

Technical design note

Project name	Welcomb Street		
Client	NS CW4 Ltd (Network Space)		
Design note title	Ground Gas Mitigation		
Document reference	22975-HYD-XX-XX-RP-GE-0001		
Author	Mark Griffiths BSc (Hons) MSc CGeol CSci FGS		
Approver	Adam Cheers BSc (Hons) CSci MEnvSc FGS		
Revision	P02		
Date	24 January 2025	Approved	✓

Welcomb Street Ground Gas Mitigation

1. Background

Hydrock Consultants Ltd (Hydrock, now Stantec, referred hereafter as Hydrock) has been commissioned by NS CW4 Ltd (Network Space) to review the ground gas monitoring and risk assessment completed by RPS and review the ground gas risk assessment produced by RPS to help inform the design of the ground gas protection measures for their proposed warehouse development.

The site is located on Welcomb Street in Openshaw, Manchester, centred at approximate National Grid reference 3879010, 397230. The existing site layout is shown in Figure 1.

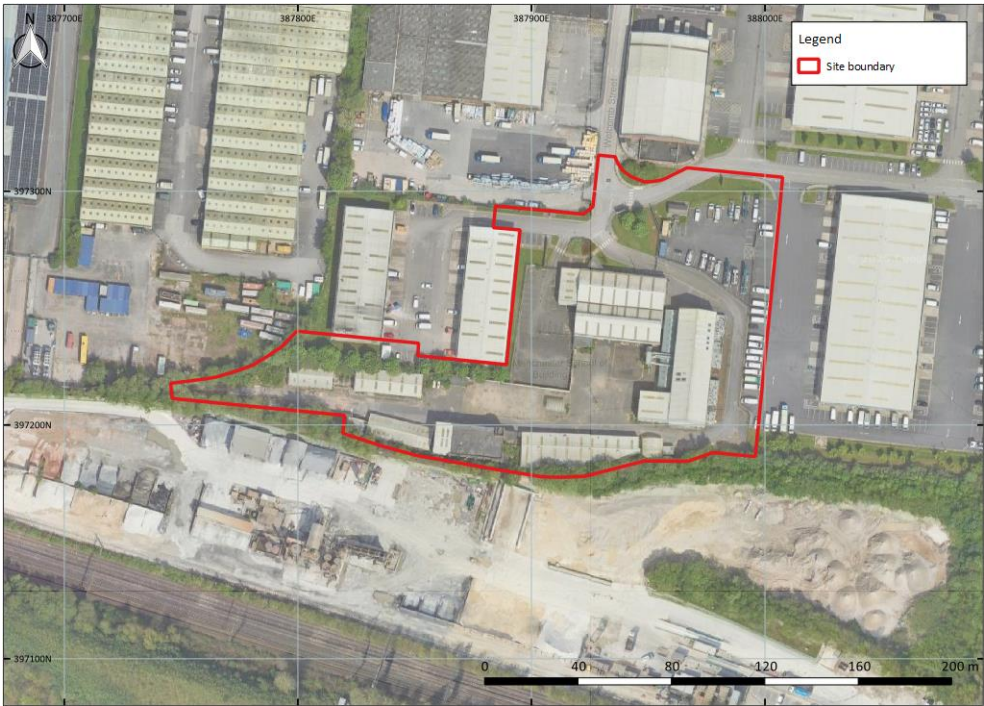


Figure 1: Existing site layout (Google © 2025)

2. Ground gas risk

2.1 Data sources

Hydrock has reviewed the following data sources in preparing this note:

- » RPS, May 2022, Phase 1 Preliminary Geo-Environmental and Geotechnical Risk Assessment Land off Welcomb St, Openshaw, Manchester M11 2NJ.
- » RPS, Aug 2022, Phase 2 Geo-Environmental and Geotechnical Site Investigation Report Land off Welcomb St, Openshaw, Manchester M11 2NJ.

2.2 Sources of ground gas

RPS identified possible sources of ground gas within and nearby to the site and these are summarised in Table 1. An assessment of the ground gas generating potential of these sources indicates the on site sources are likely to have a very low to low gas generation potential increasing to moderate for the offsite landfill to the south due to some uncertainty related to the type of material used to infill this land.

Table 1: Possible sources of ground gas at the site

Source	Description	Gas generation potential
Two small ponds in the east of the site (1848 to 1891)	Small diameter ponds and infilled prior to 1900s.	Very low
Made ground	Organic matter ranging between 2.3 and 92.9% (average 16.4%) was reported by the RPS ground investigation. However, it is considered the likely source of the organic matter is fragments of coal which were abundant in the material encountered. Analysis of PAH ratios indicates the poly aromatic hydrocarbons are representative of a coal source. Coal is not considered to represent degradable organic matter.	Low
Offsite landfills	An historic landfill is recorded 99m to the south of the site (on Preston Street). There are no records of the waste accepted at the landfill which was licenced between 1985 and 1994 according to the Groundsure report included within the RPS desk study. Historical mapping shows the area identified as landfill was infilled prior to 1982 with no evidence of levels being raised subsequently. It is considered unlikely that significant quantities of domestic waste or other degradable material was used to infill the land.	Low to moderate

2.3 Pathways

The following pathways may allow ground gases to enter the proposed buildings:

- » Flow from on site sources through granular deposits and into buildings, such as via utilities or via gaps within the floor slabs;
- » Flow from offsite landfills through granular deposits onto site and then into buildings, such as via utilities or via gaps within the floor slab.

Three falling head tests were undertaken as part of the RPS ground investigation. It was not possible to determine a permeability in two of the tests due to the negligible fall in water level, suggesting a very low permeability, and the other test recorded a permeability of 4.11×10^{-6} m/s. It is considered unlikely that ground gas from the offsite landfill would have a sufficiently permeable pathway to migrate onto site via advection.

2.4 Receptor

The receptor at the site is the proposed four industrial units to be constructed on site. These units will comprise warehouses with ancillary office, entrance and welfare. As such, the majority of the units would meet the criteria for a Type D building under BS8485:2015 with the exception of the ground floor entrance lobby and welfare areas are classified as Type C building. Offices are proposed to be at first floor level. The proposed layouts of the four units are shown on the following architects drawings, which are appended to this report:

- » 12481-AEW-B1-ZZ-DR-A-2100-S2-P02-Unit 1 GA Floor Plans.
- » 12481-AEW-B2-ZZ-DR-A-2200-S2-P02-Unit 2 GA Floor Plans.
- » 12481-AEW-B3-ZZ-DR-A-2300-S2-P02-Unit 3 GA Floor Plans.
- » 12481-AEW-B3-ZZ-DR-A-2300-S2-P02-Unit 3 GA Floor Plans.

2.5 Ground gas monitoring

RPS undertook six rounds of ground gas monitoring over a 6 week period, which given the low sensitivity of the proposed industrial development and low to moderate gas generating potential of the identified sources, is considered appropriate.

Monitoring rounds 1 and 2, and 5 and 6 were undertaken during generally falling pressure conditions and rounds 3 and 4 under generally rising pressure conditions – refer to Figure 2.

