

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Old Granada Studios, Manchester

Planning condition 17 discharge report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds, Bristol

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Version	Date	Comments	Author	Reviewer
A	19 Dec 25		JP	JA

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Summary

Sandy Brown has been appointed by Manchester Quays Developments (OGS) Ltd to carry out acoustic verification measurements to demonstrate compliance with planning condition 17 under 138820/JO/2023. This report sets out relevant information to discharge the condition.

This assessment is based on both the noise data received and measurements carried out on site. A 3D environmental noise model of the site has been produced using the computational acoustic modelling package CadnaA (version 2026). The software carries out calculations using a ray tracing technique, and considers the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

Sample noise measurements were carried out on site on 9 December and 16 December to verify the plant noise levels of the installed and operational plant and update the assessment. The predicted plant noise egress assessment indicates that at the commercial receptors located west and south of the site, plant noise egress criteria is likely to be exceeded. It is noted that the kitchen extract fan unit is the dominant source at these locations.

The day plant noise criteria is achieved at the Bauhaus apartments located east of the site, however the night criteria is predicted to be exceeded based on the measurements.

It is recommended that the following mitigation measures are implemented to meet plant noise egress criteria at nearby noise sensitive receptors:

- Level 10 rooftop ODU units (ODU/07/02, ODU/07/03, ODU/08/01, ODU/09/01) are switched off or alternatively operated at a set back duty during the night (2300 to 0700). If a set back duty is preferred, noise data should be provided for review at this duty or further measurements could be undertaken.
- Additional atmosphere side attenuation should be provided to the kitchen extract fan on level 2 and it should be switched off at night (2300 to 0700). The recommended minimum insertion losses for the attenuator are provided in Table 9.

On the basis that the recommended additional mitigation measures are implemented, planning condition 17 can be discharged.

Contents

1	Introduction.....	5
2	Planning condition 17	5
3	Plant noise egress limits.....	6
4	The site and its surroundings	7
5	Plant equipment	8
7	3D noise modelling	18
8	Recommended mitigation measures.....	20
	Appendix A	21
	Equipment details	21
	Appendix B	22
	Measurement location mark-ups	23

1 Introduction

Sandy Brown has been appointed by Manchester Quays Developments (OGS) Ltd to carry out acoustic verification measurements to demonstrate compliance with planning condition 17 under 138820/JO/2023. This report sets out relevant information to discharge the planning condition.

Noise measurements were carried out on site on 9 December and 16 December to measure the noise levels from the installed and operational plant. The measurement results have been used as the basis of an updated 3D noise model to predict the levels outside the nearby receptors for comparison to the criteria set by Manchester City Council.

2 Planning condition 17

Planning Condition 17 is split into two parts, a) and b), which states the following in regard to externally mounted plant:

- a. *“Externally mounted ancillary plant, equipment and servicing for each phase (as identified on ZONE PLAN 180146-3DR-Z0-XX-DR-D112 REV A) other than Zone 6 and the hotel gymnasium, shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location. The scheme for each phase (as identified on ZONE PLAN 180146-3DR-Z0-XX-DR-D112 REV A) other than Zone 6 and the hotel gymnasium, shall be submitted to and approved in writing by the City Council as local planning authority prior to first occupation in order to secure a reduction in the level of noise emanating from the site.”*
- b. *Prior to first occupation of each phase (as identified on ZONE PLAN 180146-3DR-Z0-XX-DR-D112 REV A) other than Zone 6 and the hotel gymnasium, a verification report to validate that the work undertaken throughout that phase of the development conforms to the recommendations and requirements in the scheme approved under point a. above, shall be submitted to and approved in writing by the City Council as local planning authority. The verification report shall include post completion testing to confirm that acceptable criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria and timescales for the implementation of those measures.”*

3 Plant noise egress limits

3.1 Background noise levels

An environmental noise survey has previously been undertaken at the site to determine the existing noise levels in the vicinity of the site and nearby noise sensitive premises. Full details of this survey can be found in Sandy Brown report 15037-R03-E *Acoustic planning report* dated 5 October 2020.

The representative background noise levels measured applicable to nearest noise sensitive receptors are set out in Table 1

Table 1 Typical background noise levels at the nearest noise sensitive premises

Location	Typical background noise level, L_{A90} (dB)	
	Day (07:00-23:00)	Night (23:00 – 07:00)
Noise sensitive receptors located to west of the site (Manchester Goods Yard)	51	50
Noise sensitive receptors located to north and east of the site (Bauhaus apartments and Globe and Simpson)	51	45

3.2 Normally operating plant items

Plant noise egress limits at 1 m from the nearest noise sensitive premises for normally operating plant are provided in Table 2. These limits are in line with the requirements of Planning Condition 17 based on the background noise levels measured at the site..

Table 2 Plant noise egress limits for OGS development

Location	Plant noise egress limit at 1 m from window of nearby noise sensitive receptor, L_{Aeq} (dB)	
	Day (07:00 – 23:00)	Night (23:00 – 07:00)
Noise sensitive receptors located to west of the site (Manchester Goods Yard)	46	45
Noise sensitive receptors located to north and east of the site (Bauhaus apartments and Globe and Simpson)	46	40

4 The site and its surroundings

The proposed development is outlined in yellow in Figure 1.

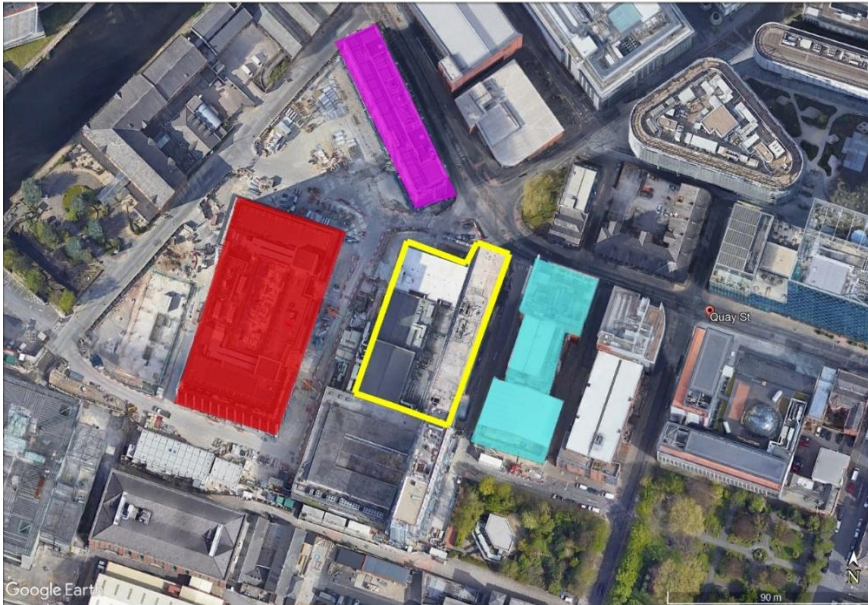


Figure 1 Site and its surrounding (courtesy of Google Earth Pro)

