Hann Tucker Associates
Consultants in Acoustics Noise & Vibration
Duke House 1-2 Duke Street Woking Surrey GU21 5BA
(t) +44 (0) 1483 770595
(e) enquiries@hanntucker.co.uk
(w) hanntucker.co.uk

PROJECT TECHNICAL MEMORANDUM

JOB TITLE	:	Viadux Phase 1
REF	:	HT: 27528/PTM9
DATE	:	9 February 2024
FROM	:	George Grenfell
ISSUED TO	:	Design Team

RE: VIADUX PHASE 1, MANCHESTER PLANNING CONDITION 20A DISCHARGE NOTE

The Viadux Phase 1 development has been granted planning permission subject to a number of conditions. Condition 20a relates to noise from fixed building services plant and this Technical Memorandum sets out the desktop study regarding the noise egress from the proposed plant.

1.0 Condition 20a

Planning condition 20a is as follows:

> *Notwithstanding the noise impact assessment prepared by Fisher Acoustics stamped as received by the City Council, as Local Planning Authority, on the 31 March 2017 and the noise addendum stamped as received by the City Council, as Local Planning Authority, on the 8 June 2022, (a) prior to the first occupation of each phase, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval.*

This Memo is specifically to discharge part a of condition 20 only, as we understand that part b will require a post construction survey.

It is worth noting that where noise levels have been omitted from the results tables in the assessments herein, this is an indication that noise levels are predicted to be low enough to be considered insignificant.

2.0 Project Criteria

2.1 External Plant Noise Emissions

Based on the planning requirements and the lowest background noise levels recorded during the Fisher Acoustics survey, we would propose the following plant noise emission limits for the development to be achieved with plant operating cumulatively at 1m from noise sensitive windows (including apartment windows within the proposed development).

Location	BS 4142 Plant Noise Rating Limit, $L_{Ar,Tr}$ (dB)	
	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
The Axis	50	45
Beetham Tower	45	42
Viadux Phase 1	45	42

NB: In most areas the nearest noise sensitive receptors are likely to be apartment windows within the development site.

2.2 Emergency Plant

It is suggested that the noise level from any emergency plant is no more than 10dB(A) greater than the ambient noise level (measured as an L_{Aeq} noise level) at any proposed or existing residential receptor.

Location	BS 4142 Plant Noise Rating Limit, $L_{Ar,Tr}$ (dB)
	Daytime (07:00 to 19:00)
The Axis	75
Beetham Tower	67
Viadux Phase 1	67

2.3 Tenant Requirements

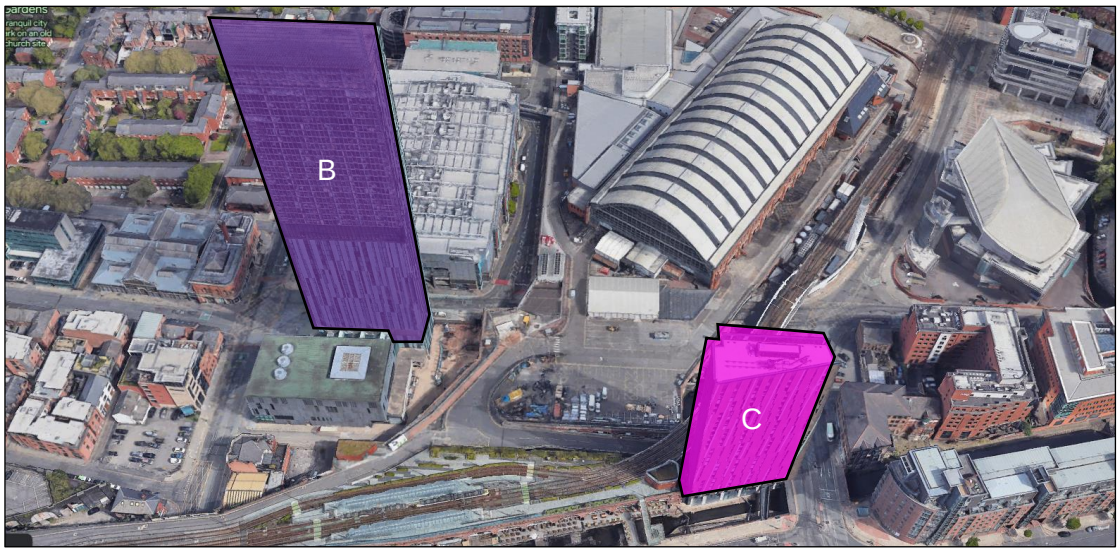
A suitable form of words should be included in the tenant's handbook making tenants responsible for controlling noise from their activities (including plant) to suitable levels.

3.0 Noise Sensitive Receptors

Externally, the nearest noise sensitive receptors to proposed plant areas are the residential apartments that are part of the Viadux development (Receptor Ax), situated on each façade. The other receptors likely to be affected are the Beetham Tower (Receptor B) and Axis (Receptor C). The following images highlight the location of each of the noise sensitive receptors.



Level 3 floor plan highlighting receptors Ax on each façade.



