
**Paragon Mill
4 Cotton Street, Manchester**

Building Services Noise Assessment

Project: Ground Floor, Paragon Mill, 4 Cotton Street, Manchester

Client: NQC Ltd

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Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by NQC Ltd to undertake a noise impact assessment with regard to new building services plant for the ground floor of Paragon Mill, No.4 Cotton Street, Manchester, M4.
- 1.2 The ground floor of the building is to be refurbished in order to provide new office accommodation. The ground floor was previously used as office accommodation and also as storage space. It is understood that the building is owned by Manchester City Council.
- 1.3 A new air-conditioning system is to be installed within the space which will require three outdoor condensing units.
- 1.4 The space will also be mechanically ventilated via a number of heat recovery units located within the ceiling void. The units will provide a fresh air supply to the space whilst extracting stale air.
- 1.5 The proposed condenser units and air intake/extract louvres will be located at ground floor level within an enclosed private car park.
- 1.6 There are dwellings (apartments) directly above the car park and also within the surrounding buildings.
- 1.7 A noise assessment has been undertaken taking into consideration the guidance given within BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*.
- 1.8 An environmental noise survey has been conducted in order to determine the typical background sound level during the daytime and night-time period.
- 1.9 Octave band sound level data has been used to determine the plant sound pressure levels at adjacent dwellings.
- 1.10 The survey and assessment was conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Corporate Member of the Institute of Acoustics.
- 1.11 This assessment has been updated following a revision to the outdoor condenser unit specification. The originally proposed Mitsubishi units have been replaced with quieter Samsung units in order to reduce the resulting sound level at adjacent properties.
- 1.12 This report provides the survey results, details of the proposed building services plant, calculated sound levels at adjacent receptors and the anticipated impact.

2. Assessment Guidance & Criteria

Manchester City Council, Planning & Noise (Technical Guidance)

- 2.1 With regard to noise from fixed plant and equipment, Manchester City Council's guidance document states the following:

'Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142:2014 and any application for fixed plant, equipment or machinery must demonstrate that:

Externally mounted ancillary plant, equipment and servicing 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'.

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 2.2 BS 4142 (amended June 2019) describes methods for rating and assessing sound of an industrial and/or commercial nature, such as sound from manufacturing processes and fixed mechanical plant/machinery.
- 2.3 Outdoor sound levels are used to assess the likely effect on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.4 BS 4142 is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.5 The standard has three different methods (subjective, objective and reference) of applying a penalty to tonal, impulsive and intermittent noises, as separate entities.
- 2.6 The current standard no longer indicates significance of noise impacts as giving rise to a '*likelihood of complaint*' but rather as an '*indication*' of varying degrees of '*adverse impact*'.
- 2.7 BS 4142:2014 states that a difference of around +10 dB or more (excess of rating level above the background sound level) is likely to be an indication of a significant adverse impact, depending on the context.
- 2.8 A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 2.9 The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- 2.10 Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3. Environmental Noise Survey

Survey methodology

- 3.1 Continuous sound level monitoring was conducted over a 24-hour period within the ground floor car park directly adjacent to Jersey Street. Measurements were performed from 12:00 hours on Monday 09th through to 12:00 hours on Tuesday 10th March 2020.
- 3.2 The monitoring position was directly adjacent to the apartments that overlook the car park.
- 3.3 A measurement interval of 15 minutes was used throughout the survey and measurements were considered to be subject to reflections from the building facade (as opposed to free-field).
- 3.4 The site location and survey measurement position are shown in Figure 3.1.

Figure 3.1 – Site location and survey measurement position (Source: Google Earth)



Survey equipment

- 3.5 The survey was performed using the following Class-1 specification equipment:
- Brüel & Kjaer 2250-Light data logging sound level meter, with microphone type 4189 and pre-amplifier type ZC0032.
 - Brüel & Kjaer 4231 acoustic calibrator.
- 3.6 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (calibration certificates are available on request).
- 3.7 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the survey. The drift in calibration was less than 0.1 dB.

