Our ref: 44277/BP

15th May 2025

RG Carter Lincoln Ltd
Regatta Building
Henley Way
Lincoln
Lincolnshire
LN6 3QR

For the attention of Ryan Goddard

Dear Ryan

Re: Royle Fold Bus Hub, Heckmondwike – Gas Membrane Validation Report

Following your instruction to undertake inspection/validation works of the membrane installation, we can now make the following comments with regards to the membrane installation at the above site.

PROJECT UNDERSTANDING

It is understood that a new Bus Hub is being constructed at Royle Fold, Heckmondwicke and that ground gas protection measures are required for the new building. The ground gas protection membrane has been installed by PAGEO Contracting Ltd (PAGEO) and third-party validation of the ground gas protection measures is required. A Site Location Plan (Figure No. 44277/01) is enclosed with this letter report.

GeoDyne Limited has reviewed the following reports in relation to the above site:

- WSP report '*Heckmondwike Bus Hub, Phase 1 Geo-Environmental Assessment For Kirklees Council*' Reference WSP-KHBH-XXX-RP-CE-00001-V0.1, Dated July 2021.
- WSP report '*Heckmondwike Bus Hub, Phase 2 Geotechnical Interpretative Report For Kirklees Council*' Reference TCF-WSP-KHBH-XXX-RP-CE-0002-V0.1, Dated February 2023.
- WSP Technical Note '*RE: Consultation Response from: KC Environmental Health (Pollution & Noise Control) 2024/91722 - Heckmondwike Hub Bus Station, Royle Fold, Heckmondwike, WF16 0HW*.' Reference WK/202426824, Dated 28th August 2024.

We understand that the site has been classified (by others) as Characteristic Situation CS2 in accordance with BS8485:2015+A1:2019.

At the request of RG Carter Lincoln Ltd a Ground Gas Verification Plan (GGVP) was produced to set out the process for the verification of ground gas protection measures:

- GeoDyne Limited report entitled '*Royle Fold Bus Hub, Heckmondwike – Ground Gas Verification Plan For RG Carter Lincoln Ltd*' reference 44277, dated 15th January 2025.

It is recommended that the above report is read in conjunction with this report.

The provision of ground gas protection measures and our Validation Works undertaken are in general accordance with the Verification Plan for the site.

MANUFACTURERS MEMBRANE SPECIFICATION DETAILS

The proprietary gas protection membrane included within the Bus Hub building has been supplied and installed by PAGEO. At the time the Verification Plan was written the Juta GP5 gas barrier membrane had been selected for installation within the Bus Hub building.

The Juta GP5 gas barrier membrane is a multi-layer composite of virgin polyethylene (PE) designed to resist the passage of ground gas and organic vapours.

The technical details relating to the Juta GP5 gas barrier membrane are provided on the attached product datasheet and are summarised in Table 1 below.

TABLE 1 – SUMMARY OF TECHNICAL SPECIFICATION OF JUTA GP5 GAS BARRIER MEMBRANE	
Property	Juta GP5 gas barrier membrane
Minimum weight/unit area	400g/m^2
Thickness	0.4mm
Minimum tensile strength	>300N/50mm (manufacturing direction) >300N/50mm (cross direction)
Carbon dioxide permeability	<0.12ml/m^2/day/atm
Methane permeability	<1.53ml/m^2/day/atm

For construction reasons the decision was taken to use the Juta Titanbond membrane beneath the footings of the building at the perimeter of the building. Juta Titanbond is a pre-applied membrane incorporating the Titanflex gas and vapour resistant membrane with a heavy duty virgin polypropylene geotextile. The geotextile is laminated to the membrane to protect the membrane from damage and to provide a bonding surface for poured concrete.

The technical details relating to the Juta Titanbond membrane are provided on the attached product data sheet and are summarised in Table 2 below.

Table 2 – SUMMARY OF TECHNICAL SPECIFICATION OF Juta Titanbond MEMBRANE	
Property	Juta Titanbond membrane
Minimum weight/unit area	650g/m2
Maximum thickness	2.0mm
Minimum tensile strength	>500N/50mm (manufacturing direction) >400N/50mm (cross direction)
Carbon dioxide permeability	<3.01ml/m2/day/atm
Methane permeability	<0.13ml/m2/day/atm

Both the Juta GP5 gas barrier membrane and the Juta Titanbond membrane are ISO15105-1 certificated and are indicated to have a methane permeability rate of <40ml/m^2/day/atm, demonstrating compatibility with the requirements of BS8485:2015+A1:2019. It is considered that these membranes are both suitable for a CS2 situation. Datasheets for the Juta GP5 gas barrier and the Juta Titanbond membrane are attached to this report.

The change in membrane represents a variation from the protocol set out in the Verification Plan, however Juta Titanbond meets the requirements of BS8485:2015+A1:2019 and is considered to be compatible with the Juta GP5 membrane, therefore the variation was considered to be acceptable.