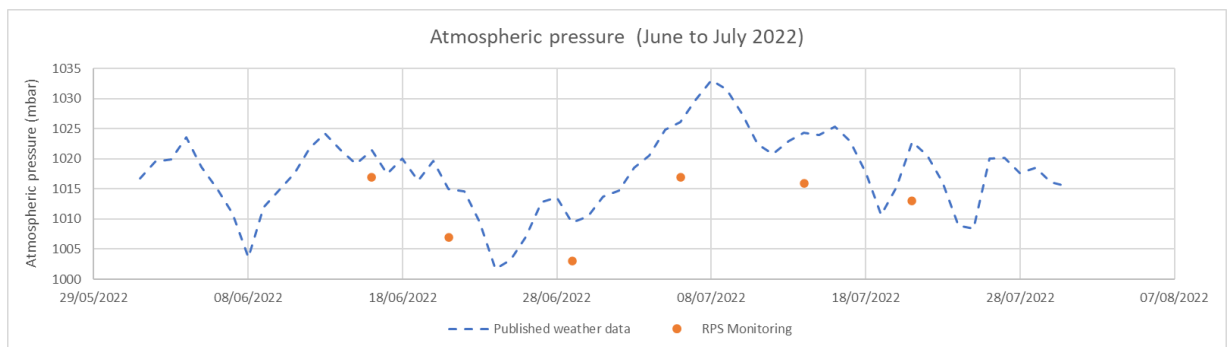


Figure 2: Atmospheric pressure trends during the RPS ground gas monitoring period

The RPS monitoring data is presented within their report and in summary:

- » Methane was not recorded at detectable concentrations in any monitoring well, on any visit.
- » Carbon dioxide was recorded at a maximum concentration of 11.1% v/v within monitoring well WSO2a screened within the Made Ground on 21st July 2022 and consistently exceed 5% in this location.
- » In all other wells carbon dioxide was <5% v/v except in CP02 on 6th July 2022 (6.8% v/v) and CP03 on 29th June 2022 (5.7% v/v), both of which are installed within Glacial Till/ Sherwood Sandstone Group with a very low gas generating potential.
- » The maximum recorded peak ground gas flow rate was 0.1L/hr, recorded at all monitoring wells.
- » The lowest recorded oxygen concentration was 3.5% v/v within monitoring well CP03 on 29th June 2022, within the sandstone.
- » The maximum borehole hazardous gas flow rate (Qhg) for methane is 0.0001 L/hr and for carbon dioxide is 0.0111 L/hr.

RPS concluded the site is within the gas screening value range indicative of Characteristic Situation 1 (CS-1) but with consideration needed within the area of WSO2a to increase the classification to CS-2 due to consistent carbon dioxide >5%.

3. Proposed ground gas mitigation

The gas monitoring results to date has determined the Characteristic Situation for the site to be CS-2 as a conservative approach.

In accordance with BS 8485:2015 the ground floor entrance lobbies, stairs and welfare areas (Type C Building) require a minimum gas protection score of 2.5 points, the main warehouse (Type D Building) requires a minimum gas protection score of 1.5 points. The offices at first floor level do not require specific protection to mitigate the risk posed by ground gases.

The proposed sub-structure detail is presented in the following Hydrock drawings:

- » 22975-HYD-B1-ZZ-D-S-2101 (Unit 1)
- » 22975-HYD-B2-ZZ-D-S-2201 (Unit 2)
- » 22975-HYD-B3-ZZ-D-S-2301 (Unit 3)
- » 22975-HYD-B4-ZZ-D-S-2401 (Unit 4).

The proposed gas protection measures to achieve the required gas protection score within all areas of the units::

- » Cast in situ ground floor slab (with nominal reinforcement) – 0.5 points
- » Gas resistant membrane meeting all the criteria of Table 7 BS8484:2015+A:2019 – 2.0 points.

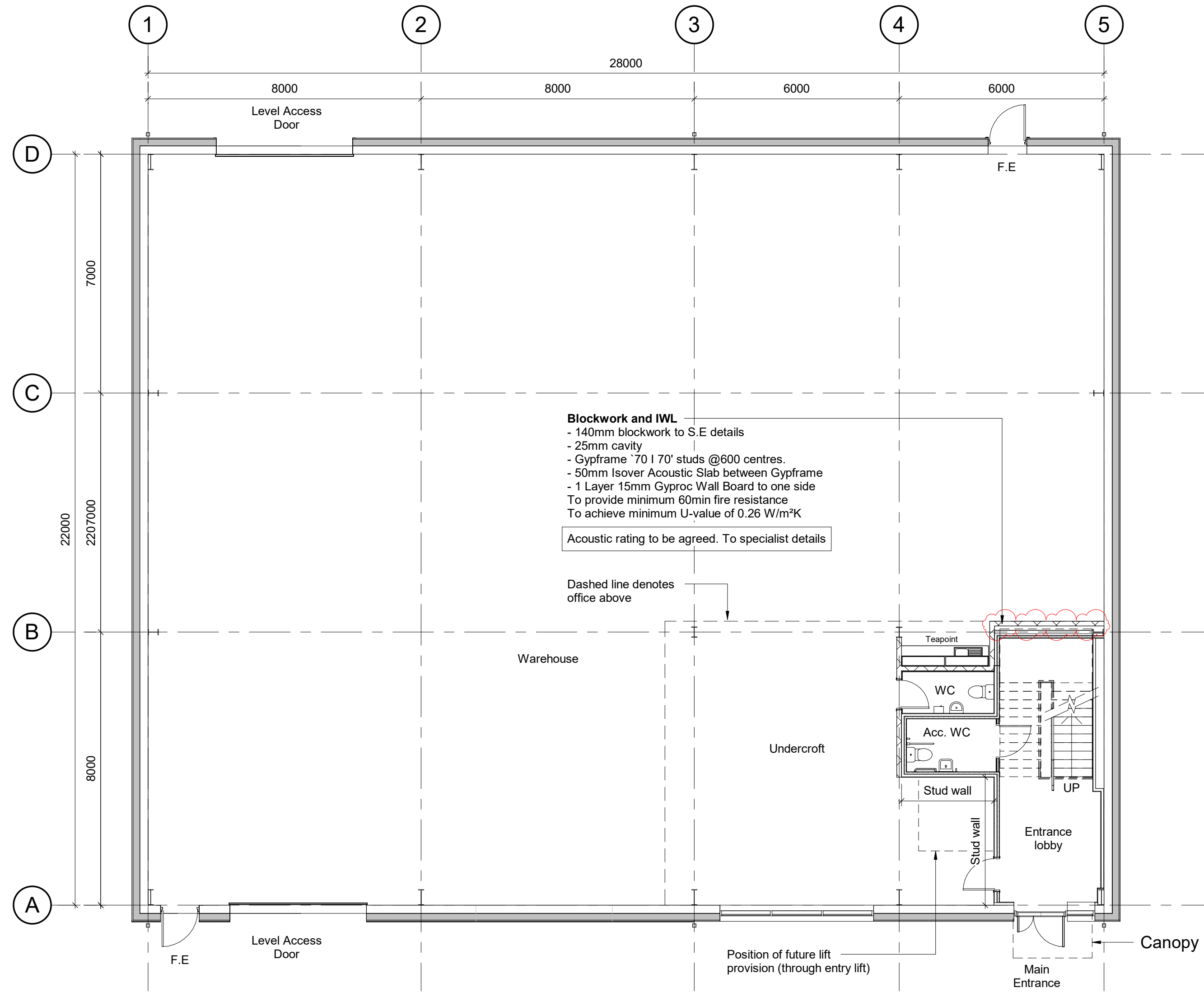
If installed correctly and accordance with relevant guidance and the manufacturer's instructions, these measures provide a gas protection score of 2.5 points and would achieve the necessary level of protection.