Weather conditions

- 3.8 The weather conditions during the survey were generally dry and fine with clear sunny spells.
- 3.9 Temperatures ranged between 7 and 12°C and wind speed measurements were less than 2 m/s⁻¹.
- 3.10 There were a number of intermittent showers during the daytime and early morning hours, however the overall weather conditions were considered suitable to obtain representative measurements.

Subjective observations of the acoustic environment

- 3.11 The dominant source of noise was observed to be road traffic on the local road network (Redhill Street, Jersey Street, Murray Street and Bengal Street).
- 3.12 The ring road (A665) to the south west is a notable source of background noise at the site.
- 3.13 Other notable sources include high altitude aircraft and intermittent activity from neighbouring commercial premises.

Results summary

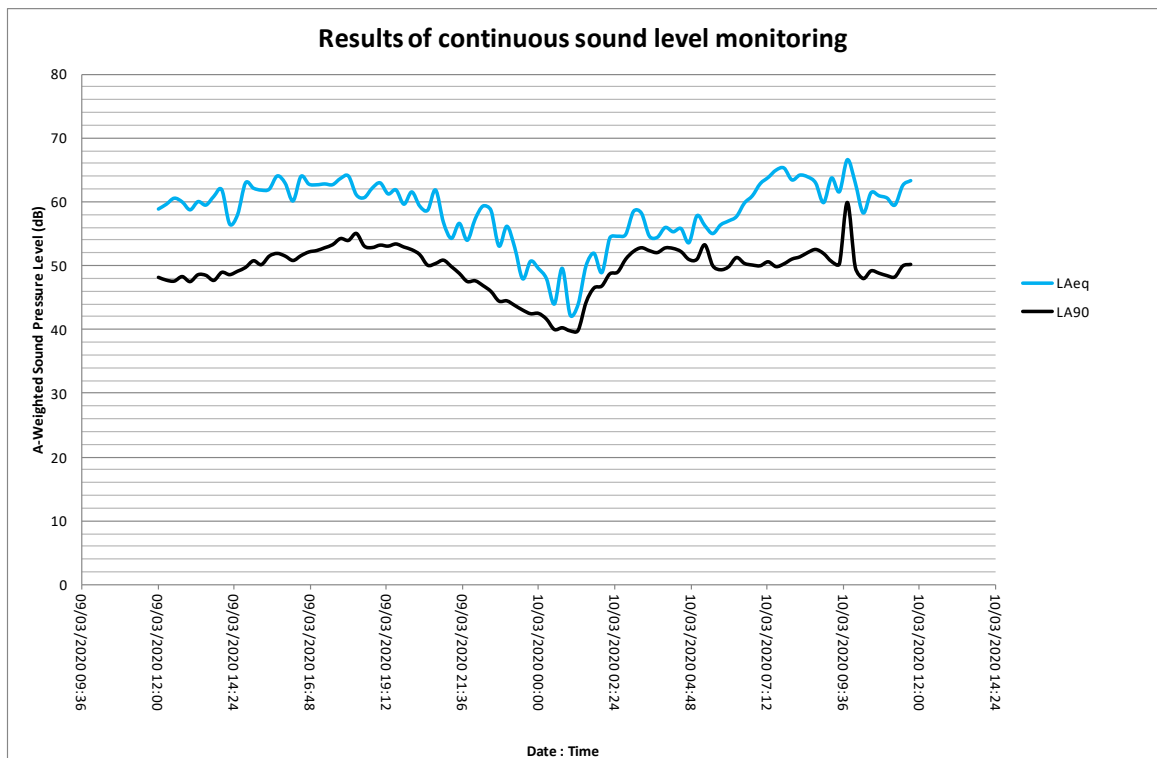
- 3.14 Table 3.1 presents a summary of the measured background L_{A90} sound pressure levels. Measured values have been rounded to the nearest whole number.

Table 3.1 – Summary of measured background L_{A90} sound pressure levels

Date	Period, Hours	Typical ¹ $L_{A90,15min}$ dB	Lowest $L_{A90,15min}$ dB	Highest $L_{A90,15min}$ dB
Monday 09/03/2020 - Tuesday 10/03/2020	Daytime (07:00-23:00)	50	44	60
	Daytime (07:00-18:00)	48	47	60
	Night-time (23:00-07:00)	40	40	53
¹ Considered to be the representative background sound level (from a statistical analysis)				

- 3.15 The results of the sound level monitoring are presented graphically in Figure 3.2. Additional survey data is provided within Appendix B.

