



Reference: **273-24-292.3184**

Date: **30th April 2025**

Prestige Air Technology Ltd

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TN25 4FN

For the Attention of: Mr Andy Collins

**GAS VERIFICATION PLAN AND VALIDATION REPORT
SEND SCHOOL BUILDING, ROCHDALE**

Dear Andy,

Further to your instructions we present the ground gas protection verification plan and validation report for the installation of ground gas protection measures at the above named site.

1.0 INTRODUCTION

The site is located to the north of the West Starkey Street approximately 7.9km to the west of Rochdale town centre. It is understood that the proposed development the construction of a new Special Education Needs and Disability School facility with two storeys and associated hardstanding for access.

The building has been constructed in three phases with piled foundations and a cast in-situ reinforced concrete ground bearing floor slab. The construction includes the installation of ground gas protection measures.

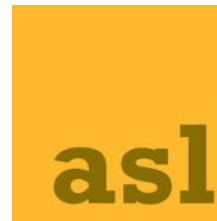
Specific information relating to the ground gas regime is included in Hydrock's Ground Investigation Report for the site (report reference 19522-HYD-XX-XX-RP—GE-0002 dated 25th January 2023). Relevant extracts from this report are presented in Appendix I.

2.0 GAS PROTECTION REQUIREMENTS

The design, installation and verification of the gas protection measures is based on Hydrock's Ground Investigation Report for the site, relevant extracts of which are included in Appendix I.

This report recommended that ground gas protection measures be incorporated into the proposed development in general accordance with Characteristic Situation 2 (CS2 – low risk) based on BS8485 (2015+A1:2019) 'Code of practise for the design or protective measures for methane and carbon dioxide ground gases in new buildings'.

The proposed development comprises the construction of a new two-story Special Education Needs and Disability School facility which is classified as a Type C building and therefore 2.5 gas protection points and at least two lines of gas protection are required in accordance with BS8485.



In accordance with the requirements for gas protection measures and given the nature of the development the gas protection measures comprise the following:

- A gas resistant membrane, Juta GP1, together with Juta Titanbond, PAG self-adhesive gas resistant membrane (SAGM) and Visqueen Ultimate Geoseal installed by Prestige Air Technology Ltd, a specialist gas membrane installer, and validated by ASL, a third-party consultant with gas protection verification specialists, to give 2 points;
- A cast in situ ground bearing floor slab, with reinforcement to top and bottom, to give at least 1.5 points.

It should be noted that the gas resistant membrane is to be installed to provide a continuous barrier across the footprint of the building and lift pits areas. Specification drawings for the installation are included in Appendix II. The data sheets for the gas resistant membrane products installed are included in Appendix III.

All joints will be sealed by welding and SAGM will be used to seal all penetrations through the membrane and details such as corners and columns.

3.0 INSTALLATION

The gas membranes were installed by Prestige Air Technology Limited, a qualified (NVQ Level 2) and experienced specialist gas membrane installer.

The works were carried out in accordance with the gas membrane manufacturer's specification and the method statement presented in Appendix IV.

4.0 VERIFICATION AND INSPECTION WORKS

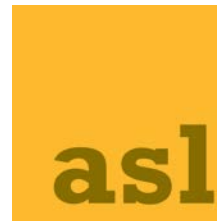
The verification has been carried out by ASL in general accordance with CIRIA C735 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases'.

The verification comprised site inspection visits by an independent verifier (ASL) in accordance with the Method Statement included in Appendix IV. ASL are an independent geo-environmental consultancy with the inspections will be carried out by geotechnical engineers and geo-environmental scientists who are experienced in these works and have been suitably trained (NVQ Level 4) in gas protection verification and validation.

Given the available information and based on the requirements of Table A2 of CIRIA C735 for CS2, the inspections would need to be completed on 50% of the installation prior to concrete pours. The verification would need to include integrity testing comprising air lance integrity testing of approximately 25% of all seams, joints and pipe penetrations. The installer is to provide verification evidence and photographs of the installation works not inspected by the independent verifier.

Air lance integrity testing comprises the use of a compressor to pressurise air to a minimum pressure of 345 Kpa (50psi). This air is then directed at joints and seals in the membrane using a hose and nozzle of 4.8mm in diameter, at no more than 50mm. The verifier observes the surface of the membrane for any air pockets building up beneath the membrane surface. Any air pockets will signify that the membrane is not correctly sealed.





The verifier will request the repair of any defects in the membrane or welds and seals by the installer before confirming that the gas protection measures have been suitably installed. The findings of each validation visit are recorded on suitable pro-forma inspection sheets.

5.0 VALIDATION FINDINGS

The site was visited on five occasions between the 15th November 2024 and 7th February 2025 to view the installation of the gas protection measures across the development. The visits are summarised as follows:

- 15th November 2024 – Inspection of Lift shaft walls;
- 10th December 2024 - Inspection of membrane across internal area of Pour 1;
- 14th January 2025 - Inspection of membrane across internal area of Pour 2;
- 22nd January 2025 - Inspection of membrane across internal area of Pour 3;
- 7th February 2025 – Inspection of membrane installed around the north-eastern and northern elevations.

The validation visits comprised a visual inspection of the placement of the gas resistant membrane, the welding of joints, sealing of penetrations through the membrane and the general standard of the installation works completed prior to concrete pours. Air lance integrity testing was completed on approximately 60% of all seams and joints, in general accordance with the requirements of CIRIA C735.

In addition to the visits summarised above, ASL have received a series of photographs detailing the installation of the gas membrane across minor areas of Pours 1, 2 and 3 and for the perimeter detailing to the southern, northern and western elevations in general accordance with the requirements of CIRIA C735.

The membranes installed were a Juta GP1 gas resistant membrane together with Juta Titanbond and locally Visqueen Ultimate Geoseal (a suitably comparable product) around the perimeter and PAG self-adhesive gas resistant membrane (SAGM) to corner details, lift pit detailing, penetrations and repairs. The membranes were installed by Prestige Air Technology Ltd.

The installation has been independently inspected by ASL. Details of the completed inspections were recorded by the verifier, and these are shown on the inspection reports presented in Appendix V. Photographs from the inspections showing the membrane installation are included in Appendix VI. A selection of photographs received from the installer detailing the membrane installation of minor areas and perimeter not inspected by ASL are included in Appendix VI.

The gas resistant membrane has been installed across the development using suitable gas resistant products and to an appropriate standard. All joints and penetrations have been suitably sealed. The general standard of the installation works was high and care was being taken to protect the membrane during the installation works.

Further to these inspections by ASL and the support information from the installer, we can confirm that the gas protection measures installed at the proposed development meet the required standards.





We trust this meets with your requirements and please contact us with any queries.

Yours sincerely
for **ASL**

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Certified holder of ABBE Level 4 NVQ Diploma in Verification of Ground Gas Protection Systems (143627)

Enc.

- Appendix I: Ground Gas Assessment
- Appendix II: Scheme Drawings
- Appendix III: Data Sheets
- Appendix IV: Method Statements
- Appendix V: Site Inspection Reports
- Appendix VI: Photographs





APPENDIX I

GROUND GAS ASSESSMENT



Rochdale SEND- Passivhaus Ground Investigation

*For Tilbury Douglas on behalf of The
Department for Education*

Date: 25 January 2023

Doc ref: 19522-HYD-XX-XX-RP-GE-0002

DOCUMENT CONTROL SHEET

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S2	P03	18/07/2022	Updated following Coal Mining Investigation
S2	P04	25/01/2023	Updated Client details

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Appendix C	Site Monitoring Data and Ground Gas Risk Assessment
Appendix D	Contamination Test Results and Statistical Analysis
Appendix E	Waste Assessment
Appendix F	Plausible Source-Pathway-Receptor Contaminant Linkages
Appendix G	Hydrock Methodologies

	Groundwater was encountered at depths between 0.75m bgl and 10.70m bgl during the investigation. Water levels recorded post-fieldwork ranged from 0.60m bgl to 9.85m bgl (112.60m OD to 102.38m OD). Shallow groundwater was encountered within the Peat. Groundwater was also sporadically recorded within the Glacial Till in one instance at 1.70m bgl and at depth at 9.56-10.70m bgl. Within the Glacial Till, no infiltration was recorded.
GEO-ENVIRONMENTAL CONCLUSIONS	
Conclusions of contamination Generic risk assessment	Human health: - Asbestos fibres (<0.001%v/v of chrysotile) measured in soil samples in the Made Ground. - Chloroethene (vinyl chloride) has been tested in the original investigation, all results were recorded as less than the laboratory limit of detection. It should be noted, the limit of detection is in excess of the GAC but Hydrock do not believe this poses a risk. - Slightly elevated concentrations of Chloromethane (maximum value of 0.033mg/kg vs a GAC of 0.019mg/kg). Plant growth: - No exceedances. Controlled Waters: - Soil leachate and groundwater samples exceed WQT for Copper, Iron, Manganese, Ammoniacal Nitrogen, pH and petroleum hydrocarbons fractions, as an indicator of potential groundwater risk. Ground gases or vapours: - Moderate risk from ground gases and CS2 conditions apply. Radon: - The site is not in a Radon Affected Area. Construction materials: - Plastic products may be at risk from high concentrations of petroleum hydrocarbons (TPH) within the Made Ground in the Northeast of the site. Water supply pipes: - This is a brownfield site and the presumption in the guidance is that barrier pipe will be used. However, the investigation and assessment has indicated no significant Contaminants of Concern and as such standard pipework may be suitable for the site following negotiations with the supply company.
Proposed mitigation measures	The mitigation measures proposed to remove unacceptable risks include: - The installation of a 450mm cover system in in public open space, comprising a subsoil beneath a topsoil thickness of between 150mm and 300mm (PL1). - Installation of ground gas mitigation measures to comply with CS2 conditions (as described in Section 6.10.1) (PL2 and PL4). - Consultation with the pipework manufacturer and installation of suitable pipework (PL5). The methodology for the remediation should be presented in a Remediation Strategy, which will need to be submitted to the warranty provider and the regulatory authorities for approval. In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site. A verification report completed by a competent independent geo-environmental specialist will be required following completion of any remedial works.
Waste management	Excavated soils scheduled for off-site disposal are likely to be classified as non-hazardous waste.

5.2.3 Groundwater summary

In general, shallow groundwater was encountered within the Peat in the lower half of the stratum between 0.60-2.20m bgl. Groundwater was also sporadically recorded within the Glacial Till in one instance (WS04) at 1.70m bgl and at depth within the two cable percussive boreholes (BH101 and 102) at 9.56-10.70m bgl. Within the Glacial Till, no infiltration was recorded.

Within RO01 groundwater was encountered at the boundary between the Glacial Till and the PLCM at 9.95-10.85m bgl. The top of the response zone in RO01 is 11.0m bgl so the groundwater body found within the PLCM is above the level of the response zone.

5.3 Ground gases (carbon dioxide and methane)

Records from the gas monitoring boreholes are presented in Appendix C and summarised in Table 5.5.

A total of six monitoring visits have been undertaken, and the scheduled monitoring as part of the current commission is now complete. The data are assessed in Section 6.

A total of three monitoring visits have been undertaken at RO01. The data are assessed in Section 6.

Table 5.5: Range of ground gas data

Stratum	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Steady flow rate (l/hr)	Comment
Made Ground (WS02)	<0.10	3.30 - 3.80	16.80 - 18.70	<0.10 - 0.10	-
Made Ground and Peat (WS03)	0.10 - 1.00	12.50 - 15.70	6.00 - 21.00	<0.10-2.20	-
Peat	<0.10 - 12.70	0.20 - 18.30	3.10 - 20.60	<0.10 - 3.20	28 out of the 36 methane readings are below detection. Seventeen out of the 30 carbon dioxide readings exceed 5%.
Peat and Glacial Till (WS06)	<0.10	1.00 - 3.70	19.00 - 21.00	<0.10 - 2.30	-
Glacial Till/ Glaciofluvial Deposits (BH102)	<0.10-0.10	0.20-1.20	14.20-20.60	<0.10-0.10	-
PLCM	0.1 - 1.2	0.10 – 2.50	17.6 – 20.6	<0.1	Peak methane concentration exceeds 1% on one occasion. Steady Methane concentrations are below the limit of detection over the three scheduled visits.

- The inland waters EQSs for copper, manganese, are based on the bioavailable fraction and because bioavailability has not been calculated for these metals, the assessment is conservative as it assumes 100% bioavailability; and
- The Pennine Lower Coal Measures Secondary A Aquifer is separated from the Made Ground and Peat above it by more than 10m of low-permeability clay. The River Roch, is in turn separated from the site by a distance of 350m.

There is currently no explanation for the hydrocarbon content of the groundwater sample from BH0102, as no visual or olfactory evidence of petroleum hydrocarbons, has been noted within the surrounding soils in BH102 or in any of the surrounding exploratory holes. This discovery will be subject to additional testing to rule out either cross-contamination or a laboratory reporting error.

On 13/01/2022 the monitoring well at BH102 was developed and a sample of the groundwater was collected for chemical analysis. There was no visual or olfactory evidence of contamination on the water that was purged or sampled from BH102. The chemical analysis results of the groundwater show all hydrocarbons to be below the limit of detection. The chemical analysis certificate is provided in Appendix D.

On this basis, and given that there has been no viable source of hydrocarbons identified on site it would be justified to suggest that the elevated concentrations identified in the previous investigation is a result of possible cross-contamination or a laboratory reporting error. No further consideration to petroleum hydrocarbons in groundwater is required.

7.6 Ground gases risk assessment

7.6.1 Data

It is judged from the available evidence that the gas generation potential at the site is moderate (due to the presence of Peat) and that the sensitivity of the development is low to moderate (The proposed development is for a two-storey school). Consequently, and in accordance with CIRIA C665 (Table 5.5a and 5.5b), an appropriate minimum monitoring regime is six to nine readings over three to six months, provided other monitoring requirements are also met, such as prevailing atmospheric pressure conditions (for example, BS 8485:2015 +A1:2019 suggests monitoring should include a period of falling atmospheric pressure).

Hydrock has undertaken the six readings required, including periods of falling and low atmospheric pressure.

A total of three monitoring visits were undertaken at RO01 to establish the ground gas regime within the PLCM.

7.6.2 Assessment

The risks associated with the ground gases methane (CH₄) and carbon dioxide (CO₂) have been assessed using BS 8485:2015 +A1:2019, which cites the guidelines published by CIRIA (Wilson et al 2007) (known as Situation A).

The assessment guidelines published by CIRIA are based on interpretation of the gas concentrations and the gas flow rates, amongst other variables, and are compliant with the model procedures of LCRM. The modified Wilson and Card assessment has been used by comparing the maximum gas concentrations

and gas screening values (GSV¹) in Appendix D with the published table (CIRIA Table 8.5) and the assessment is summarised in Table 7.6. The assessment is presented in Appendix C.

Table 7.6: Ground gas risk assessment

	Min	Max	Typical ⁽ⁱ⁾	Comment
Steady Flow Rate (l/hr)	0.10	3.70	<1	-
Methane (%)	0.10	12.70	<1	There are occasional concentrations of methane elevated above 1%. Concentrations of carbon dioxide, are frequently above 5% in the peat deposits.
Carbon Dioxide (%)	0.20	18.30	>5	
Carbon Monoxide (ppm)	1	14	<1	Peak CO was recorded at 108ppm in RO01 on one occasion. Steady CO ranged between 5ppm and 14ppm in RO01.
Hydrogen Sulphide (ppm)	1	2	<1	-
Oxygen (%)	6	21.40	>15	-
Carbon Dioxide GSV based on Maximum Values (Site) (l/hr)	0	0.44	<0.7	CS2
Methane GSV based on Maximum Values (Site) (l/hr)	0	0.02	<0.07	CS1
⁽ⁱ⁾ Hydrock assume that values are considered to be atypical if 95% or more of the remaining data are less than the value under consideration For the purposes of the calculation, where the recorded gas flow rate is below the manufacturer's limit of detection for the instrument used, the detection limit has been adopted for the gas flow rate.				

As indicated in Table 7.6, the computed GSV for carbon dioxide indicates CS2 conditions, with methane classifying as CS1. As such, given the frequently detected concentrations of carbon dioxide above 5% in the peat deposits in addition to the sensitivity of the site redevelopment as a school facility, it would be appropriate to classify the site as Characteristic Situation 2.

Within the PLCM flow rate and steady methane concentrations remained below the limit of detection, and steady carbon dioxide concentrations did not exceed 0.2%. Peak carbon monoxide was recorded at 108ppm in RO01 on one occasion, however the steady levels ranged between 5ppm and 14ppm. As such the computed GSV for carbon dioxide and methane indicates CS1 conditions. Peak carbon monoxide was detected at 108ppm on one occasion in the PLCM, however this is considered to be a spurious reading resulting from the groundwater level exceeding the response zone, hence the steady carbon monoxide on the same occasion falling to 7ppm.

On the basis that the computed GSV for the PLCM is CS1 and that mitigation measures are required for all new buildings commensurate with CS2 Conditions due to gassing peat deposits then no uplift from CS2 conditions are considered necessary.

¹ Note: GSV is synonymous with 'site characteristic hazardous gas flow rate' (Q_{hgs}) of BS 8485:2015 +A1:2019 Table.

7.10.1 Gas protection measures

Mitigation of the risk from ground gases needs to be undertaken in accordance with BRE 414, CIRIA 665, BS 8485:2015 +A1:2019, CIRIA C735. In accordance with BS 8485:2015 +A1:2019, the design of gas protection measures needs to be undertaken in accordance with the Characteristic Situation and the building type:

- The site is classified as Characteristic Situation 2.
- The school is classified as a type C building, as such requires 2.5 points of protection. This is illustrated in Table 7.8.

Table 7.8: Gas protection score by CS and type of building (after BS 8485:2015 +A1:2019)

Characteristic Situation	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5	5.5	4.5	3.5
5	— ^(A)	6.0	5.5	4.5
6	— ^(A)	— ^(A)	— ^(A)	6.0

A) The gas hazard is too high for this empirical method to be used to define the gas protection measures.

The final design of ground gas protection measures is to be specified by the designer (in accordance with CIRIA 665) and BS 8485:2015 +A1:2019) and the protection will need to be achieved by a combination of two or more of the following three types of protection measures:

- the structural barrier of the floor slab;
- ventilation measures; and
- gas resistant membrane.

