

ACOUSTIC TECHNICAL NOTE



Reference:	8231.ATN05.PNA.1
Revision:	1
To:	Stuart Lody (Barratt London)
From:	Alex J Wyatt
Date:	25 March 2022
Project:	Former Nestle Factory, Nestle Avenue, Hayes
Subject:	Block F1 - Rooftop Fan & Condenser Noise Assessment

1.0 INTRODUCTION

This Acoustic Technical Note is prepared on behalf of Barratt London to assess noise produced by plant which serves the above development. The rooftop environmental & smoke extract fans and condensers which serve Block F1 have been assessed to determine if the future installations will meet the project plant noise criteria.

2.0 CRITERIA

2.1 Plant Noise Limits

The RBA Acoustics Energy Centre Acoustic Strategy Report Ref: 8231.RP03.ECA.2 dated 6 November 2018 presents the appropriate noise criteria for the proposed plant at the development site to ensure compliance with achieving -5dB below the measured background noise levels which were ascertained at the planning stage and as detailed in our Acoustic Assessment Report Ref: 8231.RP01.AAR.2 dated 1 March 2019. The relevant criteria are repeated below for ease of reference;

(a) Development and non-development windows to the south and east of site

Emergency plant items (testing between 09:00 – 17:00 hours)	65dBA
Daytime plant operation (07:00 – 23:00 hours)	50dBA
Night-time plant operation (23:00 – 07:00 hours)	47dBA

(b) Development and non-development windows to the west of site

Emergency plant items (testing between 09:00 – 17:00 hours)	66dBA
Daytime plant operation (07:00 – 23:00 hours)	51dBA
Night-time plant operation (23:00 – 07:00 hours)	47dBA

(c) Development and non-development windows to the north of site

Emergency plant items (testing between 09:00 – 17:00 hours)	64dBA
Daytime plant operation (07:00 – 23:00 hours)	49dBA
Night-time plant operation (23:00 – 07:00 hours)	47dBA

(d) Development windows facing to the centre of site

Emergency plant items (testing between 09:00 – 17:00 hours)	63dBA
Daytime plant operation (07:00 – 23:00 hours)	48dBA
Night-time plant operation (23:00 – 07:00 hours)	43dBA

These limits apply to the cumulative effect of all plant as measured at the nearest neighbouring noise-sensitive façade.

Please note that the noise limits detailed in (d) are relevant to the future nearest noise-sensitive receptors to the proposed Block F1 plant.

2.2 Post Installation Noise Assessment

In order to meet the requirements of Planning Condition 25, RBA will undertake a commissioning assessment, once the plant has been installed, and will submit a report demonstrating whether the design requirements have been met. This report will be submitted to the Local Planning Authority for this planning condition to be discharged.

Please note that noise commissioning measurements will need to be undertaken once the equipment has been fully balanced and set to operate at the required design duties.

3.0 ASSESSMENT

3.1 Proposed Equipment and Nearest Noise Sensitive Receptors

We understand there are 1No. smoke extract/environmental fan, 1No. environmental mode fan and 13No. condensers on the roof of Block F1 – see attached Roof Plan as Figure 1. The nearest Noise Sensitive Receptors to these items of plant are the residential windows of Block F1 on the floor below. It is worth noting that the north-facing windows of this Block, overlooking the Segro site opposite, are sealed / fixed shut and cannot be opened (for contractual reasons) and this therefore minimises the risks of potential complaint from occupants of plant noise, nonetheless plant will be designed to the relevant criteria as standard.

In addition, there are a further 11No. condensers at ground floor level to the rear of the block fixed to the wall of the stair core F1.3, as well as some smaller fans serving refuse and cycle stores – see attached Ground Floor Plan as Figure 2. The condensers are located to the North side of the staircore, which is proud of the building façade, and also the windows to the residential flats are recessed in the external gantry/access walkway and are also fixed shut.

In order to meet the atmospheric plant noise criteria at the nearest residential windows, attenuation of noise emissions from the environmental fan, extract fans and condensers should be designed to not exceed **48dBA @ 1m** (daytime) and **43dBA @ 1m** (night-time) from the nearest noise sensitive windows.

Noise emissions from the smoke extract fans during test operation should be designed to not exceed **63dBA @ 1m** from the nearest noise sensitive windows.

3.2 Proposed Plant Items

Limiting levels will be provided for the ducted fan systems by back-calculating from the criteria. Details of the proposed condensers are listed below.