Figure 3.2 – Graph showing results of continuous sound level monitoring



4. Assessment & Discussion

Sound level targets for new building services plant

- 4.1 Taking into account MCC's requirements, the sound rating level (L_{Aeq}) from all new building services plant should be at least 5 dB below the typical background sound level ($L_{A90,T}$).
- 4.2 BS 4142 states 'Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context'.
- 4.3 It should be noted that the 'typical' background sound level when determined via a statistical analysis (i.e. in accordance with BS 4142) is 48 dB $L_{A90,15min}$ during the proposed operating hours.
- 4.4 However, the Environmental Health Department have stated that the 'typical' background sound level is considered by Manchester City Council to be the lowest background sound level during the daytime period (i.e. during the proposed plant operating hours).
- 4.5 On this basis, the sound level targets for new fixed plant items are presented in Table 4.1.
- 4.6 The sound level targets should be achieved at approximately 1 metre from the nearest noise sensitive window. Where free-field measurements are undertaken, the sound level targets may be reduced by 3 dB.

Table 4.1 – Sound level targets for new building services plant

Period, Hours	Lowest Background Sound Level $L_{A90,15min}$ dB	Target Rating Level $L_{Aeq,15min}$ dB
Daytime (07:00-18:00)	47	42
Night-time (23:00-07:00)	40	35

- 4.7 The new plant will not operate during the night-time period and therefore the appropriate target at adjacent windows is 42 dB $L_{Aeq,T}$.

New building services plant and nearest noise sensitive receptors

- 4.8 There will be three outdoor condensing units installed at ground floor level within an enclosed private car park. The condenser units are required to serve the air-conditioning system.
- 4.9 The office space will also be mechanically ventilated via three heat recovery units located within the ceiling void. The units will simultaneously supply fresh air whilst extracting stale air.
- 4.10 Figure 4.1 and 4.2 overleaf show the proposed location for the condensing units and the air intake/exhaust louvers.
- 4.11 The distance from the condensing units to the apartment windows on the opposite side of the car park is approximately 12 metres. Since the lowest apartment is at first floor level, the new plant may be partially screened by the building overhang. However, it is assumed that there will be a line-of-sight between the plant location and the apartment windows. The average distance from the air intake/exhaust louver to the opposite windows is approximately 13 metres.
- 4.12 There are apartments directly above the plant location, however the plant will be visually and acoustically screened from the windows above due to a notable recess in the building between ground and first floor level.

Figure 4.1 – Section showing proposed plant location

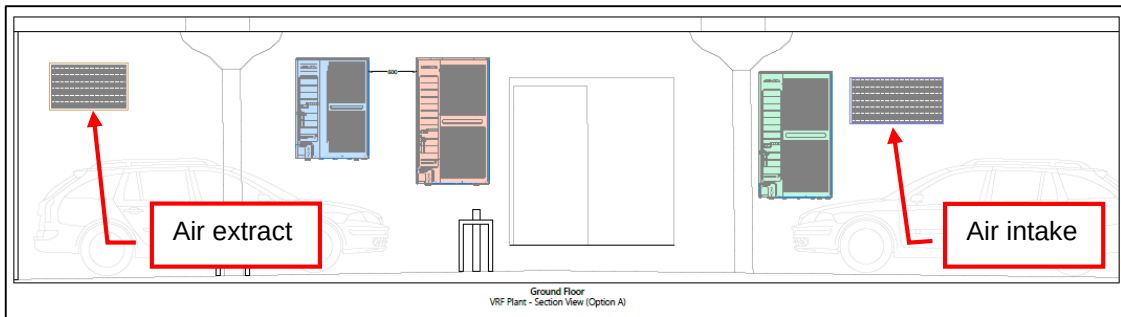
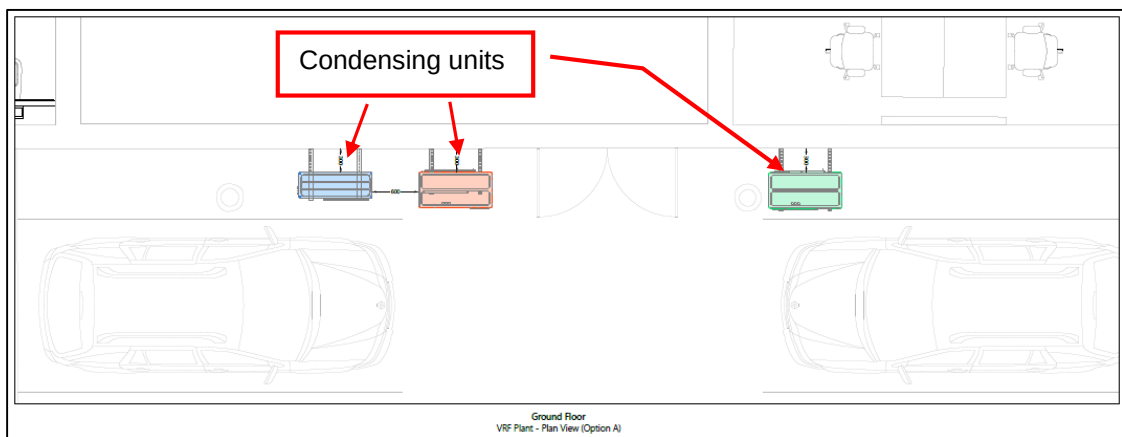