Satellite image highlighting the location of Receptor B and Receptor C

4.0 Summary of Building Services Proposals

The following assessments will be split up into separate plant items and concluded with an assessment of cumulative noise impact assessment. The plant item categories are as follows:

- **Internally Mounted Plant (Ducted to Atmosphere)**
  - Extract Fans
  - Air Handling Units
  - Heat Recovery Units
- **Externally Mounted Plant**
  - Condenser Units
  - Smoke Extract Fan

5.0 Extract Fans

5.1 Extract Fan Proposals

We understand that the proposed extract fans are as follows:

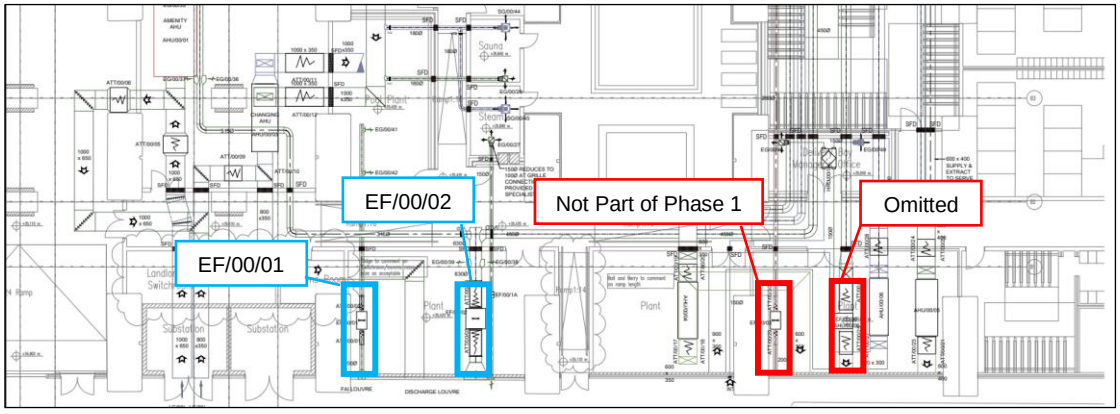
Unit Ref	Plant Description	Location	Plant Make/Model	Serving	Nearest Noise Sensitive Receptor
EF/00/01	Twin Fan - Ducted to Atmosphere	Level 00 South Plant Room	Ruck EM DUO 250 EC 01	Pool Plant Room	A_S
EF/00/02	Single Fan - ducted to atmosphere	Level 00 South Plant Room	Ruck MPC 500 EC 40	Tank Room and Cycles	A_S
EF/01/01	Single Fan - Ducted to Atmosphere	Level 01	Ruck ISOR 250 EC 20	Residential Refuse	A_E
EF/01M/01	Single Fan - Ducted to Atmosphere	Level 01	Ruck ISOR 450 EC 21	Man Central Refuse	A_W
EF/01M/02	Single Fan - Ducted to Atmosphere	Level 01	ISOR 450 EC 21	Man Central Refuse	A_W
EF/01M/03	Twin Fan - Ducted to Atmosphere	Level 01	EM DUO 150L EC 01	Cinema Karaoke Toilet	A_W
EF/02/01	Twin Fan - Ducted to Atmosphere	Level 02	EM DUO 150L EC 01	Gym Toilets	A_E
EF/02/02	Twin Fan - Ducted to Atmosphere	Level 02	EM DUO 150L EC 01	Cleaners Store	A_E

5.2 Extract Fan Noise Data

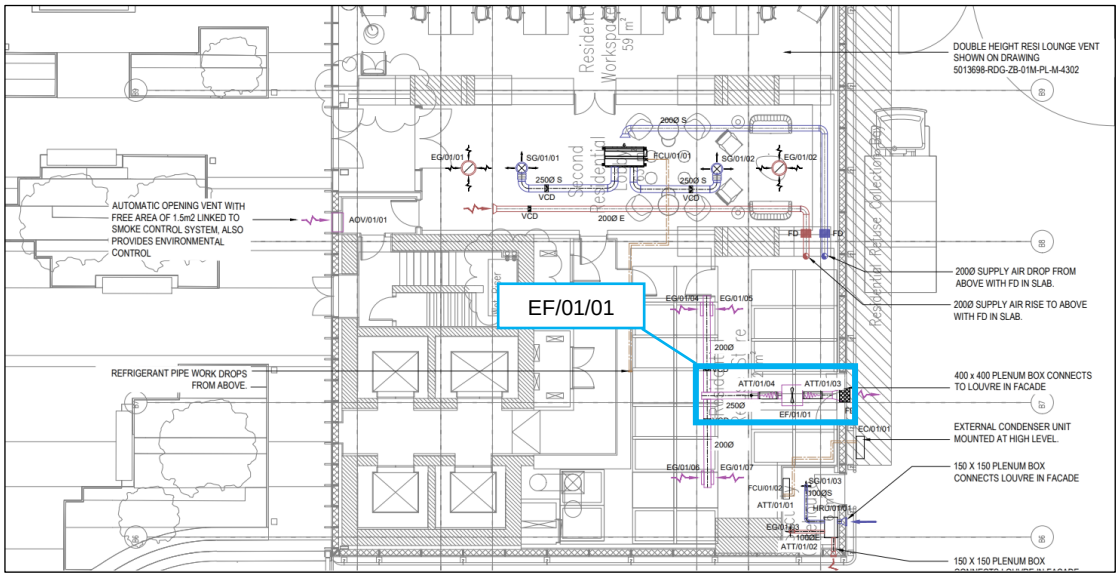
Octave band noise data for each extract fan is provided in Appendix A. Each extract fan will be fitted with attenuators and the performance of each attenuator proposed is also provided in Appendix A.