Where design elements are required to meet certain standards to qualify for the protection points (e.g. cast *in situ* monolithic reinforced floor slab), it is up to the designer to ensure the minimum requirements of the standards are met.

Where used, gas resistant membranes should be:

- sufficiently impervious to methane and carbon dioxide;
- capable, after installation, of providing a complete barrier to the entry of the relevant gas;
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab);
- sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools); and

- chemically resistant to degradation by other contaminants that might be present.

As preliminary guidance, Hydrock would suggest the following:

Either:

- Beam and block or pre-cast concrete floor slab (0 points);
- passive sub floor ventilation e.g. void (good performance 1.5 points); and
- 2000g gas resistant membrane (2.0 points).

Or:

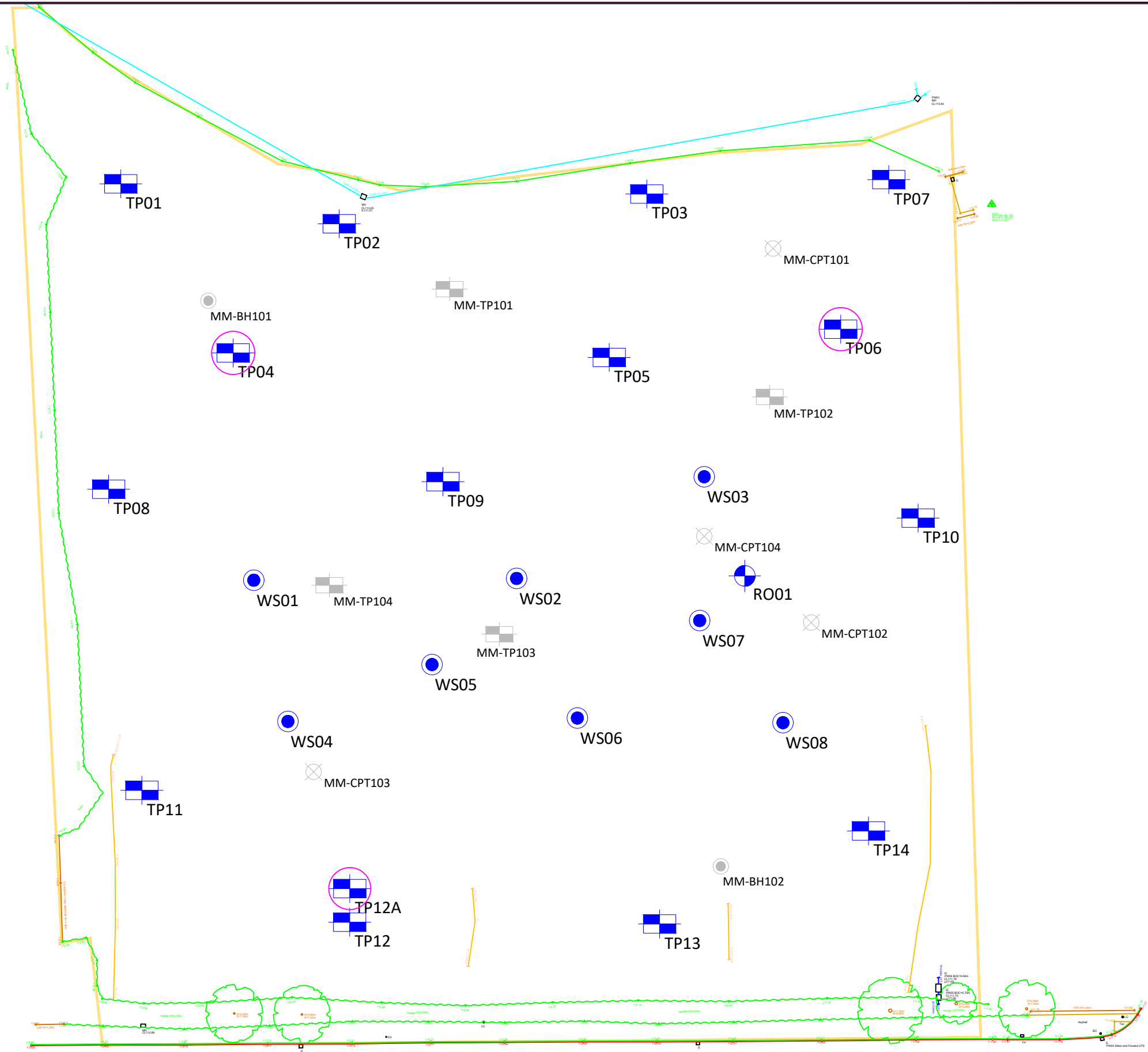
- Cast *in situ* ground-bearing floor slab (with only nominal mesh reinforcement) (0.5 points);
- 2000g gas resistant membrane (2.0 points).

Other variations are possible. It is up to the designer to design and specify ground gas protection measures.

Where a gas resistant membrane is required as part of the design, all joints and penetrations are to be sealed and the installation is to be verified in accordance with CIRIA C735 (Mallet et al 2014) or it will score zero points and will not be deemed to afford any protection. This verification will involve verification by the Contractor and independent verification on a selected number of plots by Hydrock or alternative qualified independent third-party.

Whilst tape can be utilised to seal the seams Hydrock would recommend the membranes are sealed using welded seams and the use of specialist seals around penetrations (top hats etc.). The installer is to present an installation methodology and a QA/QC plan for installation to Hydrock for comment, with particular attention given to sealing the membrane.

In order to achieve the points specified for ventilation, the architect is to design passive ventilation to meet at least 'good performance', as described in Annex B of BS 8485:2015 +A1:2019.



KEY	
	Hydrock Rotary Open Hole
	Hydrock Window Sampler Borehole
	Hydrock Trial Pit
	Hydrock Trial Pit and Soakaway Test
	Mott Macdonald 2020 Cable Percussive Borehole
	Mott Macdonald 2020 Cone Penetration Test
	Mott Macdonald 2020 Trial Pit

- NOTES
1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
 2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.
 3. This drawing has been based on the following drawings and information:
 - 40Seven, November 2019, Topographical and Underground Utility Survey, ref. EHP; and
 - Mott Macdonald, Proposed Layout - Site Option 03a
 4. Hole locations are provisional and may be subject to change due to site constraints.

P03	Update to include RO01				
	JB	12/07/22	AC	12/07/22	AC
P02	Update to include soakaway locations				
	WS	15/12/21	AC	15/12/21	AC
P01	FIRST ISSUE				
	JB	14/10/21	AC	14/10/21	AC
REV.	REVISION NOTES/COMMENTS				
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY

CLIENT

TILBURY DOUGLAS

PROJECT

ROCHDALE SEND-PASSIVHAUS

TITLE		EXPLORATORY HOLE LOCATION PLAN	
HYDROCK PROJECT NO.		SCALE @ A3	
C-19522		NTS	
PURPOSE OF ISSUE		STATUS	
SUITABLE FOR INFORMATION		S2	
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)		REVISION	
19522-HYD-XX-XX-DR-GE-0002		P03	

Method: Window Sampler

Date(s): 02/11/2021

Logged By: WS

Drilled By: DMW Drilling

Client: Tilbury Douglas

Co-ords: 385099.87, 411133.10

Checked By: JB

Rig: Premier 110

Hydrock Project No: C-19522

Ground Level: 113.20m OD

Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.20 - 2.00	80mm	100%	0.60	ES			Dark brown to black clayey fine to medium SAND with rootlets. (MADE GROUND)	0.20	(0.20)	113.00		
							Dark brown to black clayey gravelly fine to coarse SAND. Gravel is fine to coarse, angular to subrounded of brick, concrete and quartzite. (MADE GROUND)	0.50	(0.30)	112.70		
							Plastic black and occasional brown slightly sandy slightly clayey fibrous PEAT with a weak humic odour. (PEAT)	1	(0.95)			
2.00 - 3.00	75mm	90%	1.20	SPT	N=2 (1,0,1,0,1,0)		... At 1.20m bgl: Humic odour is strong.	1.45		111.75		
							Firm brownish grey sandy slightly gravelly organic CLAY with a weak humic odour. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and wood. (GLACIAL TILL)	1.55	(0.10)	111.65		
							Very soft to soft light grey very sandy slightly gravelly organic CLAY with a mild humic odour. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and wood. (GLACIAL TILL)	2	(0.45)	111.20		
3.00 - 5.00	65mm	0%	2.00	SPT	N=7 (1,2,1,2,2,2)		Loose light grey very gravelly fine to medium SAND. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. (GLACIAL TILL)	2.20	(0.20)	111.00		
							Firm grey sandy slightly gravelly CLAY. Gravel is fine to medium, angular to subrounded of sandstone and mudstone. (GLACIAL TILL)		(0.80)			
							NO RECOVERY. (GLACIAL TILL)	3		110.20		
			3.00	SPT	N=7 (1,1,2,2,2,1)							
			4.00	SPT	N=9 (1,1,2,2,2,3)							
			5.00	SPT	N=10 (1,2,2,2,3,3)							
							Firm grey sandy slightly gravelly CLAY. Gravel is fine to medium, subangular to rounded of sandstone and mudstone. (GLACIAL TILL)	5	(0.00)	108.20		
							End of Borehole at 5.00m	5.00		108.20		

General Remarks:

1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 0.50m and 1.45m bgl.

Method: Window Sampler	Date(s): 02/11/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Tilbury Douglas	Co-ords: 385131.55, 411133.23	Checked By: JB	Rig: Premier 110
Hydrock Project No: C-19522	Ground Level: 112.96m OD		Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.20 - 2.00	80mm	90%	0.50	ES			Dark brown to black clayey fine to medium SAND with rootlets. (MADE GROUND)	0.15	(0.15)	112.81		
							Black very gravelly slightly clayey fine to coarse SAND with a medium to high cobble content of sandstone, brick and concrete. Gravel is fine to coarse, angular to subangular of brick, sandstone and concrete. (MADE GROUND)		(1.35)			
2.00 - 3.00	75mm	75%	2.00	SPT	N=1 (1,0,0,1,0,0)		... From 1.20m bgl: Sand contains fibrous peat.					
							Very soft light grey slightly gravelly CLAY with organic matter. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. (GLACIAL TILL)	1.50		111.46		
3.00 - 4.00	75mm	0%	3.00	SPT	N=8 (1,1,0,0,1,0)		Soft light grey gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone and mudstone. (GLACIAL TILL)	2.30		110.66		
							NO RECOVERY. (GLACIAL TILL)	3.00		109.96		
4.00 - 5.00	65mm	95%	4.00	SPT	N=8 (2,1,1,2,3,2)		Soft to firm light grey gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone and mudstone. (GLACIAL TILL)	4.00		108.96		
							Firm light grey gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone and mudstone. (GLACIAL TILL)	4.80		108.16		
			5.00	SPT	N=11 (2,2,2,3,3,3)		End of Borehole at 5.00m	5.00	(0.20)	107.96		

General Remarks:

1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 0.50m and 1.50m bgl. 5. Groundwater encountered at 0.95m bgl.

Method: Window Sampler	Date(s): 02/11/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Tilbury Douglas	Co-ords: 385154.07, 411145.38	Checked By: JB	Rig: Premier 110
Hydrock Project No: C-19522	Ground Level: 112.66m OD		Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation station / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.20 - 2.00	85mm	0%	0.20	ES			Dark brown to black slightly clayey slightly gravelly fine to coarse SAND with rootlets. Gravel is fine to coarse, angular to subrounded of brick, concrete and quartzite. (MADE GROUND)	0.45	(0.45)	112.21		
							Firm to plastic black and dark brown slightly clayey fibrous PEAT with a weak to mild humic odour and occasional wood fragments. (PEAT)	1.20	(0.75)	111.46		
							NO RECOVERY. (PEAT)	2.00	(0.80)	110.66		
2.00 - 3.00	85mm	100%					Spongy to plastic black and dark brown slightly clayey fibrous PEAT with a weak to mild humic odour and occasional wood fragments. (PEAT)	2.90	(0.90)	109.76		
							Soft grey very sandy CLAY. (GLACIAL TILL)	3.40	(0.50)	109.26		
3.00 - 4.00	75mm	100%					Very soft to soft light grey sandy slightly gravelly CLAY with occasional organic matter. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone. (GLACIAL TILL)	4.95	(1.60)	107.66		
							... At 4.95m bgl: One piece of white with pink stains GRAVEL of gypsum.	5.00				
4.00 - 5.00	65mm	85%					End of Borehole at 5.00m					

General Remarks:
1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 1.00m and 3.00m bgl.

[illegible]

General Remarks:
1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 0.50m and 1.00m bgl. 5. Groundwater seepage at 0.80m bgl and then groundwater at 1.70m bgl. 6. No ES samples were taken.

Method: Window Sampler

Date(s): 01/11/2021

Logged By: WS

Drilled By: DMW Drilling

Client: Tilbury Douglas

Co-ords: 385121.38, 411122.93

Checked By: JB

Rig: Premier 110

Hydrock Project No: C-19522

Ground Level: 113.05m OD

Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.20 - 2.00	85mm	100%	0.40	ES			Soft dark greyish dark brown very sandy gravelly CLAY with rootlets and low cobble content of brick. Gravel is fine to coarse, angular to subrounded of brick and concrete. (MADE GROUND)	0.30	(0.30)	112.75		
							Black clayey slightly gravelly organic fine coarse SAND. Gravel is fine to coarse, angular to subrounded of brick. (MADE GROUND)	0.50	(0.20)	112.55		
							Firm black fibrous PEAT with wood and a slight humic odour. (PEAT)	1.00	(0.70)	111.85		
2.00 - 3.00	75mm	35%	2.00	SPT	N=3 (1,0,1,1,0,1)		Plastic black fibrous PEAT with wood and slight humic odour. (PEAT)	1.40	(0.20)	111.65		
							Very soft to firm dark grey and light grey silty very sandy gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of mudstone and sandstone. (GLACIAL TILL)	2.00	(0.60)	111.05		
							Soft grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to subrounded of sandstone, mudstone and occasional coal fragments. (GLACIAL TILL)	2.35	(0.35)	110.70		
3.00 - 4.00	65mm	45%	3.00	SPT	N=6 (1,2,1,1,2,2)		NO RECOVERY. (GLACIAL TILL)		(0.65)			
							Soft grey very sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to subrounded of sandstone and mudstone. (GLACIAL TILL)	3.00	(0.45)	110.05		
							NO RECOVERY. (GLACIAL TILL)	3.45		109.60		
4.00 - 5.00	55mm	55%	4.00	SPT	N=5 (3,2,1,1,1,2)				(1.55)			
												
												
			5.00	SPT	N=8 (2,1,1,3,2,2)		End of Borehole at 5.00m	5.00		108.05		

General Remarks:

1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 0.50m and 1.40m bgl. 5. Groundwater encountered at 0.75m bgl.

Method: Window Sampler	Date(s): 01/11/2021	Logged By: WS	Drilled By: DMW Drilling
Client: Tilbury Douglas	Co-ords: 385138.86, 411116.37	Checked By: JB	Rig: Premier 110
Hydrock Project No: C-19522	Ground Level: 112.63m OD		Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.20 - 2.00	80mm	100%	0.20	ES		▼	Soft dark brown to black very sandy CLAY with rootlets. (MADE GROUND)	0.15	(0.15)	112.48		
							Black and brown very clayey gravelly fine to coarse SAND to a very sandy gravelly clay with pockets of peat and medium cobble content of brick and concrete. Gravel is fine to coarse, angular to subangular of brick, concrete, sandstone, wood and glass. (MADE GROUND)	0.45	(0.30)	112.18		
							Plastic black fibrous PEAT with fragments of wood. (PEAT)					
2.00 - 3.00	75mm	100%					... At 1.30m bgl: Becoming brown.	1	(1.05)			
							Very soft to soft grey very sandy gravelly CLAY. Gravel is fine to coarse, subangular to angular of sandstone and mudstone. (GLACIAL TILL)	1.50	(0.30)	111.13		
							Firm grey sandy gravelly CLAY. Gravel is fine to coarse, subangular to angular of sandstone and mudstone. (GLACIAL TILL)	1.80	(0.20)	110.83		
3.00 - 4.00	65mm	90%					Very soft to soft grey very sandy gravelly CLAY. Gravel is fine to coarse, subangular to angular of sandstone and mudstone. (GLACIAL TILL)	2	(0.20)	110.63		
												
												
4.00 - 5.00	65mm	15%										
												
												
							NO RECOVERY. (GLACIAL TILL)			108.48		
									(0.85)			
												
							End of Borehole at 5.00m	5		107.63		
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												
												

Method: Window Sampler

Date(s): 01/11/2021

Logged By: WS

Drilled By: DMW Drilling

Client: Tilbury Douglas

Co-ords: 385153.57, 411128.05

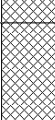
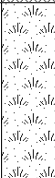
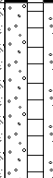
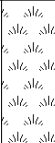
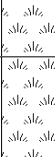
Checked By: JB

Rig: Premier 110

Hydrock Project No: C-19522

Ground Level: 112.51m OD

Scale: 1:30

Sample Run Info			Testing			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
1.00 - 2.00	80mm	0%	0.30	ES		Soft dark brown very sandy CLAY with rootlets. (MADE GROUND)	0.10	(0.10)	112.41			
						Black and dark brown very sandy gravelly CLAY with a medium cobble content of brick and concrete. Gravel is fine to coarse, angular to subangular of brick, concrete and clay pipe fragments. (MADE GROUND)	0.50	(0.40)	112.01			
						Plastic black slightly sandy fibrous PEAT with a slight humic odour. (PEAT)	1	(0.70)	111.31			
2.00 - 3.00	75mm	100%				NO RECOVERY. (PEAT)	1.20		111.31			
						Plastic black becoming brown fibrous PEAT with wood fragments. (PEAT)	2	(0.80)	110.51			
3.00 - 4.00	65mm	55%				Soft to firm light grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of sandstone and mudstone. (GLACIAL TILL)	2.90	(0.25)	109.61			
						NO RECOVERY. (GLACIAL TILL)	3.15		109.36			
4.00 - 5.00	55mm	0%					4	(1.85)				
							5		107.51			
End of Borehole at 5.00m							5	5.00	107.51			
							6					

General Remarks:

1. Hand dug inspection pit from ground level to 1.20m bgl. 2. Windowless sampling from 1.20m to 5.00m bgl. 3. Complete at 5.00m bgl. 4. Installed on completion with a response zone between 0.50m and 1.50m bgl.