4. Conclusion

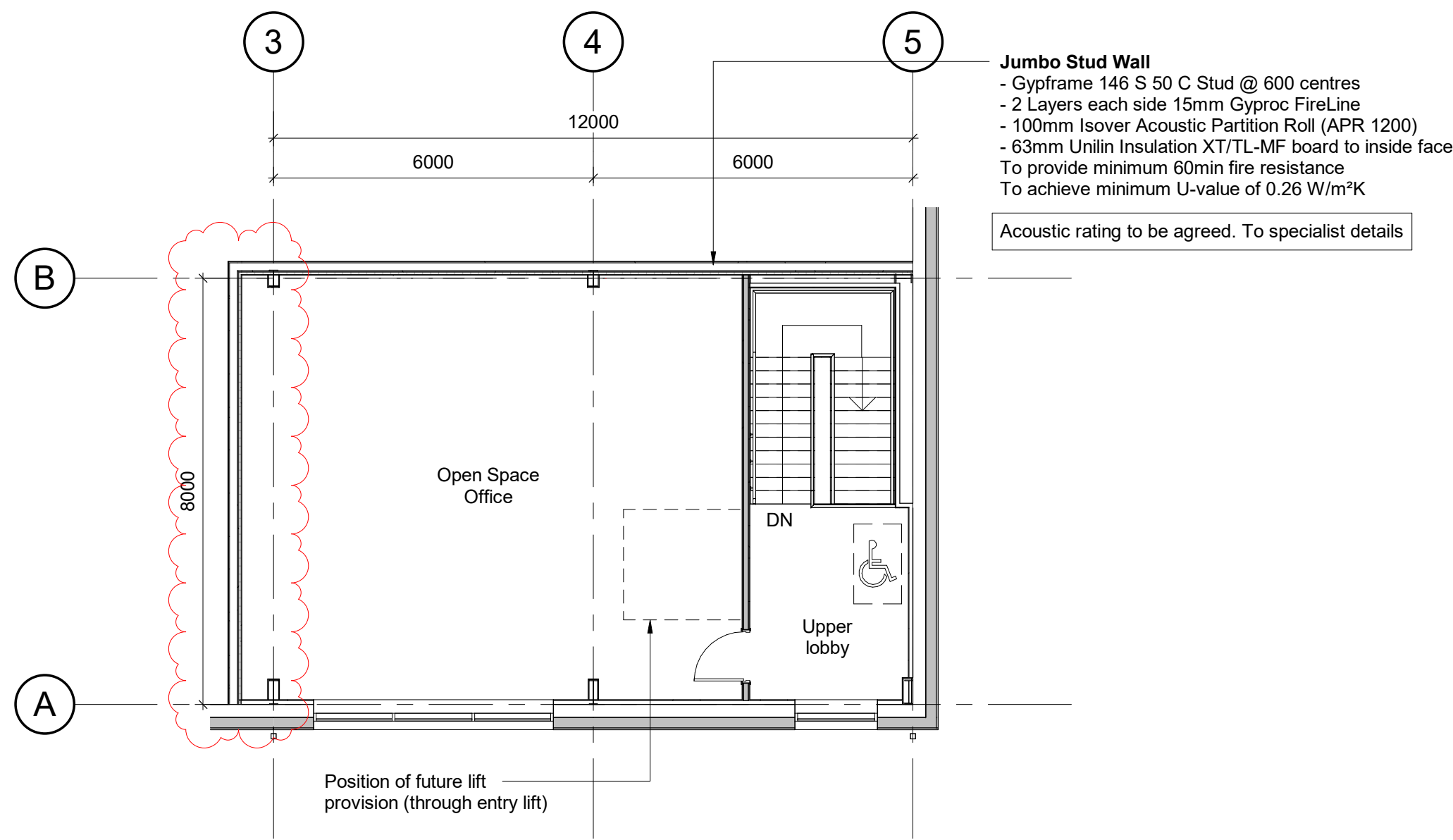
Given the desk study has not identified significant sources of ground gas with high gas generating potential on site, and this has been confirmed via ground gas monitoring at the site. It is considered that the risk posed by ground gases is low. RPS characterised the site as CS-2 based on slightly elevated carbon dioxide measurements, however no flow was recorded, which is considered to be conservative. As such, ground gas protection to meet the requirements set out in BS8485:2015+A:2019 have been proposed. Due to the low gas generating potential identified at the site and the low sensitivity of the proposed warehouse units, no further gas monitoring is recommended prior to construction.

Validation of the gas membrane installation in accordance with Ciria C735 is recommended to ensure that the performance of the membrane meets the requirements set out in Table 7 of BS8485:2015+A:2019, in particular the jointing of membranes and where utilities penetrate the floor slabs.

Drawings



Ground Floor
Scale @ 1 : 100



First Floor
Scale @ 1 : 100

NOTE: All TENDER drawings subject to full Structural, Mechanical, Electrical, Plumbing and Civils Coordination.

NOTES

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

This drawing contains the following model files: -

12481-AEW-XX-XX-M3-A-0013

CDM 2015

Client notified of duties: 07/04/21

Principal Designer: Client

Unless noted below, all known hazards have been highlighted on the drawing:

U-Values

Building Fabric Element	U-Value (W/m2K)	G-Value	Light Transmittance
Ground Floor Slab (with perimeter slab edge upstand insulation)	0.15		
External Walls	0.18		
Roof	0.15		
Rooflights (coverage approx. 10%)	1.20	0.38	0.36
Internal Separation Walls (between office & warehouse)	0.26		
Undercroft Soffit (to warehouse)	0.18		
Double Glazed Units (doors & windows)	1.30	0.29	0.6
Personnel Doors	1.40		
Vehicle Access Doors	1.30		

Air Permeability : 3.0m³/(h.m²)@50 Pa

P02	06/12/24	Blockwork wall slightly moved at ground floor lvl g1-B. Jumbo studwall to g1-3 slightly adjusted & 1 no. rooflight moved to suit.	WS	SG
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P01	08/11/24	Initial Tender Issue	WS	SG
Rev	Date	Description	Drawn by	Checked By

Status	Purpose of Issue
S2	For Information

drawing stage Stage 4

client

NSJV Ltd

project

Welcomb Street

drawing title

Unit 1 GA Floor Plans

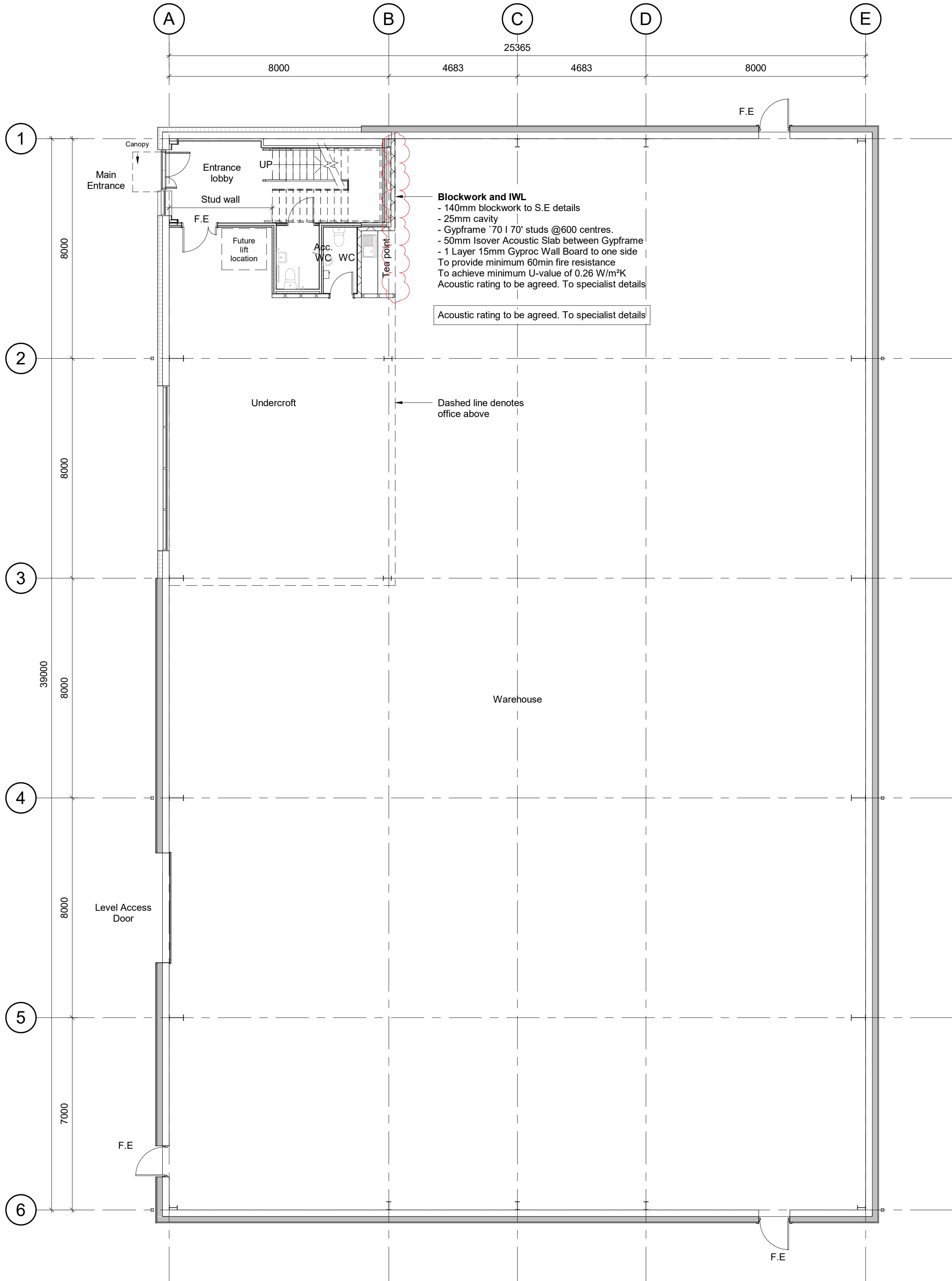
date	Nov 2024	drawn	WS
scale @ A1	1 : 100	checked	SG

