

Date: 24th April 2025
Reference: 14-768-V8

GAS MEMBRANE VALIDATION – HAWKS VIEW, CASTLETON

Project Name:	Hawks View, Castleton (formerly known as Castleton Sidings)
Project Number:	14-768
Client:	Kellen Homes
Date:	24th April 2025
Project Manager & Qualifications:	J Sheridan (MeSci, FGS)
E3P Engineer:	J. Newall
Gas Membrane Installers Name & Qualifications:	Westbourne Civil Engineers Ltd & Keytec Installation Services
Ground Gas Protection Design Report:	E3P Gas Protection Design Report (14-768-R8, March 2025)
Plots:	Membrane – Plots 174-180

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	-	Technician

PREPARED BY	QUALIFICATIONS	POSITION
Jessica Sheridan	MeSci, FGS, MEnvSci	Senior Consultant

AUTHORISED BY	QUALIFICATIONS	POSITION
Martin Dyer	BSc (Hons), FGS, FEnvSci, CEnv	Director

Table 1 Validation Letter References

PLOT NUMBER	DATE	REPORT REFERENCE
Subfloor 9-15, 18-21, 127-129	14/03/2025	V1
Membrane – Plots 18-21	19/03/2025	V2
Membrane – Plots 9-12, 125-129	21/03/2025	V3
Membrane – 13-15	28/03/2025	V4
Membrane – 130-131	01/04/2025	V5





PLOT NUMBER	DATE	REPORT REFERENCE
Subfloor – 171-174	15-04-2025	V6
Membrane – 121-124, 132, 133	15-04-2025	V7
Membrane – 174-180	24-04-2025	V8

GROUND GAS MITIGATION DESIGN

The Ground Gas Risk Assessment for the site determined that site should be classified as Characteristic Situation 2 with incorporation of low-level VOC resistant membrane in accordance with BS8485 2015 (+A1 2019).

A Gas Protection Design Report (GPDR) was prepared by E3P (14-768-R8, March 2025). Since the issue of the report, minor revisions have been made to the subfloor design, which are presented within this verification letter for clarity.

The GPDR has been prepared, reviewed, and authorised by a suitably qualified person who holds the relevant technical and professional qualifications.

OVERVIEW OF GROUND GAS MITIGATION DESIGN & CONSTRUCTION REQUIREMENTS

Characteristic Situation 2 – Design Mitigation Requirements.

- ✚ Passive sub-floor dispersal layer of very good performance which meets all criteria out in Paragraph B.6 of BS8485:2015 (minimum 150 mm clear void space and with correct frequency of side ventilation).
- ✚ Lapped and taped / sealed gas and low-level VOC 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

Banners Gate prepared the site-specific engineering drawings on behalf of Kellen Homes as Foundation Detail Ref: 23147 500 F.

The sub-structure design forms a key component of the validation procedure to ensure the constructed mitigation requirements meet the specified design criteria.