VALIDATION PROTOCOL – Gas membrane

The validation protocol applicable to the gas membrane undertaken by GeoDyne Limited on The Bus Hub was detailed within our Verification Plan and has been undertaken as part of our validation works.

INSPECTION/VALIDATION WORKS

At the request of the RG Carter Site Manager, GeoDyne attended site on Friday 25th April 2025 to undertake a visual inspection of the membranes installed within the Bus Hub in accordance with the Verification Plan. It was not possible for PAGEO to complete the installation on 25th April, therefore PAGEO returned to site on Monday 28th April to complete their works; GeoDyne also returned on 28th April to validate the completion of the membrane installation works.

Membrane Detail

Inspection of the membrane installed by PAGEO within the Bus Hub revealed that the Juta GP5 gas barrier membrane was being installed in the centre of the building while the Juta Titanbond membrane was being installed on the perimeter on 25th April 2025.

Installation Detail

The membranes were being installed on a sand blinding that had previously been installed by RG Carter.

The panels of Juta GP5 membrane were cut to shape then sealed using extrusion welding; panels of Juta Titanbond membrane were cut to shape then sealed using hot air fusion. Joins between panels of Titanbond were covered with double sided gas resistant tape which in turn was covered with a strip of Titanbond. Joins between sections of GP5 and sections of Titanbond were extrusion welded.

Service penetrations through the GP5 membranes were sealed to the membrane by PAGEO using Juta Self-Adhesive Gas Resistant Membrane (SAGRM) tape which were hot air welded to the membrane.

The geotextile fleece surface of the Titanbond made it difficult to seal service penetrations directly onto the Titanbond membrane. Service penetrations through the Titanbond were sealed by cutting a hole in the Titanbond around the service pipe into which a border of GP5 membrane was hot air welded. The GP5 then formed a surface to which the service penetration was sealed using SAGRM.

The ellipsoid nature of the Bus Hub building design of the building meant that there were no corners to be sealed. Areas of damage identified by PAGEO were also repaired during the installation stage.

Service Penetrations, Corner Details and Membrane Integrity

On each inspection visit a GeoDyne Engineer arrived on site when PAGEO were on site prior to the completion of their works. Our inspections of the installed membranes revealed that the continuity of the installed gas barrier was maintained across the perimeter. Generally, the joins in the membranes had been suitably lapped and welded using an extrusion welder or heat guns and rollers as appropriate.

Our inspection revealed that service penetrations appropriately sealed using SAGRM. Minor defects, including minor cuts, burns, weld failures and other defects were identified within the membranes installed in the Bus Hub.

Repairs were made to the defective areas of the membranes by PAGEO as part of their installation process during our visits. Identified defects were repaired using SAGRM patches which were heat welded to the membranes. All repairs were inspected and approved by GeoDyne.

Defect Plan and Plates

Plan No. 44277/02 shows the locations of defects identified and repaired within the Bus Hub during our inspection and validation works.

Plates Nos 44277/P1 to 44277/P5 show selected views of the Bus Hub taken during our inspection and validation works.

CONCLUSIONS

Based entirely on our inspection of completed membrane details as viewed on the specified dates we can confirm that the membranes appear to have been appropriately installed within the Bus Hub, in general accordance with the protocols laid down within our Verification Plan.

We would note that the responsibility for providing and installing the membrane in an appropriate manner rests with the Client and PAGEO. Our findings and comments reflect the suitability of the membrane on the days of our visits and are limited to areas completed, physically accessible and visible to the naked eye. No responsibility will be taken for any areas of membrane that could not be inspected or for any damage which occurs to the membranes after our inspections.

We would further note that our inspection visits included an inspection of the seals around the service penetration pipes. It is understood that in a number of instances these pipe penetrations will act as ducting for smaller service pipes (i.e. water supply etc.). These smaller pipes are typically installed at a later stage during the construction process and therefore we are unable to inspect the seals of the pipes within the ducting at the time of our inspection visits. An appropriate method of sealing the ducting should be adopted by the Client (such as closed cell expanding foam or an appropriately sealed bung) to minimise the risk of the duct acting as a conduit for ground gases to enter the building.

We would recommend that a copy of this report is issued to the Local Planning Authority and any warranty provider for comment/approval.