To the west of the site, the nearest affected receptor is Manchester Goods Yard highlighted in red in Figure 1. Globe and Simpson is located to the north of the site highlighted in pink in Figure 1. These comprise of commercial office premises and are therefore considered to only be a noise sensitive receptor during the day (07:00-23:00).

To the east of the site, the nearest affected receptor is Bauhaus. This is a residential receptor, highlighted in blue in Figure 1. This receptor is noise sensitive during the day (07:00-23:00) and at night (23:00-07:00).

5 Plant equipment

5.1 Equipment

5.1.1 Level 2 rooftop plant area

Screening has been provided around the perimeter of the plant area as well as a specialist acoustic screen with lid around 17 ODU units, which is taken into account in the assessment detailed in this report. The following plant equipment has been installed to the Level 2 rooftop:

- 6 x air handling units (AHUs)
 - AHU 02/03 (PFP A3-0450 2.4kW 400V-3F M6F7)
 - AHU 02/07 (unit model AH 1925-5050-FG-WP)
 - AHU 02/04 (PFP A3-0355 2.1kW 400V-3F M6F6)
 - AHU 02/01 (PFP A3-0500 4.1kW 400V-3F M6H5)
 - AHU 02/05 (PFP A3-0315 1.5kW 400V-3F M6F8)
 - AHU 02/02 (PFP A3-0355 2.1kW 400V-3F M6F6)
- 17 x ODUs (condenser units).
 - ODU/LG/01 (Daikin REYQ14U)
 - ODU/00/01 (Daikin REYQ14U)
 - ODU/00/02 (Daikin REYQ10U)
 - ODU/01/01 (Daikin REYQ8U)
 - ODU/01/02 (Daikin REYQ8U)
 - ODU/01/03 (Daikin REYQ8U)
 - ODU/02/01 (Daikin REYQ8U)
 - ODU/02/02 (Daikin REYQ8U)
 - ODU/03/01 (Daikin REYQ8U)
 - ODU/03/02 (Daikin REYQ8U)
 - ODU/04/01 (Daikin REYQ8U)
 - ODU/04/02 (Daikin REYQ8U)
 - ODU/05/01 (Daikin REYQ8U)
 - ODU/05/02 (Daikin REYQ8U)

- ODU/06/01 (Daikin REYQ8U)
- ODU/06/02 (Daikin REYQ8U)
- ODU/LG/02 (Daikin RXM50R).

It should be noted that a specialist acoustic screen with a lid has been installed in this location and is included within our 3D acoustic modelling.

- 2 x extract fans
 - 1 x KRD 500/4/80/50 A Rectangular Box Fan (EF 02 01)
 - 1 x GBD 630/4 T 120 (CENT) (EF 02 02A&B)
- 3 x intake atmosphere side connections
- 3 x exhaust atmosphere side connections

5.1.2 Level 10 rooftop plant area

Acoustic screening has been provided around the perimeter of the Level 10 plant deck and is included within our assessment. The following plant equipment has been installed to the Level 10 rooftop:

- 5 x air handling units (AHUs):
 - AHU 10/01 (PFP A3-0450 2.4kW 400V-3F M6F7)
 - AHU 10/02 (PFP A3-0355 2.1kW 400V-3F M6F6)
 - AHU 10/03 (PFP A3-0450 2.4kW 400V-3F M6F7)
 - AHU 10/04 (PFP A3-0450 2.4kW 400V-3F M6F7)
 - AHU 10/05 (PFP A3-0500 4.1kW 400V-3F M6H5)
- 6 x ODUs (condenser units):
 - ODU/07/01 (Daikin REYQ8U)
 - ODU/07/02 (Daikin RMX42R)
 - ODU/07/03 (Daikin RMX42R)
 - ODU/07/04 (Daikin RMX50R)
 - ODU/08/01 (Daikin REYQ24U)
 - ODU/09/01 (Daikin REYQ20U)
- 1 x ODU (condenser unit):
 - ODU/10/01 (no data received)
- 1 x extract fan:

- 1 x GBD 560/4 T 120 (CENT) (EF 10 01)

5.1.3 Zone 5 ground level louvred areas

The following plant equipment has been installed to ground level louvred areas:

- 2 x boilers, 3 x hot water heaters, 2 x boosted cold water pumps and 3 x sets of heat pumps
- Mitsubishi EP250 condenser unit

5.2 Plant noise data

5.2.1 Zone 5 ground level louvred areas

Louvred area A

Noise levels within the LG plant room are limited to NR 70 with low frequency limits of 80 dB within the 63 Hz and 125 Hz octave bands.

Louvred area B and C

The following units are proposed behind louvred area B and louvred area C:

- 1 x Mitsubishi EP250
- 2 x Daikin RXM60R.

The sound pressure data provided for the Mitsubishi EP250 condenser is not at a stated distance, but it is assumed to be measured at 1 m. In addition, the data is provided as a broadband sound pressure level. For the purpose of this assessment, a representative spectrum has been used. This data for the EP250 is provided in Table 3.

The sound pressure data for the proposed Daikin RXM60R is summarised in Table 3.

Table 3 GF condenser sound pressure data

	Sound pressure level L_{eq} at 1 m(dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Mitsubishi EP250	70	62	62	59	53	47	45	43
Daikin RXM60R	49	52	51	48	44	38	34	-

The received transmission loss data for the attenuation package proposed for the Mitsubishi unit are detailed in Table 4.