Figure 4.2 – Site plan showing proposed plant location



4.13 The condenser model types are understood to be as follows:

- 2 x Samsung AM100KXMDGH (58 dBA at 1 metre).
- 1 x Samsung AM040NXMDER (50 dBA at 1 metre).

4.14 The heat recovery units will be Mitsubishi Lossnay units, type LGH-RVX-E (or similar).

4.15 The octave-band sound pressure levels for the condenser units are presented in Table 4.2 and 4.3 (cooling mode). The sound level data for the units is presented graphically in Appendix A.

4.16 It is worth noting that the condenser units can be up to 2 dB louder in heating mode, when compared to the standard cooling mode (assuming the units run at full operating duty).

Table 4.2 – Condenser AM100KXMDGH octave band sound pressure levels (L_{eq} dB)

Octave Band Centre Frequency (Hz)								Overall L_{Aeq} dB
63	125	250	500	1000	2000	4000	8000	
63	63	57	54	53	49	46	37	58

Table 4.3 – Condenser AM040NXMDER octave band sound pressure levels (L_{eq} dB)

Octave Band Centre Frequency (Hz)								Overall L_{Aeq} dB
63	125	250	500	1000	2000	4000	8000	
51	50	49	46	44	42	35	23	50

- 4.17 It is understood that the heat recovery units generate a sound pressure level of approximately 32 dBA at a distance of 1.5 metres from the unit casing. The octave band sound power levels for the air intake and exhaust fans are currently unavailable for the proposed units.
- 4.18 For this assessment, the octave band sound power levels for the intake and exhaust fans of a similar Caice heat recovery unit have been used in the calculations. The sound power levels are provided in Table 4.4.

Table 4.4 – Heat recovery unit octave band sound power levels (L_w dB)

Fan	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Fresh air intake	67	68	71	66	60	59	55	47
Exhaust	68	67	68	66	64	67	61	58

Predicted plant sound levels at adjacent dwellings

Condenser unit sound level

- 4.19 It is assumed that the condenser units and heat recovery units (air supply/extract fans) will operate simultaneously and continuously. This assessment is therefore a worst-case scenario.
- 4.20 To determine the level of sound attenuation due to distance separation, standard acoustic principals for a point source have been assumed.
- 4.21 Table 4.5 presents a calculation summary for the proposed condenser units taking into consideration the sound pressure spectrum, surface directivity factor (reflection) and average distance separation. Tabulated values have been rounded to the nearest whole number.