Table 1 – Condenser Information

Compound Location	Manufacturer/Model	No. Off
Ground Floor	Samsung AM080FXMDGH/EU	8
	Samsung AM060FXMDEH/EU	2
	Daikin REYQ16U7Y1B	1
Roof Level	Samsung AM080FXMDGH/EU	7
	Samsung AM060FXMDEH/EU	5
	Samsung AM040FXMDEH/EU	1

3.3 Noise Levels

Information regarding the noise levels of the proposed condensers has been provided by the manufacturer of the units. The associated plant noise levels are detailed as follows:

Table 2 – Condenser Noise Levels

Unit	Mode	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
Samsung 80	Cooling	SPL @ 1m	58	58	57	54	51	45	40	30	56
	Silent 1	SPL @ 1m	51	54	54	50	48	42	37	27	53
	Silent 2	SPL @ 1m	48	50	50	46	44	40	35	25	50
	Silent 3	SPL @ 1m	45	46	46	42	40	37	32	22	47
Samsung 60	Cooling	SPL @ 1m	54	54	52	48	47	45	38	27	53
	Silent 1	SPL @ 1m	47	50	49	45	44	37	34	24	50
	Silent 2	SPL @ 1m	44	45	45	42	40	36	32	21	47
	Silent 3	SPL @ 1m	41	42	42	38	37	35	28	17	44
Samsung 40	Cooling	SPL @ 1m	51	51	50	46	45	44	35	25	50
	Silent 1	SPL @ 1m	46	46	46	44	42	39	34	23	47
	Silent 2	SPL @ 1m	43	44	44	40	39	35	30	20	44
	Silent 3	SPL @ 1m	40	41	40	36	35	33	26	16	41

Unit	Mode	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
Daikin	Standard	SPL @ 1m	67	69	65	61	55	52	52	47	63
	Quiet 1	SPL @ 1m	50	55	55	51	42	44	40	38	53
	Quiet 2	SPL @ 1m	53	47	50	45	41	37	37	34	48
	Quiet 3	SPL @ 1m	53	55	47	42	37	35	34	33	46

3.4 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed plant at the nearest residential windows, based on the information stated above, is summarised below.

- Source-term, Sound Pressure Level (SPL) or Sound Power Level (SWL)
- Duct losses
- Grille-end reflections
- Reflections
- Directivity
- Acoustic screening from roof-edge
- Barrier screening loss
- Divergence Correction
- 20LogR distance attenuation

The results of the calculations indicate the following noise levels at the nearest affected residential windows, based upon noise emissions from the condensers only. Ducted fan systems have been “removed” from the calculations by detailing a limiting level, see Section 3.5 below.

Table 3 – Predicted Noise Levels

Condenser Compound Location	Noise Level at Nearest NSR	
	Prediction (dBA)	Criterion (dBA)
Ground Floor	<43	43
Roof Level	~32	43

Noise from the proposed units meet the criteria and, therefore, no further mitigation is required, albeit if it is possible to run any or all of the condensers in a “night set back mode” (i.e. Silent or Quiet mode) then this will further reduce the source noise levels and therefore minimise the audibility of the condensers even further. From the above data, a minimum 3dBA reduction should be realised – if not significantly more – which would be considered a noticeable difference.

3.5 Limiting Levels for Ducted Fan Systems

In order to achieve the 43dBA criterion at the nearest residential windows, the ducted fan systems to the refuse chute room and the cycle stores should be designed, and in-line attenuation provided, to ensure each termination point of each system achieves a limiting level of 40dBA @ 1m on-axis.

The environmental mode fan system on the roof should be designed to achieve a limiting level of 65dBA @ 1m on-axis from the outlet of the exhaust discharge point.

The above limit should include the times when higher fan speeds will be required in high heat gain periods.

The smoke extract fan systems on the roof should be designed to achieve a limiting level of 85dBA @ 1m on-axis from each termination.

We understand that routine testing of the emergency smoke extract systems will be required. We would note that testing of these systems should be undertaken during the daytime (between 09:00-17:00 hours) on a weekday.

Adoption of the above noise limiting levels will ensure the plant noise criteria outlined in Section 2.1 are achieved.

3.6 Environmental Fan Roomside Noise Limit

We would advise that the design of the smoke shaft system (when operating in environmental mode) should achieve a level of NR35 when assessed within the residential common corridor areas, i.e. 1m from the AOV louvre in the worst case (top floor) corridor.

We have recently encountered noise problems due to wind generated noise from such shafts. M&E Contractors should ensure that the outlet design prevents such noise nuisance. In addition, noise from the motors controlling the louvres has also been problematic on past projects and they should ensure the motors are sufficiently isolated.