HoleBASE SI - Hydrock Dynamic Sampling Template v3



Method: Rotary Open	Date(s): 22/06/2022	Logged By: JH	Drilled By: DMW Drilling
Client: Tilbury Douglas	Co-ords: 385158.99, 411133.52	Checked By: JB	Flush: Water
Hydrock Project No: C-19522			Scale: 1:100

Run (m)	Samples / Tests			Drilling Record			Water- Strokes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation	Backfill
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs								
								Grass over dark brown gravelly clayey fine to coarse SAND. Gravel is fine to coarse, angular to subangular of sandstone, concrete, plastic and rootlets. (MADE GROUND) ... At 0.30m bgl. one concrete cobble. Dark brownish black fibrous PEAT with wood fragments and slight humic odour. (PEAT)	0.40	(0.40)				
								Grey silty CLAY (Drillers description) (GLACIAL TILL)	4.50	(4.10)				
								Grey MUDSTONE with sandstone bands (Drillers description) (PENNINE LOWER COAL MEASURES)	10.50	(6.00)				
								Grey shaley MUDSTONE with coal traces (Drillers description) (PENNINE LOWER COAL MEASURES)	16.50	(3.00)				
								Grey MUDSTONE with sandstone bands (Drillers	19.50					
									20					

Progress and Observations									General Remarks:				
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type	Returns (colour)	1. Location cleared for services. 2. Hand dug inspection pit from ground level to 1.20m bgl. 3. Hole progressed using rotary open hole to 30.00m bgl. 4.Hole completed at 30.00m bgl and installed with standpipe - response zone from 11.00m to 19.50m bgl. 5. Gas concentrations remained within a normal range at all times.				

				Project: Rochdale SEND - Passivhaus				Borehole No RO01 Page No. 2 of 2																		
Method: Rotary Open				Date(s): 22/06/2022				Logged By: JH		Drilled By: DMW Drilling																
Client: Tilbury Douglas				Co-ords: 385158.99, 411133.52				Checked By: JB		Flush: Water																
Hydrock Project No: C-19522										Scale: 1:100																
Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill													
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs																				
								Grey MUDSTONE with sandstone bands (Drillers description) (PENNINE LOWER COAL MEASURES)	21	(9.00)																
								22																		
								23																		
								24																		
								25																		
								26																		
								27																		
								28																		
								28.50																		
								Grey MUDSTONE (Drillers description) (PENNINE LOWER COAL MEASURES)	29						(1.50)											
								30																		
								----- End of Borehole at 30.00m -----								30.00										
								31																		
								32																		
								33																		
								34																		
								35																		
								36																		
								37																		
								38																		
								39																		
40																										
Progress and Observations								General Remarks: 1. Location cleared for services. 2. Hand dug inspection pit from ground level to 1.20m bgl. 3. Hole progressed using rotary open hole to 30.00m bgl. 4.Hole completed at 30.00m bgl and installed with standpipe - response zone from 11.00m to 19.50m bgl. 5. Gas concentrations remained within a normal range at all times.																		
Rig	Date	Time	Borehole Depth (m)	Casing Depth (m)	Casing Diam.(mm)	Water Depth (m)	Flush Type							Returns (colour)												

Site: Rochdale SEND - Passivhaus Job number: C-19522 Client: Tilbury Douglas							Notes on site conditions:																		
							Date			Operator			Weather Conditions												
							08/06/20-17/07/20			Geotechnics			Cloudy												
Gas analyser: GFM 435 SERIES							15/11/2021			Enitial- R. C-Williams			Overcast												
Equipment check OK: Y							30/11/2021			Enitial- S Mullen			Showers												
Service in date: Y							13/12/2021			Enitial			Rain												
Calibration check OK: Y							29/12/2022			Enitial			Rain												
Name of person monitoring: See Notes.							13/01/2022			Enitial			Cloudy												
							24/01/2022			Enitial			Cloudy												
							Notes: LEL = lower explosive limit = 5%v/v. * where the flow or gas concentration is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in blue). GSVs are rounded to 3 places.																		
Monitoring round		Borehole details					Pressure and flow					Gas concentrations										GSV		Local conditions	
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes on condition of borehole and surrounding ground	
												Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO (PPM)	H ₂ S (PPM)				
							Max. individual values: 3.2 12.7 44.0 18.3 21.0 0.022 0.442																	Summary statistics for this monitoring period.	
							Min. individual values: 0.1 0.1 0.1 0.1 3.1 0.000 0.000																		
							Worst-case GSVs based on max. individual flow and max. individual conc. over the duration of this table: 0.4064 0.5856																		
08/06/20		BH101	S	1.90	1.90	D	1008	S		0.1	0.1	0.1	0.1	2	2	23.0	3.1	20.7	18.4	1	1	0.000	0.003		
08/06/20		BH102	S	12.00	9.81		1007	S		0.1	0.1	0.1	0.1	2	2	0.8	0.8	20.9	20.1	1	1	0.000	0.001		
15/06/20		BH101	S	1.90	1.90	D	1004	S		0.1	0.1	0.1	0.1	2	2	2.6	2.6	20.8	18.8	1	1	0.000	0.003		
15/06/20		BH102	S	12.00	9.85		1003	S		0.1	0.1	0.1	0.1	2	2	0.2	0.2	20.7	20.6	1	1	0.000	0.000		
25/06/20		BH101	S	1.90	1.90	D	1006	F		0.1	0.1	0.1	0.1	2	2	4.0	4.0	19.4	14.4	2	2	0.000	0.004		
25/06/20		BH102	S	12.00	9.80		1007	F		0.1	0.1	0.1	0.1	2	2	1.3	1.2	19.6	14.2	2	2	0.000	0.001		
02/07/20		BH101	S	1.90	1.60		999	R		0.1	0.1	0.1	0.1	2	2	4.4	4.4	20.5	15.9	1	1	0.000	0.004		
02/07/20		BH102	S	12.00	9.65		999	R		0.1	0.1	0.1	0.1	2	2	0.2	0.2	20.6	20.5	1	0	0.000	0.000		
10/07/20		BH101	S	1.90	1.13		1006	S		0.1	0.1	0.1	0.1	2	2	0.6	0.2	20.6	20.6	1	1	0.000	0.000		
10/07/20		BH102	S	12.00	9.56		1005	S		0.1	0.1	0.1	0.1	2	2	0.4	0.4	20.8	19.8	1	1	0.000	0.000		
17/07/20		BH101	S	1.90	1.29		1007	S		0.1	0.1	0.1	0.1	2	2	0.6	0.3	20.3	20.2	1	1	0.000	0.000		
17/07/20		BH102	S	12.00	12.00	D	1007	S		0.1	0.1	0.1	0.1	2	2	0.3	0.3	20.5	19.7	1	1	0.000	0.000		
15/11/21	AM	WS01	S	1.70	0.74		1016	S	0.1	0.1	0.1	0.1	2	2	4.4	4.4	16.3	16.3	1	1	0.000	0.004			
15/11/21	AM	WS02	S	1.70	0.88		1015	S	0.1	0.1	0.1	0.1	2	2	3.0	3.0	16.8	16.8	1	1	0.000	0.003			
15/11/21	AM	WS03	S	2.29	1.56		1014	S	0.0	0.1	1.1	1.0	22	20	12.7	12.5	11.0	11.0	1	1	0.001	0.013			
15/11/21	AM	WS04	S	1.15	0.90		1016	S	0.1	0.1	0.1	0.1	2	2	3.2	3.2	17.5	17.5	1	1	0.000	0.003			
15/11/21	AM	WS05	S	1.60	0.78		1016	S	0.1	0.1	0.1	0.1	2	2	11.0	11.0	9.1	9.1	1	1	0.000	0.011			
15/11/21	AM	WS06	S	2.50	1.11		1016	S	0.1	0.1	0.1	0.1	2	2	1.0	1.0	19.0	19.0	1	1	0.000	0.001			
15/11/21	AM	WS07	S	1.55	0.75		1015	S	0.1	0.1	0.1	0.1	2	2	6.6	6.6	13.7	13.7	1	1	0.000	0.007			
15/11/21	AM	WS08	S	2.20	1.62		1015	S	0.2	0.1	12.9	12.7	>>>>>	>>>>>	15.9	15.8	10.1	10.1	5	1	0.013	0.016			
30/11/21	AM	WS01	S	1.70	0.68		999	F	3.8	0.7	0.7	0.1	0.1	2	2	8.0	8.0	14.0	14.0	1	1	0.001	0.056		

Monitoring round		Borehole details					Pressure and flow					Gas concentrations										GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes on condition of borehole and surrounding ground
												Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO (PPM)	H ₂ S (PPM)			
30/11/21	AM	WS02	S	1.70	0.80		999	F	-0.5	0.1	0.1	0.1	0.1	2	2	3.0	3.0	18.7	18.7	1	1	0.000	0.003	
30/11/21	AM	WS03	S	2.29	1.80		999	F	6.9	2.2	2.2	0.1	0.1	2	2	15.7	15.7	6.0	6.0	1	1	0.002	0.345	
30/11/21	AM	WS04	S	1.15	0.83		999	F	-0.1	0.1	0.1	0.1	0.1	2	2	3.2	3.2	19.1	19.1	1	1	0.000	0.003	
30/11/21	AM	WS05	S	1.60	1.15		999	F	-0.2	0.1	0.1	0.1	0.1	2	2	5.4	5.4	17.4	17.4	1	1	0.000	0.005	
30/11/21	AM	WS06	S	2.50	1.13		1000	F	7.2	2.3	2.3	0.1	0.1	2	2	3.7	3.7	19.4	19.4	1	1	0.002	0.085	
30/11/21	AM	WS07	S	1.55	1.09		999	F	1.2	0.3	0.3	0.1	0.1	2	2	6.5	6.5	15.4	15.4	1	1	0.000	0.020	
30/11/21	AM	WS08	S	2.20	2.01		999	F	0.2	0.1	0.1	1.5	1.5	30	30	17.2	17.2	9.3	9.3	2	1	0.002	0.017	
13/12/21	08:20	WS01	S	1.70	0.68		1008	S	-0.3	0.1	0.1	0.1	0.1	0.1	0.1	5.5	5.5	16.1	16.1	1.0	1	0.000	0.006	
13/12/21	08:15	WS02	S	1.70	1.20		1009	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.6	3.6	18.1	18.1	1.0	1	0.000	0.004	
13/12/21	08:11	WS03	S	2.29	1.86		1009	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.3	20.9	20.9	1.0	1	0.000	0.000	
13/12/21	08:25	WS04	S	1.15	0.95		1008	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.1	3.1	19.5	19.5	1.0	1	0.000	0.003	
13/12/21	08:30	WS05	S	1.60	0.65		1008	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.5	20.6	20.6	1.0	1	0.000	0.001	
13/12/21	08:35	WS06	S	2.50	1.60		1008	S	-0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	21.0	21.0	1.0	1	0.000	0.000	
13/12/21	08:40	WS07	S	1.55	0.70		1008	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.7	3.5	19.3	19.3	2.0	1	0.000	0.004	
13/12/21	08:45	WS08	S	2.20	2.20		1008	S	1.5	0.7	0.7	2.2	2.2	44	44	18.3	18.3	5.3	5.3	1.0	1	0.015	0.128	
29/12/21	08:55	WS01	S	1.70	0.69		983	S	6.5	0.2	0.2	0.1	0.1	0.1	0.1	7.3	7.3	7.6	7.6	1.0	1.0	0.000	0.015	
29/12/21	09:02	WS02	S	1.69	0.75		983	S	0.0	0.1	0.1	0.1	0.1	0.1	0.1	3.8	3.8	17.4	17.4	1.0	1.0	0.000	0.004	
29/12/21	09:05	WS03	S	2.30	1.35		983	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.2	21.0	21.0	1.0	1.0	0.000	0.000	
29/12/21	08:51	WS04	S	1.14	0.80		983	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.8	2.8	19.1	19.1	1.0	1.0	0.000	0.003	
29/12/21	08:48	WS05	S	1.59	0.68		984	S	0.5	0.1	0.1	0.1	0.1	0.1	0.1	6.7	6.7	13.5	13.5	1.0	1.0	0.000	0.007	
29/12/21	08:44	WS06	S	2.39	1.10		984	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	20.7	20.7	1.0	1.0	0.000	0.000	
29/12/21	08:40	WS07	S	1.55	0.62		984	S	0.2	0.1	0.1	0.1	0.1	0.1	0.1	6.0	6.0	15.0	15.0	1.0	1.0	0.000	0.006	
29/12/21	08:36	WS08	S	2.19	1.65		983	S	39.3	0.3	0.3	1.7	1.6	34	32	14.4	14.4	3.1	3.1	1.0	1.0	0.005	0.043	
13/01/22	12:10	WS01	S	1.70	0.60		1027	F	-0.8	-0.8	0.8	0.1	0.1	0.1	0.1	0.9	0.9	20.0	20.0	1.0	1	0.001	0.007	
13/01/22	12:37	WS02	S	1.70	0.85		1029	F	-0.2	0.1	0.1	0.1	0.1	0.1	0.1	3.6	3.6	18.2	18.2	1.0	1.0	0.000	0.004	
13/01/22	08:11	WS03	S	2.29	1.41		1028	F	1.4	0.1	0.1	0.2	0.2	4.0	4.0	9.2	9.2	18.8	18.8	1.0	1.0	0.000	0.009	
13/01/22	08:25	WS04	S	1.15	0.88		1029	F	-0.2	0.1	0.1	0.1	0.1	0.1	0.1	3.0	3.0	18.3	18.3	1.0	1.0	0.000	0.003	
13/01/22	08:30	WS05	S	1.60	0.72		1029	F	3.0	0.1	0.1	0.1	0.1	0.1	0.1	5.0	5.0	16.8	16.8	1.0	1.0	0.000	0.005	
13/01/22	08:35	WS06	S	2.50	1.12		1029	F	-2.0	-0.4	0.4	0.1	0.1	0.1	0.1	0.9	0.8	20.8	20.8	2.0	1.0	0.000	0.003	
13/01/22	08:40	WS07	S	1.55	0.73		1029	F	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.1	3.1	19.0	19.0	1.0	1.0	0.000	0.003	
13/01/22	08:45	WS08	S	2.20	1.49		1029	F	13.4	3.2	3.2	0.7	0.7	14	14	13.8	13.8	5.7	5.7	1.0	1.0	0.022	0.442	
13/01/22	11:54	BH102	S	2.32	1.80		1028	F	-0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.5	20.4	20.4	1.0	1.0	0.000	0.001	
24/01/22	08:40	WS01	S		0.82		1020	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	7.5	7.5	6.8	6.8	1.0	1.0	0.000	0.008	
24/01/22	08:47	WS02	S		0.92		1020	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.3	3.3	18.1	18.1	1.0	1.0	0.000	0.003	
24/01/22	08:50	WS03	S		1.51		1020	S	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.5	21.0	21.0	1.0	1.0	0.000	0.001	
24/01/22	08:36	WS04	S		0.91		1020	S	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.1	3.1	18.4	18.4	1.0	1.0	0.000	0.003	
24/01/22	08:33	WS05	S		0.82		1020	S	0.3	0.1	0.1	0.1	0.1	0.1	0.1	6.0	6.0	14.8	14.8	1.0	1.0	0.000	0.006	
24/01/22	08:29	WS06	S		1.12		1020	S	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	20.0	20.2	1.0	1.0	0.000	0.000	

Monitoring round		Borehole details					Pressure and flow					Gas concentrations										GSV		Local conditions
Date	Time	Borehole	Single or dual gas tap	Response zone depth (m)	Depth to water or depth of hole if dry (m)	D denotes dry hole	Atmospheric pressure (hPa)	Atm pressure falling / rising / steady	Relative BH pressure (hPa)	Gas flow* (l/hr)	Gas flow* (absolute value) (l/hr)	CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases		Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes on condition of borehole and surrounding ground
												Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO (PPM)	H ₂ S (PPM)			
24/01/22	08:26	WS07	S		0.86		1020	S	0.0	0.1	0.1	0.1	0.1	0.1	5.4	5.4	15.5	15.5	1.0	1.0	0.000	0.005		
24/01/22	08:18	WS08	S		1.45		1020	S	9.8	0.2	0.2	0.3	0.2	6	4	10.1	10.1	3.4	3.4	1.0	1.0	0.000	0.020	

[illegible]