Table 4.5 – Cumulative condenser unit sound pressure level at adjacent dwellings

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Samsung AM100KXMDGH (L _{eq} dB)	63	63	57	54	53	49	46	37
Samsung AM100KXMDGH (L _{eq} dB)	63	63	57	54	53	49	46	37
Samsung AM040NXMDER (L _{eq} dB)	51	50	49	46	44	42	35	23
Cumulative sound pressure L_{eq} dB	66	66	60	57	56	52	49	40
Directivity factor dB	+3	+3	+3	+3	+3	+3	+3	+3
Distance attenuation dB	-22	-22	-22	-22	-22	-22	-22	-22
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level dB	21	31	32	35	37	34	31	20
Specific sound level L_{Aeq,T} = 42 dB								

- 4.22 The calculation results indicate a specific sound pressure level of approximately 42 dB L_{Aeq,T} at the adjacent dwellings in cooling mode.
- 4.23 Taking into consideration the tonal characteristics of the units, it is considered unnecessary to apply a correction (penalty) with regard to the potential tonality or characteristics of the noise as experienced at the receptor position.
- 4.24 On this basis, the specific sound level is considered to be equal to the rating level (42 dB L_{Ar,15min}).
- 4.25 It is understood that the air-conditioning system and outdoor condenser units will operate during the daytime hours only (circa 07:00 to 18:00 hours).
- 4.26 The ideal target noise limit at adjacent windows is 42 dB L_{Aeq,T} during the daytime period.
- 4.27 The sound rating level of the condenser units therefore achieves the target noise limit in cooling mode.

- 4.28 It should be noted that the rating level is actually 5 dB below the lowest background sound level during the proposed operating hours.
- 4.29 With regard to heating mode, the condenser units could potentially be up to 2 dB louder should the units run simultaneously and at full operating duty (which is unlikely). In this instance, the units would marginally exceed the target.
- 4.30 However, the sound rating level of the condenser units would still be approximately 3 dB below the lowest background sound level and 4 dB below the typical background sound level during the proposed operating hours.
- 4.31 With regard to the anticipated noise impact, BS 4142 states:
- The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs...*
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- 4.32 On this basis, noise from the condenser units in both operating modes is expected to have a low impact at adjacent dwellings.
- 4.33 It is anticipated that noise from the condenser units will be inaudible and will not cause disturbance at the adjacent dwellings.
- Vibration control**
- 4.34 It is recommended that suitable anti-vibration (resilient) mounts are fitted to the condenser unit in order to eliminate the potential for structure-borne noise. Without appropriate anti-vibration mounts, vibration levels from the condenser unit could potentially become audible as structure-borne noise.

Heat recovery unit (air supply/extract) sound level

- 4.35 Table 4.6 and 4.7 present the calculation results for the air supply and extract system, taking into consideration the fan sound power spectrum, in-duct attenuation, end reflection loss and distance separation.

Table 4.6 – Air intake sound pressure level at adjacent dwellings

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Air intake cumulative L_w dB	72	73	76	71	65	64	60	52
In-duct attenuation dB	-15	-12	-6	-3	-3	-3	-3	-3
Bend attenuation dB	0	0	0	-2	-4	-6	-6	-6
End reflection loss dB	-9	-5	-2	0	0	0	0	0
Spherical radiation dB	-33	-33	-33	-33	-33	-33	-33	-33
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level L_{Aeq} dB	-11	7	26	30	25	23	19	9
Specific sound level $L_{Aeq,T} = 33$ dB								

Table 4.7 – Air exhaust sound pressure level at adjacent dwellings

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Air exhaust cumulative L_w dB	73	72	73	71	69	72	66	63
In-duct attenuation dB	-2	-2	-2	-3	-4	-4	-4	-4
Bend attenuation dB	0	0	0	-2	-4	-6	-6	-6
End reflection loss dB	-9	-5	-2	0	0	0	0	0
Spherical radiation dB	-33	-33	-33	-33	-33	-33	-33	-33
A-weighting correction dB	-26	-16	-9	-3	0	+1	+1	-1
Resulting level L_{Aeq} dB	3	16	27	30	28	30	24	19
Specific sound level $L_{Aeq,T} = 35$ dB								

- 4.36 The calculation results indicate a specific sound pressure level of approximately 33 dB $L_{Aeq,T}$ for the air intake and approximately 35 dB $L_{Aeq,T}$ for the air exhaust at the adjacent dwellings.
- 4.37 The cumulative sound pressure level for the air intake and exhaust is approximately 37 dB $L_{Aeq,T}$.
- 4.38 Taking into consideration the tonal characteristics of the system, it is considered unnecessary to apply a correction with regard to the potential tonality or characteristics of the noise as experienced at the receptor position.
- 4.39 The specific sound level is therefore considered to be equal to the rating level (37 dB $L_{Ar,15min}$).
- 4.40 It is understood that the ventilation system will operate during the daytime hours only.