Table 4 Mitsubishi attenuation package

	Transmission loss (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Mitsubishi condenser package	5	6	7	8	11	11	8	8

5.2.2 Manufacturer plant noise data (rooftop plant areas)

Noise data for the proposed equipment selections at the roof top plant areas are detailed below. No acoustic data have been received for the proposed ODU/10/01 at level 10 rooftop or the internal plant connected to the atmosphere via terminations at Level 2 rooftop plant area.

Table 5 Noise data used within assessment for roof top plant selections

Plant items and termination	Sound power level L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
<i>Level 2 rooftop plant</i>								
<u>EF/02.02A&B</u>								
Extract ^[1]	-	96	90	86	83	80	75	69
Break out ^[1]	-	81	75	67	64	63	59	55
<u>EF/02/01</u>								
Extract ^[1]	-	71	66	58	54	48	45	47
Break out ^[1]	-	64	51	41	32	23	20	23
<u>AHU 02/03</u>								
Inlet	70	70	76	67	62	56	50	42
Inlet break out ^[2]								
Exhaust	72	76	74	75	76	72	67	61
Exhaust break out ^[2]	51	55	9	37	35	36	27	16
<u>AHU 02/07</u>								
Inlet	76	81	75	68	69	59	55	46
Inlet break out	69	70	55	53	54	53	45	35
<u>AHU 02/04</u>								

Plant items and termination	Sound power level L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Inlet	66	64	69	64	58	52	48	37
Inlet break out ^[2]	49	46	38	34	34	34	36	28
Exhaust	68	65	71	70	73	70	66	59
Exhaust break out ^[2]	47	44	36	32	32	34	26	14
<u>AHU 02/01</u>								
Inlet	65	69	66	61	59	52	49	41
Inlet break out ^[2]	51	53	36	33	35	35	26	17
Exhaust	71	73	70	70	75	70	65	61
Exhaust break out ^[2]	50	52	35	32	34	34	25	16
<u>AHU 02/05</u>								
Inlet	64	64	70	61	56	49	44	33
Inlet break out ^[2]	50	48	47	28	27	32	28	13
Exhaust	70	67	74	67	69	68	64	57
Exhaust break out ^[2]	49	47	46	27	26	31	27	12
<u>AHU 02/02</u>								
Inlet	65	63	68	63	57	51	47	36
Inlet break out ^[2]	48	45	37	33	33	35	27	15
Exhaust	67	64	70	69	72	69	65	58
Exhaust break out ^[2]	46	43	35	31	31	33	25	13
ODU/LG/01	90	83	80	80	75	70	70	68
ODU/00/01								
ODU/01/01, ODU/01/02, ODU/01/03, ODU/02/01 ODU/02/02, ODU/03/01 ODU/03/02, ODU/04/01 ODU/04/02, ODU/05/01 ODU/05/02, ODU/06/01 ODU/06/02	88	81	79	77	71	68	64	59
ODU/LG/02 ^[2]	49	51	52	48	44	38	32	-

Plant items and termination	Sound power level L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
ODU/01/04 ^[2]	53	54	51	50	45	40	36	28
ODU/01/05 ^[2]								
<i>Level 10 rooftop plant</i>								
<u>EF/10/01</u>								
Extract ^[1]	-	92	86	82	79	76	71	65
Break out ^[1]	-	77	71	63	60	59	55	51
<u>AHU 10/05</u>								
Inlet	67	69	75	65	64	61	57	56
Inlet break out ^[2]	51	48	39	34	33	41	29	23
<u>AHU 10/02</u>								
Inlet	70	68	73	67	62	54	49	34
Inlet break out ^[2]	54	51	43	39	39	41	33	21
Exhaust	73	70	76	75	78	75	71	64
Exhaust break out ^[2]	52	49	41	37	37	39	31	19
<u>AHU 10/01</u>								
Inlet	71	71	75	69	63	56	49	35
Inlet break out ^[2]	58	57	47	41	41	43	34	23
Exhaust	74	78	76	77	78	74	69	63
Exhaust break out ^[2]	53	57	41	39	37	38	29	18
<u>AHU 10/04</u>								
Inlet	74	72	77	72	66	60	56	45
Inlet break out ^[2]	57	54	46	42	42	44	36	24
Exhaust	74	78	76	77	78	74	69	63
Exhaust break out ^[2]	53	57	41	39	37	38	29	18
<u>AHU 10/03</u>								
Inlet	74	72	77	72	66	60	56	45
Inlet break out ^[2]	57	54	46	42	42	44	36	24

Plant items and termination	Sound power level L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Exhaust	76	80	78	79	80	76	71	65
Exhaust break out ^[2]	55	59	43	41	39	40	31	20
ODU/07/01	88	81	79	77	71	68	64	59
ODU/07/02 ^[2]	48	52	51	47	42	37	30	-
ODU/07/03 ^[2]								
ODU/07/04 ^[2]	49	51	52	48	44	38	32	-
ODU/08/01 ^[3]	96	91	87	86	78	76	73	70

^[1] Presented data has been calculated from the A-weighted sound power levels received

^[2] The presented data are sound pressure levels at 1 m

^[3] This unit is formed of 1 x REYQ8U + 1 x REYQ16U, the predicted worst case sound power levels are presented.

ODU noise data in quiet mode

Quiet mode noise data has been provided for 13 of the condenser units (ODUs), as presented in Table 6. These units are proposed to operate at a lower duty to reduce noise emissions.

Table 6 Quiet mode condenser sound pressure level data

	Sound pressure level at 1 m L_{eq} (dB)							
	at each octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
REYQ8U Quiet mode 1 (ODUs 05/02 and 06/02)	62	56	50	49	49	47	44	36
REYQ8U Quiet mode 2 (ODUs 02/01,02/02,03/01, 03/02,04/01,04/02,05/01, 06/01)	55	55	48	47	47	45	43	34
REYQ8U Quiet mode 3 (ODU 01/03)	54	53	48	48	41	41	40	35
REYQ10U Quiet mode 1 (ODU 00/02)	62	56	50	49	49	47	44	36

	Sound pressure level at 1 m L_{eq} (dB) at each octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
REYQ20U Quiet mode 1 (ODU 09/01)	60	57	57	55	48	45	42	38

6 Plant noise verification measurements

6.1 Method

Sample noise measurements were carried out on 9 December 2025 and 16 December 2025 to determine the noise levels produced by the installed and operational normally operating plant.