Figure 1 Structural Engineers Substructure Design – External Wall

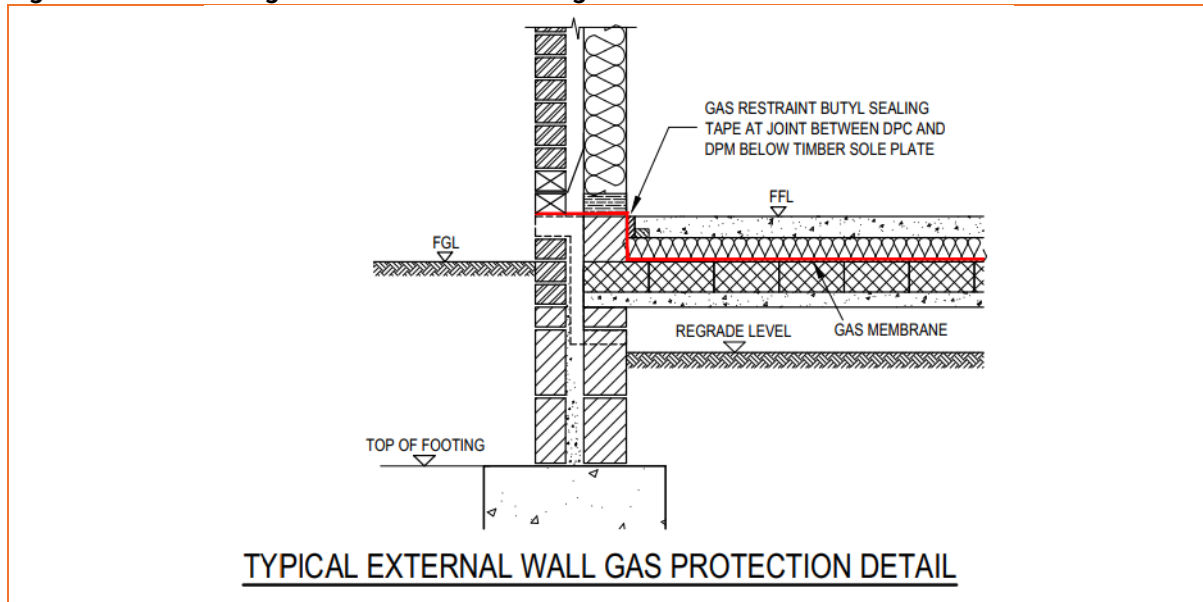


Figure 2 Structural Engineers Substructure Design – Party Wall

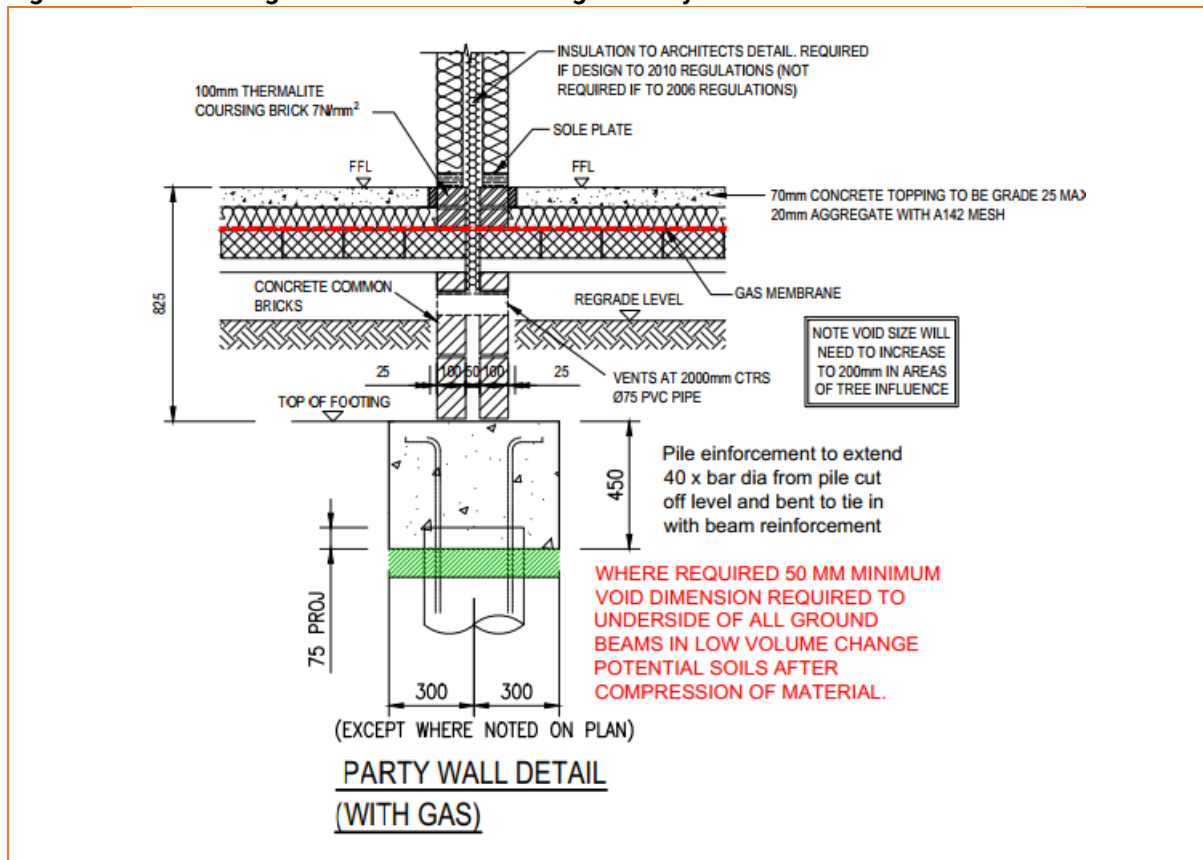
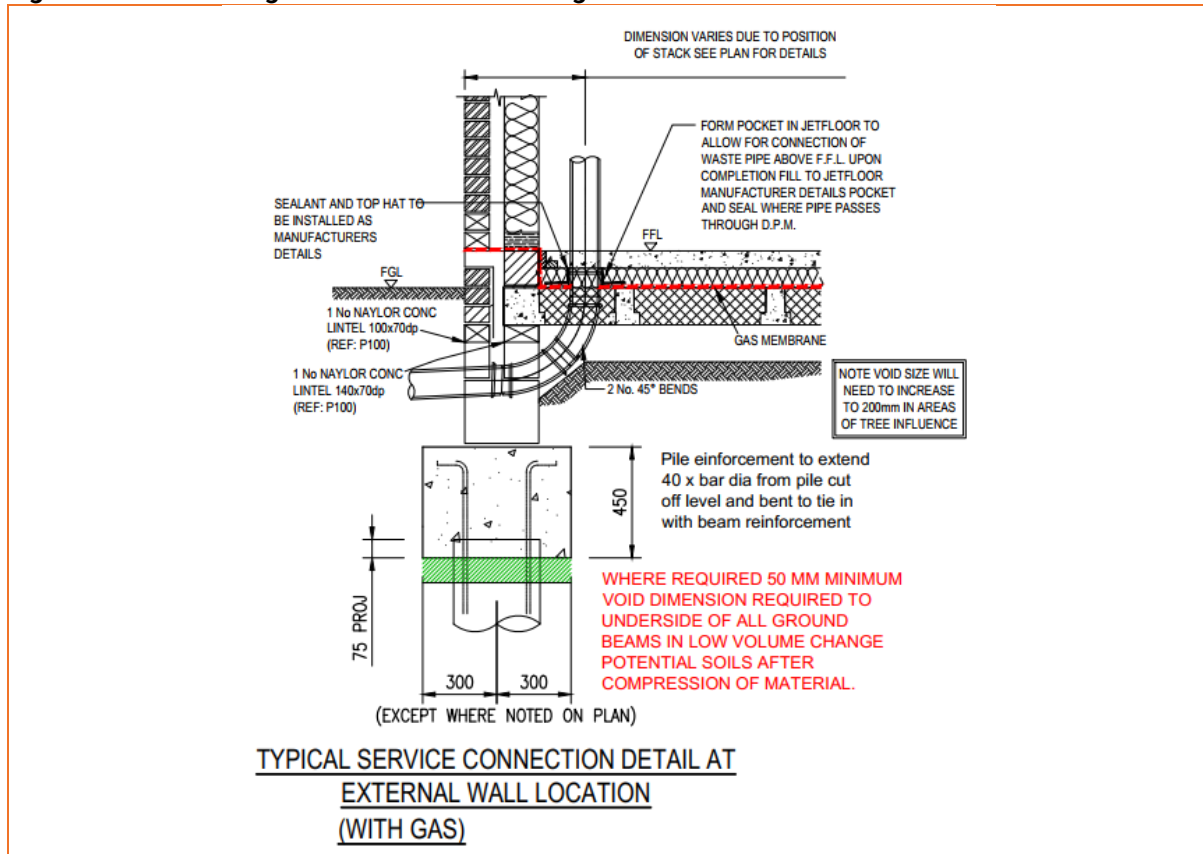