5.3 Extract Fan Locations

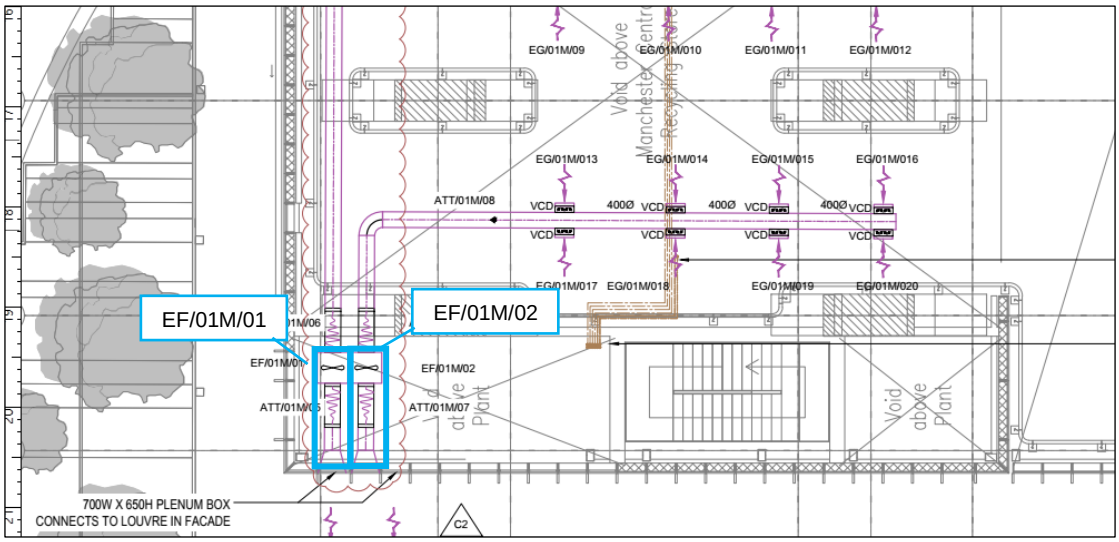
The following plans highlight the location of each of the proposed extract fans:



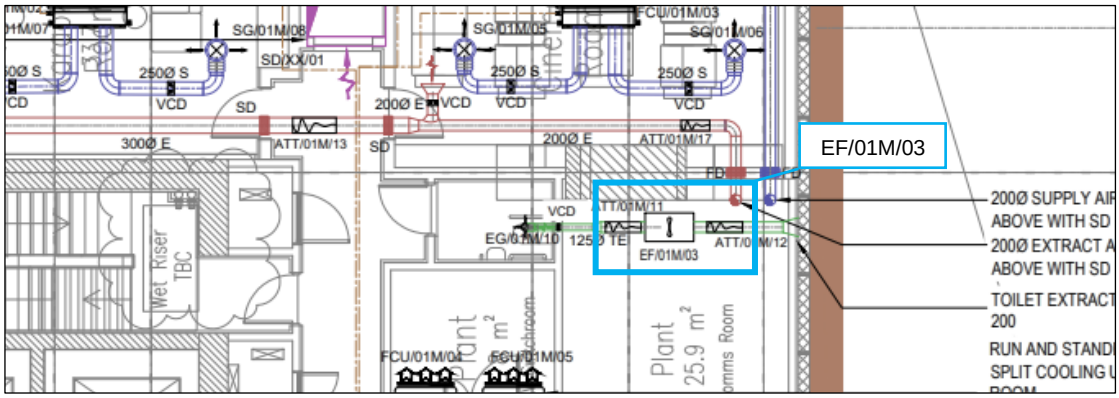
Level 00 Extract Fan Locations



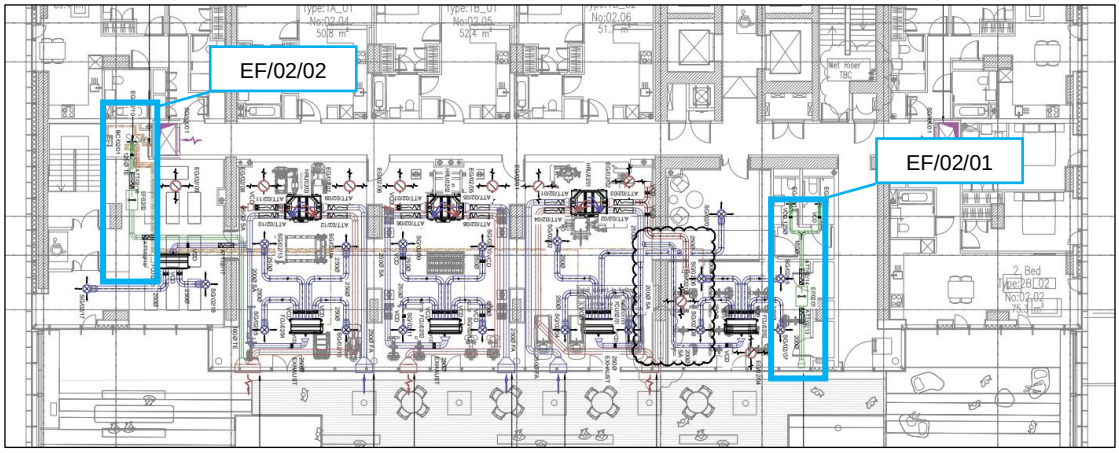
Level 01 Extract Fan Locations



Level 01M Extract Fan Locations



Level 01M Extract Fan Location



Level 02 Extract Fan Locations

5.4 Extract Fan Assessment (Including Proposed Attenuation)

We understand that the proposed extract fans could operate 24/7.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained.

Worst-case plant noise emission levels from the proposed extract fans are detailed in the table below. It should be noted that for the sake of brevity, the results from more favourable receptors, ie where the extract fans are expected to be significantly below the requirements, have been shown as a value less than 5 dB.

Extract Fan Ref	Predicted SPL at 1m from each Receptor					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
EF/00/01	<5	11	<5	<5	<5	13
EF/00/02	<5	18	<5	<5	<5	23
EF/01/01	<5	<5	<5	35	19	<5
EF/01M/01	<5	22	<5	21	<5	<5
EF/01M/02	<5	23	<5	22	<5	<5
EF/01M/03	<5	<5	<5	6	<5	<5
EF/02/01	<5	<5	25	<5	<5	<5
EF/02/02	<5	<5	23	<5	<5	<5
Cumulative	<15	28	27	35	19	23

As indicated in the table above, plant noise emissions from the proposed extract fans and corresponding attenuators should be compliant with the limits at each of the nearest noise sensitive receptors.