Yours sincerely
For and on the behalf of GeoDyne Limited

Ben Parry
Geo-Environmental Engineer

Encl Site Location Plan (44277/01)
Membrane Validation Plan (44277/02)
Plates (44277/P1 to 44277/P5)
Juta GP5 Technical Data Sheet
Juta Titanbond Technical Data Sheet
Conditions and Limitations

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	06/05/2025
Title	Site Location Plan	Revision	
		Figure No.	44277/MV/01

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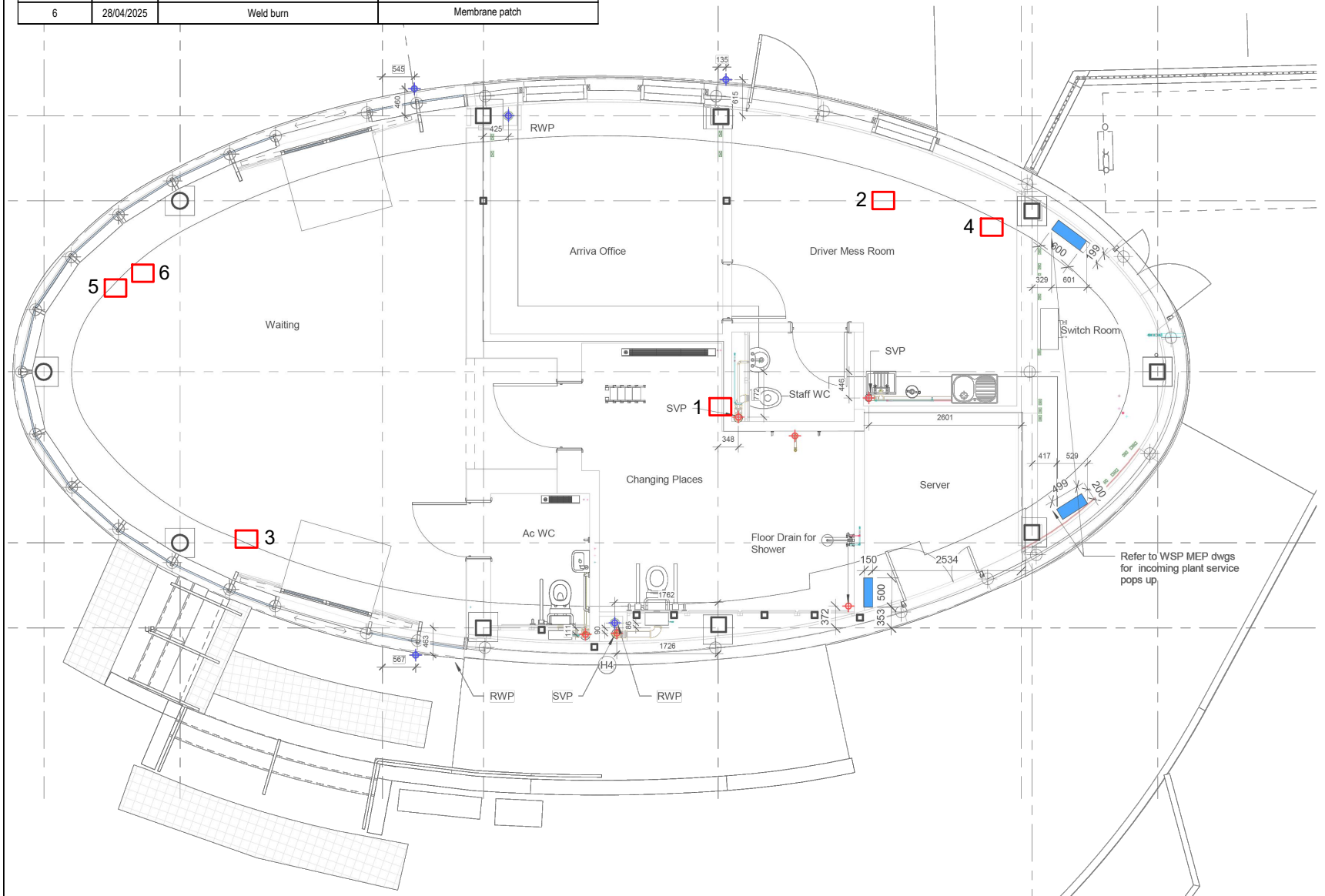
SUMMARY OF DEFECTS			
Defect No.	Date of Inspection	Description	Repair
1	25/04/2025	Capillary failure	Tape re-sealed
2	25/04/2025	Puncture	Membrane patch
3	25/04/2025	Weld failure	Membrane patch
4	25/04/2025	Cut to membrane	Membrane patch
5	28/04/2025	Capillary failure	Tape re-sealed
6	28/04/2025	Weld burn	Membrane patch

KEY

Validated Repair



Drawing based on Services Pop Up Plan by Stephan George & Partners, Ref: 20233-003-SGP-HEK-XX-DR-A- 220100- C3, Dated: 17th October 2024. Used, edited and reproduced with permission of the Client.