3.7 Vibration Isolation / Anti-Vibration Mounts

Each item of mechanical services plant will require appropriate treatment in order to ensure vibration transfer to the building structure (which may then cause a re-radiated noise issue) is controlled to acceptable levels. We therefore present the following advice.

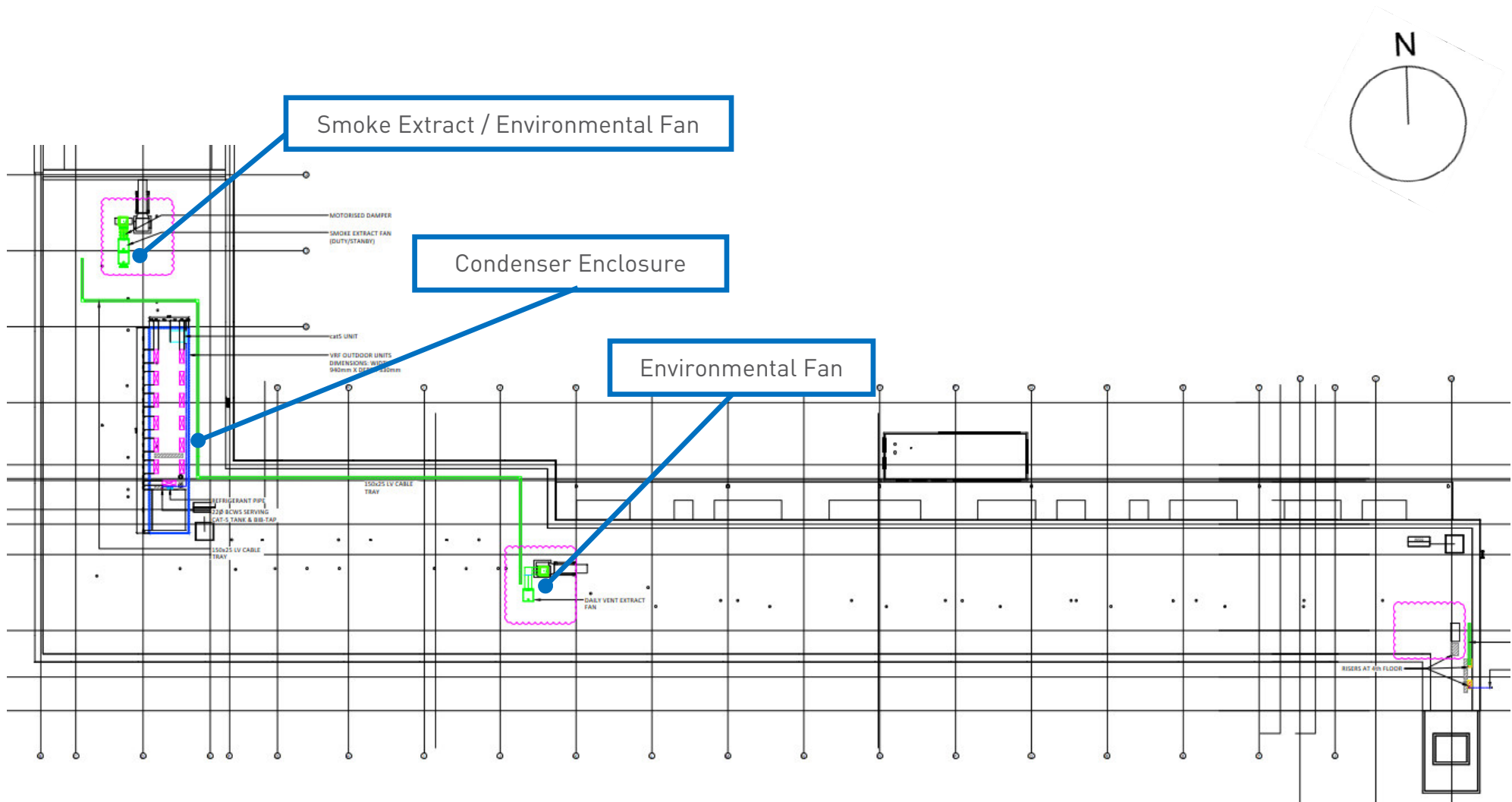
We would advise that the condensers should be isolated from the supporting structure by means of neoprene in-shear isolators with a 10mm static deflection. The units should either be mounted on a concrete plinth or mounted on bigfoot frames on the roof, or on metal angle brackets from the rear wall of the stair core at ground level.

Where there are cased fans located across the development, such as the refuse & cycle store extract fans and the environmental fan, these should be isolated using neoprene in-shear isolators or hangers with neoprene turrets with a minimum 10mm static deflection.