Measurements were carried out in 1/3 octave bands over 30 second to 1 minute periods.

For each measurement, the microphone was located on a tripod approximately 1 m from each plant item/termination and approximately 1.5 m above the ground/roof.

A mark-up of the measurement locations is provided in Appendix B.

6.2 Weather conditions

Weather was clear and dry and considered suitable for obtaining representative measurements.

6.3 Observations

Observations were carried out from an upper floor window at the Bauhaus apartments on 16 December 2025, with all OGS normally operating plant running. Plant noise was not audible at the receptor and no attention catching features, with reference to BS4142 were noted.

6.4 Measurement results

Plant measurement results are set out in Table 7.

Observations for each measurement are provided. Plant noise was noted to be the dominant noise source in all cases.

No attention catching features, with reference to BS4142 were noted during the measurements.

Table 7 Plant measurement results

Test reference	Sound pressure levels measured			Notes
	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	
1	61	66	61	Dominated by AHU 10.05
2	63	67	62	Noise egress from ductwork noted to be dominant
3	66	67	65	Noise egress from ductwork noted to be dominant as well as AHU breakout
4	60	69	59	Dominated by AHU 10.02
5	69	72	69	Dominated by AHU 10.02 exhaust termination
6	65	66	65	Dominated by ODU/07/02 unit
7	69	70	69	As above
8	68	69	67	Contributions were noted from AHU/10/01 and AHU/10/03 as well as from ODU/07/02
9	66	68	66	Dominated by contributions from AHU/10/03 exhaust
10	64	66	63	Dominated by contributions from AHU/10/04 exhaust
11	61	62	60	No dominant noise sources noted.
12	65	67	64	Dominated by AHU/02/02 exhaust termination
13	65	66	64	
14	60	66	59	Dominated by AHU/02/02 case breakout with some contributions from exhaust termination
15	59	64	58	
16	58	60	57	Dominated by AHU/02/02 case breakout with some contributions from exhaust termination
17	63	65	62	Dominated by AHU/02/05 exhaust termination with some contribution from AHU/02/01 exhaust termination
18	63	66	63	
19	62	64	61	Dominated by AHU/02/05 case breakout with some contribution from AHU/02/01 exhaust termination
20	62	64	61	
21	60	63	60	

Test reference	Sound pressure levels measured			Notes
	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	
22	61	67	60	Dominated by AHU/02/05 case breakout with some contribution from AHU/02/01 exhaust termination
23	66	68	65	Dominated by AHU/02/01 exhaust termination
24	66	70	65	
25	62	64	61	Dominated by AHU/02/01 exhaust termination
26	62	64	61	
27	61	65	60	Dominated by AHU/02/01 case breakout with some contribution from AHU/02/01 exhaust termination
28	61	67	60	
29	66	69	66	Dominated by AHU/02/04 exhaust termination
30	66	67	66	
31	62	64	61	Dominated by AHU/02/04 case breakout with some contribution from AHU/02/04 and AHU/02/01 exhaust terminations
32	63	65	62	Dominated by AHU/02/04 case breakout with some contribution from AHU/02/04 and AHU/02/01 exhaust terminations
33	66	68	66	Noted to have contributions from both ODU/LG/02 as well as AHU units on plant deck.
34	69	70	68	Dominated by AHU/02/03 exhaust termination with significant contribution from ODU units surrounding AHUs
35	77	78	76	Dominated by AHU/02/07 and AHU/02/03 exhaust termination with significant contribution from ODU units surrounding AHUs
36	77	77	77	Dominated by AHU/02/07 and AHU/02/03 exhaust termination with significant contribution from ODU units surrounding AHUs
37	77	78	76	Dominated by extract fan termination and case breakout
38	77	78	76	
39	65	72	65	

Test reference	Sound pressure levels measured			Notes
	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	
40	65	71	64	Significant contributions were noted from both KEF and AHU/02/03
41	59	63	59	No individual plant items noted to dominate in this position
42	59	63	58	
43	61	64	60	
44	61	65	60	No individual plant items noted to dominate in this position
45	60	62	60	
46	59	61	59	
47	59	63	58	Some contributions audible from otherside of louvre, however plant noise egress was barely audible at 1 m from ground level louvre
48	58	61	57	

7 3D noise modelling

7.1 Method

A 3D environmental noise model of the site has been produced using the computational acoustic modelling package CadnaA (version 2026).

3D modelling has been used to predict the plant noise egress at the nearby noise sensitive premises for normally operating plant, based on the measurement results.

The modelling is based on both the noise data received and measurements carried out on site, and includes for the acoustic screening where installed. The model has been calibrated based on the measurements to predict plant noise egress levels at the worst affected noise sensitive receptors.

The software carries out calculations using a ray tracing technique, and considers the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

A screenshot of the model is presented below in Figure 2.