Project No.	44277
Client	RG Carter Lincoln Ltd
Project	Bus Station, Heckmondwike
Title	Membrane Validation Works
Drawn By	DL
Checked By	CEH
Approved By	RS
Scale	NTS
Date Drawn	06/05/2025
Revision	
Figure No.	44277/MV/02

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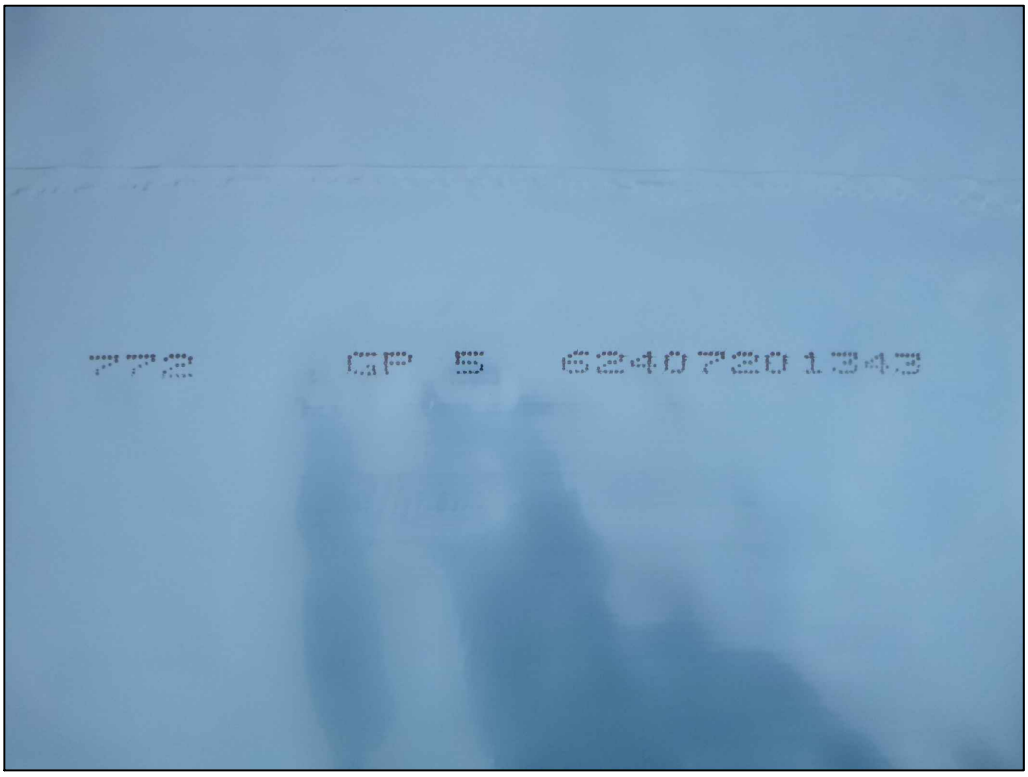
A	General view of site during installation, 25/04/2025



B	Batch mark on Juta GP5 membrane, 25/04/2025

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	07/05/2025
Title	General Views of Membrane Installation Works	Revision	
		Figure No.	44277/MV/P1

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A	Extrusion welded membrane joins, 25/04/2025

B	Testing an extrusion welded join, 25/04/2025

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	07/05/2025
Title	General Views of Membrane Installation Works	Revision	
		Figure No.	44277/MV/P2