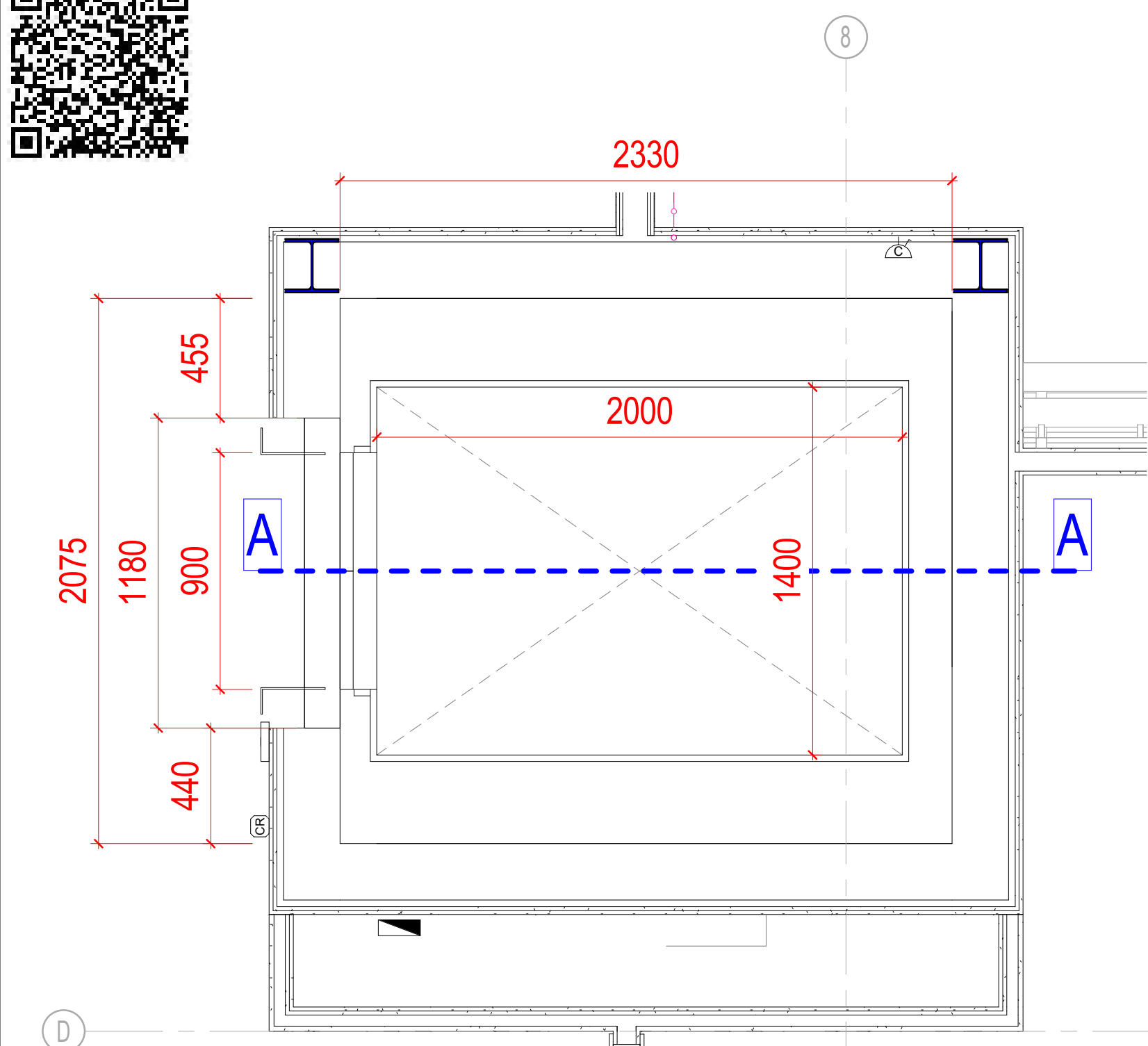


APPENDIX II

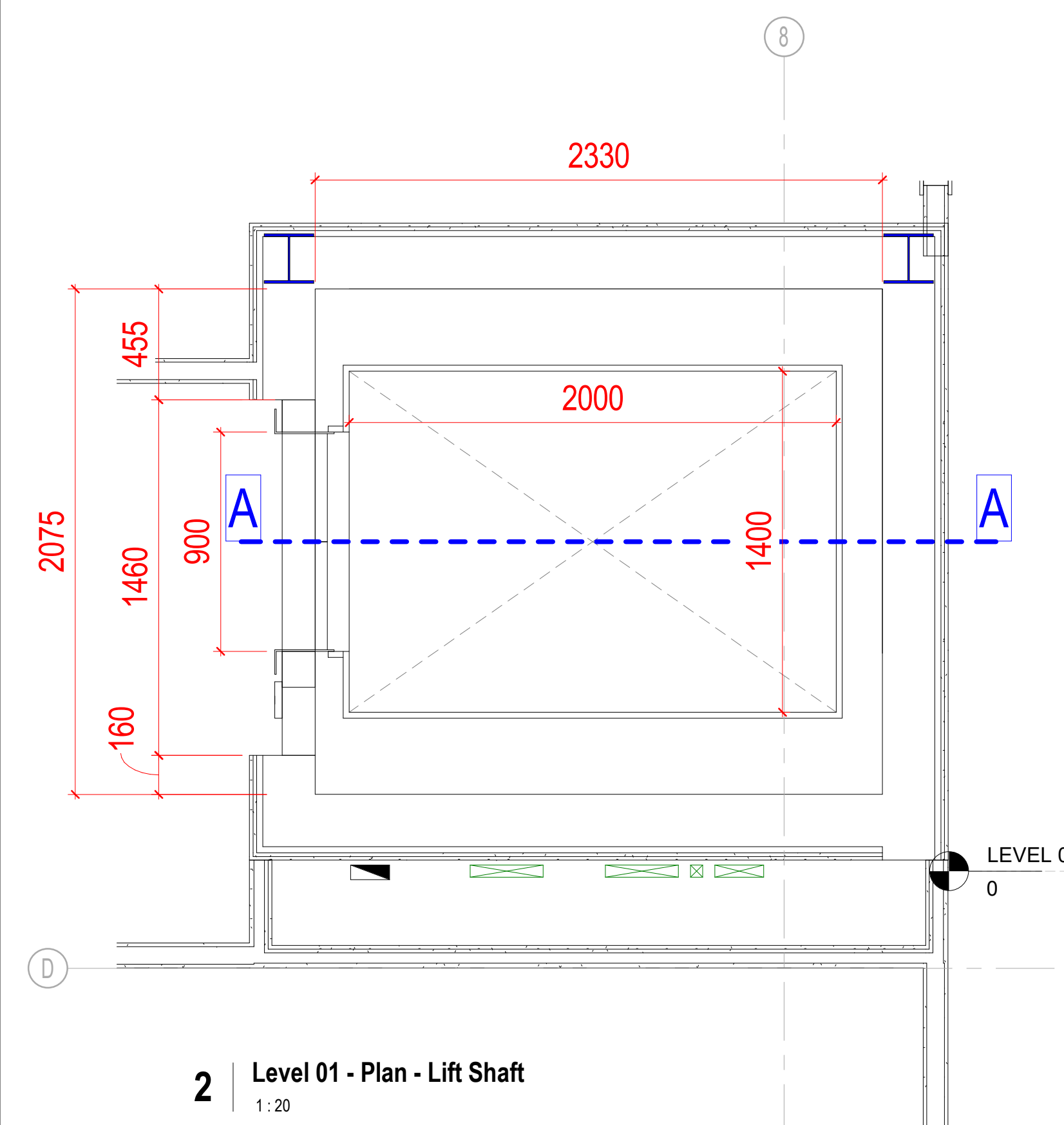
SCHEME DRAWINGS



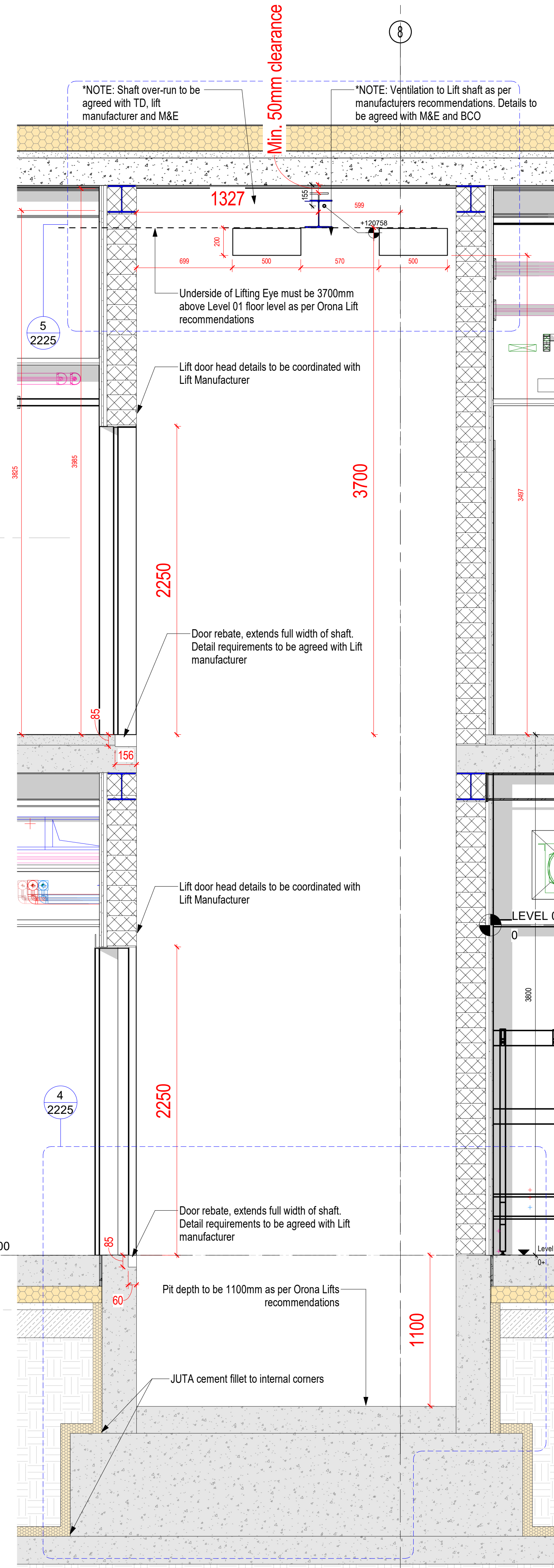
NOTES				
Copyright: All rights reserved. This drawing must not be reproduced without permission. This drawing must not be scaled. Dimensions are in millimetres unless specified.				
Rev	Date	Notes	By	Che
C03	24.10.25	Waterproofing position amended in line with TD/Contractors instructions	JP	AS
C02	24.10.16	Waterproof material changed as requested by TD, from Visqueen to JUTA	JP	AS



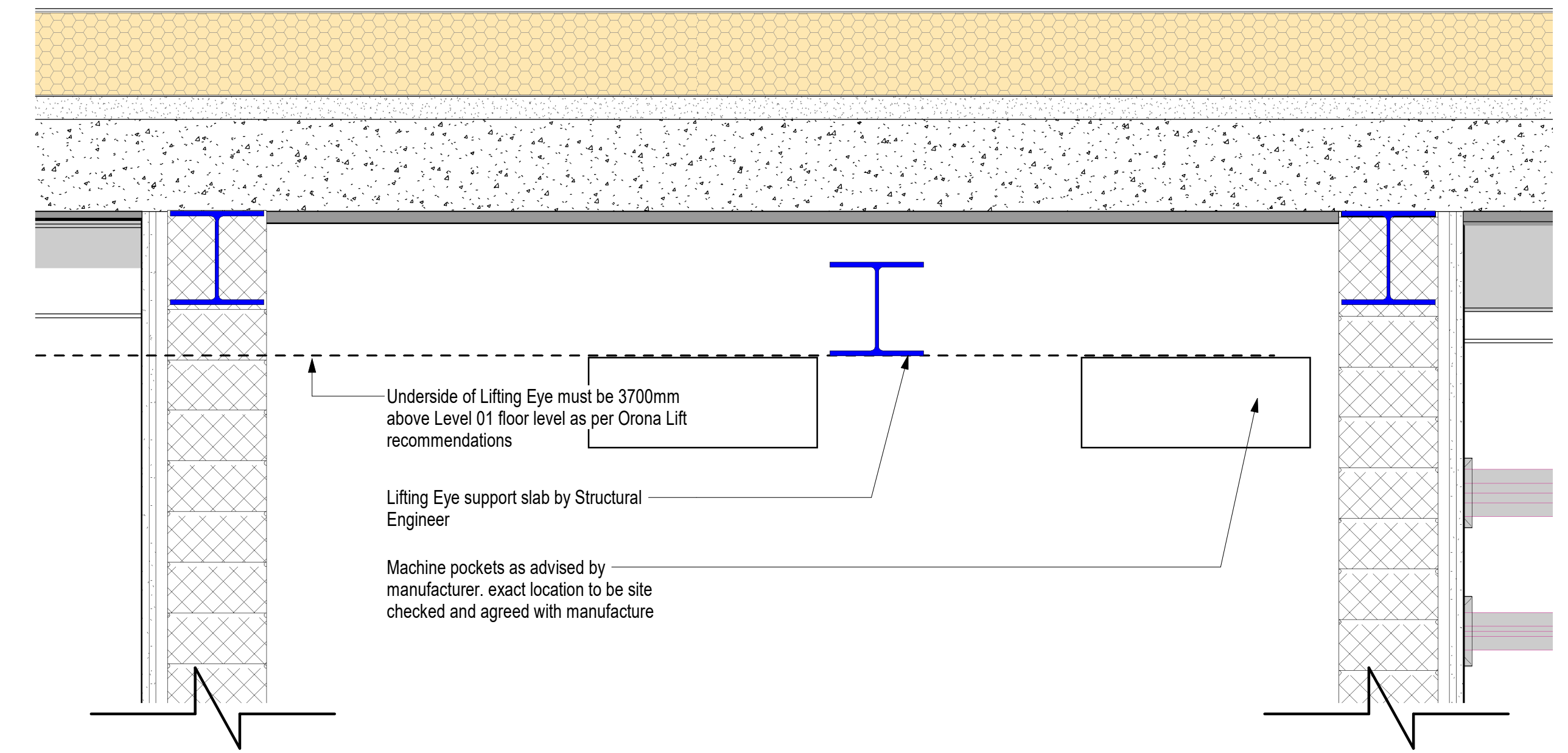
1 Level 00 - Plan - Lift Shaft
1:20



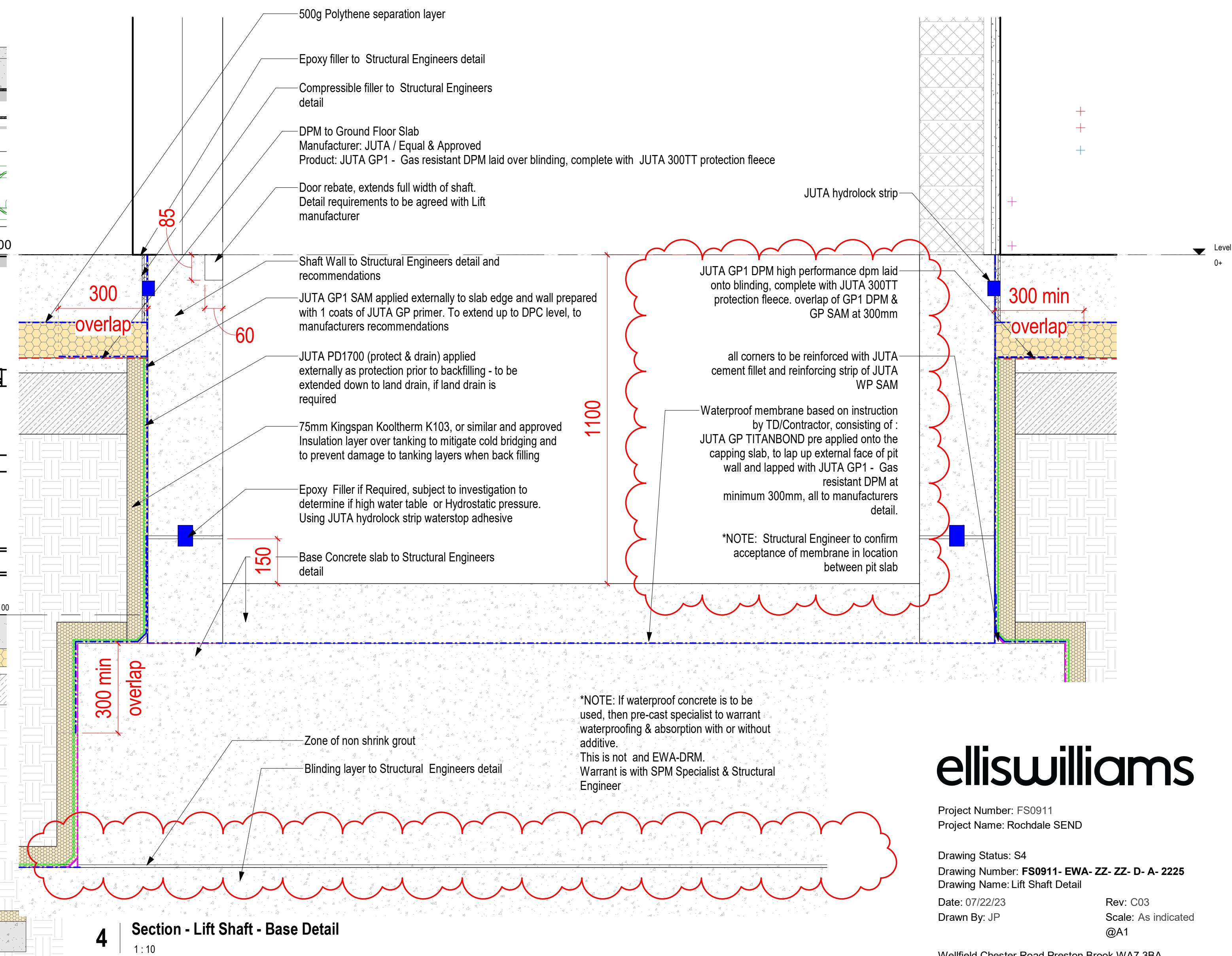
2 Level 01 - Plan - Lift Shaft
1:20



A Section - Lift Shaft
1:20



5 Section - Lift Shaft - Head Detail
1:10



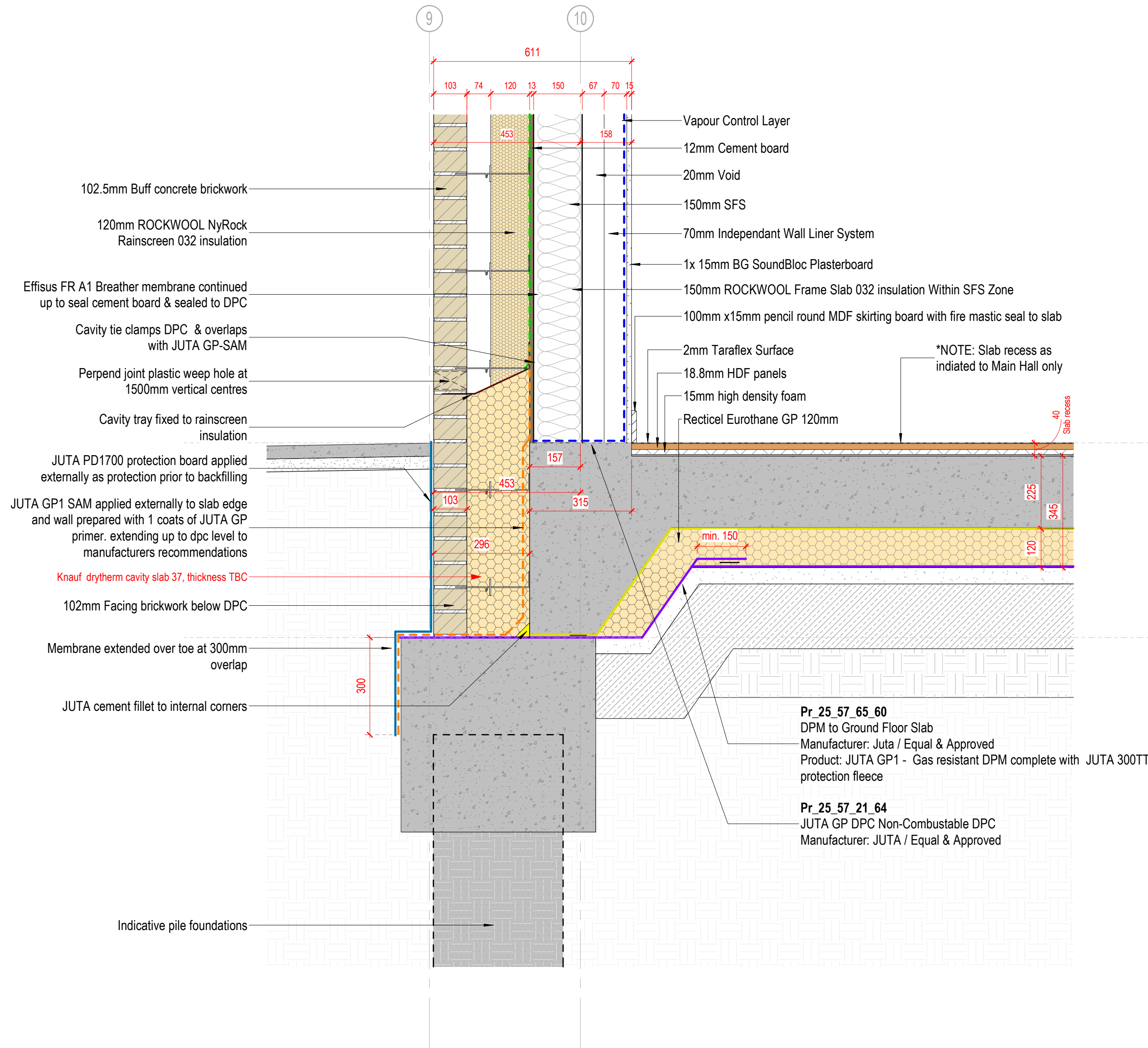
4 Section - Lift Shaft - Base Detail
1:10