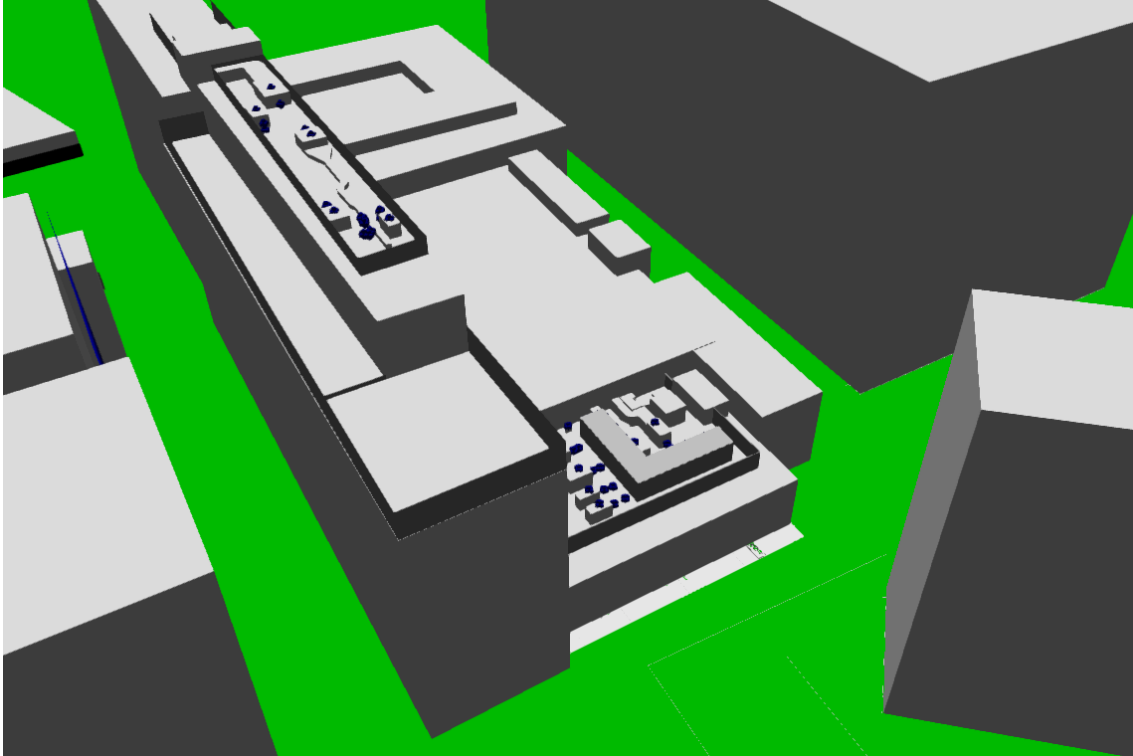


Figure 2 Screenshot of 3D environmental noise model

7.2 Results

The predicted plant noise egress levels outside the nearby noise sensitive receptors are provided in Table 8

Table 8 Predicted plant noise egress levels for OGS development based on measurements

Location	Plant noise egress limit, L_{Aeq} (dB)		Predicted plant noise egress level, L_{Aeq} (dB)
	Day (07:00 – 23:00)	Night (23:00 – 07:00)	
Manchester Goods Yard	46	-	49
Globe & Simpson	46	-	54
Bauhaus Apartments	46	40	45

The predicted plant noise egress level indicate that at Manchester Goods Yard and Globe & Simpson receptors, plant noise egress criteria is exceeded. It is noted that the kitchen extract unit is the dominant source at these locations.

The day criteria is achieved at Bauhaus, however night criteria is exceeded due to noise associated with the ODU's at level 10.

8 Recommended mitigation measures

It is recommended that the following mitigation measures be implemented to control plant noise egress to the nearby noise sensitive receptors:

- Level 10 rooftop ODU units (ODU/07/02, ODU/07/03, ODU/08/01, ODU/09/01) are switched off or alternatively operated at a set back duty during night (2300 to 0700). If a set back duty is preferred, noise data should be provided for review at this duty or further measurements undertaken.
- Atmosphere side attenuation should be provided to the kitchen extract fan on Level 2 and should be switched off during the night (2300 to 0700). The recommended insertion losses are provided in Table 9.

Table 9 Recommended KEF attenuator insertion losses

		Minimum insertion losses, L_i (dB)							
		Octave-band centre frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
KEF	-	11	18	23	22	18	16	10	
attenuator									

The above losses can typically be achieved with an attenuator 900-1200 mm in length.

Appendix A

Equipment details

Equipment

The noise measurements were taken using a Rion NL-52 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	24 Apr 26	TCRT23/1806
Microphone	UC-59/09251	Rion	24 Apr 26	TCRT23/1806
Pre-amp	NH-25/32354	Rion	24 Apr 26	TCRT23/1806
Calibrator	NC-74/34536129	Rion	24 Apr 26	TCRT23/1576

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter(s) used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

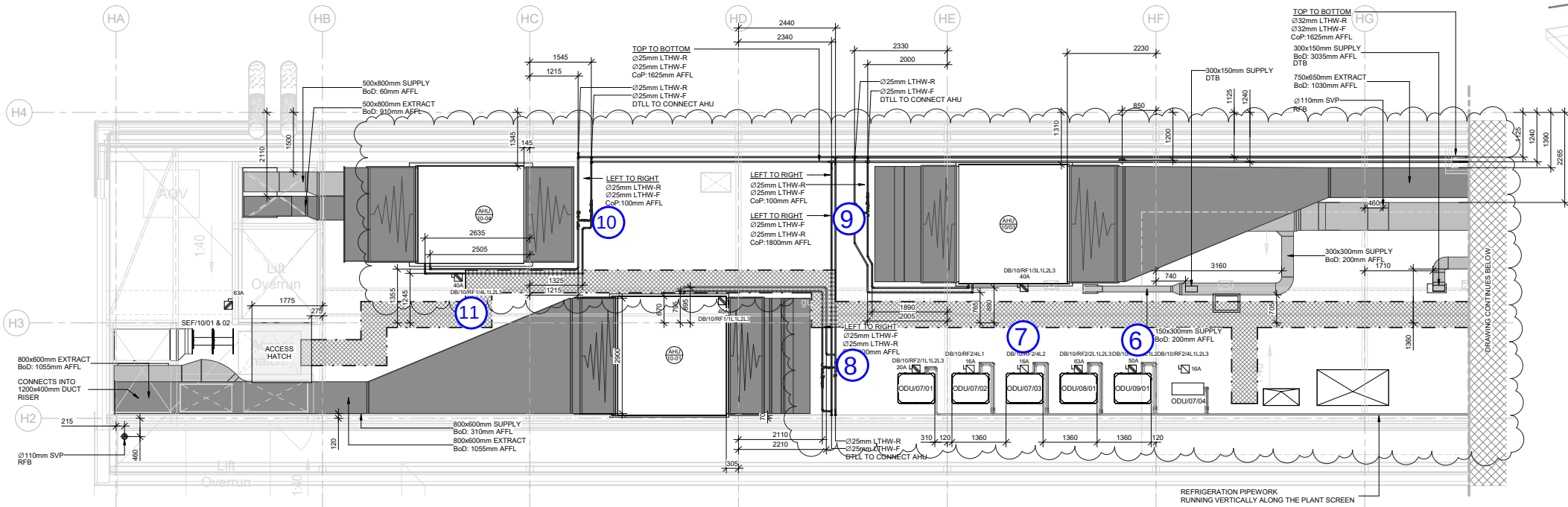
Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg, L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS 7445: Part 1: 2003