Figure 3 Structural Engineers Substructure Design – Service Penetration



SUMMARY OF VALIDATION INSPECTION & APPROVAL

SUB-FLOOR VOID

The sub-floor void for plots 9-15, 18-21, 127-129 was inspected on 14th and 17th March 2025. Sub-floor 171-174 were also inspected on 15th April 2025.

The sub-floor void was observed and inspected to be a minimum of 150 mm with no visible inclusions that would limit the performance of this ventilation mechanism. Sleeper wall ventilation bricks were also observed to be present

Photographs of the sub-floor voids are included in validation letter V1 and V6.

AIR BRICKS & TELESCOPIC VENTILATION

As per NHBC guidance and the structural engineers design as part of the mitigation a telescopic vent and vent brick is required at 2 m intervals in the brick course. E3P can confirm these have also been fitted accurately on all elevations of the plot to allow the sufficient function of the passive sub-floor ventilation system.

GAS RESISTANT MEMBRANE

The membrane utilised on-site comprises: JUTA GP5+ resistant to radon, carbon dioxide, methane and low-level Volatile Organic Compounds .



It has been confirmed as part of the validation that the membrane utilised in the plots discussed herein matches the membrane described.

The E3P Technician has inspected the installation of this membrane in line with the structural engineer's specifications in terms of placement and position (



Figure 1-3), and the manufacturer's detail in terms of the workmanship.

E3P can confirm that there were no holes or rips at the inspection time.

Where any rips or tears 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.

In accordance with the design, gas resistant butyl sealing tape is required beneath the membrane on the inner wall beneath the timber frame sole plate. E3P can confirm the butyl sealing tape has been installed accordingly.

Upon confirmation of suitable installation, the membrane is to be covered with a floor insulation material which is considered to provide a high degree of protection before the application of the cast in-situ concrete monolithic floor slab.

Based on the information provided within this report, the site inspection and validation checklists, E3P can confirm that Plot 18-21 has been installed with gas protection measures in accordance with the detailed structural design and the requirements of BS8485 Characteristic Situation 2 (including low-level VOC resistant membrane) 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 letter.