The smoke extract fans should be isolated via caged steel springs with a restraining device and minimum static deflection of 25mm.

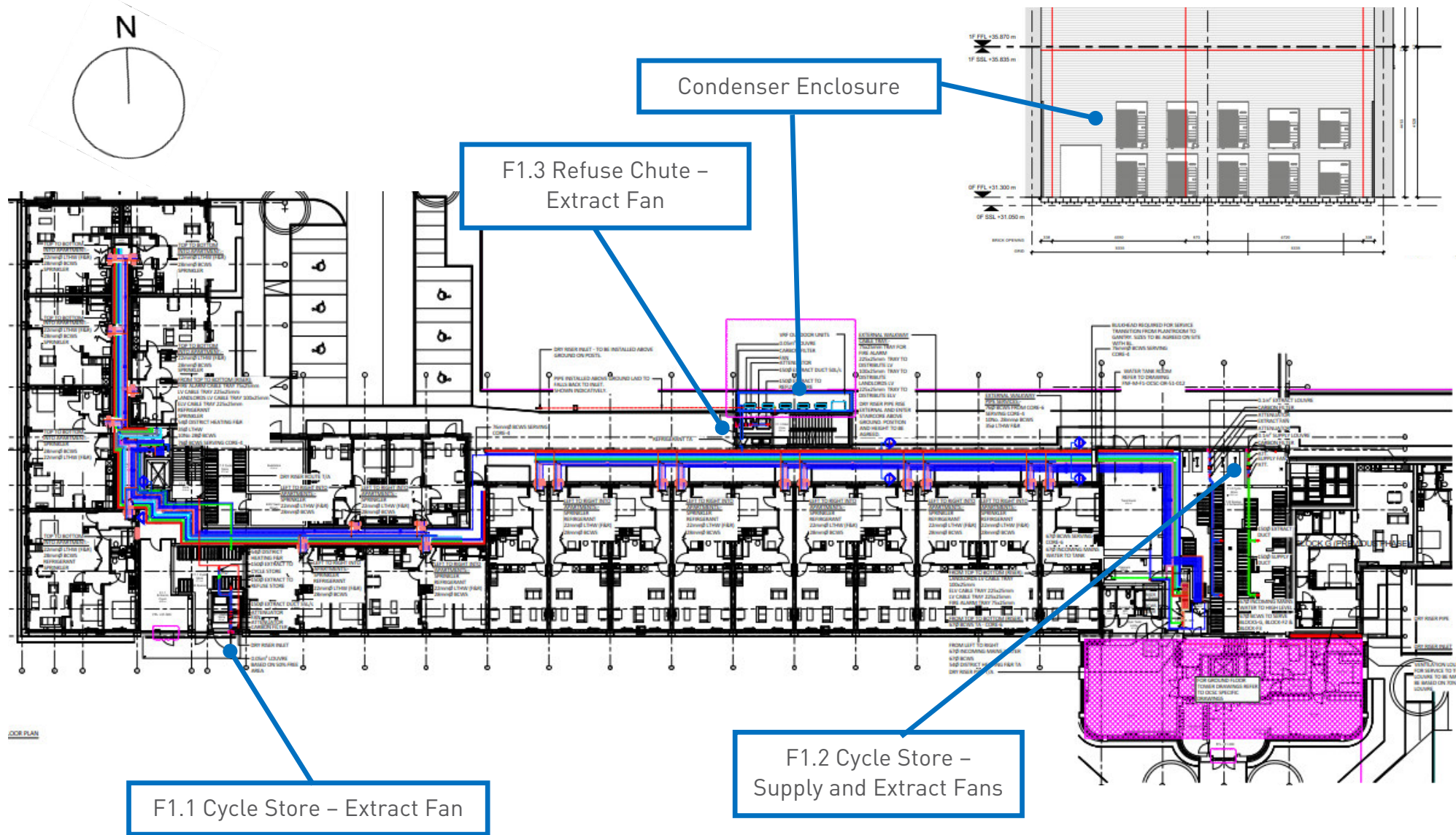
3.8 Conclusion

Our assessment shows that the current proposals ensure that noise levels at the nearest noise-sensitive receptors are within the required criteria and should be considered acceptable, providing the mitigation measures detailed herein are adopted; namely, the limiting levels for the fans, night setback mode for the condensers, and AVMs for each item of plant.



Former Nestle Factory, Nestle Avenue, Hayes
Roof plan showing plant locations
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Figure 1
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Not to Scale



Former Nestle Factory, Nestle Avenue, Hayes
Ground Floor plan showing plant locations
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Figure 2
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Not to Scale