Description and measurement of environmental

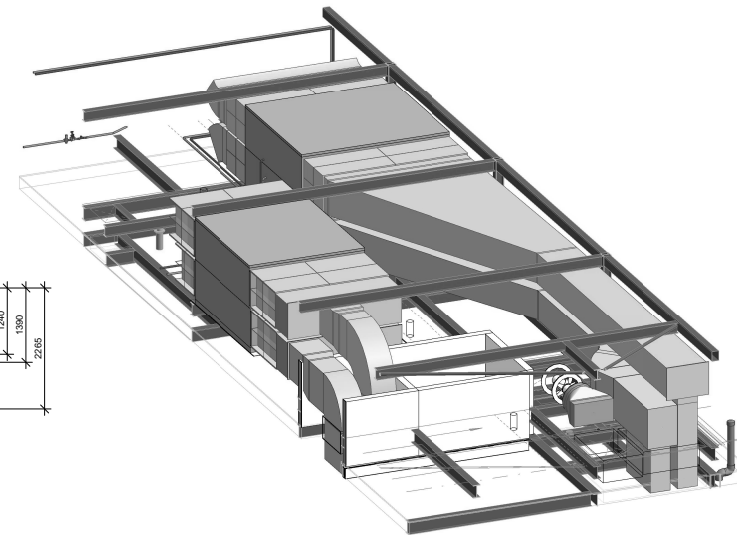
Appendix B

Measurement location mark-ups

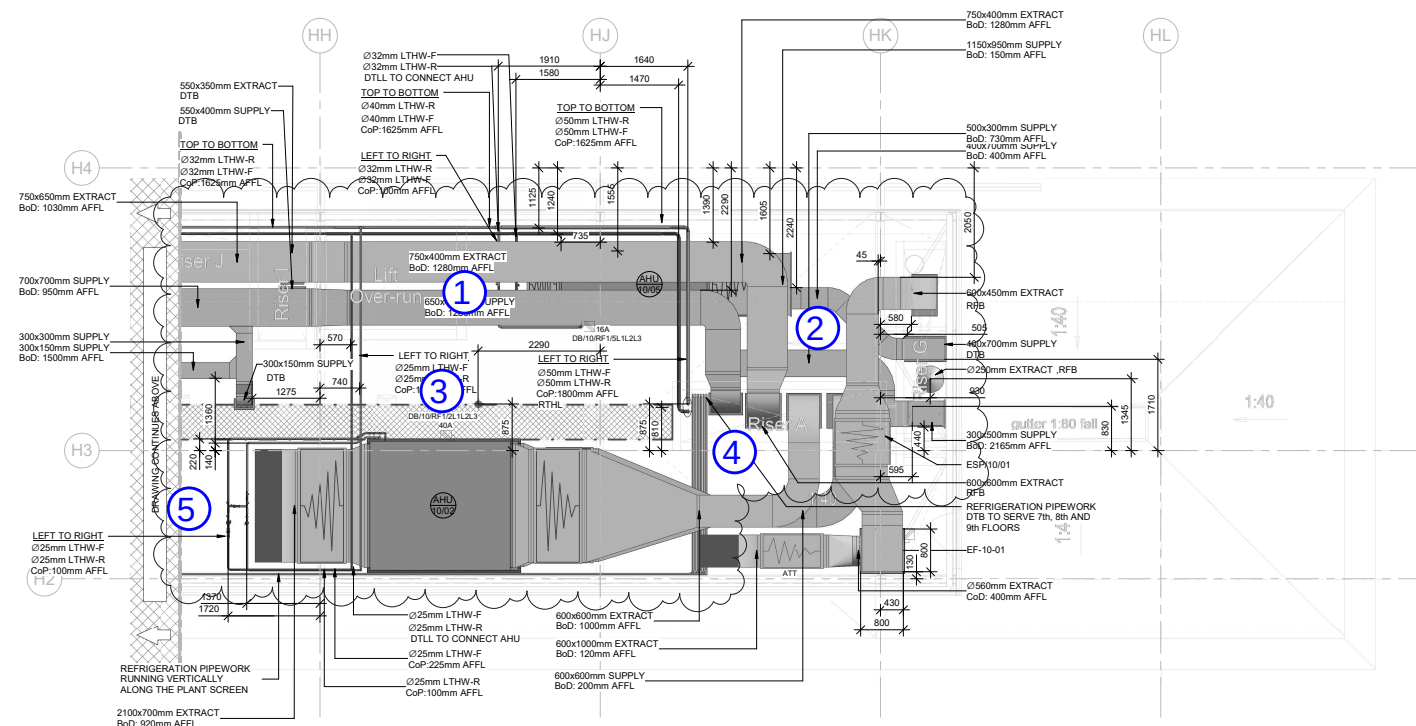


Combined Services / RF Hotel (Left Side)