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	37 / 37 (100%)	Flagged items	0	Actions	0
Site Name	Castleton sidings				
Location	Unison Business Park, Robson Avenue Manchester England M41 7JQ United Kingdom (53.47014721777067, -2.345788409581469)				
Project Manager	JS				
Project number	14768				
Developer	Kellen homes				
Site representative Signature	 24 Apr 2025 10:30 AM BST				
Conducted on	24 Apr 2025 8:06 AM BST				
Prepared by	Joe Newall				
Have you got the correct Gas Membrane detail (attached to the job in synergist)?	Yes				



Gas Membrane Inspection	36 / 36 (100%)
Plot Inspection	36 / 36 (100%)
Plot Inspection 1	12 / 12 (100%)
Plot Number	174-175

Type of Development: if other add Note	House
Floor Slab Type	Block and beam suspended
Are telescopic vents present?	Yes

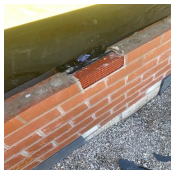


Photo 1



Photo 2

Gas Membrane Type: Manufacturer, gauge, and colour. (Take photos where possible showing Label)	JUTA GP5+
Installer's name, company and qualification	Keytec

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 lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED	Pass
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Photo 3

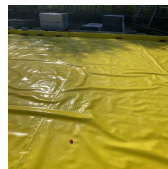


Photo 4



Photo 5



Photo 6



Photo 7

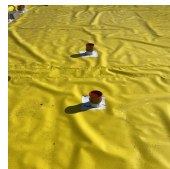


Photo 8

Are welds complete?	Yes
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Photo 9



Photo 10



Photo 11



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

Yes



Photo 12

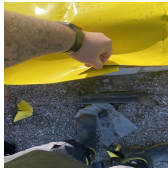


Photo 13



Photo 14

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

Pass



Photo 15



Photo 16



Photo 17



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22

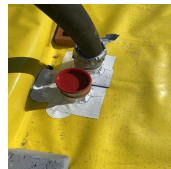


Photo 23

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

Pass



Photo 24



Photo 25



Photo 26



Photo 27



Photo 28



Photo 29



Photo 30

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

Pass



Photo 31

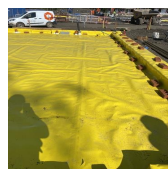


Photo 32

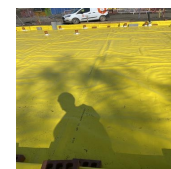


Photo 33

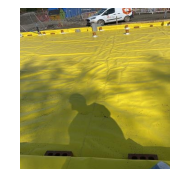


Photo 34



Photo 35

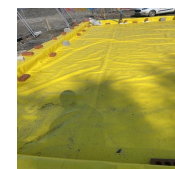


Photo 36



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

Yes



Photo 37

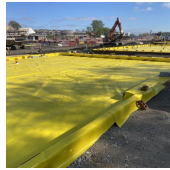


Photo 38



Photo 39



Photo 40



Photo 41

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

Yes



Photo 42



Photo 43



Photo 44



Photo 45



Photo 46

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



Photo 47



Photo 48



Photo 49



Photo 50



Photo 51

Plot Inspection 2

12 / 12 (100%)

Plot Number

176-178

Type of Development: if other add Note

House

Floor Slab Type

Block and beam suspended



Are telescopic vents present?

Yes



Photo 52



Photo 53

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

JUTA GP5+

Installer's name, company and qualification

Keytec

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 lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED

Pass

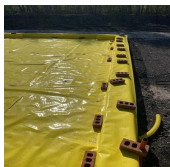


Photo 54



Photo 55

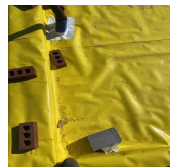


Photo 56



Photo 57



Photo 58



Photo 59



Photo 60

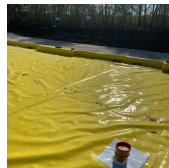


Photo 61



Photo 62



Photo 63



Photo 64

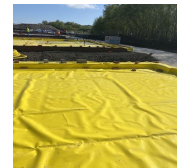


Photo 65



Photo 66

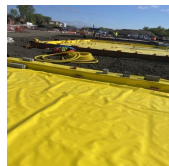


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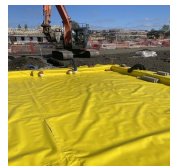


Photo 68



Photo 69

Are welds complete?

Yes



Photo 70



Photo 71



Photo 72

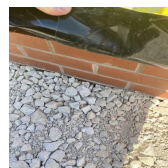


Photo 73



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

Yes



Photo 74



Photo 75



Photo 76



Photo 77

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

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

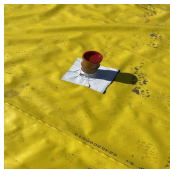


Photo 90



Photo 91



Photo 92



Photo 93



Photo 94

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

Pass



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

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

Pass

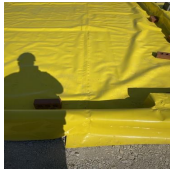


Photo 108



Photo 109

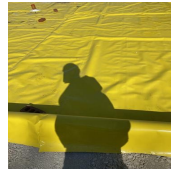


Photo 110

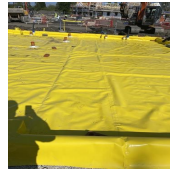


Photo 111



Photo 112

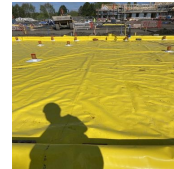


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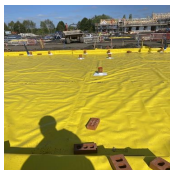