6.0 Air Handling Units (AHU)

6.1 AHU Proposals

We understand that the proposed extract fans are as follows:

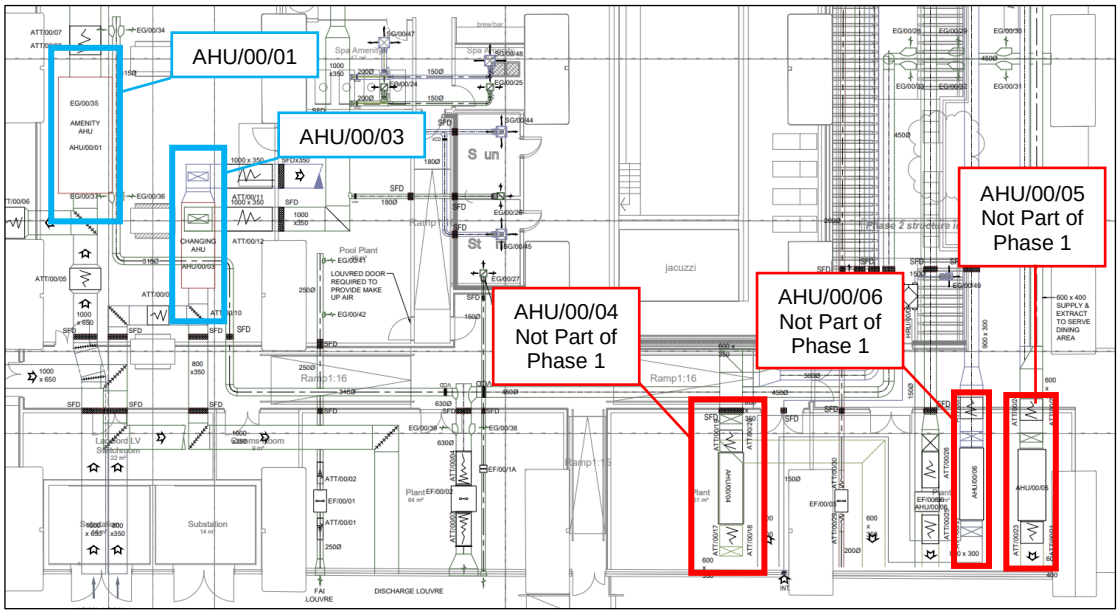
Unit Ref	Plant Description	Location	Plant Make/Model	Serving	Nearest Noise Sensitive Receptor
AHU/00/01	Supply & Extract AHU	Ground Floor Mid Plant Room	Sovereign SQ082373-042103290-1-1	Amenity	A_S
AHU/00/03	Supply & Extract AHU	Ground Floor Mid Plant Room	Sovereign SQ082373-0421-3290-3-2	Changing	A_S

6.2 AHU Noise Data

Octave band noise data for each AHU is provided in Appendix A. Each AHU will be fitted with attenuators and the performance of each attenuator proposed is also provided in Appendix A.

6.3 AHU Locations

The following plans highlight the location of each of the proposed air handling units:



Ground floor AHU Locations

6.4 AHU Assessment

We understand that the proposed air handling units could operate 24/7.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained.

The following tables summarise our predictions of atmospheric noise emissions from each of the extract fans to each receptor. Results from more favourable receptors, i.e. where the noise levels are expected to be significantly below the requirements, have been shown as a value less than 5 dB.

AHU Ref	Predicted SPL at 1m from each Receptor					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
AHU/00/01 Inlet	<5	9	<5	<5	<5	15
AHU/00/01 Outlet	<5	3	<5	<5	<5	11
AHU/00/02 Inlet	<5	<5	<5	<5	<5	-
AHU/00/02 Outlet	<5	<5	<5	<5	<5	6
Cumulative AHU noise	<15	<15	<15	<15	<15	17

7.0 Heat Recovery Units (HRUs)

7.1 HRU Proposals

We understand that the proposed extract fans are as follows:

Unit Ref	Plant Description	Location	Plant Make/Model	Serving	Nearest Noise Sensitive Receptor
HRU/01/01	Heat Recovery Unit	Security Room	Ruck - LETA K 2500	Security Room	A_W
HRU/01M/01	Heat Recovery Unit	Resident's Workspace	Ruck - LETA K 2500	Resident's Workspace	A_N
HRU/02/01	Heat Recovery Unit	Gym	Ruck - LETA K 700	Gym	A_E
HRU/02/02	Heat Recovery Unit	Gym	Ruck - LETA K 700	Gym	A_E
HRU/02/03	Heat Recovery Unit	Gym	Ruck - LETA K 700	Gym	A_E
HRU/XX/01-03	Heat Recovery Unit	Apartments	MRXBOXAB-ECO5-AECV with MR-ECO-COOL-V	Apartments	All Facades

7.2 HRU Noise Data

Octave band noise data for each RHU is provided in Appendix A. Each HRU, with the exception of the apartment MVHR units, will be fitted with attenuators and the performance of each attenuator proposed is also provided in Appendix A.