Element	DfE Targets
Walls	0.15 W/m2K
Ground Floor Slab	0.12 W/m2K
Roof	0.12 W/m2K
Windows	1.1 W/m2K
Curtain Wall	1.1 W/m2K
Doors	1.1 W/m2K
Rooflights	1.1 W/m2K
Glass G-Value	N/E: 0.40 S/W: 0.35
Air Permeability (@50PA)	3 m³/hr/m²

(04)_Thermal Performance Criteria

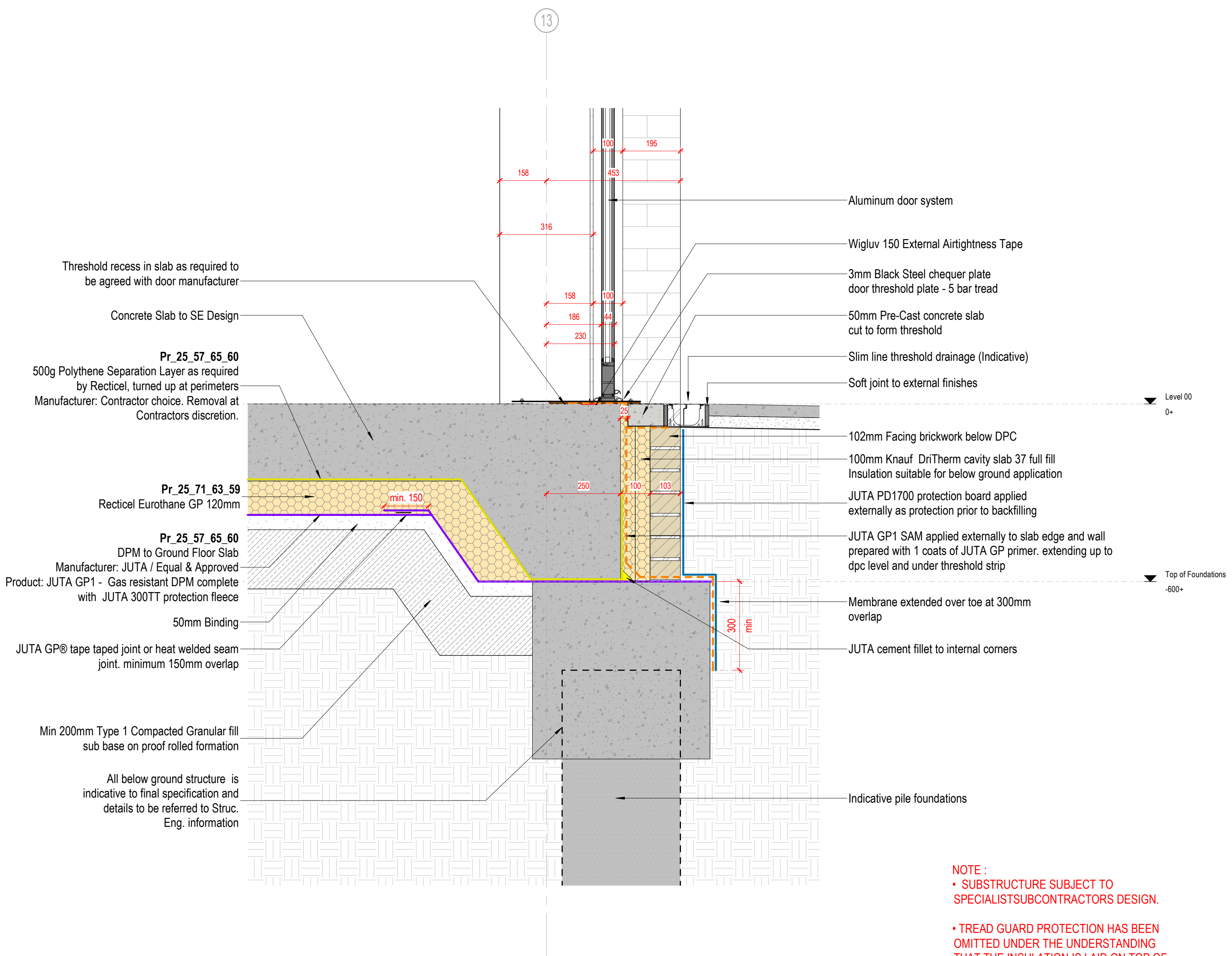
NOTES				
Copyright: All rights reserved. This drawing must not be reproduced without permission. This drawing must not be scaled. Dimensions are in millimetres unless specified.				
Rev	Date	Notes	By	Che
C01	24.10.16	Waterproof material changed as requested by TD, from Visqueen to JUTA	JP	AS
P2	23.09.22	CP ISSUE	JC	AS
P1	23.08.11	Stage 4 Draft CP Issue	JH	JP



1 Brick Wall Foundation Detail

(23)_Waterproofing Key

- Pr_25_57_10_94 - Breather Membrane (Effisus FR A1)
- Pr_25_57_65_60 - Vapour Control Layer (Effisus AVCL FR A1)
- Pr_25_57_21_64 - JUTA GP DPC Non-Combustable DPC
- Pr_25_57_08_08 - JUTA GP1 SAM self adhesive membrane
- Pr_25_57_65_60 - Vapour Check Separation Layer
- Pr_25_57_65_60 - JUTA PD1700 protection board
- Pr_25_57_65_60 - JUTA GP1 - Gas resistant DPM complete



2 Door to Wall Foundation Detail

NOTE :
• SUBSTRUCTURE SUBJECT TO SPECIALISTSUBCONTRACTORS DESIGN.

• TREAD GUARD PROTECTION HAS BEEN OMITTED UNDER THE UNDERSTANDING THAT THE INSULATION IS LAID ON TOP OF THE DPM STRAIGHT AWAY TO PROTECT FROM GENERAL SITE DAMAGE. ANY DAMAGE TO THE DPM WILL NEED TO BE REPAIRED ON SITE.

100 0 100 200 300 400 500
SCALE 1:10 mm

elliswilliams

Project Number: FS0911
Project Name: Rochdale SEND

Drawing Status: S4
Drawing Number: **FS0911- EWA- ZZ- D- A- 2320**
Drawing Name: Slab Edge Details 01
Date: 07/13/23
Scale: 1 : 10
@A1

Wellfield Chester Road Preston Brook WA7 3BA
T: 01928 752200 E: info@ewa.co.uk W: ewa.co.uk



APPENDIX III

DATA SHEETS



GP[®]1



GP[®]1 proprietary gas resistant damp proof membrane (DPM) is a multi-layer, low density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil. GP[®]1 is specifically designed and manufactured to perform as a methane, carbon dioxide, radon, ground gas, air & moisture protection system.

Thickness	0.6 mm
Width	Various m
Length	Various m
Weight	370 g/m ²

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.

Handling

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

Storage

Rolls of GP[®]1 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.

Installation

GP[®]1 should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015.

Certifications



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Rev 2024



Feature	Characteristics	Test Method	GP [®] 1
Physical Properties	Thickness	EN 1849-2	0.6 mm
	Thickness - between Scrim	BS EN ISO 9863-1:2016	0.4 mm
	Width	EN 1849-2	Various m
	Length	EN 1849-2	Various m
	Weight	EN 1849-2	370 g/m ²
Hydraulic Press	Water Column	EN 20811	> 300
	Resistance to Water Penetration	EN 13967, EN 1928	Pass
	Water Tightness	EN 11296, EN 1367, EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	20 kg
	Tensile Strength (MD)	EN 12311-1	600 N/50mm
	Tensile Strength (CMD)	EN 12311-1	480 N/50mm
	Tensile Elongation (MD)	EN 12310-1	20%
	Tensile Elongation (CMD)	EN 12310-1	20%
	Puncture Resistance	EN 12236	1.25 kN
	Resistance to Tearing (Nail Shank) MD	EN 12310-1	330 N
	Resistance to Tearing (Nail Shank) CMD	EN 12310-1	400 N
Durability and Chemical Resistance	Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	0.246 g/m ² /h
	Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	0.571 g/m ² /h
	Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	0.583 g/m ² /h
	Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	0.135 g/m ² /h
Gas Permeability	Methane Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
	Carbon Dioxide Permeability	BS EN ISO 15105-1	< 0.09 ml/m ² /day/atm
	Radon Permeability	K124/02/95	8.0 x 10 ⁻¹⁵ m ² /s
	Hydrogen Sulphide Permeability	BS EN ISO 15105-1	< 0.1 ml/m ² /day/atm
Compliance and Certification	CE Mark - EN13967:2012 (A1 2017)		
	NHBC Standards Compliant		
	Conforms to BS 8485:2015 + A1 2019		
	BBA Certified - Certificate No. 20/5728		

JUTA UK

Please contact JUTA
UK Directly for more
information on GP[®]1

Jointing and Sealing

It is recommended GP[®]1 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.

Accessory Products

- GP[®]1 Starter Band
- GP[®] Tape
- GP[®] Self Adhesive Membrane
- GP[®] Primer
- GP[®] Top Hats and Preformed Corners
- GP[®] Protection Fleece
- GP[®] Void Vent (24/40mm)

**GROUND GAS
PROTECTION
GP® TITANBOND®
NBS SPECIFICATION
SHEET**

JUTA



TITANTECH®



**GP®
TITANBOND®**

Specification in NBS Format

**J40 flexible waterproofing /
damp proofing membrane
including gas/hydrocarbon
protection Uniclass Code:
Pr_25_57_65_60 Plastics sheets**

To be read with Preliminaries/
General conditions.

110 SOFT BLINDING TO hardcore BEDS

- Material: Soft sand.
 - Thickness (minimum): 25 mm.
- Finish on completion: Smooth, consolidated bed free of sharp projections.
 - Optional - use 300TT geotextile in place of soft sand blinding.

OR

115 CONCRETE BLINDING TO hardcore BEDS

- Concrete: Designated GEN 1 or Standardised prescribed ST2.
 - Thickness: 50 mm or as agreed with project engineer.

TYPES OF TANKING/DAMP PROOFING

297 WATERPROOFING/DAMP PROOFING MEMBRANE

- Substrate: Sand blinded hardcore as 110 OR Concrete blinded hardcore as 115.
- Primer: Not required.
- Manufacturer: JUTA UK LTD, Melton Grove Works, Church Road, Lytham, FY8 5PL.
Tel: 01772 754177, E-mail: technical@juta.co.uk, Web: www.juta.co.uk
- Product reference: GP® TITANBOND®.
- Number of layers: One.
- Thickness / Gauge: 2 mm.
- Joints:
 - Surfaces to be joined: Clean and dry beyond full width of joint.
 - Laps (minimum): 100 mm.
 - Sealing: GP® TAPE (100mm wide) or Thermal welded joint >50 mm. Finish with GP® OVERTAPE.



• Accessories:

- GP® OVERTAPE – To seal over joints, internal/external corners and pipe collars to suit,
- GP® TITANBOND® edge strip – for horizontal/vertical transitions.
- GP® TITAN EXT TAPE for roll end joints.
- GP® TAPE.
- GP® TITANTECH® weld strip where thermal seal required.

WORKMANSHIP

310 WORKMANSHIP GENERALLY

- Condition of substrate:
 - Clean and even textured, free from voids and sharp protrusions.
 - Moisture content: Compatible with damp proofing/tanking.
- Air and surface temperature: Do not apply sheets if below minimum recommended by membrane manufacturer.
- Condition of membrane at completion:
 - Neat, smooth and fully supported, dressed well into abutments and around intrusions.
 - Completely impervious and continuous.
 - Undamaged. Prevent puncturing during following work.
- Permanent overlying construction: Cover membrane as soon as possible.
- Specific requirements – Where ground gas a consideration, specialist installer recommended – NVQ level 2 gas membrane installation or TWI/CSWIP accreditation for plastic welding.

320 INSPECTION

- Give notice: Before covering any part of membrane with overlying construction.
- Specific requirements – Where ground gas a consideration, independent validation/verification required in accordance with C735.

360 JUNCTIONS WITH PROJECTING DPCS/CAVITY TRAYS

- Adjoining surfaces: Clean and dry.
- Dpcs/Cavity trays: Lap and fully bond/seal with sheeting.
 - Laps (minimum): 100 mm.
 - Bonding/Sealing: As main sheeting.

370 PREFORMED COLLARS FOR PIPES, DUCTS, CABLES, ETC.

- Where these pass-through sheeting, follow details as recommended for the purpose by the sheet Manufacturer.



380 PROTECTION FOR DAMP PROOFING (OPTIONAL)

- Manufacturer: JUTA UK LTD, Melton Grove Works, Church Road, Lytham, FY8 5PL.
Tel: 01772 754177, E-mail: technical@juta.co.uk, Web: www.juta.co.uk
 - Product reference: GP® Protection Board (or equal and approved).
- Thickness: 3 mm.
- Application: Membrane surface clean and free from contaminants.
 - Bonding: GP® TAPE.
 - Board joints: Butted together.
 - Board contact with membrane: Secure and continuous.
- Backfilling: Carry out when tanking, loading and protection are complete.

OR

- See Clause 295

295 GEOCOMPOSITE STUDDED CAVITY DRAINAGE/ VENTING MEMBRANE

- Substrate: Concrete retaining wall, or WP rigid insulation to retaining wall.
- Manufacturer: JUTA UK LTD, Melton Grove Works, Church Road, Lytham, FY8 5PL.
Tel: 01772 754177, E-mail: technical@juta.co.uk, Web: www.juta.co.uk
 - Product reference: PD1700.
- Stud height: 6 mm.
- Fixing: JUTA GP® TAPE, unless noted otherwise.
 - Fixing centres: 2000 mm maximum.
 - Board joints: Butted together.
- Joints: Separate geotextile fabric from studded sheet, make overlapped joint and connect in accordance with manufacturer's recommendations.
- Exposed edges and corners: Seal with geotextile fabric to prevent silt entering the core..
- Accessories: optional GP® OVERTAPE.



GP[®]1 SAM

GP[®]1 SAM, gas protection self adhesive membrane, is a bituminous gas proof and water proof sheet, composed of self-adhesive SBS polymer modified bitumen incorporating GP[®]1 with an upper surface finish of black reinforced LDPE, and a lower surface finish of siliconized release film. GP[®]1 SAM is used for the gas/waterproofing of underground structures where harmful ground gasses are anticipated, and as a self adhesive accessory to GP[®]1.

Thickness	1.2 mm
Width	0.9 m or 0.3 m
Length	20 m
Weight	1100 g/m ²

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.

Handling

Roll weights can be in excess of 20 kg (approx 33 kg/roll) and hence appropriate care and equipment is required for unloading and handling. This product is non-toxic nor flammable.

Storage

Rolls of GP[®]1 SAM should be stored on in a cool, dry place, and be protected from exposure to rain, sun, heat and cold temperatures prior to installation. Exposure to sunlight for extended period of time could cause difficulty with removal of the release film.

Certifications



Please
Scan



Rev 2024



Feature	Characteristics	Test Method	GP [®] 1 SAM
Physical Properties	Thickness	EN 1849-2	1.2 mm
	Width	EN 1849-2	0.9 or 0.3 m
	Length	EN 1849-2	20 m
	Weight	EN 1849-2	1100 g/m ²
Hydraulic Press	Water Tightness	EN 1928	Pass
	Water Vapour Transmission	EN 1931	0.013 g/m ² /day
Mechanical Properties	Tensile Strength (MD/CMD)	EN 12311-2 (A)	500 N/50mm
	Elongation (MD/CMD)	EN 12311-2 (A)	> 12 %
	Resistance to Static Load	EN 12370	20 kg
	Joint Strength	EN 12317-2	> 30 N
	Durability and Water Tightness (Ageing and Chemicals) 60 kPa	EN 1847	Pass
	Resistance to Nail Tear (MD/CMD)	EN 12310-1	> 300 N
	Resistance to Fire	EN 13501	F Euro Class
Gas Permeability	Methane Permeability	EN ISO 15105-1	< 0.68 ml/m ² /day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	< 2.81 ml/m ² /day/atm
	Radon Permeability	K124/02/95	8.0 x 10 ⁻¹⁵ m ² /S
Compliance and Certification	CE Mark - EN13967:2012 + A1:2017 Type (A/T)		
	BS 8485:2015 Compliant (Methane and Carbon Dioxide Barrier)		

JUTA UK

Please contact JUTA UK Directly for more information on GP[®]1 SAM

Installation

GP[®]1 SAM should be installed in accordance with the product installation guidelines, and in accordance with BS 8485:2015, and/or BS 8102:2009.