Photo 114

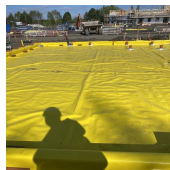


Photo 115



Photo 116

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

Yes



Photo 117



Photo 118

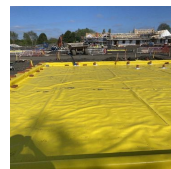


Photo 119

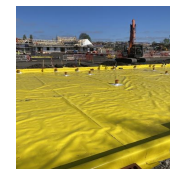


Photo 120



Photo 121

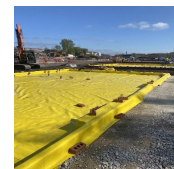


Photo 122



Photo 123

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

Yes



Photo 124



Photo 125



Photo 126



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 an 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



Photo 127

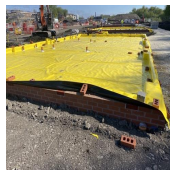


Photo 128



Photo 129



Photo 130



Photo 131



Photo 132



Photo 133

Plot Inspection 3

12 / 12 (100%)

Plot Number

179-180

Type of Development: if other add Note

House

Floor Slab Type

Block and beam suspended

Are telescopic vents present?

Yes

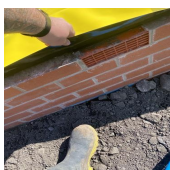


Photo 134



Photo 135

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

JUTA GP5+



Installer's name, company and qualification

Keytec

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 lain gas membrane? IF FAIL DESCRIPTION IN ACTIONS AND PHOTOS REQUIRED

Pass



Photo 136



Photo 137

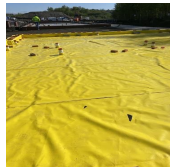


Photo 138



Photo 139



Photo 140

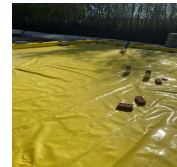


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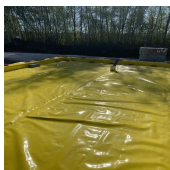


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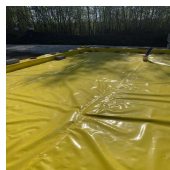


Photo 143



Photo 144



Photo 145



Photo 146

Are welds complete?

Yes



Photo 147



Photo 148



Photo 149



Photo 150



Photo 151

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

Yes

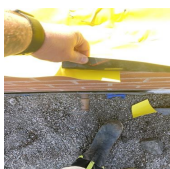


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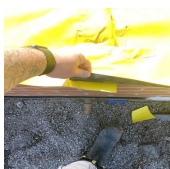


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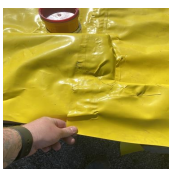


Photo 154



Photo 155

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

Pass



Photo 156

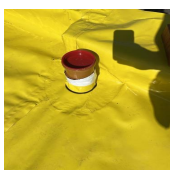


Photo 157



Photo 158



Photo 159



Photo 160



Photo 161



Photo 162



Photo 163

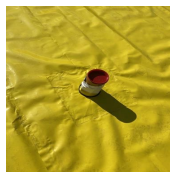


Photo 164



Photo 165

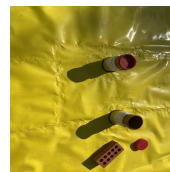


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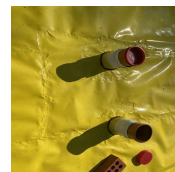


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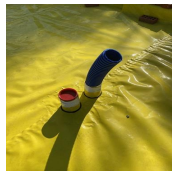


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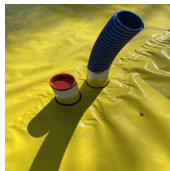


Photo 169



Photo 170



Photo 171

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

Pass



Photo 172



Photo 173



Photo 174



Photo 175



Photo 176



Photo 177



Photo 178



Photo 179



Photo 180

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

Pass



Photo 181



Photo 182



Photo 183



Photo 184



Photo 185

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

Yes

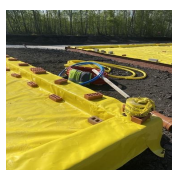


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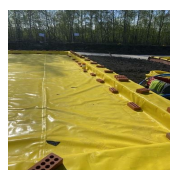


Photo 187



Photo 188



Photo 189



Photo 190



Photo 191

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

Yes



Photo 192



Photo 193



Photo 194

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 an 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