Rev P02

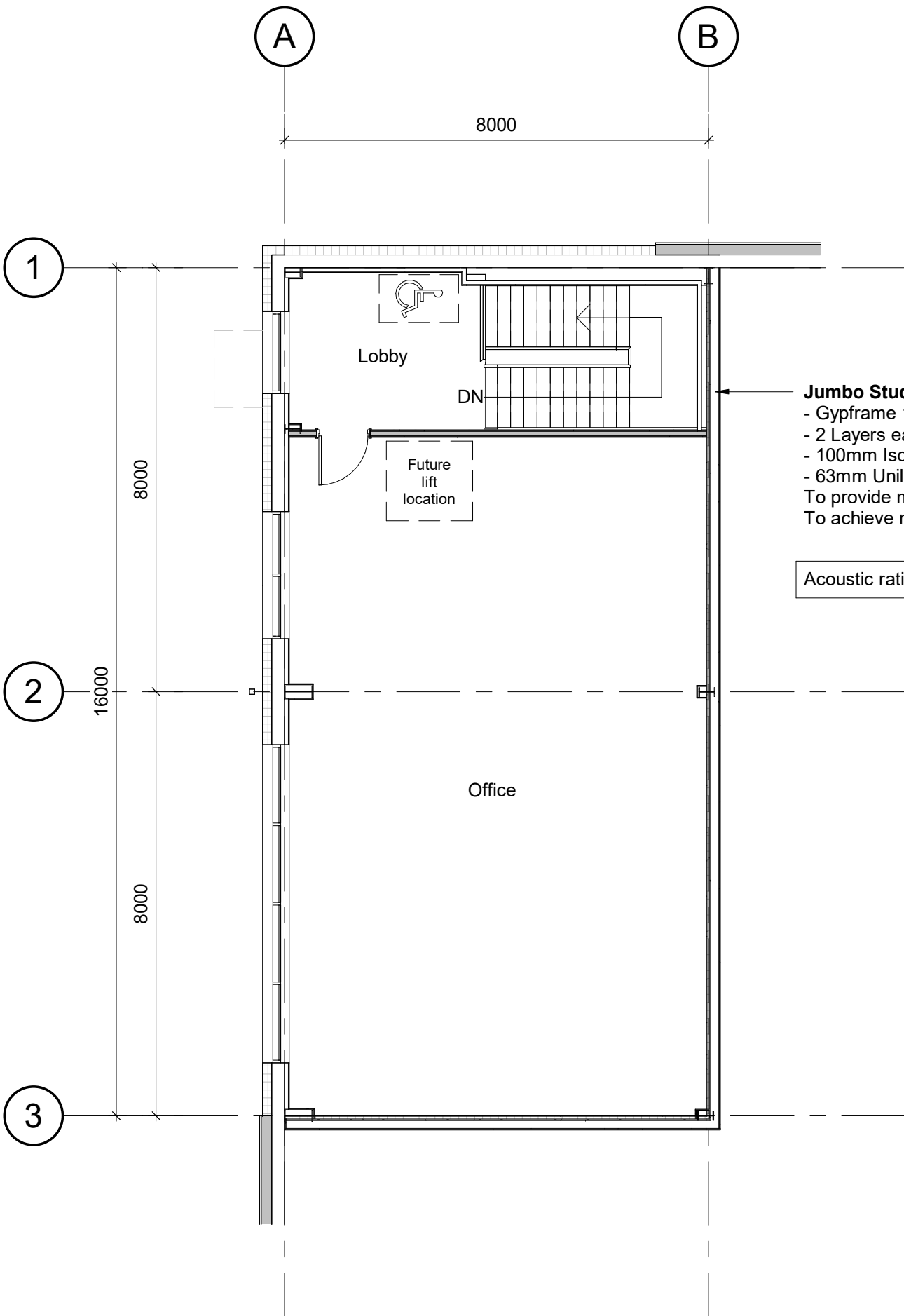
12481-AEW-B1-ZZ-DR-A-2100

aew architects
0161 214 4370
www.aewarchitects.com

aew



Ground Floor
Scale @ 1 : 100



First Floor
Scale @ 1 : 100

NOTE: All TENDER drawings subject to full Structural, Mechanical, Electrical, Plumbing and Civils Coordination.

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CDM 2015

Client notified of duties: 07/04/21

Principal Designer: Client

Unless noted below, all known hazards have been highlighted on the drawing:

U-Values

Building Fabric Element	U-Value (W/m ² K)	G-Value	Light Transmittance
Ground Floor Slab (with perimeter slab edge upstand insulation)	0.15		
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Roof	0.15		
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Undercroft Soffit (to warehouse)	0.18		
Double Glazed Units (doors & windows)	1.30	0.29	0.6
Personnel Doors	1.40		
Vehicle Access Doors	1.30		

Air Permeability : 3.0m³/(h.m²)@50 Pa

P02	06/12/24	Blockwork wall slightly moved at ground floor lvl di-B	WS	SG
P01	08/11/24	Initial Tender Issue	WS	SG
Rev	Date	Description	Drawn by	Checked By

Status: S2 Purpose of Issue: For Information

drawing stage: Stage 4

client:

NSJV Ltd

project:

Welcomb Street

drawing title:

Unit 2 GA Floor Plans

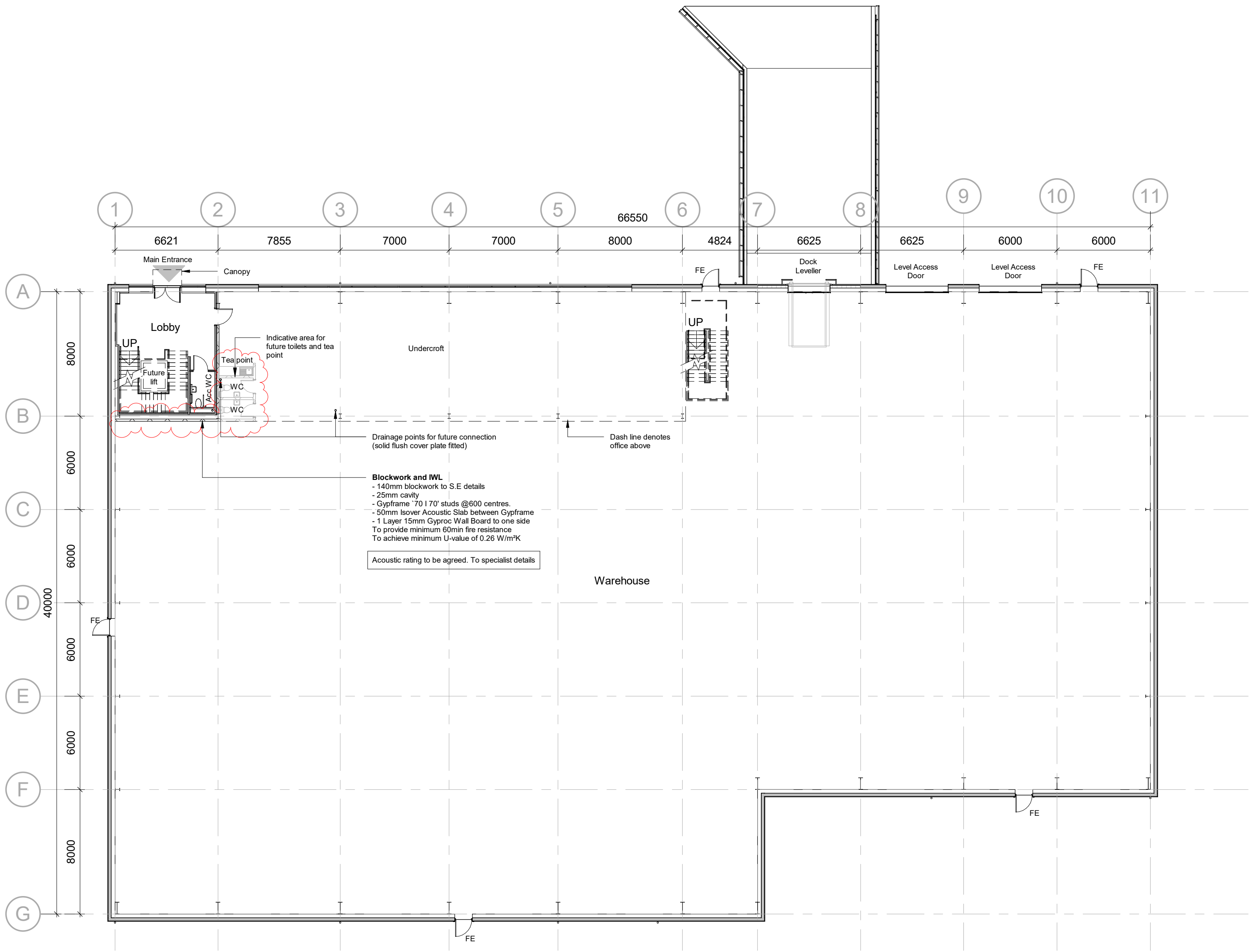
date: Nov 2024 drawn: WS
scale @ A1: 1 : 100 checked: SG