It is recommended that GP[®]1 SAM is not applied in temperatures below 10°C, in colder weather the material can be warmed slightly to aid adhesion.

Accessory Products

- GP[®] Primer
- GP[®] Protection Board
- GP[®] Protection Fleece

PAG SAGR

PAG SAGR is a sheet membrane constructed from an Aluminium/Polythene laminate, coated with a layer of Self Adhesive Polymer modified Bitumen.

	UNIT		TEST METHOD
Backing Thickness	mm	0.125	
Adhesive Thickness	mm	1.40	
Width	mm	300	
Length	M	20	
Area	M ²	6	
Weight	Kg/m ²	1.6	
Membrane Strength	N/mm	3.0	ASTM D1000
Elongation	%	40	ASTM D1000
Puncture resistance	N	250	ASTM E154
Adhesion (180° Peel)	N/mm	2.0	ASTM D1000
Water Vapour Transmission	g/m ² /24h	<0.1	ASTM E96
Methane Transmission Rate	ml/m ² /24h/atm	<10	15105-1
Carbon dioxide Transmission	ml/m ² /24h/atm	<10	15105-1
Radon Diffusion Coefficient	M ² /s	5.0 x 10 ⁻¹⁴	NRPB
Dimensional stability			
Longitudinal	%	0.0	MOAT 27 5.1.6 (80°C)
Lateral	%	0.0	MOAT 27 5.1.6 (80°C)
Roll sizes		0.3 x 20m	
		1 x 20m	

To be stored out of direct sunlight and away from any heat source.



Classification : Moisture Barrier Type A – EN 13967

Jan 2017

Visqueen Ultimate GeoSeal

Features and benefits

- Agreement certified - third party accreditation
- Complies with NHBC Foundation's NF94 guidance for use in Type B and Type C membrane locations
- Complies with CIRIA C748:2014 - industry standard for volatile organic compounds (VOC) protection
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Type A Barrier Membrane (Tanking Membrane) - resistant to ground water in accordance with BS 8102:2022
- High resistance to impact compared to standard Visqueen DPMs - greatly reduces risk of barrier becoming damaged during the build process
- Also provides radon and damp proof membrane protection
- Dual jointing methods - lap joints can be taped or heat welded

Product description

Visqueen Ultimate GeoSeal is a 1mm thick, robust pre-applied waterproofing barrier. It is coloured grey on the upper surface and black on the reverse. The grey surface is textured to aid adhesion to cast concrete. The barrier is supplied in single wound rolls (not folded), 2.44m x 41m or 2.44m x 20.5m.

Approvals and standards

- Third party accreditation (BDA BAF-18-056-P-A-UK)
- Complies with NHBC Foundation's NF94 guidance for use in Type B and Type C membrane locations
- Suitable for use as a Type A Barrier Membrane (Tanking Membrane) to BS 8102:2022
- Complies with CIRIA C748:2014
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2012
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Ultimate GeoSeal is a pre-applied fully bonded Type A Barrier Membrane (Tanking Membrane) for use with below ground reinforced concrete structures e.g. basements, retaining walls, lift pits and car parks. The barrier also prevents the ingress of harmful levels of volatile organic compounds (VOCs) and hazardous ground gases. The pre-applied barrier can be used to achieve waterproofing to Grades 1, 2 and 3 as defined in BS 8102:2022.

Radon, carbon dioxide, methane, and VOC protection – NHBC NF94 guidance:

Visqueen Ultimate GeoSeal when installed with welded joints complies with NHBC Foundation's NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type B membrane locations in reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft). Visqueen Ultimate GeoSeal also complies with this guidance when installed with welded joints in Type C membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft). For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Services.

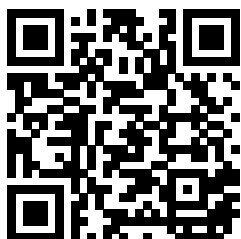
System components

- Visqueen 100mm Double Sided Butyl Tape, 100mm x 15m
- Visqueen GR Lap Tape, 150mm x 10m
- Visqueen Retaining Discs, 50mm long x 35mm head diameter x 500 per box
- Visqueen Ultimate Top Hat Units
- Visqueen Preformed Units
- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen Pile Cap Sealer, 25kg
- Visqueen IGW5 and IGW10 Waterstops

Find your local stockist



Visqueen Ultimate GeoSeal



Visqueen Ultimate GeoSeal

Storage and handling

Visqueen Ultimate GeoSeal should be stored horizontally, under cover in its original packaging.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Ultimate GeoSeal should be installed on a smooth continuous surface e.g. compacted blinding layer, smooth concrete blinding or well consolidated MOT Type 1. The substrate should be free from irregularities such as voids or protrusions.

Where protection against hydrostatic water pressure is required, the barrier should be applied with welded joints.

The barrier can be cut with a sharp retractable safety knife or robust scissors.

Installation

Visqueen Ultimate GeoSeal should be loose laid on horizontal substrates and pre-applied to vertical substrate with the grey textured side facing towards the wet cast concrete so that a key to the concrete can be achieved.

The barrier has been designed to exhibit superior welding properties using hot wedge, hot air or extrusion welding, therefore onsite welding of all lap joints is recommended for all applications, and should be employed when hydrostatic water pressure or hydrocarbon/VOC contamination is present.

Alternatively, when the barrier is used for damp proofing, ground gas protection and sites where hydrostatic water pressure or hydrocarbon/VOC contamination is of low risk, lap joints can be bonded with Visqueen 100mm Double Sided Butyl Tape and sealed with Visqueen GR Lap Tape. When using tapes to secure laps, the overlap should be minimum 150mm and the membrane surfaces to be jointed should be dry and free from contamination such as dust or sand. Once the tapes are applied, the lap should be well rolled with a seam roller to ensure full adhesion and continuity.

The barrier should not be taken through any masonry wall. The relevant Visqueen damp proof or gas proof course should be taken through and extended beyond the wall by a minimum of 250mm where it can be jointed to the barrier with the above tapes.

When installed vertically, the barrier should be pre-applied to temporary formwork or the adjoining structure. Visqueen Retaining Discs are available to provide a means for securing the leading edge of the membrane to the temporary formwork. The barrier should be installed with the smooth black surface facing the formwork. Visqueen Retaining Discs should be mechanically fixed at maximum 400mm centres to the internal face of the shuttering using oval nails. A suitable power tool and 6mm drill bit to create a pilot hole in the barrier, it should be secured over the protruding section of the retaining disc. The top edge of the barrier should be trimmed to approximately 10mm below the top edge of the slab. Once the concrete has set, the oval nails should be removed by pulling through from the external face of the shuttering. When the temporary formwork is removed the Visqueen Retaining Discs should be visible on the external (smooth black) face of the barrier. Continuity of the barrier system with the damp or gas proof course is maintained using Visqueen Gas Resistant Self Adhesive Membrane.

Visqueen Ultimate Preformed Top Hat Units should be used for sealing service entry pipes. The base of the top hat and the upstand should be bonded using Visqueen 100mm Double Sided Butyl Tape and sealed with Visqueen GR Lap Tape. The upstand should be secured with the supplied jubilee clip. Alternatively VisqueenPro Detailing Strip can be used to seal service entry points. The upstand should be secured with a jubilee clip.

Forming an effective barrier to gases may give rise to complex three-dimensional detailing where, it is recommended that welded membrane or Visqueen Ultimate Preformed Units are used e.g. corners. Alternatively VisqueenPro Detailing Strip can be used to seal awkward junctions.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and, depending on the specified jointing method, either welded in position or bonded with Visqueen 100mm Double Sided Butyl Tape and sealed with Visqueen GR Lap Tape. Alternatively a patch can be formed using VisqueenPro Detailing Strip and lapped at least 150mm beyond the perimeter of the puncture.

Due to the robust nature of the product, the barrier can withstand normal on-site foot traffic and the activities associated with the laying of a reinforced concrete slab without the need for additional protection. However, care should still be taken to ensure that the barrier is not punctured, stretched or displaced when applying the reinforced concrete.

In high temperature conditions the barrier should be covered immediately after installation.

Usable temperature range

It is recommended that Visqueen Ultimate GeoSeal and all associated system components should not be installed below 5°C.



Visqueen Ultimate GeoSeal

Additional information

Where required, Visqueen's network of preferred installers can install the barrier and offer the client a fully warranted system. To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall construction.

When used in accordance with CIRIA C748:2014 or BS8485:2015 + A1:2019, a subfloor ventilation system or pressure relief maybe required.

For additional detailing information contact Visqueen Technical Services +44 (0) 333 202 6800.

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Visqueen Ultimate GeoSeal

Property	Test method	Units	Criteria	Result
Colour				Grey/black
Weight		kg		97 or 48.5
Length	BS EN 1848-2	m	-0/+10%	41 or 20.5
Width	BS EN 1848-2	m	-0/+10%	2.44
BS 8485 and C748:2014 data				
Puncture	BS EN 12236	N	MDV	2850
Impact resistance Method A hard surface	BS EN 12691	mm	MDV	750
Impact resistance Method B soft surface	BS EN 12691	mm	MDV	>2000
Tensile strength MD (1) equipment unable to break the barrier	ASTM D4885-01	kN/m	MDV	11.9
Tensile strength CD (1) equipment unable to break the barrier	ASTM D4885-01	kN/m	MDV	12.7
Elongation MD (1) equipment unable to break the barrier	ASTM D4885-01	%	MDV	>500
Elongation CD (1) equipment unable to break the barrier	ASTM D4885-01	%	MDV	>501
Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	79.6
Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	75.8
Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	128.3
Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	126.9
C748:2014 - Permeation vapour tests @ 100% conc.				
Benzene	BS ISO 15105-2	ml/m ² /d	MDV	<1
Toluene	BS ISO 15105-2	ml/m ² /d	MDV	<1
Ethyl benzene	BS ISO 15105-2	ml/m ² /d	MDV	<1
m,p xylene	BS ISO 15105-2	ml/m ² /d	MDV	<1
Hexane	BS ISO 15105-2	ml/m ² /d	MDV	<1
Vinyl chloride	BS ISO 15105-2	ml/m ² /d	MDV	<1
Tetrachloroethene (PCE)	BS ISO 15105-2	ml/m ² /d	MDV	<1
Trichloroethene (TCE)	BS ISO 15105-2	ml/m ² /d	MDV	<1
Naphthalene	BS ISO 15105-2	ml/m ² /d	MDV	<1
C748:2014 - Chemical immersion testing (2) (2) Pass achieved if barrier under test is within 25% of untested barrier		Weight % (2)	Thickness % (2)	Tensiles/elongation (2)
Benzene	BS EN 14414	Pass	Pass	Pass
Toluene	BS EN 14414	Pass	Pass	Pass
Ethyl benzene	BS EN 14414	Pass	Pass	Pass
(m,p, and o) xylenes	BS EN 14414	Pass	Pass	Pass
Hexane	BS EN 14414	Pass	Pass	Pass
Vinyl chloride	BS EN 14414	Pass	Pass	Pass
Tetrachloroethene (PCE)	BS EN 14414	Pass	Pass	Pass

Visqueen Ultimate GeoSeal

Property	Test method	Units	Criteria	Result
Trichloroethene (TCE)	BS EN 14414	Pass	Pass	Pass
Naphthalene	BS EN 14414	Pass	Pass	Pass
CE Marking to EN 13967:2017				
Characteristic	Test method	Units	Criteria	Result
Tensile Strength - MD	BS EN 12311	N/mm ²	MDV	23.6
Tensile Strength - CD	BS EN 12311	N/mm ²	MDV	22.4
Tensile Elongation - MD	BS EN 12311	%	MDV	701
Tensile Elongation - CD	BS EN 12311	%	MDV	706
Joint Strength	BS EN 12317-2	N	MDV	598
Watertightness to 60 kPa for 24 hours	BS EN 1928	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691	mm	MDV	700
Durability watertightness after heat ageing	BS EN 1296	60kPa	Pass/Fail	Pass
Durability watertightness against chemicals	BS EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) CD	BS EN 12310-1	N	MDV	720
Resistance to tearing (nail shank) MD	BS EN 12310-1	N	MDV	750
Resistance to static loading	BS EN 12730	kg	>MLV	20
Water vapour transmission - resistance	BS EN 1931	MNs/g	MDV	2142
Water vapour transmission - permeability	BS EN 1931	g/m ² /d	MDV	0.063
Watertightness welded and taped joint	BS EN 1928	60kPa	Pass/Fail	Pass
Methane gas transmission rate (unjointed)	BS ISO 15105-1	ml/m ² /day/atm	<40	3.2
Methane gas transmission rate (jointed)	BS ISO 15105-1	ml/m ² /day/atm	<40	34.7
Carbon dioxide gas transmission rate (unjointed)	BS ISO 15105-1	ml/m ² /day/atm	<40	7
Radon permeability	SP RI.SE	m ² /s		3.0 x 10 ⁻¹²

Health and safety information

Refer to the Visqueen Ultimate GeoSeal safety datasheet (SDS).

Visqueen Ultimate GeoSeal

About Visqueen

The Visqueen name has long been recognised as one of the leading manufacturers of high quality advanced membrane technologies and design based solutions by specifiers, distributors, builders merchants and contractors throughout the UK and Europe.

For further guidance on the Visqueen services shown below, please refer to the relevant section of the Visqueen website (www.visqueen.com) or contact Visqueen Technical Services on +44 (0) 333 202 6800 or enquiries@visqueen.com

Complete Range, Complete Solution



Structural
Waterproofing



Gas
Protection



Damp Proof
Membrane



Tapes



Damp Proof
Course



Stormwater



Vapour
Control

Visqueen Technical Support

Visqueen combine an extensive product portfolio with industry leading levels of service and support which includes guidance over the phone, bespoke CAD drawings to help with complex detailing, electronic NBS specifications and access to a dedicated team of highly knowledgeable and experienced field based Technical Support Managers.

Visqueen Technical Support is available to all our customers including architects, specifiers, distributors, builders merchants, contractors and end users. All of our technical team have been awarded the industry recognised qualification Certificated Surveyor in Structural Waterproofing (CSSW).

Visqueen CPD Seminars

The Visqueen Continuing Professional Development (CPD) Seminars provide up-to-date information on changes within Building Regulations/Building Standards and nationally recognised industry guidance affecting damp proofing, water vapour control, hazardous ground gas protection and below ground structural waterproofing.

The one hour seminars have been produced for design specialists within the construction sector and are delivered by our team of Technical Support Managers.

Visqueen Training Academy

Based at our manufacturing facility in Derbyshire, the Visqueen Training Academy is available to support Visqueen customers throughout the UK by providing a wide range of both theory and practical skills related training.

Courses include one day product awareness training for our distributors and builders merchants to help them in their day-to-day jobs, through to intensive three day courses giving detailed hands-on training in the practical skills required for safe and robust product installation.



APPENDIX IV

METHOD STATEMENTS



METHOD STATEMENT AND SAFE WORKING PROCEDURES ON-SITE GAS MEMBRANE VALIDATION:

1.0 SCOPE

To define the procedures to be followed in validating the installation of gas membranes.

The purpose of this procedure is to ensure that a suitable procedure is followed to confirm that gas membranes have been suitably installed by visual inspection and air lance testing where appropriate.

2.0 DEFINITIONS

The verification will be carried out in general accordance with CIRIA C735 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases', and will comprise visual inspection together with integrity testing consisting of air lance testing where appropriate.

Air lance testing will be carried out in general accordance with ASTM D4437-08:2013.

3.0 RESPONSIBILITIES

The Project Leader shall ensure that only suitably trained staff shall undertake gas membrane validation.

The validator is responsible for complying with site rules and any specific contractor method statement.

4.0 PROCEDURES

Personal Protective Equipment (PPE)

In addition to the minimum PPE requirements the validator shall always wear disposable gloves when inspecting membrane.

Validation Process

The verification will be carried out in general accordance with CIRIA C735 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases', and will comprise visual inspection together with integrity testing consisting of air lance testing.

Based on the Gas Classification (in accordance with BS8485) where known, or the contractor requirements the validation will comprise site visits by an independent verifier (ASL) to inspect the installed membranes.

The independent validation inspection visits, including any integrity testing works, will be carried out by experienced geologists, engineers and scientists who are experienced in these works and have been suitably trained in-house.

The inspections will include detailed visual inspection of the membrane integrity, the quality of all welded or taped seams and taped sealing around penetrations such as pipes.



Where required, air lance integrity testing will also be completed along all seams and joints prior to all concrete pours. Air lancing integrity testing is deemed to be the most appropriate testing method due to the easily observable results, non-destructive methodology and ease of use.

Air lance integrity testing comprises the use of a compressor to pressurise air to a minimum pressure of 345 Kpa (50 psi). This air is then directed at joints and seals in the membrane using a hose and nozzle of 4.8mm in diameter, at a distance of no more than 50mm. The verifier will then observe the surface of the membrane for any air pockets building up beneath the membrane surface. Any air pockets will signify that the membrane is not correctly sealed.

The verifier will request that any defects in the membrane or welds and seals, either identified by a visual inspection or by air lance testing, are suitably repaired by the installer before confirming that the gas protection measures have been suitably installed.

The findings of each validation visit, including the results of any integrity testing, will be recorded on suitable pro-forma. Photographs will be taken showing the general level of workmanship and will show the membrane, seals and any other details that require specific installation techniques. The validator will confirm that suitable protection will be placed as soon as is practical following placement to reduce the risks of the membrane becoming damaged.

PRESTIGE AIR TECHNOLOGY LTD

GROUND GAS PROTECTION SCHEME

DOCUMENTATION

AT

ROCHDALE SEND

FOR

TILBURY DOUGLAS CONSTRUCTION LTD

REF: 3539

DATE: 28th October 2024

GROUND GAS PROTECTION SCHEME

METHOD STATEMENT

Gas Membrane

Pre start

1. Site supervisor qualifications to be min Construction Site Supervisors Safety Certificate and installers to be min. 1 no. per 2 man team NVQ Level 2 Gas Membrane Installation. All installers to be Prestige Air personnel.
2. On site foot and vehicle movement to be site designated routes.
3. Full PPE at all times to include min hard hat, gloves, high viz. and steel toe cap boots.
4. Supervisor/Representative to attend site meetings as required.