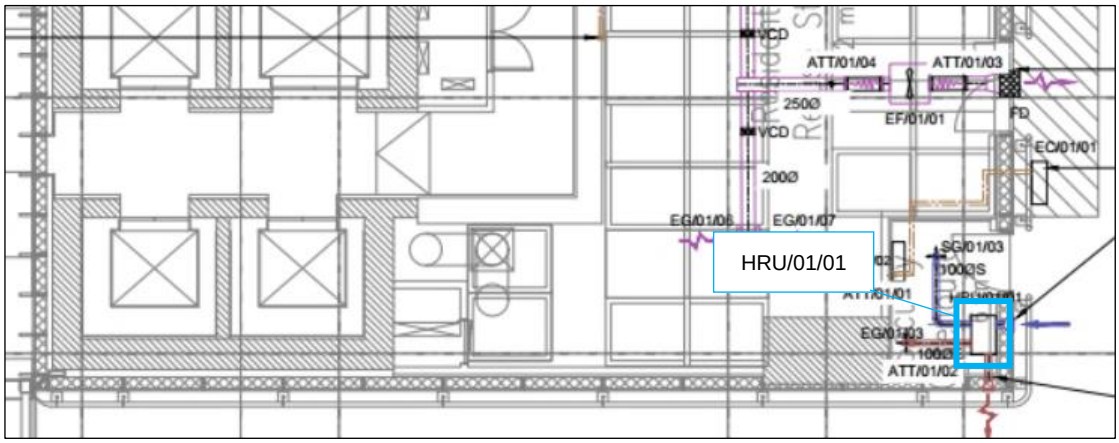
7.3 HRU Locations

7.3.1 Apartments

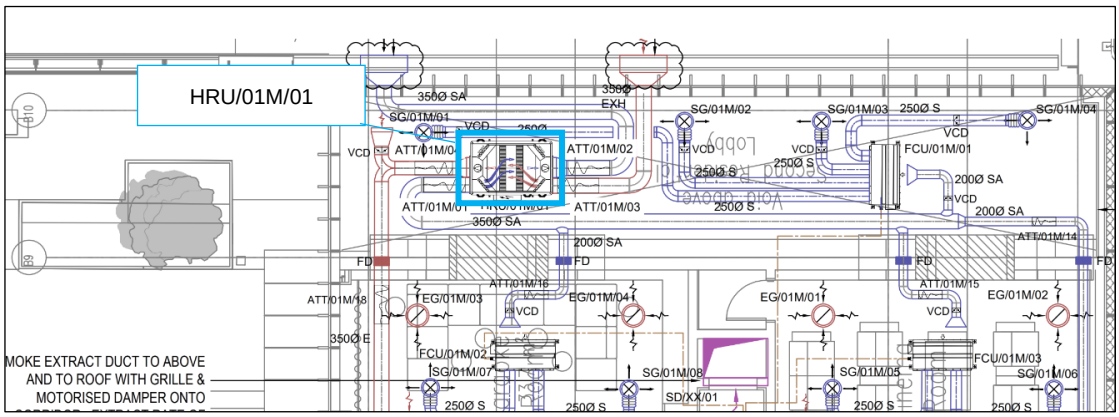
The MVHRs for the apartments will be ducted from the service cupboard to the façade. As such there are MVHR atmosphere side connections on every façade of the development.

7.3.2 Other Spaces

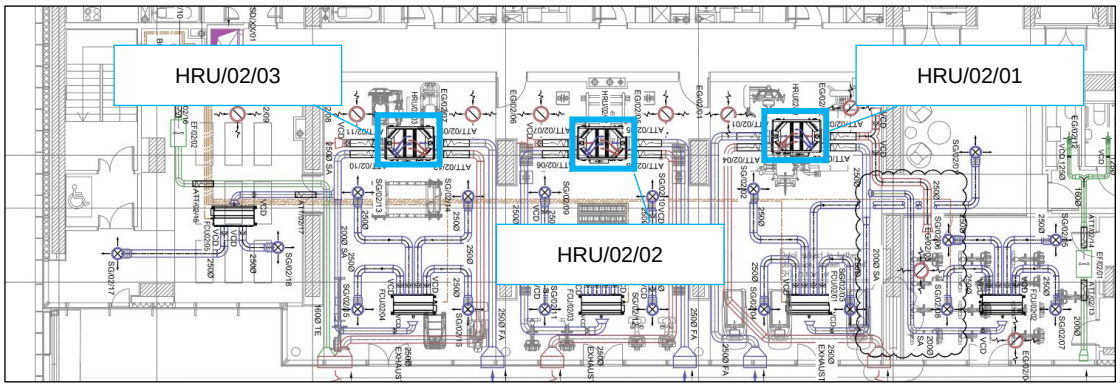
The following plans highlight the location of each of the proposed air handling units in the proposed lower floors (ground to Level 02):



Level 01 HRU location.



Level 01M HRU location.



Level 02 HRU locations

7.4 HRU Assessment

We understand that the proposed air handling units could operate 24/7.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained.

The following tables summarise our predictions of atmospheric noise emissions from each of the HRU's to each affected receptor. Results from more favourable receptors, ie where the noise levels are expected to be significantly below the requirements, have been shown as a value less than 5 dB.

HRU Ref	Predicted SPL at 1m from each Receptor					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
HRU/01M/01 FAI	12	<5	<5	<5	<5	<5
HRU/01M/01 Exhaust	37	<5	<5	<5	<5	<5
HRU/02/01 FAI	<5	<5	13	<5	<5	<5
HRU/02/01 Extract	<5	<5	23	<5	<5	<5
HRU/02/02 FAI	<5	<5	13	<5	<5	<5
HRU/02/02 Extract	<5	<5	21	<5	<5	<5
HRU/02/03 FAI	<5	<5	13	<5	<5	<5
HRU/02/03 Extract	<5	<5	21	<5	<5	<5
Cumulative HRU noise	37	<15	27	<15	<15	<15

As indicated in the table above, plant noise emissions from the proposed units with the corresponding attenuators should be compliant with the limits at each of the nearest noise sensitive receptors.