Rev P02

12481-AEW-B2-ZZ-DR-A-2200

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Ground Floor
Scale @ 1 : 200

U-Values			
Building Fabric Element	U-Value (W/m2K)	G-Value	Light Transmittance
Ground Floor Slab (with perimeter slab edge upstand insulation)	0.15		
External Walls	0.18		
Roof	0.15		
Rooflights (coverage approx. 10%)	1.20	0.38	0.36
Internal Separation Walls (between office & warehouse)	0.26		
Undercroft Soffit (to warehouse)	0.18		
Double Glazed Units (doors & windows)	1.30	0.29	0.6
Personnel Doors	1.40		
Vehicle Access Doors	1.30		

Air Permeability : 3.0m³/(h.m²)@50 Pa

NOTE: All TENDER drawings subject to full Structural, Mechanical, Electrical, Plumbing and Civils Coordination.

NOTES

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This drawing contains the following model files: -

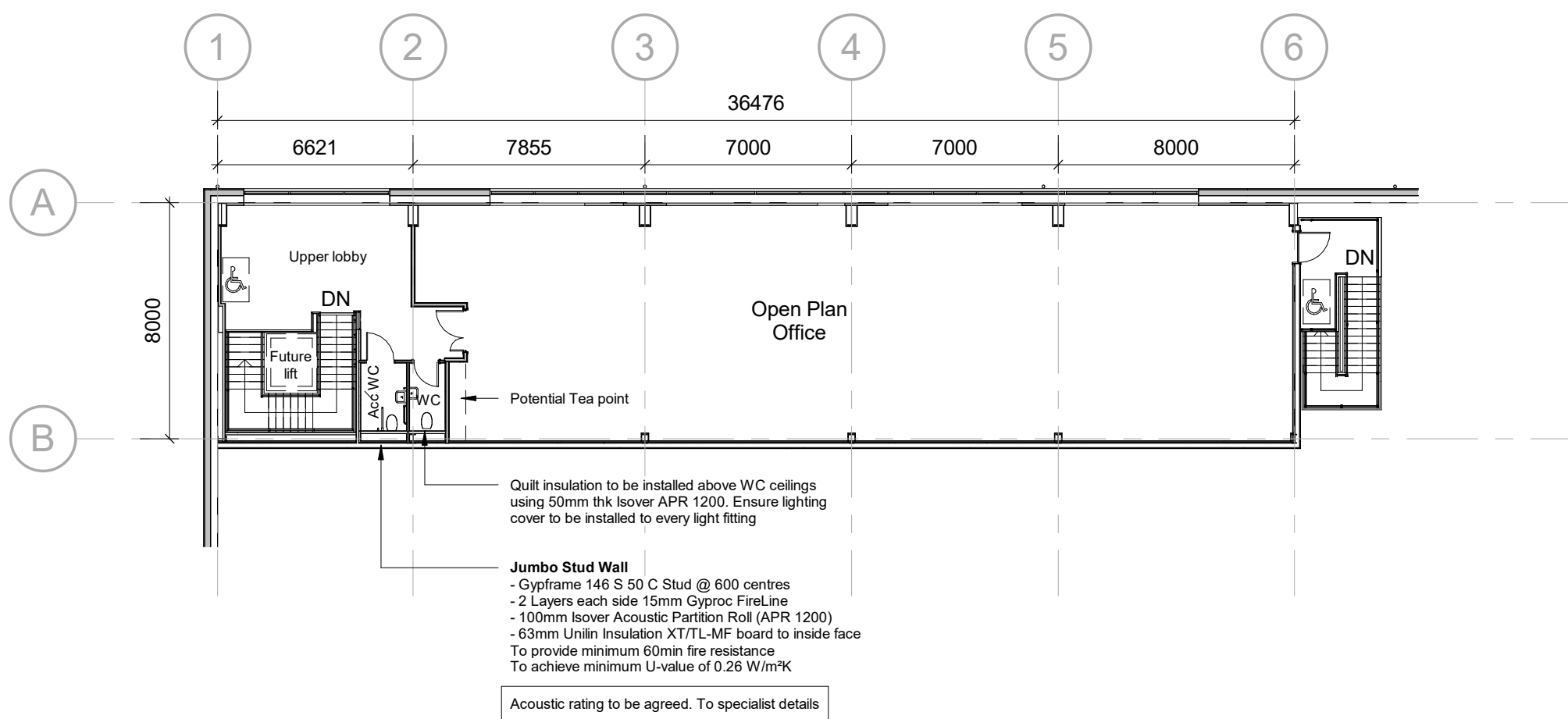
12481-AEW-XX-XX-M3-A-0011

CDM 2015

Client notified of duties: **07/04/21**

Principal Designer: **Client**

Unless noted below, all known hazards have been highlighted on the drawing:



First Floor
Scale @ 1 : 200

P02	06/12/24	Blockwork wall slightly moved at ground floor lvl g-B, future WCs & teapoints adjusted to suit. Rooflights slightly adjusted.	WS	SG
Rev	Date	Description	Drawn by	Checked By
P01	08/11/24	Initial Tender Issue		

Status	Purpose of Issue
S2	For Information

drawing stage **Stage 4**

client

NSJV Ltd

project

Welcomb Street

drawing title

Unit 3 GA Floor Plans

date Nov 2024 drawn WS
scale @ A1 1 : 200 checked SG

Rev P02

Dwg No 12481-AEW-B3-ZZ-DR-A-2300

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U-Values			
Building Fabric Element	U-Value (W/m²K)	G-Value	Light Transmittance
Ground Floor Slab (with perimeter slab edge upstand insulation)	0.15		
External Walls	0.18		
Roof	0.15		
Rooflights (coverage approx. 10%)	1.20	0.38	0.36
Internal Separation Walls (between office & warehouse)	0.26		
Undercroft Soffit (to warehouse)	0.18		
Double Glazed Units (doors & windows)	1.30	0.29	0.6
Personnel Doors	1.40		
Vehicle Access Doors	1.30		