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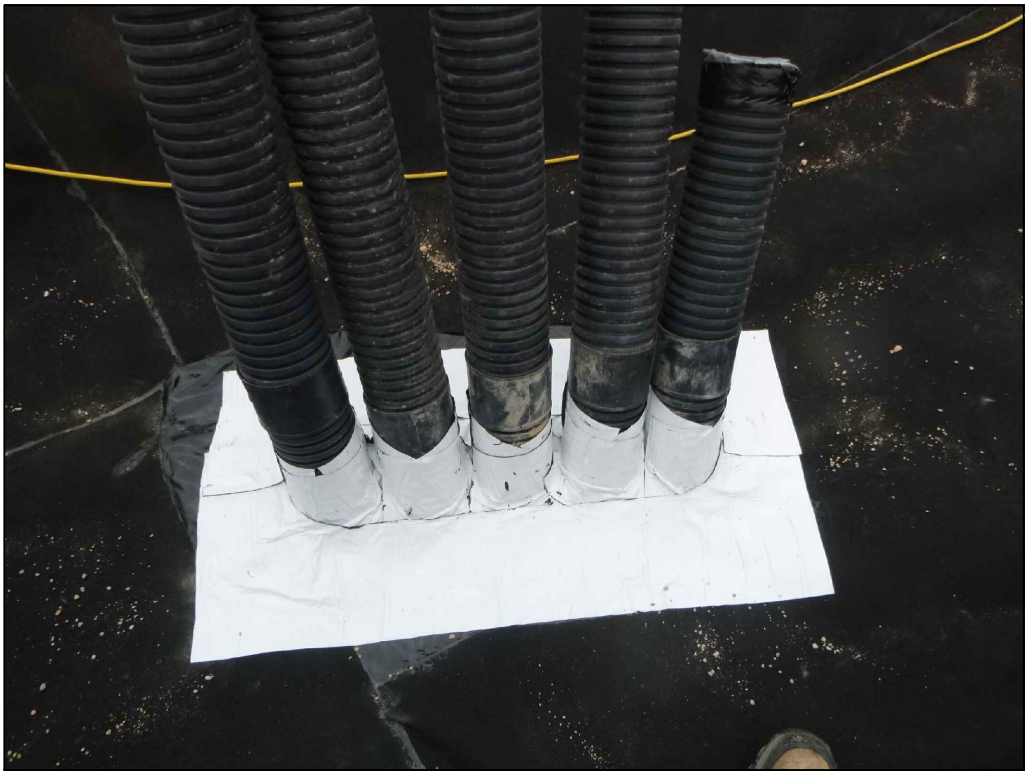
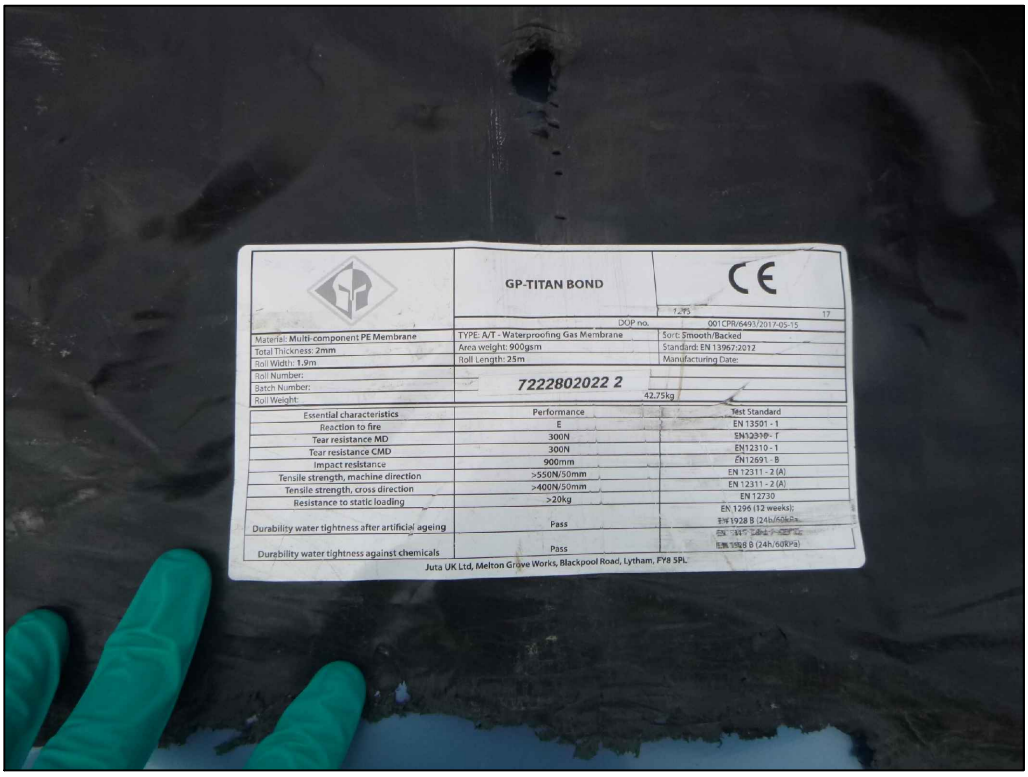


A	Service penetration sealed through Juta Titanbond perimeter, 25/04/2025



B	Juta Titanbond packaging batch label, 25/04/2025

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	07/05/2025
Title	General Views of Membrane Installation Works	Revision	
		Figure No.	44277/MV/P3

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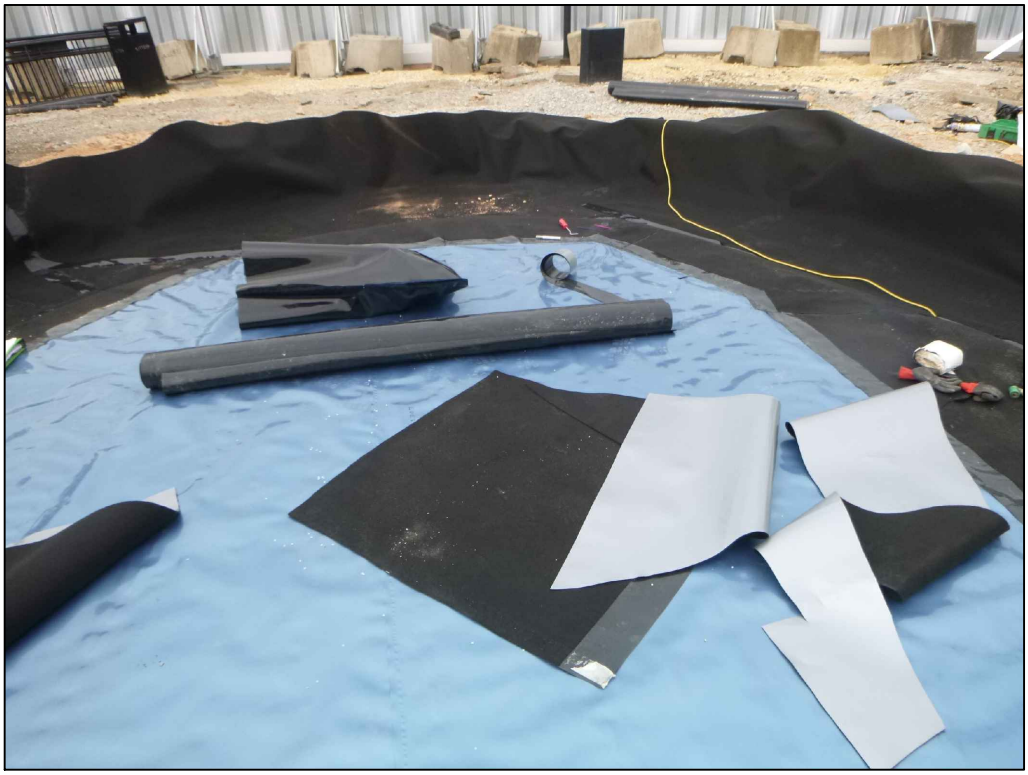