- 4.41 The sound rating level of the supply and extract system is therefore approximately 5 dB below the target noise limit and 10 dB below the lowest background sound level during the proposed operating hours.
- 4.42 In practice, noise from the supply and extraction system will be inaudible and will not cause disturbance at the neighbouring dwellings.
- 4.43 On this basis, the proposed air supply and extraction system is expected to have a negligible impact at adjacent dwellings.
- 4.44 It is also worth noting that the cumulative sound level of the condenser units and air intake/extract system combined is expected to be below the lowest background sound level during the daytime period and inaudible at adjacent dwellings.

5. Conclusion

- 5.1 The typical background sound level has been determined by continuous sound level monitoring over 24-hours.
- 5.2 The survey was conducted during the pandemic when commercial activity and local traffic flow was considerably reduced. The current background sound levels are likely to be slightly higher than those measured previously and therefore this assessment is considered to be robust.
- 5.3 Appropriate noise targets have been determined for the daytime and night-time period.
- 5.4 The air-conditioning system and ventilation system will operate during the daytime hours only.
- 5.5 Predictions indicate that the sound rating level of the newly proposed condenser units will achieve the target noise limit in cooling mode. The sound rating level is 5 dB below the lowest background sound level during the proposed operating hours.
- 5.6 With regard to heating mode, the condenser units could potentially be up to 2 dB louder than in cooling mode and in this instance would marginally exceed the ideal target. However, the rating level would still be 3 dB below the lowest background sound level and 4 dB below the typical background sound level during the proposed operating hours.
- 5.7 Noise from the condenser units in both cooling mode and heating mode is expected to have a low impact at adjacent dwellings. In practice, it is anticipated that noise from the condenser units will be inaudible and will not cause disturbance at the neighbouring dwellings.
- 5.8 Predictions indicate that the sound rating level of the supply and extract system is approximately 5 dB below the target noise limit and 10 dB below the lowest background sound level during the proposed operating hours.
- 5.9 On the basis of this assessment and BS 4142 guidance, the operation of the proposed plant is expected to have a negligible impact at the adjacent dwellings.