Photo 195



Photo 196



Photo 197



Photo 198



Photo 199



Photo 200

Passive Venting

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

Yes – Separate Validation



Media summary



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11

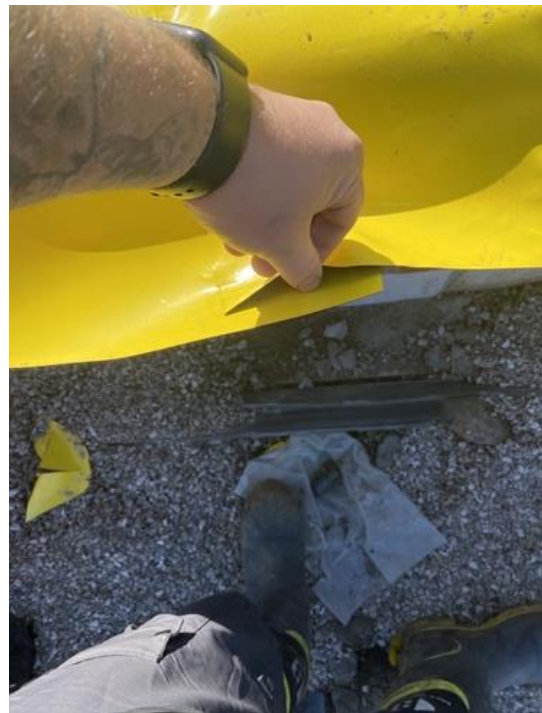


Photo 12



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

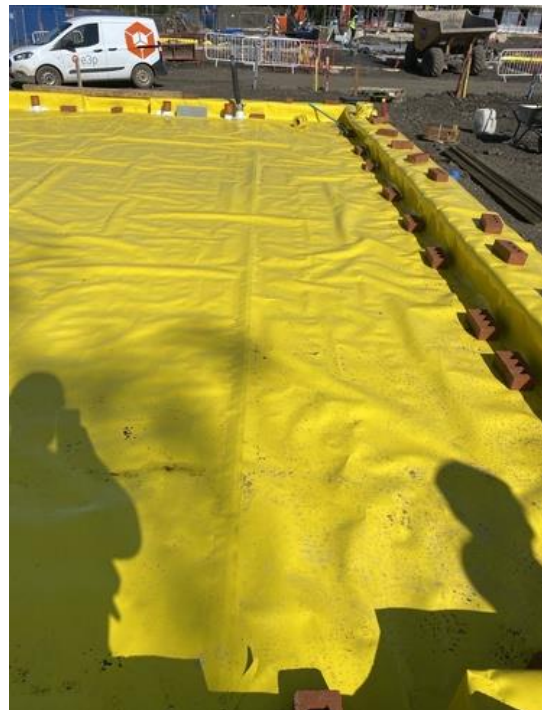


Photo 32



Photo 33



Photo 34

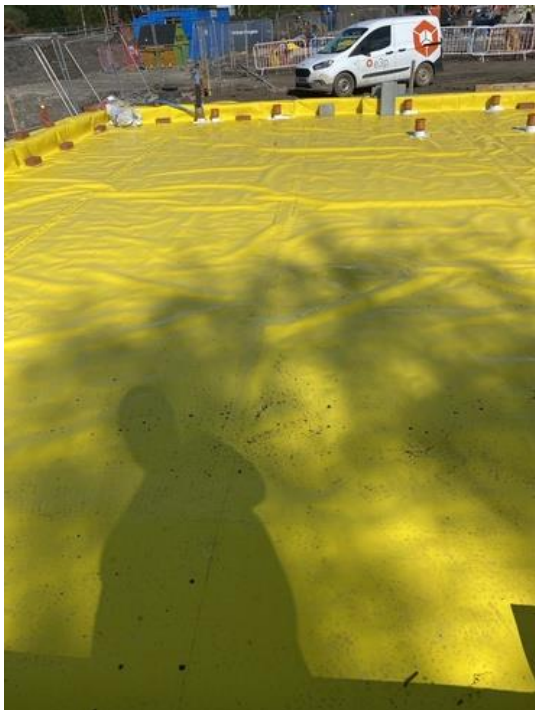


Photo 35



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

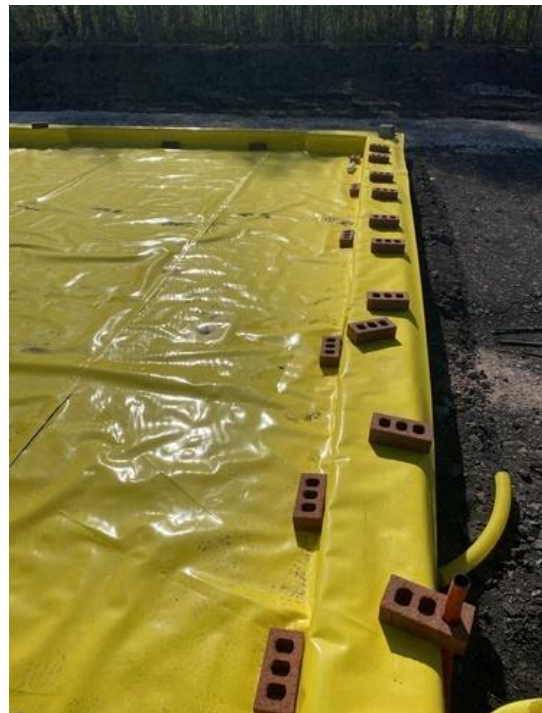


Photo 54



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