A	Completed Titanbond perimeter installation, 28/04/2025

B	Perimeter join covered with Titanbond strip, 28/04/2025

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	07/05/2025
Title	General Views of Membrane Installation Works	Revision	
		Figure No.	44277/MV/P4

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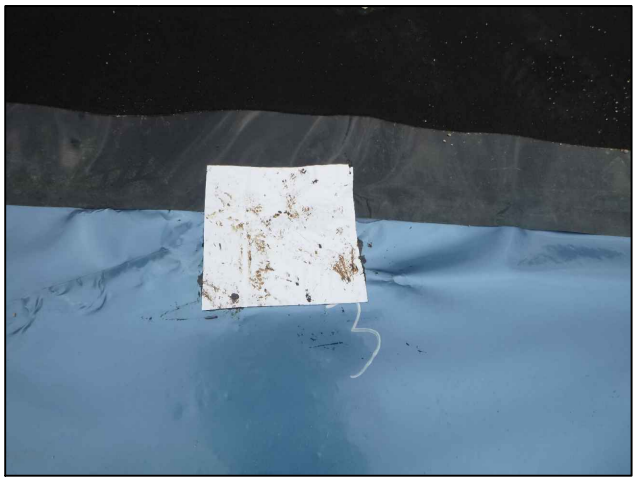
Heckmondwike Bus Station

A | Minor gap in perimeter join, 25/04/2025



B | Patch used to repair defect shown in A, 25/04/025

C | Minor cut to membrane, 25/04/2025

D | Patch used to repair defect shown in C, 25/04/025

E | Minor capillary, 28/04/2025

F | Patch used to repair defect shown in E, 28/04/025

Project No.	44277	Drawn By	DL
Client	RG Carter Lincoln Ltd	Checked By	CEH
		Approved By	RS
Project	Bus Station, Heckmondwike	Scale	NTS
		Date Drawn	07/05/2025
Title	Views of Membrane Installation Works	Revision	
		Figure No.	44277/MV/P5

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GROUND GAS PROTECTION
GP®5 TECHNICAL DATA SHEET

JUTA | TITANTECH®

GP® 5

GP®5 gas barrier is a multi-layer composite of virgin polyethylene (PE) giving exceptional resistance to the passage of ground gas and organic vapours. It also acts as a high performance DPM.

Thickness	0.4 mm
Width	Various m
Length	Various m
Weight	400 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.

GP®5 is suitable for the following applications:

- Carbon dioxide and methane affected sites in accordance with BS 8485:2015 + A1:2019 & NHBC
- Radon affected sites in accordance with BRE211:2015
- Damp protection in accordance with Building Regulations Part C
- Low level VOC contaminated sites (site specific assessment required)

Handling

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

Installation

GP®5 should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015.