Materials

1. Juta GP1 is a reinforced multi-layered LDPE aluminium foil gas barrier.
2. GP SAM is a bitumastic self-adhesive gas membrane including an aluminium foil.
3. 3mm protection board.
4. 300g/m2 protection fleece.
5. PD1700 a protection drainage sheet a supply only item.
6. Bitumastic primer.
7. Deliveries to site are to be by Prestige Air panel van and to be unloaded by hand.
8. Material off cuts, primer containers, packaging and all other waste to be bagged up and disposed of in main contractors skip.

Installation

1. Loose laid membrane to be supplied to site in 2m wide rolls, self adhesive membrane in 300mm and 1m wide rolls.
2. The membrane is to be laid below the ground floor construction immediately below insulation layer. If required a 300g/m² protection fleece to be provided for the installed membrane. The laying surface for the membrane needs to be reasonably flat and free from sharp protrusions.
3. The membrane is to be sealed to all internal penetrations and be continuous throughout the footprint area. At the perimeter the membrane is to be taken down the batter and across the top of the foundation with a section of GP SAM taken vertically on the outside face of the slab edge thickening to cavity tray level and across the cavity as a section of GP1 and horizontally across the foundation toe and vertically on the outside face of the foundation to an extent approx. 300mm. At the 1no. lift pit the membrane is to be taken vertically on the outside face as sections of GP SAM complete with protection board and below the base as a section of Titan Bond Loose laid membrane and self adhesive membrane to be handheld knife cut. Cutting of the membrane is to be carried out on a firm section of the over site and the knife blade is to be moved in a direction away from the installer. Knives and scissors to have blade protection and Kevlar Gloves to be worn. Welding of self adhesive membrane to be by hot air Leister Gun Triac ST 120v/1600w. Leister Gun to be used by trained personnel only. Hot works permit not required, equipment to be PAT tested and stored on site vehicle when not in use.
4. Adjacent sheets of loose laid membrane are to be lapped by a min 100 mm and wedge welded or taped. Welder to be a Demtec 110v wedge welder and generator complete with drip tray. The lead is to be run away from pedestrian and vehicle traffic. The wedge welder works using a hot iron which is placed in the lap and moved along the joint to make the weld. Wedge welder to be used by trained personnel only.
5. All pipe and service entries to be sealed to, where possible using prefabricated top hat sections or where not, using self adhesive membrane. Where services are to be drawn through ducts the service is to be separately sealed to the inside of duct using- min. 100mm expanding polyurethane foam over laid by liquid membrane, sealing to be carried out by Main Contractor. When sealing to pipe and service entries a minimum 150 mm, section, free from collars or bends, is required protruding above the floor level with a minimum 100mm gap between adjacent pipes, services or other structural elements.
6. Any structural elements requiring sealing to will first be primed with a Bitumastic primer then sealed to using self adhesive membrane. Columns to be sealed to using a 300mm wide section of self adhesive membrane. Any concrete surfaces requiring sealing to present a trowelled finish min extent 150mm and columns, where required to be pre-primed. Primer to be applied with brush and paint kettle or roller and tray with one complete coat required. Brush and kettle to be used for areas less than 1m² and roller and tray to be used for areas greater than 1m². All priming to be carried out in well ventilated areas.

7. Internal and external corners will be prefabricated on site using self adhesive membrane. 300mm/300mm square section to be folded into equal quarters, pressed into the corner using a Leister hot air gun and one quarter removed.
8. Installed membrane to be validated by others.
9. On completion of works at the end of each work period the work area is to be left clean and tidy and all waste removed.
10. Risk Assessment sheets nos. 3, 7, 8, 11, 19, 20, 21, 29 & COSHH for Bitumastic Primer and Petrol to apply.

Signed by:-

Date:-

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No.3	DATE: April 2024
LOCATION On site	
OPERATION/PROCESS: Production of electric power	
EQUIPMENT USED Generator	
SUBSTANCES USED Petrol	COSHH ASSESSMENT Done
HAZARDS IDENTIFIED: Petrol spillage whilst refilling	NOISE ASSESSMENT: 81dB
SECONDARY HAZARDS Heat from engine body	
EXPOSED PERSONS Operator and assistant	EXPOSURE TO OTHER PERSONNEL To be excluded from 1 m radius
FREQUENCY OF EXPOSURE: Every day	DURATION OF EXPOSURE 8 hours per day
CONTROL MEASURE P.P.E. to be worn at all times Ensure – 1) Equipment is well maintained 2) Fluorescent jackets/waistcoats 3) Safety footwear 4) Safety glasses 5) Hard hats 6) Gloves Cat 5 7) Permit to work if required, helmets with visor or face masks to be worn when lifting equipment, side by side working in preference to face to face	8) A minimum of 2 people are available to lift equipment. 9) Necessary containers/funnels are available for re-fuelling, drip tray to be used 10) Equipment to have separate earth. 11) Maintained fire extinguisher. 12) Equipment to be maintained and PAT tested
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No. 7	DATE: October 2024
LOCATION On site	
OPERATION/PROCESS: Cutting plastic sheeting	
EQUIPMENT USED Knife or scissors	
SUBSTANCES USED N/A	COSHH ASSESSMENT N/A
HAZARDS IDENTIFIED: Cuts received to hands and from falling onto blade	NOISE ASSESSMENT: N/A
SECONDARY HAZARDS None identified	
EXPOSED PERSONS Operator and Assistant	EXPOSURE TO OTHER PERSONNEL None
FREQUENCY OF EXPOSURE: Every day	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure – 1) Fluorescent jackets/waistcoats 2) Safety footwear 3) Safety glasses 4) Hard hat 5) Gloves 6) Knives or scissors to have protective caps or blades (where specified) when not in use 7) Knives/scissors are not to be placed in back or side pockets when not in use	
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No. 8	DATE: October 2024
LOCATION On site	
OPERATION/PROCESS: Joining of two membrane sections	
EQUIPMENT USED Leister Hot Air Gun	
SUBSTANCES USED None	COSHH ASSESSMENT N/A
HAZARDS IDENTIFIED: Hot Air	NOISE ASSESSMENT: 65dB
SECONDARY HAZARDS 110v power supply	
EXPOSED PERSONS Operator only	EXPOSURE TO OTHER PERSONNEL None
FREQUENCY OF EXPOSURE: Every day	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure – 1) Operator is fully trained. 2) Fluorescent jackets/waistcoats 3) Safety footwear 4) Safety glasses 5) Hard hats 6) Gloves 7) Equipment should be switched off when not in use 8) Regular equipment testing	
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No.11	DATE: October 2024
LOCATION On site	
OPERATION/PROCESS: Priming	
EQUIPMENT USED Disposable Brush and pot	
SUBSTANCES USED Bitumastic Primer	COSHH ASSESSMENT Manufacturer supplied
HAZARDS IDENTIFIED: Accidental Spillage	NOISE ASSESSMENT: N/A
SECONDARY HAZARDS Contact with skin and eyes	
EXPOSED PERSONS Operator	EXPOSURE TO OTHER PERSONNEL N/A
FREQUENCY OF EXPOSURE: Every day	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure – 1) Fluorescent jackets/waistcoats 2) Safety footwear 3) Safety glasses 4) Hard hats	5) Gloves 6) Primer only dispensed from product can. 7) Primer dispensed in small quantities in area of use. 8) Use disposable brushes and pots for primer.
MONITORING RESULTS: No accidents recorded	
RESIDUAL RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

**PRESTIGE AIR TECHNOLOGY
RISK ASSESSMENT SHEET**

ASSESSMENT No. 19

DATE:
May 2024

LOCATION

On Site

OPERATION/PROCESS:

Application of Bitumastic Primer

EQUIPMENT USED

Brush, roller, tin.

SUBSTANCES USED

Bitumastic Primer

COSHH ASSESSMENT

Harmful

HAZARDS IDENTIFIED:

Fire hazard, inhalation of fumes, direct
Skin contact.

NOISE ASSESSMENT:

N/a

SECONDARY HAZARDS

N/a

EXPOSED PERSONS

Personnel involved

FREQUENCY OF EXPOSURE:

Everyday

DURATION OF EXPOSURE

8 hours per day

**CONTROLS MEASURES P.P.E. to
be worn at all times**

Ensure: 1) Personnel are fully trained.
2) Fluorescent jackets/waistcoats
3) Safety footwear

4) Safety glasses
5) Hard hats
6) Gloves
7) Maintained fire extinguisher
8) Well ventilated work area

MONITORING RESULTS:

No accidents recorded

RISK ASSESSMENT

Low

ASSESSOR:

Richard Stevens

POSITION:

Health & Safety Officer

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No. 20	DATE: October 2024
LOCATION On Site	
OPERATION/PROCESS: Decanting petrol	
EQUIPMENT USED Petrol can, funnel, spillage tray.	
SUBSTANCES USED Petrol	COSHH ASSESSMENT Harmful
HAZARDS IDENTIFIED: Fire hazard, inhalation of fumes, direct Skin contact.	NOISE ASSESSMENT: N/a
SECONDARY HAZARDS N/a	
EXPOSED PERSONS Personnel involved	
FREQUENCY OF EXPOSURE: Everyday	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure: 1) Personnel are fully trained. 2) Fluorescent jackets/waistcoats 3) Safety footwear	4) Safety glasses 5) Hard hats 6) Gloves 7) Maintained fire extinguisher 8) Well ventilated work area
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

**PRESTIGE AIR-TECHNOLOGY
RISK ASSESSMENT SHEET**

ASSESSMENT No. 21	DATE: March 2024
LOCATION On Site	
OPERATION/PROCESS: General movement around construction site.	
EQUIPMENT USED N/a	
SUBSTANCES USED N/a	COSHH ASSESSMENT N/a
HAZARDS IDENTIFIED: Site traffic, trips, spills, secondary operations/processes.	NOISE ASSESSMENT: Advised levels infrequently above 85db
SECONDARY HAZARDS None	
EXPOSED PERSONS Personnel involved	
FREQUENCY OF EXPOSURE: Everyday	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure: 1) Personnel are fully trained, 2) Fluorescent jackets/waistcoats 3) Safety footwear 4) Safety glasses 4) Fluorescent jackets/Waistcoats	
5) Hard hats 5) Gloves 7) Maintained fire extinguisher 8) Well ventilated work area 9) Ear defenders when advised. 10) CSCS general site safety, Training check lists Task No. 2 & No.3 See H & S Policy pages 27 & 28	
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

PRESTIGE AIR TECHNOLOGY RISK ASSESSMENT SHEET	
ASSESSMENT No. 29	DATE: October 2024
LOCATION On site	
OPERATION/PROCESS: Joining of two membrane sections	
EQUIPMENT USED Demtech 110v Wedge Welder	
SUBSTANCES USED None	COSHH ASSESSMENT N/A
HAZARDS IDENTIFIED: Minor burns	NOISE ASSESSMENT: N/a
SECONDARY HAZARDS 110v power supply	
EXPOSED PERSONS Operator only	EXPOSURE TO OTHER PERSONNEL None
FREQUENCY OF EXPOSURE: Every day	DURATION OF EXPOSURE 8 hours per day
CONTROLS MEASURES P.P.E. to be worn at all times Ensure – 1) Operator is fully trained. 2) Fluorescent jackets/waistcoats 3) Safety footwear 4) Safety glasses 5) Hard hats 6) Gloves 7) Equipment should be switched off when not in use. 8) Regular equipment testing	
MONITORING RESULTS: No accidents recorded	
RISK ASSESSMENT Low	
ASSESSOR: Richard Stevens	POSITION: Health & Safety Officer

Substance Information									
Name of Substance*		HP Tanking Primer			Has a safer alternative been considered:		Yes ☐ No ☒		
Physical Properties:		Discus black liquid			Workplace Exposure Limit (WEL)		8 – hr limit mg/m3 350		
								Other (state)	
Explosive ☐	Oxidiser ☐	Flammable ☒	Toxic ☐	Harmful ☒	Health ☒	Corrosive ☐	Environmental ☒	☐	
Work Process/Application									
Process substance used for		Priming concrete/steel surfaces.							
Frequency of usage		daily		Who/how many use it		Individual installer use			
Duration of exposure		8 hrs		Volume/Concentration		5ltr tins not diluted			
Exposure Type		Health Effects			First Aid Measures				
Eye Contact		Irritation			Rinse with plenty of water				
Skin Contact		irritation			Wash with soap and water				
Inhalation		Nausea and vomiting			Move into fresh air				
Ingestion		Nausea and vomiting			Do not induce vomiting and seek immediate medical advice				
Environmental		Avoid release to the environment							
Control Measures, Monitoring and Emergency Procedures									
Personal Protective Equipment (PPE)		Gloves – Kevlar Cat 2 EN388	☒	Eye Protection – Safety glasses	☒	Face shield	☐		
		Overalls	☐	Resp. Protect. (state)	☐	Other	☐		
Hygiene requirements		Gloves, safety glasses to be worn at all times, use in well ventilated area							
State Training / Awareness reqd.		Awareness of hazard of eye, skin contact inhalation and ingestion and accidental spillage action required							
Identify any Procedures / SSoW									
Monitoring		Monitor Exposure	☐	Health Surveillance	☐	None	☒		
Work environment		Restricted Access	☐	Good Ventilation	☒	Other	☐		
Storage requirements		Container tightly closed store well ventilated and cool							
Disposal methods		Contents and container to licensed waste disposal site							
Spill control and clean up		Absorb with inert absorbent material and transfer to suitably labelled container for disposal							
Fire fighting measures		Flammable? Yes ☒ No ☐	Fumes Released? Yes ☒ No ☐	Extinguisher types: Water ☐ Foam ☒ Powder ☐ CO2 ☒ Chemical ☒					
Other Comments									

None			
Overall Health Risks			
Based on the above criteria and full implementation of all specified controls, monitoring and emergency measures, the risk to health is assessed as:		LOW ☒	MED ☐
Assessor Name	Richard Stevens	Date	October 2024

Substance Information									
Name of Substance*		Petrol			Has a safer alternative been considered:		Yes ☐ No ☒		
Physical Properties:		Straw coloured Liquid			Workplace Exposure Limit (WEL)				
 Explosive ☒	 Oxidiser ☐	 Flammable ☒	 Toxic ☐	 Harmful ☒	 Health ☒	 Corrosive ☐	 Environmental ☒	Other (state) ☐	
Work Process/Application									
Process substance used for		Generator Fuel							
Frequency of usage		Daily		Who/how many use it			Individual Operatives		
Duration of exposure		-		Volume/Concentration			-		
Exposure Type		Health Effects			First Aid Measures				
Eye Contact		Irritation			Wash with Clean water min 15 minutes, obtain medical advice if pain or redness develops				
Skin Contact		Irritation			Remove contaminated clothing and wash skin with soapy water				
Inhalation		Nausea			Remove to fresh air, artificial respiratory if breathing stops				
Ingestion		Nausea			Do not induce vomiting, if unconscious place in recovery position				
Environmental		Clean up spill							
Control Measures, Monitoring and Emergency Procedures									
Personal Protective Equipment (PPE)		Gloves (State)	☒	Eye Protection (State)	☐	Face shield	☐		
		Overalls	☐	Resp. Protect. (state)	☐	Other	☐		
Hygiene requirements		-							
State Training / Awareness reqd.		Verbal instruction							
Identify any Procedures / SSoW									
Monitoring		Monitor Exposure	☐	Health Surveillance	☐	None	☒		
Work environment		Restricted Access	☐	Good Ventilation	☒	Other	☐		
Storage requirements		Containers remote from sources or heat, ignition and open flame							
Disposal methods		Dispose of in accordance with local authority/ national guidelines							
Spill control and clean up		Spillage tray, where possible remove contaminated ground and dispose of in accordance with local authority guidelines							
Fire fighting measures		Flammable? Yes ☒ No ☐	Fumes Released? Yes ☒ No ☐	Extinguisher types: Water ☐ Foam ☒ Powder ☒ CO2 ☒ Chemical ☐					
Other Comments									

Overall Health Risks				
Based on the above criteria and full implementation of all specified controls, monitoring and emergency measures, the risk to health is assessed as:		LOW x	MED ☐	HIGH ☐
Assessor Name	Richard Stevens Director Prestige Air Technology	Date	October 2024	



APPENDIX V

SITE INSPECTION REPORTS

asl

GAS PROTECTION MEASURES VALIDATION INSPECTION REPORT

Project Name: <u>Rochdale - SEND</u>		Inspection Carried Out by: <u>ASM</u>	
Project No. <u>273-24-292</u>		Date: <u>15/11/24</u>	

Plot Type: Detached / Semi-Detached / Apartments <u>Commercial</u>	Plot Number (s): <u>lift pit walls.</u>	Gas Membrane Installer: <u>Prestige Air Tech</u>
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Gas Risk Rating (CS)	<u>CS2</u>	VOC	Yes	<u>No</u>	N/A	Radon	Yes	<u>No</u>	N/A
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Verification Plan Completed:	Yes	No	<u>In Production</u>
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Gas Protection Provided by:		Other Details (Membrane Products, Ventilation Type etc):	
1. Gas Resistant Membrane	<u>Yes</u>	No	<u>PAG Self adhesive + Ugreen ultimate Geoseal</u>
2. Ventilation	Yes	<u>No</u>	<u>N/A</u>
3. Structural Barrier	<u>Yes</u>	No	<u>Reinforced floor slabs</u>

Gas Membrane Installation:	Welded	Taped
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Inspection Findings:
(note repairs, defects, vent locations, and any other issues identified)

Plot No(s). Lift pit walls.