Air Permeability : 3.0m³/(h.m²)@50 Pa

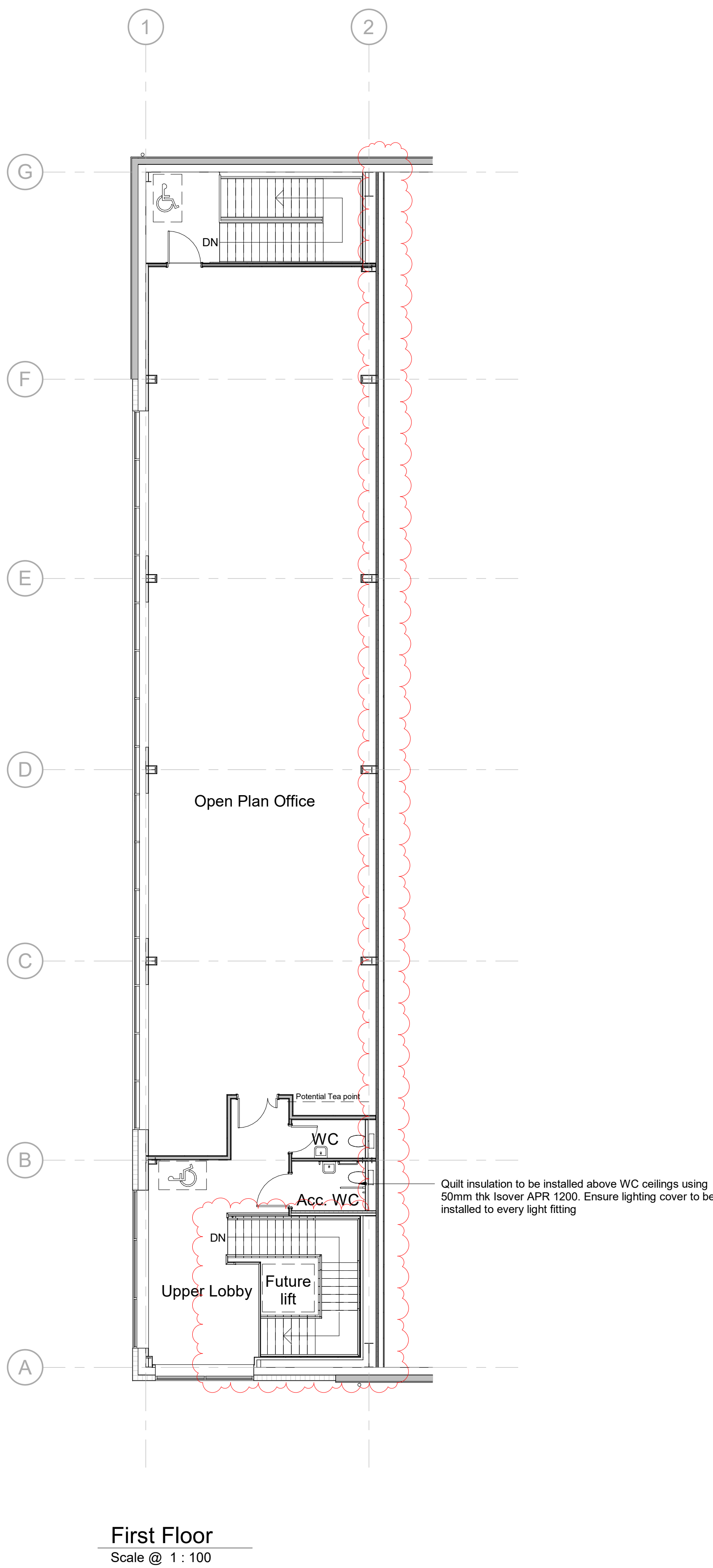
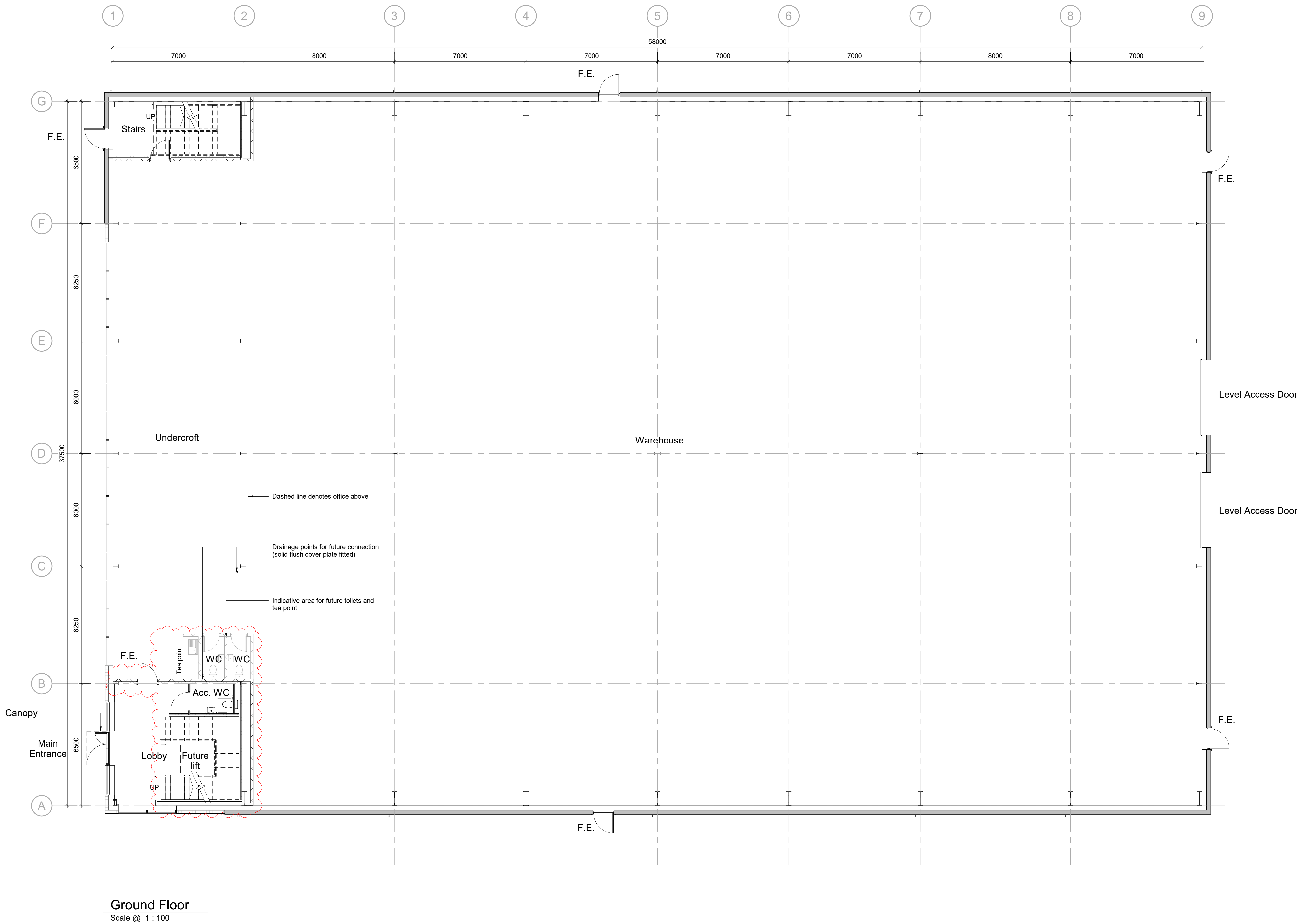
NOTE: All TENDER drawings subject to full Structural, Mechanical, Electrical, Plumbing and Civils Coordination.

- NOTES
- All dimensions and levels are to be checked on site.
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- 12481-AEW-XX-XX-MS-A-0010

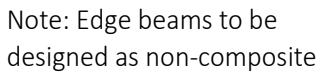
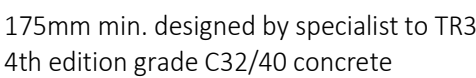
CDM 2015

Client notified of duties: 07/04/21
Principal Designer: Client

Unless noted below, all known hazards have been highlighted on the drawing.