Certifications

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 20/5705

Please Scan

CE UK CA UK NI

Rev 2024

GROUND GAS PROTECTION
GP®5 TECHNICAL DATA SHEET

GP®5

Feature	Characteristics	Test Method	GP®5
Physical Properties	Thickness	EN 1849-2	0.4 mm
	Width	EN 1849-2	Various m
	Length	EN 1849-2	Various m
	Weight	EN 1849-2	400 g/m^2
Hydraulic Press	Resistance to Water Penetration	EN 1928 (A)	Pass
Mechanical Properties	Resistance to Static Load	EN 12730	> 20 kg
	Tensile Strength (MD)	EN 12311-2 (A)	> 300 N/50mm
	Tensile Strength (CMD)	EN 12311-2 (A)	> 300 N/50mm
	Resistance to Tearing (Nail Shank) MD	EN 12310-1	> 230 N
	Resistance to Tearing (Nail Shank) CMD	EN 12310-1	> 230 N
	Impact Resistance	EN 12691-B	500 mm
	Puncture Resistance	ASTM D 4833	> 160 N
	Puncture Resistance	EN 12236	1.60 kN
	Reaction to Fire	EN 13501-1	E
Vapour Permeability	Methane Permeability	BS EN ISO 15105-1	0.12 ml/m^2/day/atm
	Carbon Dioxide Permeability	BS EN ISO 15105-1	1.53 ml/m^2/day/atm
	Hydrogen Permeability	BS EN ISO 15105-1	68.7 ml/m^2/day/atm
	Benzene Permeability	BS EN ISO 15105-2	0.41 ml/m^2/day
	Oxygen Permeability	BS EN ISO 15105-2	<3 ml/m^2/day
	Radon Permeability	K124/02/95	1.0 x 10^{-12} m^2/s
	Hydrogen Sulphide Permeability	BS EN ISO 15105-1	<0.68 ml/m^2/day/atm
Fuel Vapour Permeability	Petrol	BS EN ISO 15105-2	(ave.) 3.4 x 10^{-13} /mol/(m^2.s.Pa)
	Diesel	BS EN ISO 15105-2	(ave.) 3.4 x 10^{-13} /mol/(m^2.s.Pa)
Durability	Durability Watertightness After Artificial Ageing	EN 1928	Pass
	Durability Watertightness Against Chemicals	EN 1928	Pass
Compliance and Certification	CE Mark - EN 13967:2012		
	NHBC Standards Compliant		
	BS 8485:2015 + A1 2019 Accordant		

JUTA UK

Please contact JUTA UK Directly for more information on GP®5

Storage

Rolls of GP®5 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.

GROUND GAS PROTECTION
GP®5 TECHNICAL DATA SHEET

GP® 5

JUTA UK

Please contact JUTA UK Directly for more information on GP®5

Jointing and Sealing

It is recommended GP®5 can 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. GP®5 should be overlapped by at least 100mm. If taping joints, only suitable tape must be used, ensuring application with a silicone roller to remove trapped air. JUTA pre-formed details, or self adhesive gas membrane are available for sealing around protuberances.

Accessory Products

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

GROUND GAS PROTECTION
GP® TITANBOND® TECHNICAL DATA SHEET

GP® TITANBOND®

GP® TITANBOND® is a pre-applied fully bonded waterproofing membrane incorporating the GP® TITANFLEX® membrane and a heavy duty virgin polypropylene geotextile. The geotextile is laminated to the membrane to provide a dual function; protecting the membrane from damage and providing an integrated 'bond' to poured concrete, ensuring a fully bonded waterproofing barrier which has exceptionally high resistance to ground gases and VOCs. GP® TITANBOND® is used for the gas/waterproofing/tanking of underground structure where harmful ground gases are anticipated.

Thickness	2.0 mm
Width	1.9 m
Length	25 m
Weight	650 g/m²

Handling

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

Storage

Rolls of GP® TITANBOND® 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.

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.

Certifications

Please Scan

Rev 2024

GROUND GAS PROTECTION
GP® TITANBOND®
TECHNICAL DATA SHEET

GP® TITANBOND®

Feature	Characteristics	Test Method	GP® TITANBOND®
Physical Properties	Thickness	EN 1849-2	2.0 mm
	Width	EN 1849-2	1.9 m
	Length	EN 1849-2	25 m
	Weight	EN 1849-2	650 g/m^2
Hydraulic Press	Water Vapour Transmission Rate	EN 1931	0.11 - 0.18 g/m^2/day
	Water Tightness (60 kPa)	EN 1928	Pass
	Water Tightness (196 kPa - 20 m Water Head) (Basement Application)	EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	≥ 20 kg
	Puncture Resistance	EN 12236	≥ 2.0 kN
	Tensile Strength (MD)	EN 12311-1	> 550 N/50mm
	Tensile Strength (CMD)	EN 12311-1	> 400 N/50mm
	Tensile Elongation (MD/CMD)	EN 12310-1	> 550 %
	Tear Resistance (MD/CMD)	EN 12310-1	> 300 N
	Resistance to Impact	EN 12691-B	> 1650 mm
	Reaction to Fire	EN 13501-1	E Class
	Concrete Peel Adhesion	ASTM D903 (MOD)	> 3.0 kN/m
	Resistance to Artificial Ageing	EN 1296/EN 1928	Pass
	Resistance to Chemicals	EN 1296/EN 1928	Pass
Compliance and Certification	CE Mark - EN13967:2012		
	NHBC Standards Compliant		
	BS 8485:2015 Compliant (Methane and Carbon Dioxide barrier)		
	CIRIA C748 Compliant (VOC Barrier)		
	BS 8102:2009 Compliant (Type A Waterproofing Barrier)		
Vapour Permeability 100% Concentration	Transmission Rate of Benzene	EN ISO 15105-2	< 3.6 mg/m^2/day
	Transmission Rate of Toluene	EN ISO 15105-2	< 13.8 mg/m^2/day
	Transmission Rate of Ethyl Benzene	EN ISO 15105-2	< 2.7 mg/m^2/day
	Transmission Rate of Xylenes (M,P,O)	EN ISO 15105-2	< 7.7 mg/m^2/day
	Transmission Rate of Hexane	EN ISO 15105-2	< 0.6 mg/m^2/day
	Transmission Rate of Vinyl Chloride	EN ISO 15105-2	< 0.05 mg/m^2/day
	Transmission Rate of Trichloroethene (TCE)	EN ISO 15105-2	< 54.7 mg/m^2/day
	Transmission Rate of Tetrachloroethene (PCE)	EN ISO 15105-2	< 26.2 mg/m^2/day
	Transmission Rate of Naphthalene	EN ISO 15105-2	< 0.0006 mg/m^2/day
	Transmission Rate of CIS-1,2-Dichloroethylene	EN ISO 15105-2	< 1.1 mg/m^2/day
Gas Permeability	Methane Permeability	EN ISO 15105-1	0.13 ml/m^2/day/atm
	Methane Permeability (Jointed)	EN ISO 15105-1	1.00 ml/m^2/day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	3.01 ml/m^2/day/atm
	Vinyl Chloride Gas Permeability	EN ISO 15105-1	0.04 ml/m^2/day/atm
	Radon Permeability	K124/02/95	1.0 x 10^{-12} m^2/S
	Hydrogen Sulphide Permeability	EN ISO 15105-1	< 0.16 ml/m^2/day/atm