1 : 50

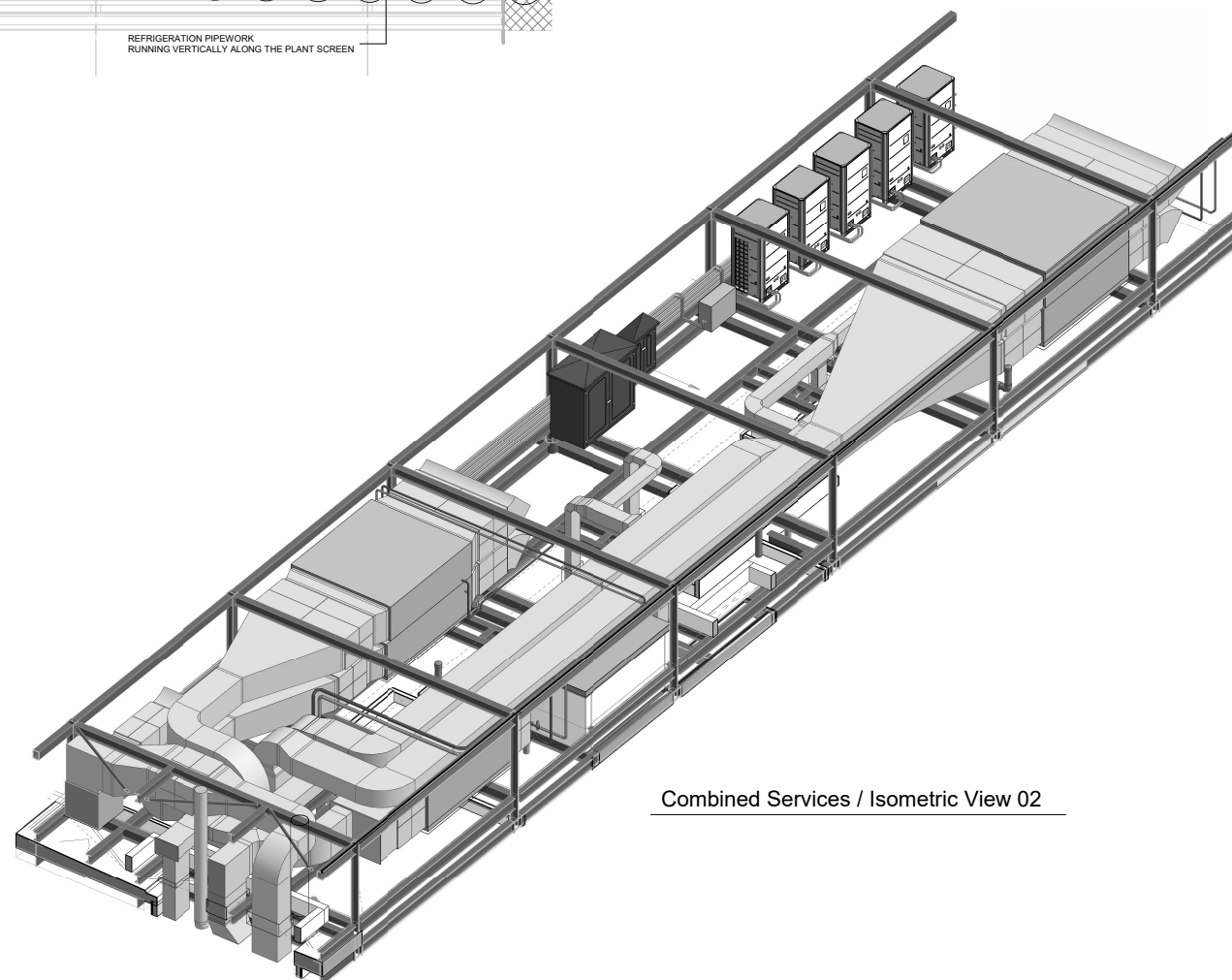


Combined Services / Isometric View 01



Combined Services / RF Hotel (Right Side)

1 : 50



Combined Services / Isometric View 02

012MILLIMETER10

LINEAR SCALE BAR

reference			
drawing	rev	date	supplier

Keyplan

notes

C5	JB	MINOR AMENDMENTS	21.12.23
C4	MM	MINOR AMENDMENTS	07.08.23
C3	ND	FOR CONSTRUCTION	15.08.23
C2	MM	FOR CONSTRUCTION	01.08.23
C1	MM	FOR CONSTRUCTION	02.06.23

Issued by

Description

Date

FOR CONSTRUCTION

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client

ARJ CONSTRUCTION LTD

project

OLD GRANADA STUDIOS

draw title

MECHANICAL SERVICES
COMBINED SERVICES LAYOUT
ROOF LEVEL

draw no.