Key:
X Repairs
■ Vents
○ Penetrations
□ Columns

Number of Defects/Repairs Identified: <u>1</u> <u>No</u>	All Defects/Repairs Completed: (Note locations above) <u>Yes</u> No
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Number of Vents/Vent Spacing: (Note vent locations above) <u>N/A</u>	
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Integrity Testing required? Yes <u>No</u>	Details: <u>Self adhesive on vertical faces</u>
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General Comments/Further Action Required: <u>Membrane in excellent condition, minor repair carried out by Prestige, membrane passed</u>	
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Photos Taken (✓) ☒

Verifier Signature

Installer Representative Name

Signed

Company

Site Representative

Name

Signed

Company

GAS PROTECTION MEASURES VALIDATION INSPECTION REPORT

Project Name: <u>Rockdale - SEND</u>	Inspection Carried Out by: <u>ASM</u>
Project No. <u>273-24-242</u>	Date: <u>10/12/24</u>

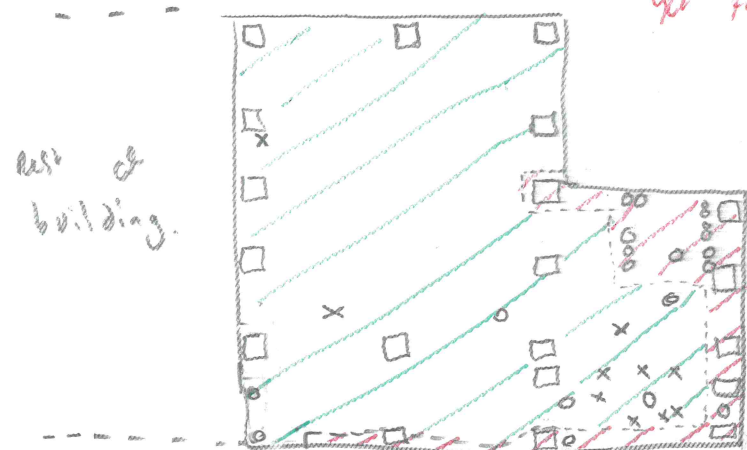
Plot Type: Detached / Semi-Detached / Apartments / <u>Commercial</u>	Plot Number (s): <u>see drawing</u>	Gas Membrane Installer: <u>Petite AS Tech.</u>
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Gas Risk Rating (CS) <u>CS2</u>	VOC Yes ☐ No ☒	Radon Yes ☐ No ☒
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Verification Plan Completed:	Yes ☐ No ☐ In Production ☒
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Gas Protection Provided by:	Other Details (Membrane Products, Ventilation Type etc):
1. Gas Resistant Membrane ☒ Yes ☐ No	<u>Sura GFI, GCSAM + Titan board (plaster)</u>
2. Ventilation ☒ Yes ☒ No	<u>N/A</u>
3. Structural Barrier ☒ Yes ☐ No	<u>reinforced ground bearing floor slab</u>

Gas Membrane Installation:	<u>Welded</u> ☒ Taped ☐
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Inspection Findings: (note repairs, defects, vent locations, and any other issues identified) Plot No(s). 	Key: X Repairs O Vents □ Penetrations □ Columns
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10 No repairs = completed.

Number of Defects/Repairs Identified: <u>10 No</u>	All Defects/Repairs Completed: (Note locations above) ☒ Yes ☐ No
Number of Vents/Vent Spacing: (Note vent locations above) <u>N/A</u>	
Integrity Testing required? ☒ Yes ☐ No	Details: <u>Air lance testing</u>
General Comments/Further Action Required: <u>Membrane in good condition, not all finished (see drawing), photos required, air lance tested and passed</u>	
Photos Taken ☒	

Verifier Signature

Installer Representative Name

K. PLAIN

Signed

P. 109

Company

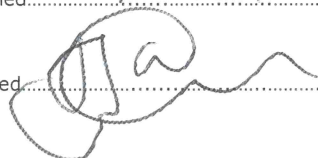
PAR

Site Representative

Name

Same Martin

Signed



Company

T.D

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GAS PROTECTION MEASURES VALIDATION INSPECTION REPORT

Project Name: ROCHDALE - SEND	Inspection Carried Out by: ASL
Project No. 273-24-292	Date: 14/01/25

Plot Type: Detached / Semi-Detached / Apartments / <u>Commercial</u>	Plot Number (s): Pour 2 (see plan)	Gas Membrane Installer: Profige Air Tech
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Gas Risk Rating (CS)	CS2	VOC	Yes	<u>No</u>	N/A	Radon	Yes	<u>No</u>	N/A
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Verification Plan Completed:	Yes	No	<u>In Production</u>
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Gas Protection Provided by:		Other Details (Membrane Products, Ventilation Type etc):	
1. Gas Resistant Membrane	<u>Yes</u> No	Juta GFI, Titenbond + CASAM	
2. Ventilation	Yes <u>No</u>	N/A	
3. Structural Barrier	<u>Yes</u> No	Reinforced ground bearing floor slab	

Gas Membrane Installation:	<u>Welded</u>	Taped
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Inspection Findings: (note repairs, defects, vent locations, and any other issues identified) Plot No(s). 	Key: X Repairs ■ Vents ○ Penetrations □ Columns
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Number of Defects/Repairs Identified: 3 No	All Defects/Repairs Completed: (Note locations above) <u>Yes</u> No
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Number of Vents/Vent Spacing: (Note vent locations above) N/A	Details: Air lance testing 100%.
Integrity Testing required? <u>Yes</u> No	

General Comments/Further Action Required: Membrane in excellent condition, minor repairs carried out by Profige, Membrane air lanced, minor areas to be completed and Profige to take photos.	
Photos Taken ☒	

Verifier Signature

Installer Representative Name **DALLAN W** Signed CompanySite Representative Name **FIL FLANNERY** Signed Company **TDC**

asl

GAS PROTECTION MEASURES VALIDATION INSPECTION REPORT

Project Name: <u>ROCHDALE - SEND</u>	Inspection Carried Out by: <u>ASJ</u>
Project No. <u>273-24-292</u>	Date: <u>22/01/25</u>

Plot Type: Detached / Semi-Detached / Apartments // <u>Commercial</u>	Plot Number (s): <u>Pour 3</u>	Gas Membrane Installer: <u>Prestige Air Tech</u>
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Gas Risk Rating (CS) <u>CS2</u>	VOC	Yes	<u>No</u>	N/A	Radon	Yes	<u>No</u>	N/A
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Verification Plan Completed:	Yes	No	<u>In Production</u>
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Gas Protection Provided by:		Other Details (Membrane Products, Ventilation Type etc):	
1. Gas Resistant Membrane	<u>Yes</u> No	<u>Tufa GP1, Hitenbond + GRSM</u>	
2. Ventilation	<u>Yes</u> <u>No</u>	<u>N/A</u>	
3. Structural Barrier	<u>Yes</u> No	<u>Reinforced ground bearing floor slab</u>	

Gas Membrane Installation:	<u>Welded</u>	Taped
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Inspection Findings: (note repairs, defects, vent locations, and any other issues identified) Plot No(s). 	Key: X Repairs V Vents O Penetrations □ Columns
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Number of Defects/Repairs Identified: <u>8</u> <u>No</u>	All Defects/Repairs Completed: (Note locations above) <u>Yes</u> No
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Number of Vents/Vent Spacing: (Note vent locations above)	<u>N/A</u>
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Integrity Testing required? Yes <u>No</u>	Details: <u>Air tested ~60% across previous visits</u>
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General Comments/Further Action Required: <u>Membrane in excellent condition, minor repairs carried out by Prestige Air Tech, some columns and all outside perimeter to be completed</u>	Photos Taken (✓) <u>✓</u>
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Verifier Signature [Signature]

Installer Representative Name J. Loughlin Signed [Signature] Company Prestige

Site Representative Name J. Martin Signed [Signature] Company T-D

asl

GAS PROTECTION MEASURES VALIDATION INSPECTION REPORT

Project Name: ROCHDALE - SEND	Inspection Carried Out by:
Project No. 273-24-292	Date: 7/02/25

Plot Type: Detached / Semi-Detached / Apartments / Commercial	Plot Number (s): Extensor Way	Gas Membrane Installer: Prestige Airtech
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Gas Risk Rating (CS)	CS2	VOC	Yes	No	N/A	Radon	Yes	No	N/A
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Verification Plan Completed:	Yes	No	In Production
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Gas Protection Provided by:	Other Details (Membrane Products, Ventilation Type etc):
1. Gas Resistant Membrane Yes No	Juta GFI, SAM, Titum bond - Primed
2. Ventilation Yes No	N/A
3. Structural Barrier Yes No	Reinforced floor slab.

Gas Membrane Installation:	(Welded)	Taped
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Inspection Findings: (note repairs, defects, vent locations, and any other issues identified) Plot No(s). 	Key: X Repairs ■ Vents ○ Penetrations □ Columns
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Number of Defects/Repairs Identified: 2 No	All Defects/Repairs Completed: (Note locations above) Yes No
Number of Vents/Vent Spacing: (Note vent locations above) N/A	
Integrity Testing required? Yes No	Details: Visual inspection
General Comments/Further Action Required: Great install on the enclosed section, very minor repairs identified	
Photos Taken (✓)	

Verifier Signature

Skates

Installer Representative Name

J. J. J.

Signed

J. J. J.

Company

J. J. J.

Site Representative

Name

Fin Fildarity

Signed

Fin Fildarity

Company

TDC



APPENDIX VI

PHOTOGRAPHS

Plate 1 **Visit 1 – Lift Shaft Walls (15/11/24)**



Plate 2 **Visit 1 – Lift Shaft Walls (15/11/24)**



Plate 3 **Visit 1 – Lift Shaft Walls (15/11/24)**



Plate 4 **Visit 2 – Area 1 - Membrane (10/12/24)**



Plate 5 Visit 2 – Area 1 – Sealed Penetration (10/12/24)



Plate 6 Visit 2 – Area 1 - Sealed Penetration (10/12/24)



Plate 7 Visit 2 – Area 1 – Edge Detailing (10/12/24)



Plate 8 Visit 3 – Area 2 - Membrane (14/01/25)



Plate 9 **Visit 3 – Area 2 – Sealed Penetrations (14/01/25)**



Plate 10 **Visit 3 – Area 2 – Sealed Penetrations (14/01/25)**



Plate 11 **Visit 3 – Area 2 – Sealed Penetrations (14/01/25)**



Plate 12 **Visit 3 – Area 2 – Edging Detailing and Sealed Penetrations (14/01/25)**



Plate 13 **Visit 3 – Area 2 – Edge Detailing (14/01/25)**



Plate 14 **Visit 3 – Area 2 – Membrane Including lift Pit (14/01/25)**



Plate 15 **Visit 4 – Area 3 – Membrane (22/01/2025)**



Plate 16 **Visit 4 – Area 3 – Sealed Penetrations (22/01/2025)**



Plate 17 Visit 4 – Area 3 – Sealed Penetration (22/01/2025)



Plate 18 Visit 4 – Area 3 – Sealed Penetrations (22/01/2025)

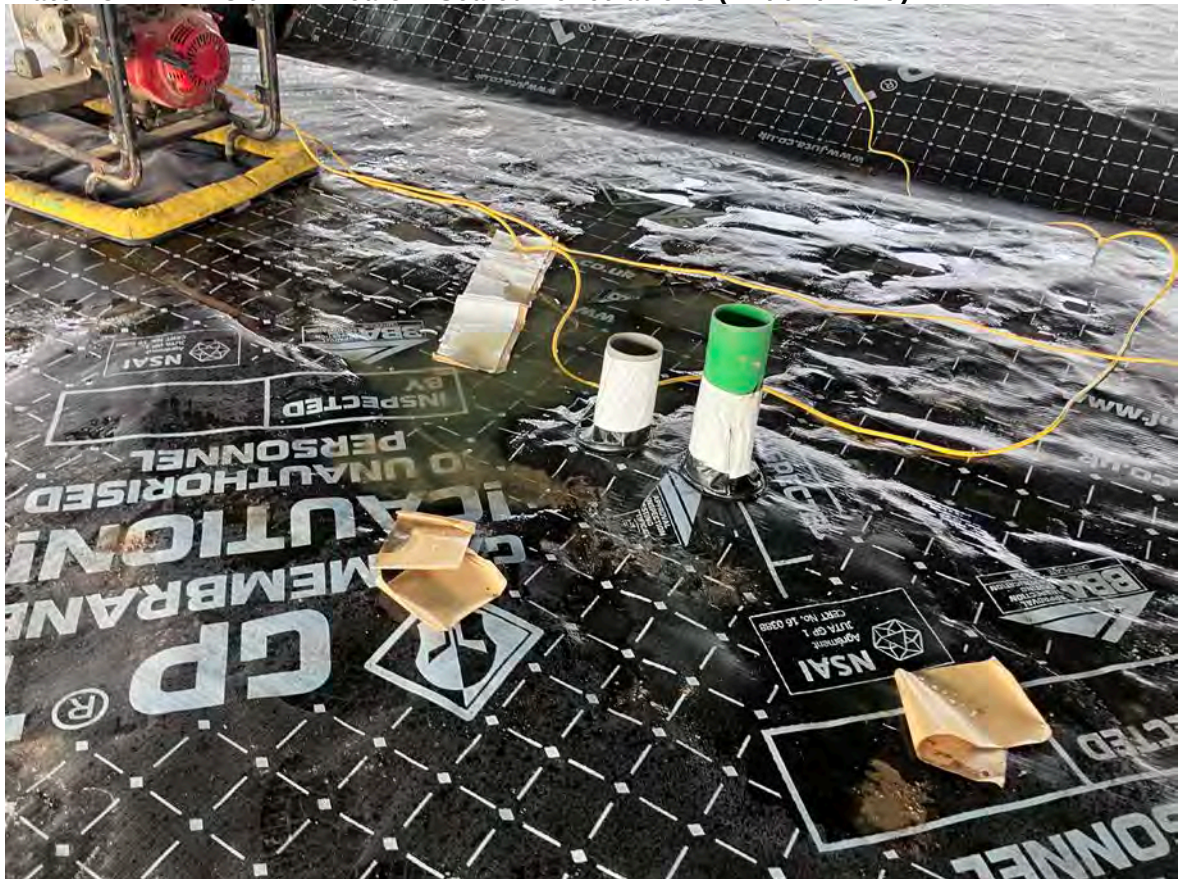


Plate 19 Visit 4 – Area 3 – Sealed Joint (22/01/2025)



Plate 20 Visit 5 – Exterior Perimeter Detail (07/02/2025)



Plate 21 **Visit 5 – Exterior Perimeter Detail (07/02/2025)**



Plate 22 **Visit 5 – Exterior Perimeter Detail (07/02/2025)**



Plate 23 **Visit 5 – Exterior Perimeter Detail (07/02/2025)**



Plate 24 **Visit 5 – Exterior Perimeter Detail (07/02/2025)**



Plate 25 Area 1 – Membrane (Photograph From Installer)



Plate 26 Area 1 – Membrane (Photograph From Installer Installer)



Plate 27 Area 1 –Sealed Penetration (Photograph From Installer)

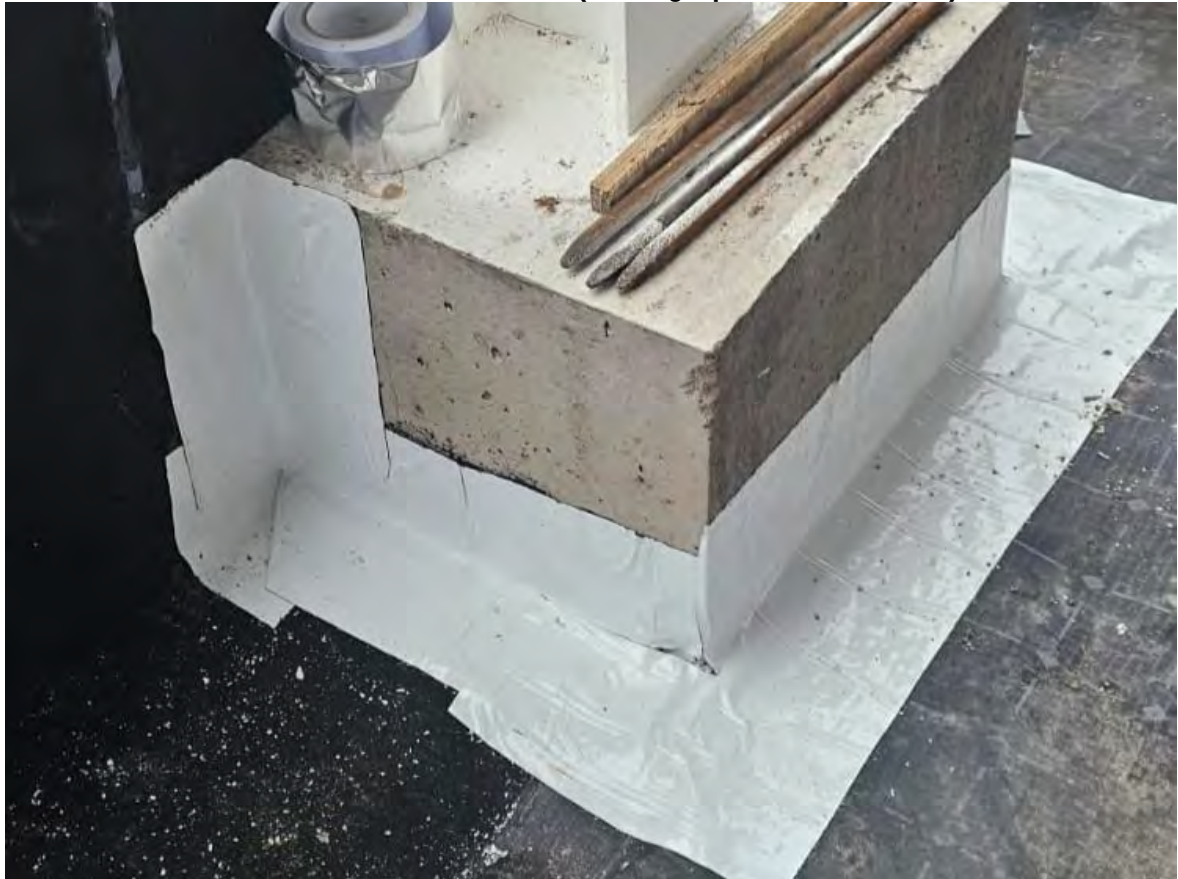


Plate 28 Area 1 – Sealed Penetration (Photograph From Installer)



Plate 29 Area 1 – Sealed Penetration (Photograph From Installer)



Plate 30 Area 2 – Corner Detailing (Photograph From Installer)



Plate 31 Area 2 – Sealed Penetration (Photograph From Installer)



Plate 32 Area 2 – Sealed Penetration (Photograph From Installer)



Plate 33 Area 3 – Perimeter Detailing (Photograph From Installer)



Plate 34 Area 3 – Perimeter and Sealed Penetration (Photograph From Installer)



Plate 35 Area 3 – Perimeter Detailing (Photograph From Installer)



Plate 36 Area 3 – Sealed Penetration (Photograph From Installer)



Plate 37 Exterior Perimeter Detailing (Photograph From Installer)



Plate 38 Exterior Perimeter Detailing (Photograph From Installer)



Plate 39 **Exterior Perimeter Detailing (Photograph From Installer)**



Plate 40 **Exterior Perimeter Detailing (Photograph From Installer)**