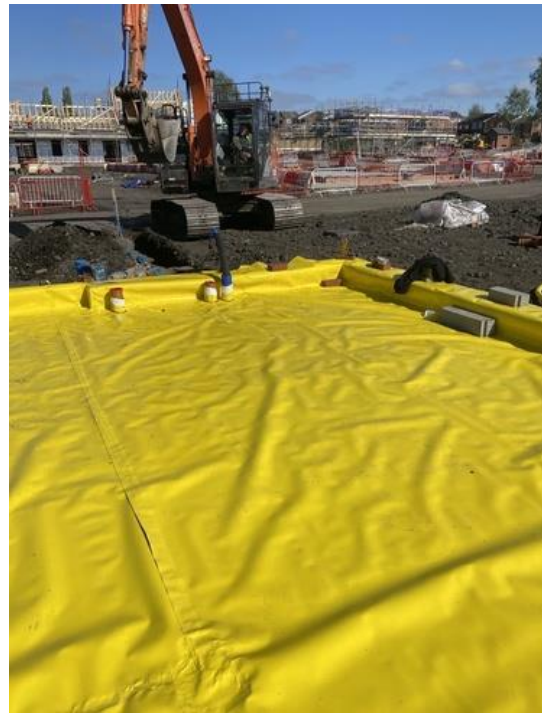


Photo 68



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

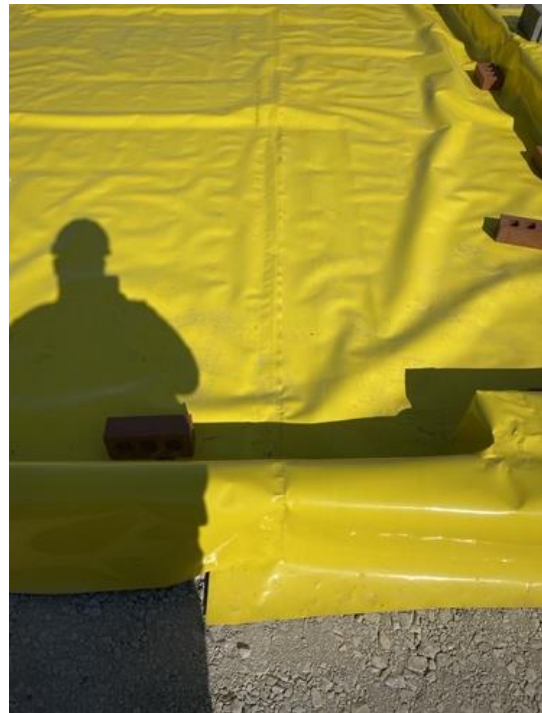


Photo 108

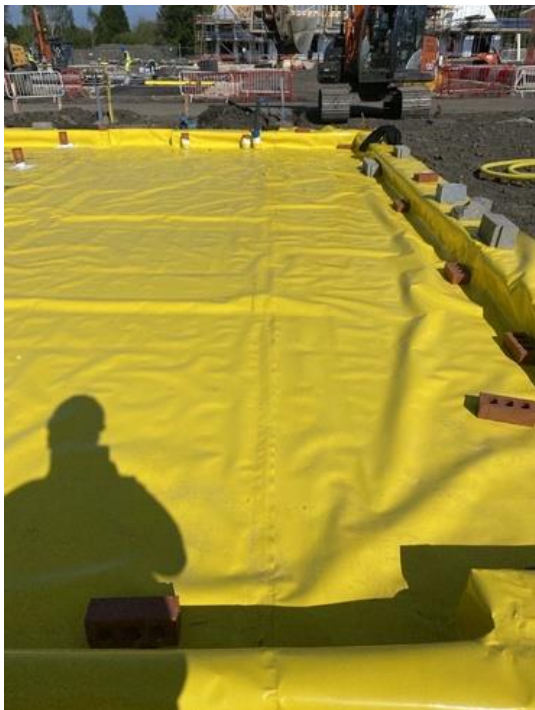


Photo 109



Photo 110



Photo 111



Photo 112



Photo 113



Photo 114

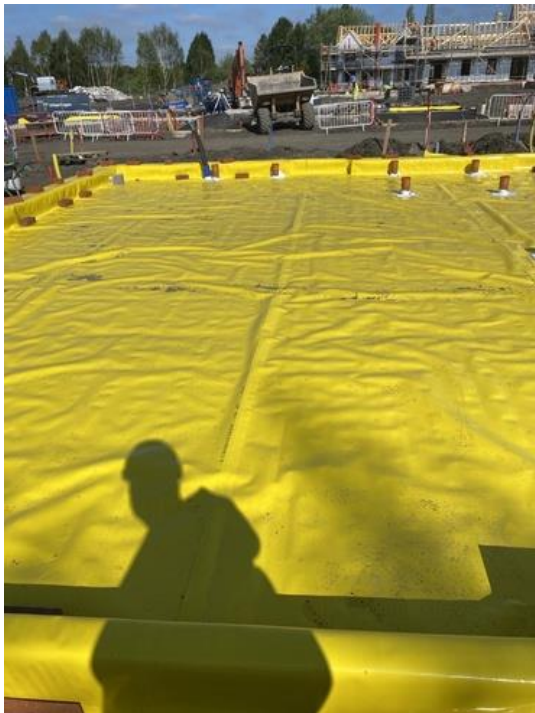


Photo 115



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



Photo 132



Photo 133



Photo 134



Photo 135



Photo 136



Photo 137

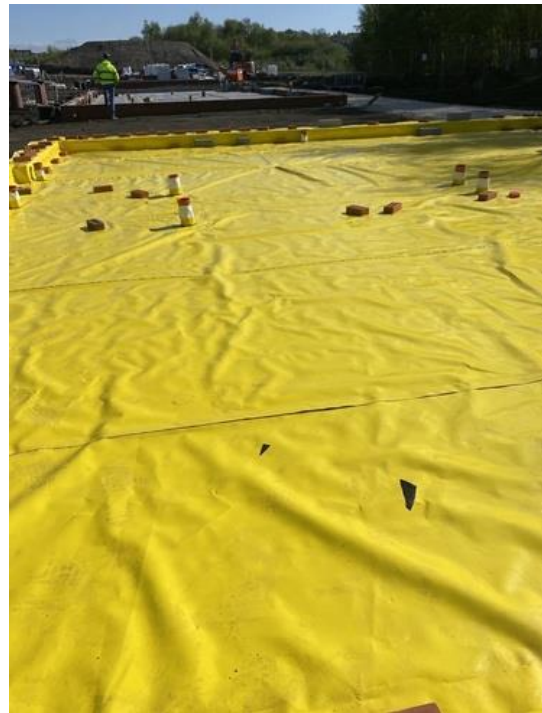


Photo 138



Photo 139



Photo 140



Photo 141



Photo 142



Photo 143



Photo 144



Photo 145



Photo 146



Photo 147



Photo 148



Photo 149



Photo 150



Photo 151