P02	04/12/24	Stairs flipped further to clients request. Stair core slightly adjusted. Staircase and lighting moved to ground floor to g2. Future WC's & reports adjusted to suit. Stairs flipped along g2 slightly adjusted.	SGWS	DRS
P01	08/11/24	Initial Tender Issue	WS	SG
Rev	Date	Description	Drawn By	Checked By
S2		Purpose of Issue For Information		
drawing stage Stage 4				
client NSJV Ltd				
project Welcomb Street				
drawing title Unit 4 GA Floor Plans				
date Nov 2024 drawn WS				
scale @ A0 1 : 100 checked SG				



↑ Denotes span direction of profile steel decking

These measures provide a gas protection score of **2.5 points**

Revisions				
i1	First Issue	17.01.2025	SB	PC VC
v.	Revision Notes	Date	Drawn By	Checked Approved

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IENT

NSJV Ltd

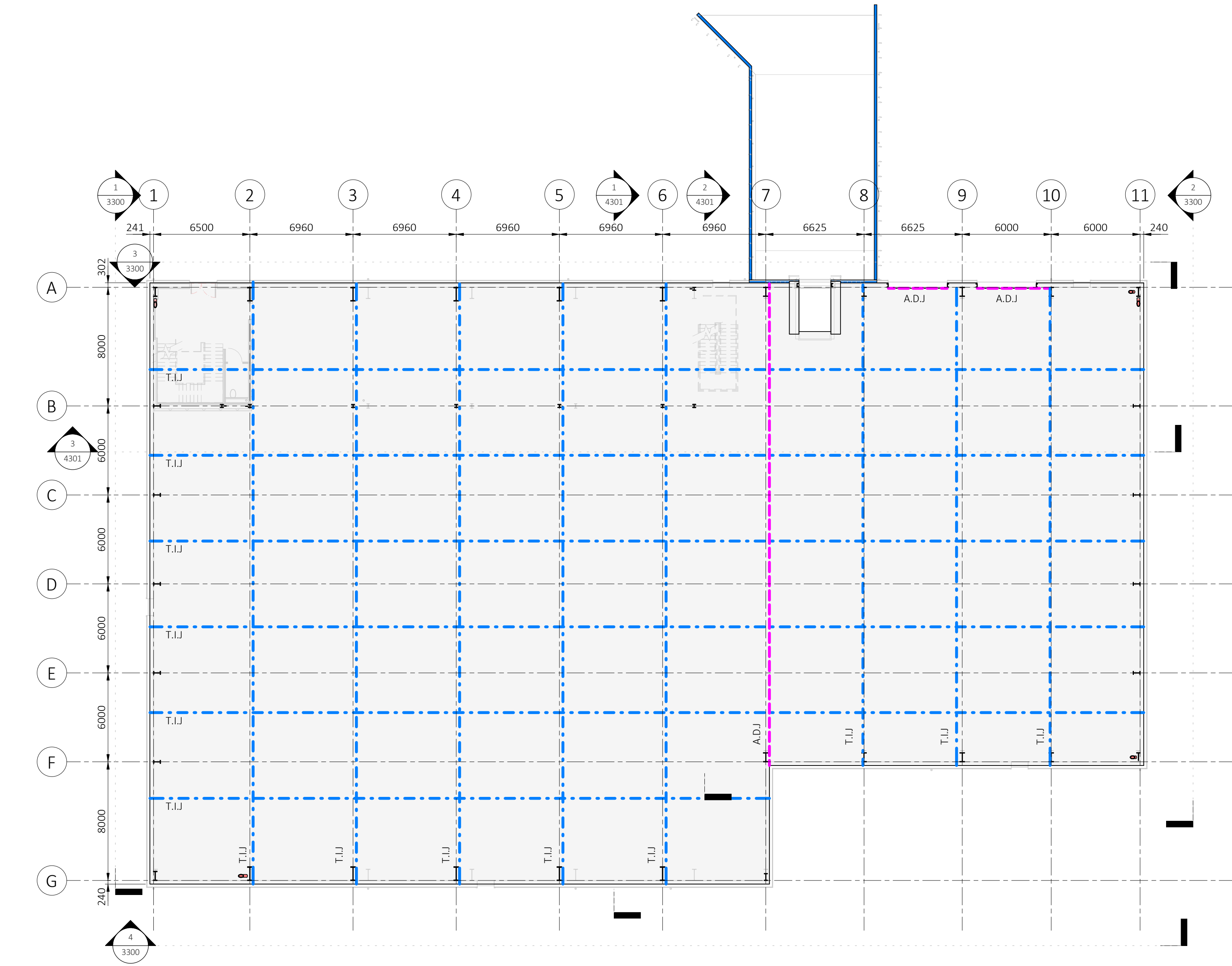
PROJECT

Melcomb Street

TLE

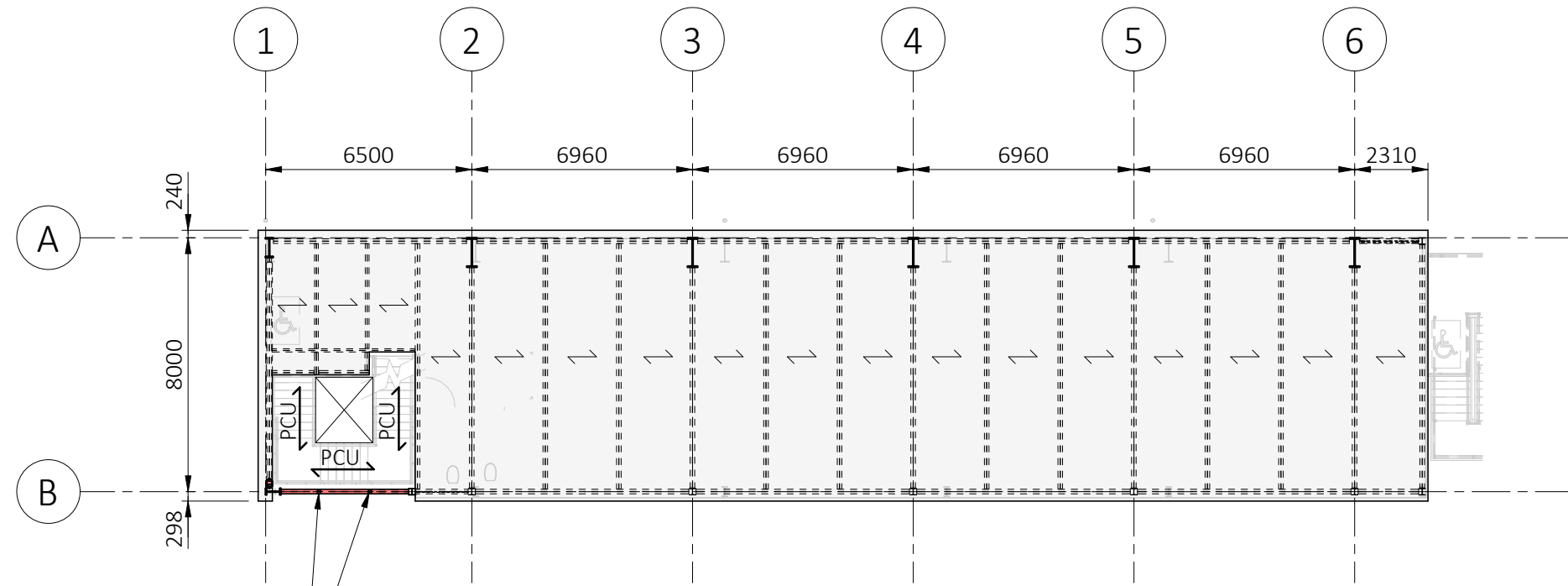
Unit 2 Ground Floor and Mezzanine General Arrangement & Details

HYDROCK PROJECT NO. 22975	SCALE @ A1 As indicated
STATUS DESCRIPTION SUITABLE FOR STAGE APPROVAL	STATUS S4
DRAWING NO. 22975-HYD-B2-ZZ-D-S-2201	REVISION P01