GROUND GAS PROTECTION
GP® TITANBOND®
TECHNICAL DATA SHEET

GP® TITANBOND®

Feature	Characteristics	Test Method	GP® TITANFBOND®
Durability and Chemical Resistance	Chemical Resistance - Sulfuric ACID (10% Solution of Sulfuric Acid (H_2SO_4)) 50° For 56 Days	EN 14414-A	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Chemical Resistance - BASIC (Calcium Hydroxide Saturated Suspension) 50° For 56 Days	EN 14414-B	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Chemical Resistance - SOLVENTS (35% Diesel, 35% Paraffin, 30% Oil Hd3O (Vol)) 50° For 56 Days	EN 14414-C	TENSILE STRENGTH RETAINED >80%
			RESULT - PASS
	Chemical Resistance - SYNTHETIC LEACHATE (Mixture of 14 Acids, Chlorides, Sulphates & Phosphates) 50° For 56 Days	EN 14414-D	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Resistance to Leaching - HOT WATER (Deionised Water) 50° For 56 Days	EN 14415-A	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Resistance to leaching - AQUEOUS ALKALINE (Saturated Calcium Hydroxide) 50° For 56 Days	EN 14415-B	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Resistance to Leaching - ORGANIC ALCOHOL (30% Methanol, 30% Isopropanol, 40% Glycol) 50° For 56 Days	EN 14415-C	TENSILE STRENGTH RETAINED 100%
			RESULT - PASS
	Chemical Resistance - BENZENE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 95% (MD), 102% (CMD)
			RESULT - PASS
	Chemical Resistance - TOLUENE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 94% (MD), 91% (CMD)
			RESULT - PASS
	Chemical Resistance - ETHYL BENZENE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 99% (MD), 97% (CMD)
			RESULT - PASS
	Chemical Resistance - XYLENES - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 91% (MD), 106% (CMD)
			RESULT - PASS
	Chemical Resistance - TCE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 99% (MD), 93% (CMD)
			RESULT - PASS
	Chemical Resistance - PCE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 93% (MD), 93% (CMD)
			RESULT - PASS
	Chemical Resistance - NAPTHALENE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 101% (MD), 93% (CMD)
			RESULT - PASS
	Chemical Resistance - HEXANE - 100% Saturated Concentration	EN 14414-D (MOD)	TENSILE STRENGTH RETAINED 99% (MD), 104% (CMD)
			RESULT - PASS

GROUND GAS PROTECTION
GP® TITANBOND®
TECHNICAL DATA SHEET

GP® TITANBOND®

JUTA UK

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

Installation

GP® TITANBOND® should be installed in accordance with the product installation guidelines, and in accordance with best practice.

Jointing and Sealing

GP® TITANBOND® can be heat welded or taped, with jointing carried out by competent personnel with suitable qualifications in accordance with best practice. GP® TITANBOND® should be overlapped by at least 100mm. If taping joints, only suitable tape must be used, ensuring application with a silicone roller to remove trapped air. JUTA pre-formed details, or self adhesive gas membrane are available for sealing around protuberances.

Accessory Products

- GP® DPC
- GP® TITAN TAPE
- GP® TITAN OVERTAPE
- JUTA 300TT

Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create 'soft spots', therefore, should the Client wish to designate 'no dig' zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date. GeoDyne reserve the right to charge interest on any late payments.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

4 GeoDyne reserve the right to charge for abortive costs for any site works cancelled by the client within 5 working days before mobilisation to site.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.