Photo 152



Photo 153



Photo 154



Photo 155



Photo 156



Photo 157



Photo 158



Photo 159



Photo 160



Photo 161



Photo 162



Photo 163



Photo 164



Photo 165



Photo 166



Photo 167



Photo 168



Photo 169



Photo 170



Photo 171



Photo 172



Photo 173



Photo 174



Photo 175



Photo 176

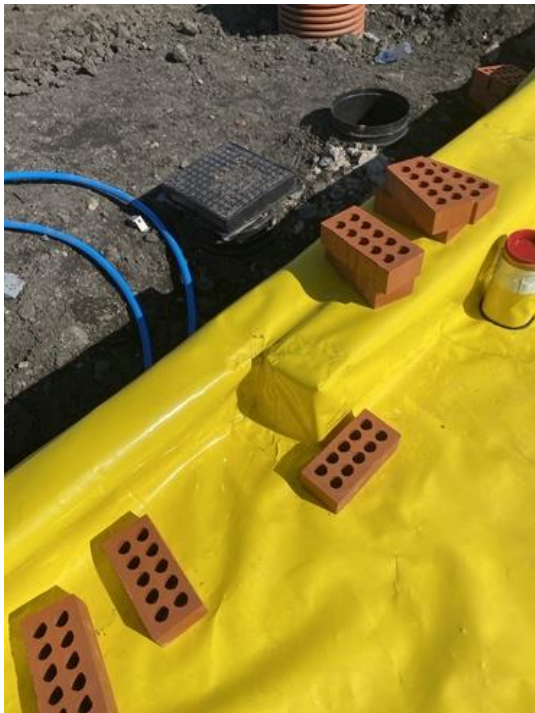


Photo 177



Photo 178



Photo 179



Photo 180



Photo 181



Photo 182



Photo 183



Photo 184



Photo 185



Photo 186



Photo 187



Photo 188



Photo 189



Photo 190



Photo 191



Photo 192



Photo 193



Photo 194



Photo 195



Photo 196



Photo 197



Photo 198



Photo 199



Photo 200