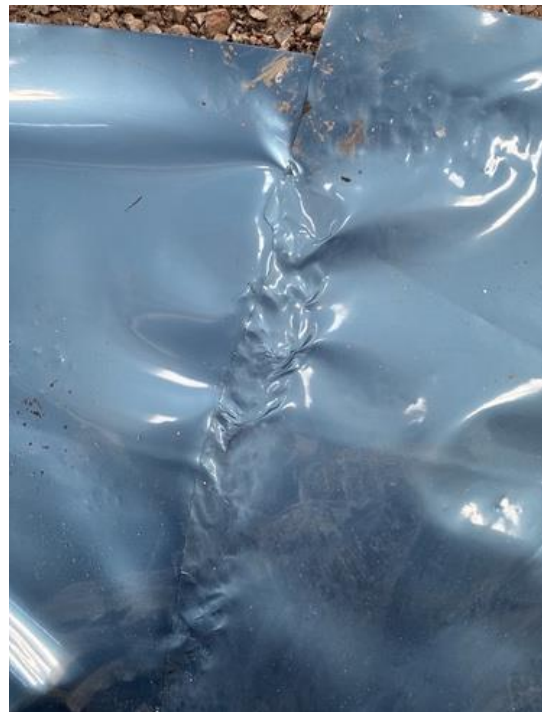


Photo 68



Photo 69



Photo 70



Photo 71



Photo 72



Photo 73



Photo 74



Photo 75



Photo 76



Photo 77



Photo 78



Photo 79



Photo 80



Photo 81



Photo 82



Photo 83



Photo 84



Photo 85



Photo 86



Photo 87



Photo 88



Photo 89



Photo 90



Photo 91



Photo 92



Photo 93



Photo 94



Photo 95



Photo 96

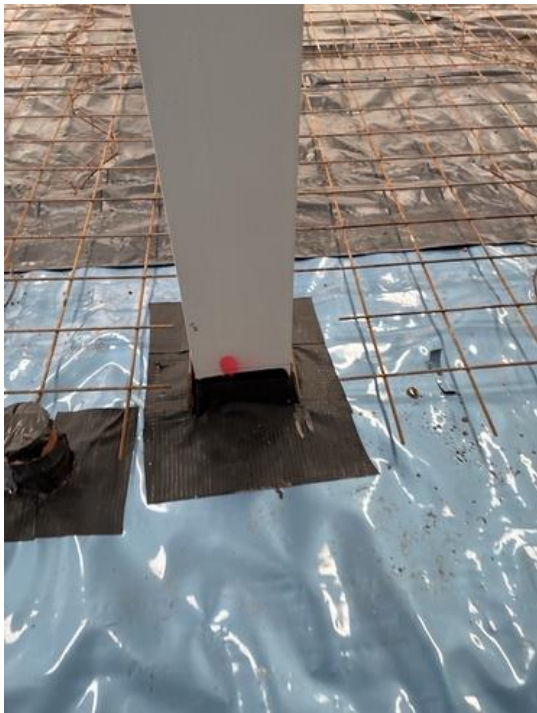


Photo 97

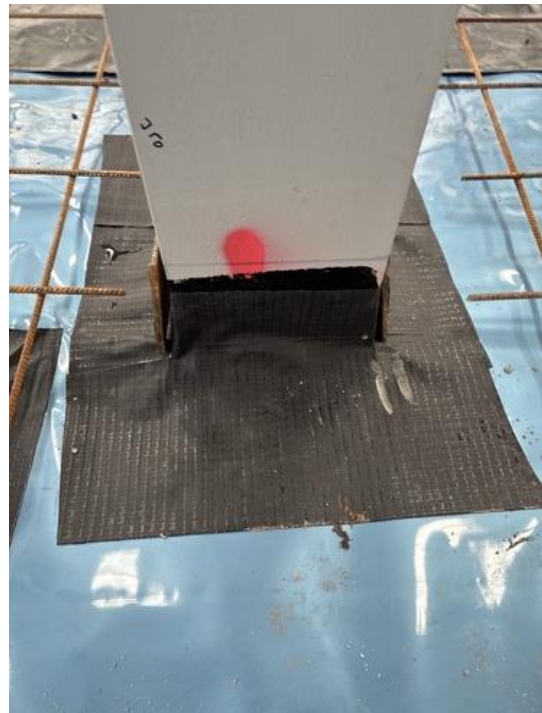


Photo 98



Photo 99



Photo 100