8.0 External Condenser Units (ECU)

8.1 ECU Proposals

We understand that the proposed condenser units are as follows:

Unit Ref	Plant Description	Location	Plant Make/Model	Serving	Nearest Noise Sensitive Receptor
EC/01/01	External Condensing Unit	Condenser Plantroom	Toshiba MMY-MAP1406FT8P	TBC	As / Aw
EC/01/02	External Condensing Unit	Condenser Plantroom	Toshiba MMY-MAP1806FT8P	TBC	As / Aw

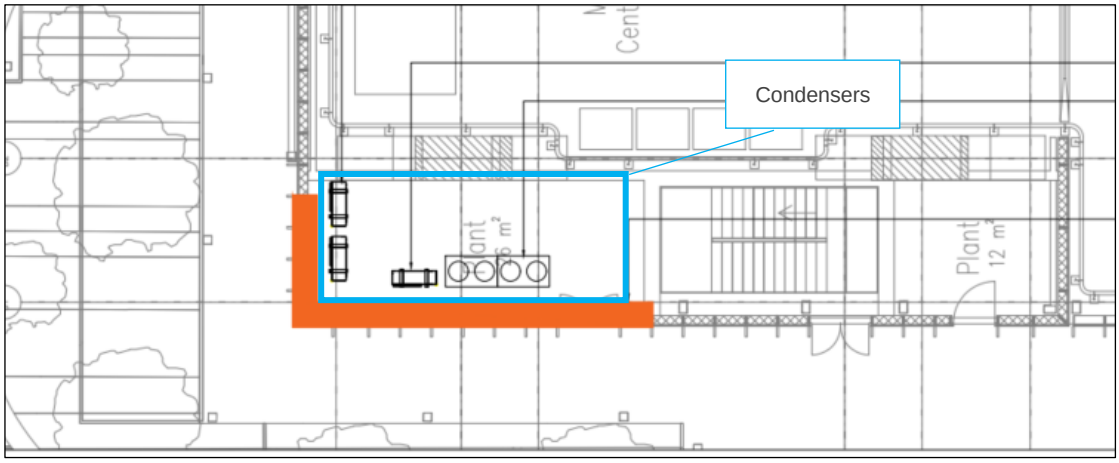
8.2 ECU Noise Data

Noise data for the proposed units, as provided by the manufacturer is provided in the table below. No octave band data has been provided at the time of writing, and as such the noise spectrum shape has been estimated from analysis of similar units.

Unit Ref	Sound pressure levels (dB) at octave band frequencies (Hz) at 1m								
	63	125	250	500	1000	2000	4000	8000	dBA
EC/01/01	70	63	61	60	59	54	49	41	63
EC/01/02	71	64	62	61	60	55	50	42	64

8.3 ECU Locations

The following plans highlight the location of each of the proposed condenser units:



8.4 ECU Assessment

We understand that the proposed units would operate during the daytime only.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained.

The following tables summarise our predictions of atmospheric noise emissions from each of the ECU's to each affected receptor.

ECU Ref	Predicted SPL at 1m from each Receptor					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
Cumulative ECU noise	<5	44	<5	41	34	32

As indicated in the table above, plant noise emissions from the proposed units with the corresponding attenuators should be compliant with the limits at each of the nearest noise sensitive receptors.

9.0 Pool Plant

9.1 Pool Plant Proposals

We understand that there is only one item of pool plant that discharges to atmosphere, as detailed in the table below.

Unit Ref	Plant Description	Location	Plant Make/Model	Serving	Nearest Noise Sensitive Receptor
H&V	Heat and vent unit	Pool Plant room	Heatstar	Pool area	As

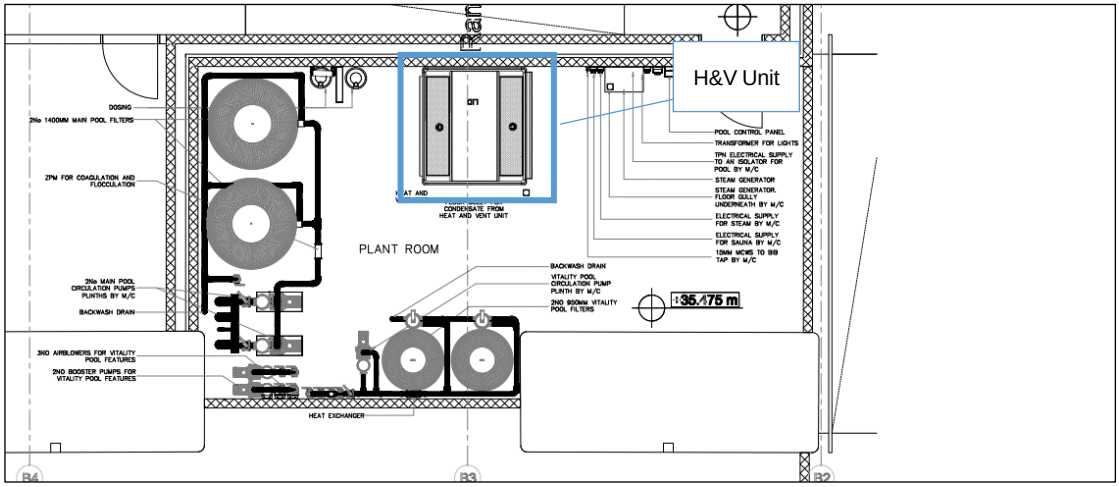
9.2 Pool Plant Noise Data

Noise data for the proposed units, as provided by the manufacturer is provided in the table below:

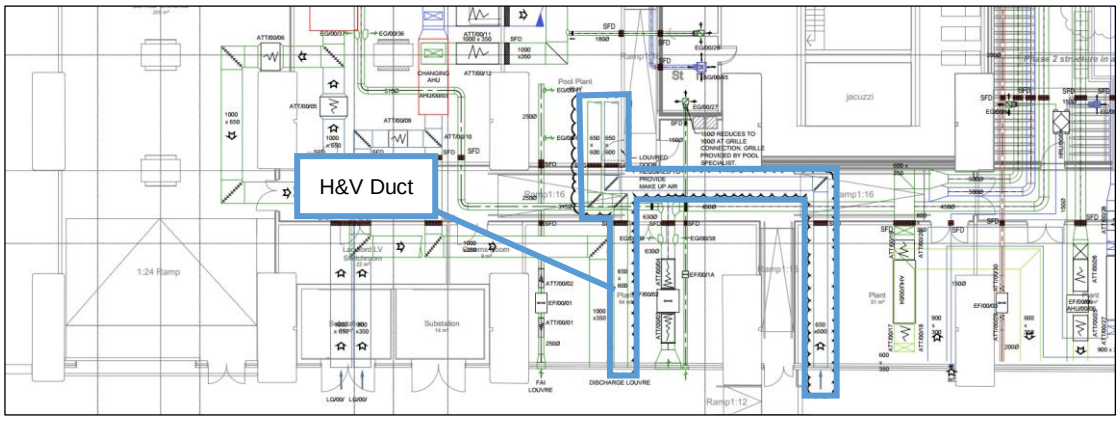
Unit Ref	Fan Section	Sound power levels (dB) at octave band frequencies (Hz)								
		63	125	250	500	1000	2000	4000	8000	dBA
H&V	Fresh Air Supply	71	71	69	69	67	68	66	58	74
	Exhaust Air	73	75	73	74	72	74	71	62	79

9.3 Pool Plant Locations

The following plans highlight the location of the proposed heat and ventilation unit:



Pool Plantroom Layout c/o Portrait Pools 2022



Ground Floor Ventilation Layout c/o Ridge 2021.

9.4 Pool Plant Assessment

We understand that the proposed pool plant could operate 24/7.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained.

The following tables summarise our predictions of atmospheric noise emissions from the H&V unit to the worst affected receptors.

Pool Plant Ref	Predicted SPL at 1m at each Receptor					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
H&V FAI	<5	24	<5	<5	<5	33
H&V Exhaust	<5	27	<5	<5	<5	38
Cumulative H&V noise	<10	29	<10	<10	<10	39

As indicated in the table above, plant noise emissions from the proposed pool plant should be compliant with the limits at each of the nearest noise sensitive receptors.

10.0 Cumulative Noise Egress

Predicted plant noise egress levels at each receptor have been calculated, considering externally mounted plant items or items ducted directly to atmosphere. The results are as provided in the table below:

Description	Predicted cumulative plant noise level SPL at 1m from each Receptor dB					
	Receptor A_N	Receptor A_S	Receptor A_E	Receptor A_W	Receptor B	Receptor C
Predicted Noise Levels Daytime	37	44 (1)	30	42 (1)	34	40
Predicted Noise Levels Night-time	37	32	30	35	22	39
Compliance Note (Daytime/Night-time)	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓

(1) Note that daytime noise levels on the A_S and A_W facades are being driven by the external condenser units in the Level 01 louvred plantroom, however we understand that these units do not serve apartments and so should not be operating during night-time hours.

As indicated above, it is predicted that proposed plant items should be compliant with the agreed criteria during daytime and night-time periods.

Yours sincerely



George Grenfell

for HANN TUCKER ASSOCIATES

Appendix A

Plant Noise & Attenuator Data

Extract Fan Noise Data

The noise data provided for each of the proposed extract fans is listed in the table below:

Unit Ref	Fan Section	Sound power levels (L_w dB) at octave band frequencies (Hz)							
		63	125	250	500	1000	2000	4000	8000
EF/00/01	Supply	69	69	60	57	57	54	50	43
	Discharge	71	75	61	57	59	53	46	37
	Breakout	68	65	53	42	38	31	24	18
EF/00/02	Supply	68	74	71	68	64	62	59	56
	Discharge	71	84	74	73	69	63	59	54
	Breakout	68	69	57	48	45	45	42	34
EF/01/01	Supply	67	67	74	58	56	49	49	44
	Discharge	63	73	81	76	72	68	64	58
	Breakout	65	63	64	58	51	34	30	26
EF/01M/01	Supply	70	76	61	57	55	52	46	43
	Discharge	76	77	66	55	50	44	40	38
	Breakout	71	72	58	48	38	32	35	32
EF/01M/02	Supply	70	76	61	57	55	52	46	43
	Discharge	76	77	66	55	50	44	40	38
	Breakout	71	72	58	48	38	32	35	32
EF/01M/03	Supply	64	63	55	49	45	44	41	35
	Discharge	66	64	55	52	49	44	43	36
	Breakout	66	59	51	41	29	29	20	15
EF/02/01	Supply	63	68	58	52	48	47	44	39
	Discharge	65	67	58	54	51	47	46	39
	Breakout	67	62	54	43	32	27	22	18
EF/02/02	Supply	63	68	58	52	48	47	44	39
	Discharge	65	67	58	54	51	47	46	39
	Breakout	67	62	54	43	32	27	22	18

Extract Fan Attenuators

We understand that attenuators are proposed for each of the extract fans, the insertion losses that were available are as provided in the table below:

Atten. Ref.	Location	Insertion Loss							
		63	125	250	500	1000	2000	4000	8000
ATT/00/01	EF/00/01 Discharge (Atmosphere)	1	3	7	19	28	23	20	15
ATT/00/02	EF/00/01 Intake (Roomside)	1	3	7	19	28	23	20	15
ATT/00/03	EF/00/02 Discharge (Atmosphere)	5	10	16	25	28	26	22	17
ATT/00/04	EF/00/02 Intake (Roomside)	5	10	16	25	28	26	22	17
ATT/01/003	EF/01/01 Exhaust (Atmosphere)	1	2	6	15	20	15	14	10
ATT/01/004	EF/01/01 Extract (Roomside)	1	2	6	15	20	15	14	10
ATT/1M/005	EF/01M/01 Exhaust (Atmosphere)	4	11	17	27	32	32	30	25
ATT/1M/006	EF/01M/01 Extract (Roomside)	4	11	17	27	32	32	30	25
ATT/1M/007	EF/01M/02 Exhaust (Atmosphere)	4	11	17	27	32	32	30	25
ATT/1M/008	EF/01M/02 Extract (Roomside)	4	11	17	27	32	32	30	25
ATT/01M/11	EF/01M/03 Extract (Roomside)	0	2	6	16	23	19	17	12
ATT/01M/12	EF/01M/03 Exhaust (Atmosphere	0	2	6	16	23	19	17	12
ATT/02/13	EF/02/01 Exhaust (Atmosphere)	0	2	6	16	23	19	17	12
ATT/02/14	EF/02/01 Extract (Roomside)	0	2	6	16	23	19	17	12
ATT/02/15	EF/02/02 Exhaust (Atmosphere)	0	2	6	16	23	19	17	12
ATT/02/16	EF/02/02 Extract (Roomside)	0	2	6	16	23	19	17	12

AHU Noise Data

The noise data provided for each of the proposed Air Handling Units is listed in the table below:

Unit Ref	Fan Section	Z weighted Sound levels (dB) at octave band frequencies (Hz)							
		63	125	250	500	1000	2000	4000	8000
AHU/00/01 Supply	SWL @ Inlet	66	65	72	62	60	56	50	41
	SWL @ Outlet	73	70	75	73	75	76	67	63
	SPL Case @ 1m	54	51	42	37	36	44	32	26
AHU/00/01 Exhaust	SWL @ Inlet	69	72	70	66	63	61	57	49
	SWL @ Outlet	74	76	73	73	78	73	68	64

Unit Ref	Fan Section	Z weighted Sound levels (dB) at octave band frequencies (Hz)							
		63	125	250	500	1000	2000	4000	8000
	SPL Case @ 1m	53	55	38	35	37	37	28	19
AHU/00/03 Supply	SWL @ Inlet	63	61	66	61	55	49	45	34
	SWL @ Outlet	65	62	68	67	70	65	60	50
	SPL Case @ 1m	46	43	35	31	31	33	25	13
AHU/00/03 Exhaust	SWL @ Inlet	64	61	67	63	56	55	50	39
	SWL @ Outlet	66	63	69	68	71	68	64	57
	SPL Case @ 1m	45	42	34	30	30	32	24	12
AHU/00/04 AHU/00/05 AHU/00/06	Phase 2								

AHU Attenuators

We understand that attenuators are proposed for each of the air handling units, the insertion losses that were available are as provided in the table below:

Atten. Ref.	Location	Insertion Loss							
		63	125	250	500	1000	2000	4000	8000
ATT/00/05	AHU/00/01 FAI (Atmosphere)	3	7	13	26	37	30	26	16
ATT/00/06	AHU/00/01 Exhaust (Atmos)	3	7	13	26	37	30	26	16
ATT/00/07	AHU/00/01 Extract (Roomside)	4	9	18	34	49	39	34	21
ATT/00/08	AHU/00/01 Supply (Roomside)	4	9	18	34	49	39	34	21
ATT/00/09	AHU/00/03 FAI (Atmosphere)	5	9	16	26	37	30	26	16
ATT/00/10	AHU/00/03 Exhaust (Atmosphere)	5	9	16	26	37	30	26	16
ATT/00/11	AHU/00/03 Supply (Roomside)	5	9	16	26	37	30	26	16
ATT/00/12	AHU/00/03 Extract (Roomside)	5	9	16	26	37	30	26	16

HRU Noise Data

Noise data for the proposed units, as provided by the manufacturer is provided in the table below:

Unit Ref	Fan Section	Z weighted Sound levels (dB) at octave band frequencies (Hz)							
		63	125	250	500	1000	2000	4000	8000
Ruck - LETA K 700	Supply Inlet	64	60	61	51	50	50	40	34
	Exhaust Outlet	65	69	71	69	68	70	64	58
	Case	67	63	59	49	47	47	40	33
Ruck - LETA K 2500	Supply Inlet	66	61	66	55	51	47	40	37
	Exhaust Outlet	72	72	84	73	73	72	67	70
	Case	68	63	72	49	44	44	41	40
Nuaire MR-XBOXAB Eco 5 - 75%	Supply Inlet (open)	47	49	50	43	41	27	16	16
	Exhaust Outlet (open)	47	54	58	59	47	45	33	24
	Case (open)	54	55	52	51	44	42	28	16

HRU Attenuators

We understand that atmosphere side attenuators are proposed for a number of the air handling units, the insertion losses that were available are as provided in the table below:

Atten. Ref.	Location	Insertion Loss							
		63	125	250	500	1000	2000	4000	8000
ATT/01 M/01	HRU/01M/01 FAI (Atmosphere)	6	11	18	26	35	30	25	16
ATT/01 M/04	HRU/01M/01 Exhaust (Atmosphere)	5	11	19	32	53	52	48	33
ATT/01 /03	HRU/01/01 Exhaust (Atmosphere)	1	2	6	15	20	15	14	10
ATT/01 /04	HRU/01/01 FAI (Atmosphere)	1	2	6	15	20	15	14	10
ATT/02 /01	HRU/02/01 FAI (Atmosphere)	6	11	18	26	35	30	25	16
ATT/02 /02	HRU/02/01 Exhaust (Atmosphere)	6	11	19	30	43	39	33	22
ATT/02 /05	HRU/02/02 FAI (Atmosphere)	6	11	18	26	35	30	25	16
ATT/02 /07	HRU/02/02 Exhaust (Atmosphere)	6	11	19	30	43	39	33	22
ATT/02 /09	HRU/02/03 FAI (Atmosphere)	6	11	18	26	35	30	25	16
ATT/02 /11	HRU/02/03 Exhaust (Atmosphere)	6	11	19	30	43	39	33	22