0765-VAU-ZZ-RL-DR-M-5101

drawn

MM

date

02.06.23

checked

CWC

date

02.06.23

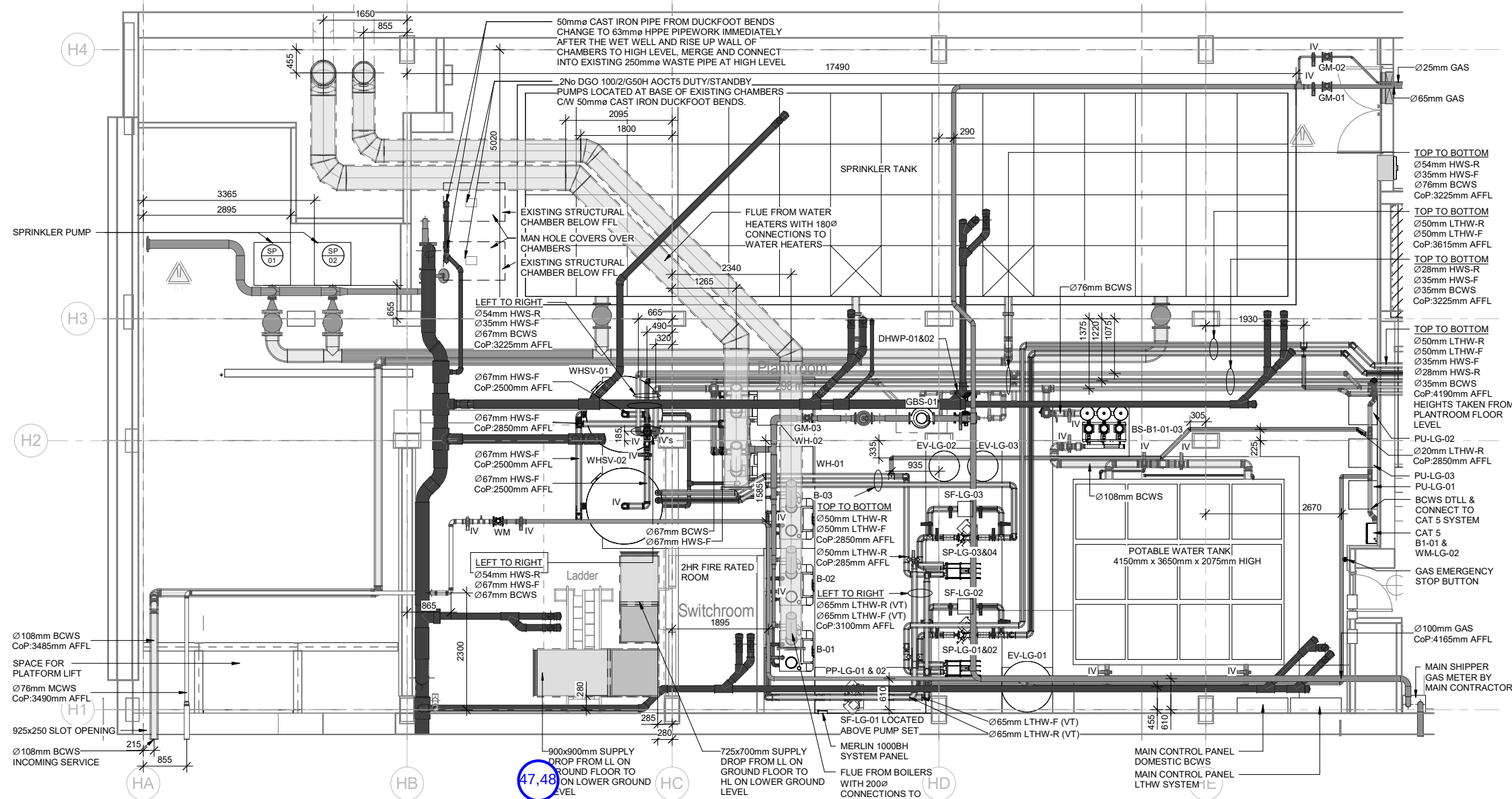
scale

1 : 50

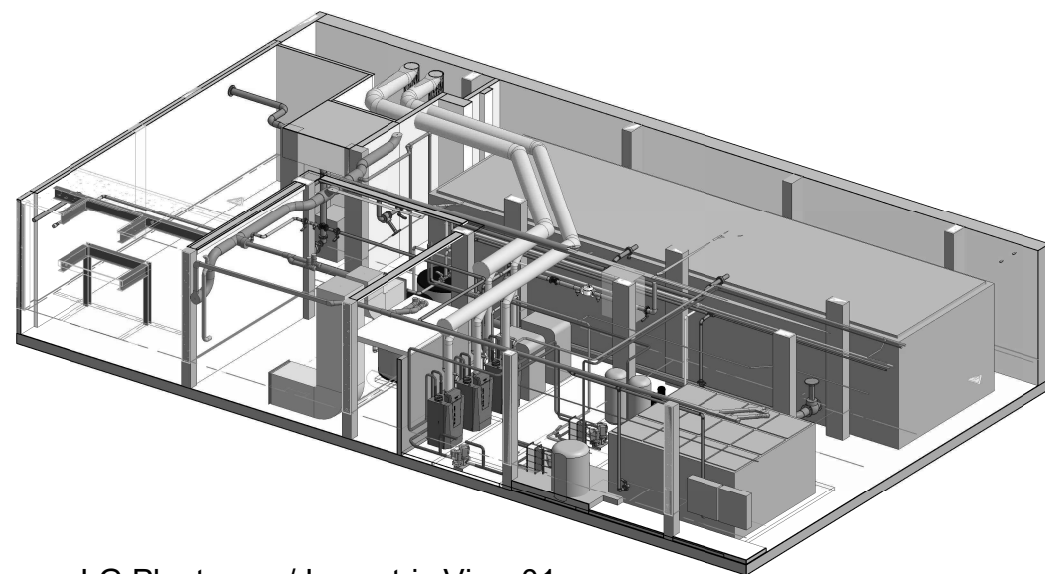
contract

765

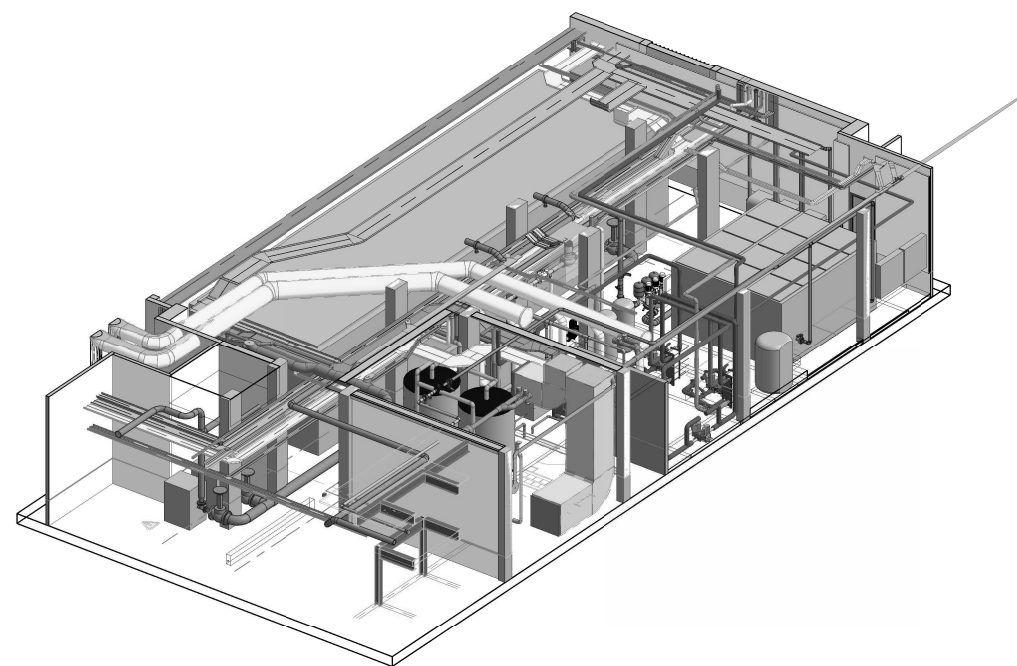
C5



Combined Mechanical / LG Plantroom
1 : 50



LG Plantroom / Isometric View 01



LG Plantroom / Isometric View 02

0 10 20 100 MILLIMETERS
LINEAR SCALE BAR

reference drawings			
drawing number	rev	date	supplied by

Keyplan

notes

NOTE
ALL HEIGHTS SHOWN ON THIS DRAWING ARE TAKEN FROM PLANTROOM FLOOR LEVEL (790mm BELOW LG LEVEL).

Rev	Issued by	Description	Date
C2	MM	REDESIGNED LAYOUT	21.09.23
C1	MM	FOR CONSTRUCTION	02.06.23

status

FOR CONSTRUCTION

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client

ARJ CONSTRUCTION LTD

project

OLD GRANADA STUDIOS

drg title

MECHANICAL SERVICES
COMBINED SERVICES LAYOUT
LOWER GROUND FLOOR PLANTROOM

drg no. 0765-VAU-ZZ-LG-DR-M-5101

drawn	MM	date	02.06.23	rev
checked	CWC	date	02.06.23	
scale	1 : 50	contract	765	
				C2

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