Photo 101



Photo 102



Photo 103



Photo 104



Photo 105



Photo 106



Photo 107



Photo 108



Photo 109



Photo 110



Photo 111



Photo 112



Photo 113



Photo 114



Photo 115

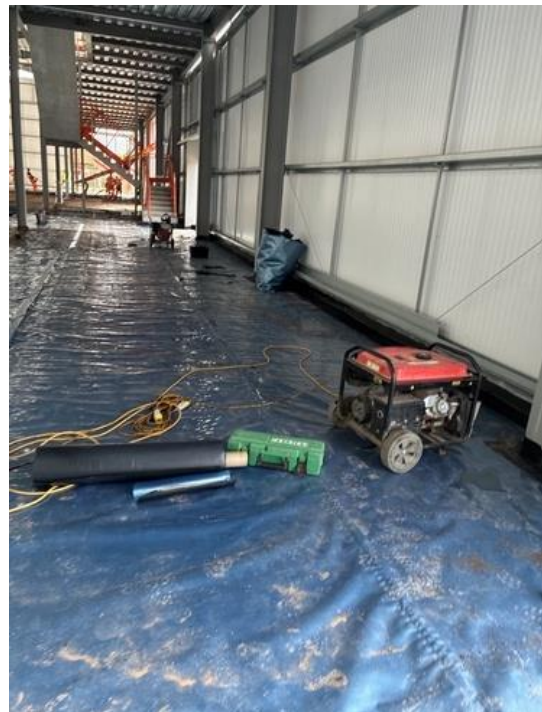


Photo 116



Photo 117



Photo 118



Photo 119

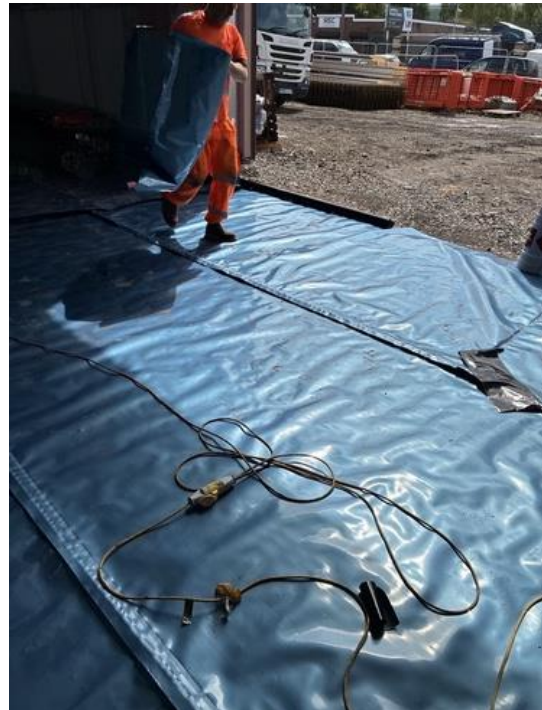


Photo 120



Photo 121



Photo 122



Photo 123



Photo 124



Photo 125



Photo 126



Photo 127

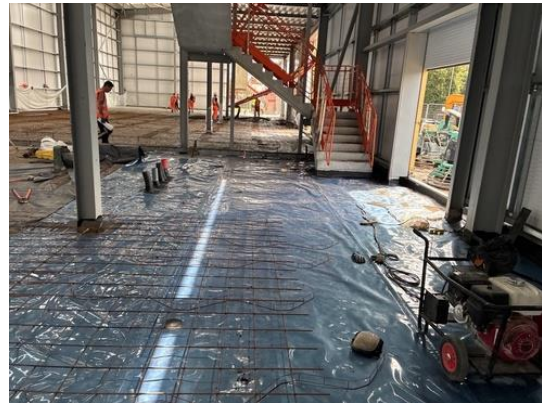


Photo 128



Photo 129



Photo 130



Photo 131