Appendix A

Condenser sound level data

Figure A.1 – Sound level data for Samsung AM100KXMDGH

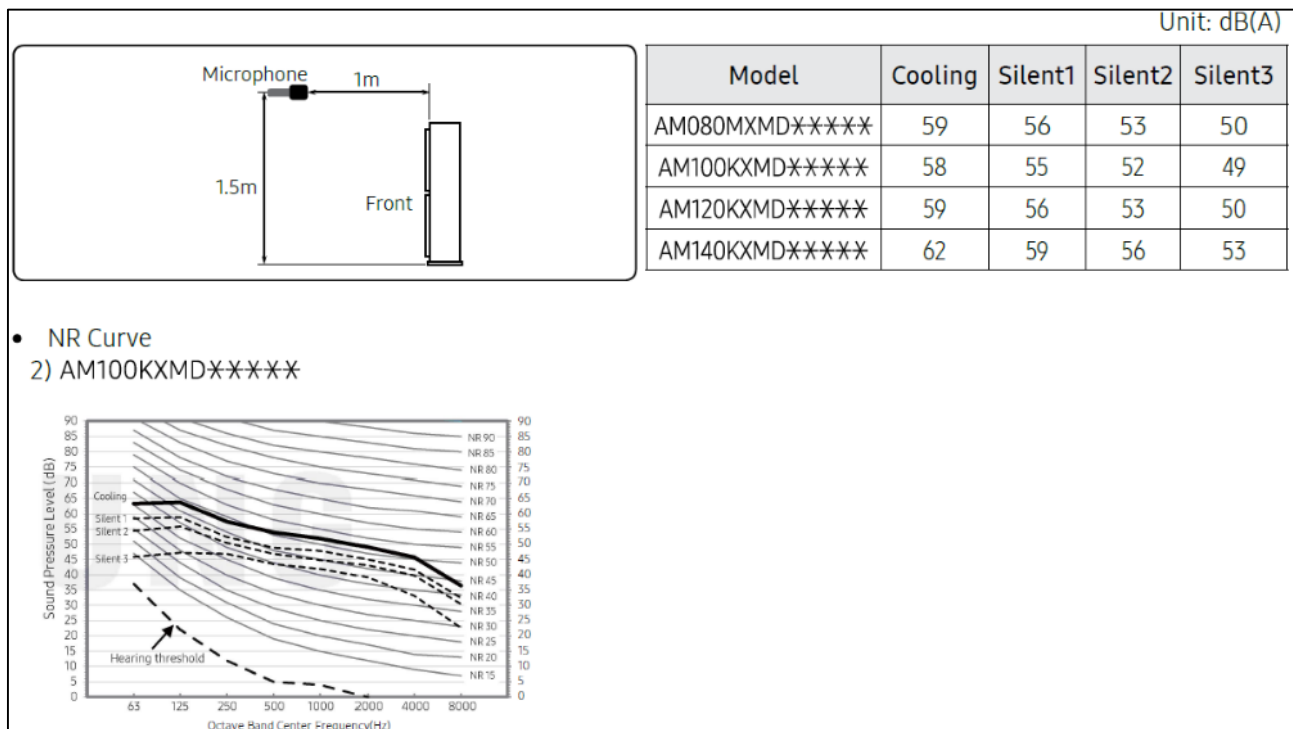
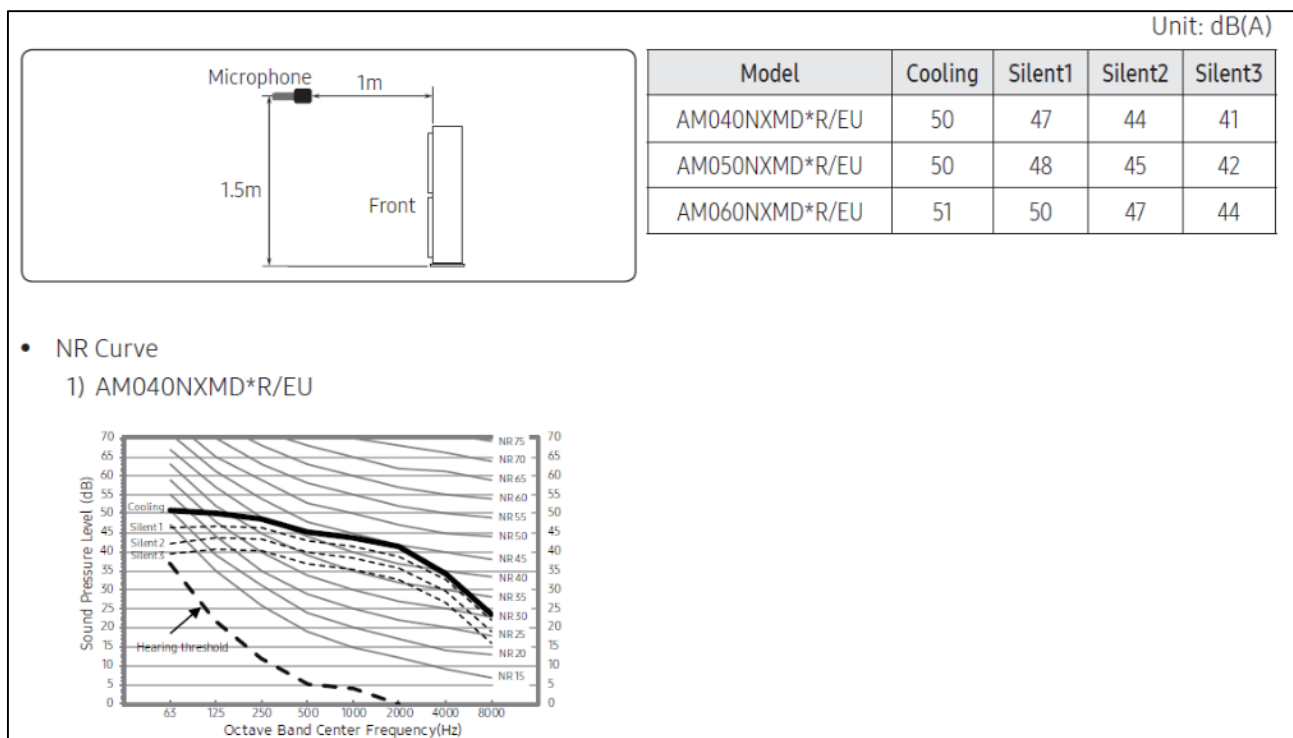