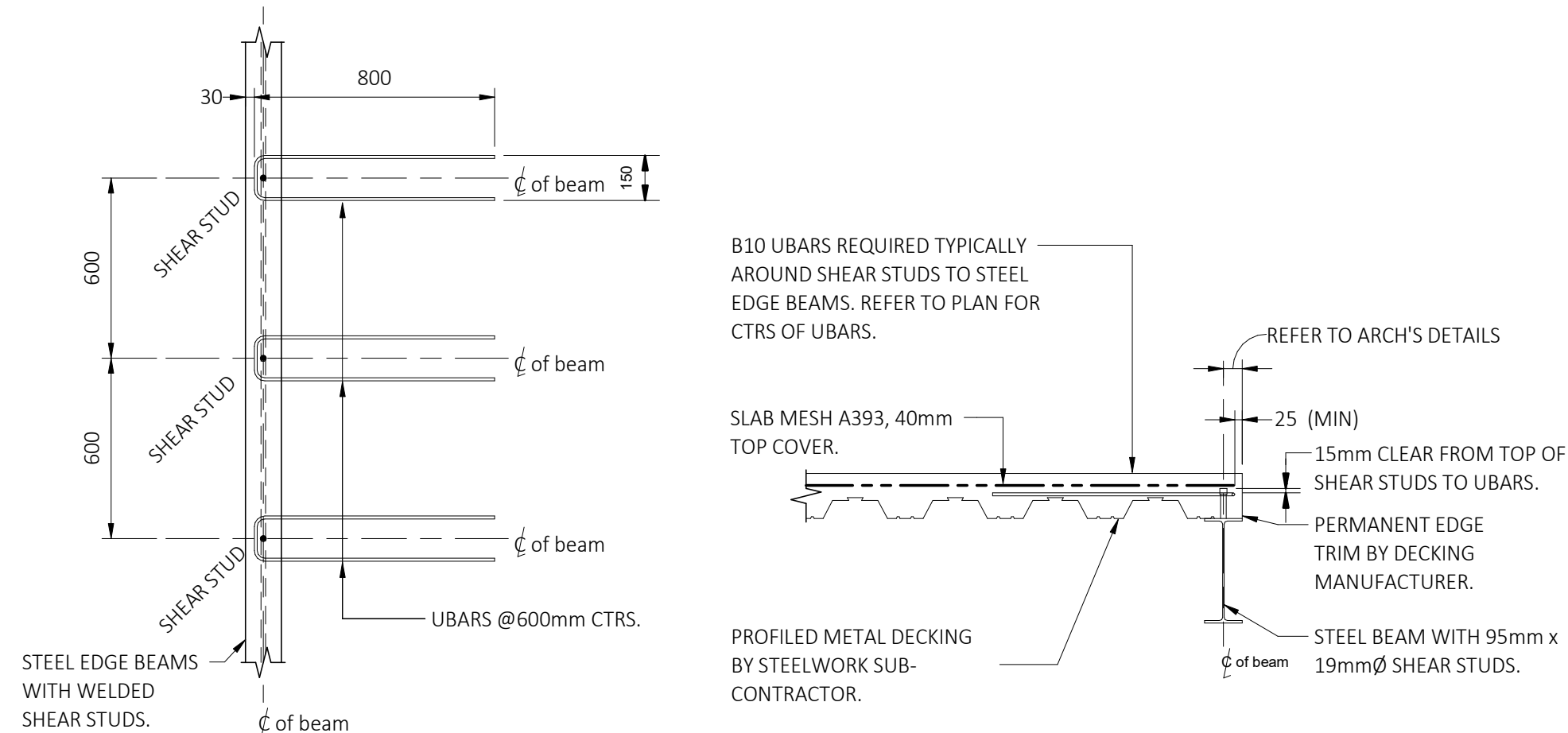
1- Ground Floor Slab Plan
1 : 200

175mm min. designed by specialist to TR34
4th edition grade C32/40 concrete



2- Mezzanine Slab Plan
1 : 200

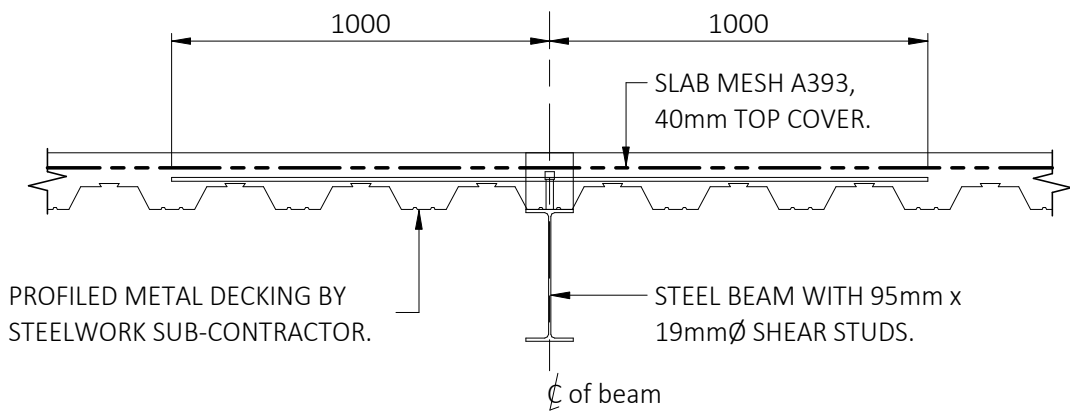
Note: Edge beams to be
designed as non-composite



Plan on Edge Beam

Typical Section Through Edge Beams

NOTE:
THIS DETAIL ALSO APPLIES AROUND VOIDS IN SLAB.



Typical Section Through Transverse
Reinforcement

MEZZANINE SLAB SPECIFICATION

150mm thick grade C32/40 concrete slab to BS EN 206-1 and BS 8500 reinforced with 1 layer A393 fabric with 40mm top cover (300mm min laps) on profiled metal decking by steelwork sub-contractor.

↗ Denotes span direction of profile steel decking

GROUND GAS PROTECTION

The gas monitoring results to date has determined the Characteristic Situation for the site to be CS-2.

In accordance with BS 8485 the Offices / Entrance (Type C Building) require a minimum gas protection score of 2.5 points, the main warehouse (Type D Building) requires a minimum gas protection score of 1.5 points.

Therefore the proposals to achieve the required gas protection score are:

- 1.Cast in situ ground floor slab (with nominal reinforcement) – **0.5 points**
- 2.Gas resistant membrane meeting all the criteria of Table 7 BS8485:2015+A:2019 – **2.0 points**

These measures provide a gas protection score of **2.5 points**

GROUND FLOOR SLAB

Ground improvement works are to be undertaken to achieve a bearing capacity of 58 kPa at slab formation level.

The design is based on using vibro-stone columns to achieve the required bearing capacity.

Concrete to ground floor slab to have minimum strength of C32/40

KEY PLAN

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. This drawing is copyright.

Key:

- PCU Indicates span of precast concrete stair units.
- T.I.J. Indicates location of Tied Induced Joint
- A.D.J. Indicates location of Armoured Day Joint

REVISIONS

Rev.	Revision Notes	Date	Drawn By	Checked	Approved
P01	First Issue	17.01.2025	SB	PC	VC



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CLIENT

NSJV Ltd

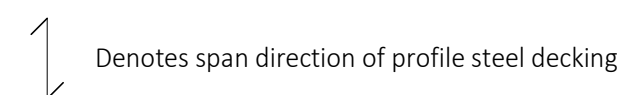
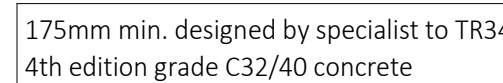
PROJECT

Welcomb Street

TITLE

Unit 3 Ground Floor and Mezzanine General
Arrangement & Details

HYDROCK PROJECT NO. 22975	SCALE @ A1 As indicated
STATUS DESCRIPTION SUITABLE FOR STAGE APPROVAL	STATUS S4
DRAWING NO. 22975-HYD-B3-ZZ-D-S-2301	REVISION P01



Concrete to ground floor slab to have minimum strength of C32/40

Key:

	Indicates span of precast concrete stair units.
	Indicates location of Tied Induced Joint
	Indicates location of Armoured Day Joint

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DRAWING NO.	REVISION
22975-HYD-B4-ZZ-D-S-2401	P01