Figure A.2 – Sound level data for Samsung AM040NXMDER



Appendix B

Tabulated survey data

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A10,15min} dB	L _{A90,15min} dB
09/03/2020 12:00	78.5	58.8	60.5	48.2
09/03/2020 12:15	76.3	59.6	60.2	47.7
09/03/2020 12:30	80.2	60.5	63.4	47.0
09/03/2020 12:45	76.4	59.9	62.9	48.3
09/03/2020 13:00	78.9	58.7	60.6	47.5
09/03/2020 13:15	79.1	60.0	61.2	48.6
09/03/2020 13:30	75.0	59.5	62.4	48.5
09/03/2020 13:45	77.6	60.8	64.5	47.7
09/03/2020 14:00	80.1	61.8	63.5	49.0
09/03/2020 14:15	76.9	56.5	59.0	48.6
09/03/2020 14:30	79.5	58.0	59.8	49.1
09/03/2020 14:45	81.0	62.9	65.5	49.7
09/03/2020 15:00	79.5	62.1	64.4	50.8
09/03/2020 15:15	80.7	61.8	63.2	50.2
09/03/2020 15:30	76.8	61.9	65.2	51.5
09/03/2020 15:45	82.8	64.0	67.7	51.9
09/03/2020 16:00	80.4	62.9	65.2	51.5
09/03/2020 16:15	79.7	60.1	61.9	50.8
09/03/2020 16:30	81.9	63.9	67.0	51.6
09/03/2020 16:45	80.9	62.7	63.7	52.2
09/03/2020 17:00	79.3	62.6	65.6	52.4
09/03/2020 17:15	80.8	62.8	65.1	52.8
09/03/2020 17:30	77.6	62.6	66.4	53.3
09/03/2020 17:45	79.7	63.6	67.2	54.3
09/03/2020 18:00	83.4	64.0	67.6	54.0
09/03/2020 18:15	74.3	61.0	64.5	55.1
09/03/2020 18:30	73.8	60.6	64.1	53.1
09/03/2020 18:45	79.8	62.1	65.7	52.8
09/03/2020 19:00	83.5	62.9	65.5	53.2
09/03/2020 19:15	77.7	61.2	63.4	53.1
09/03/2020 19:30	80.8	61.8	64.6	53.4
09/03/2020 19:45	75.7	59.6	62.2	52.9
09/03/2020 20:00	80.0	61.5	63.8	52.5
09/03/2020 20:15	79.2	59.3	61.2	51.7
09/03/2020 20:30	79.4	58.7	60.8	50.1
09/03/2020 20:45	80.4	61.8	62.0	50.3
09/03/2020 21:00	72.3	56.7	58.6	50.9
09/03/2020 21:15	67.6	54.3	56.2	49.9
09/03/2020 21:30	77.8	56.6	56.2	48.8
09/03/2020 21:45	74.5	54.0	52.8	47.5
09/03/2020 22:00	76.2	57.3	58.1	47.0
09/03/2020 22:15	86.3	59.3	58.8	46.9
09/03/2020 22:30	78.8	58.6	57.2	46.0

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A10,15min} dB	L _{A90,15min} dB
09/03/2020 22:45	70.5	53.1	53.3	44.5
09/03/2020 23:00	76.9	56.1	53.4	44.5
09/03/2020 23:15	75.1	52.8	52.2	43.8
09/03/2020 23:30	68.1	47.9	47.8	43.0
09/03/2020 23:45	71.8	50.7	47.8	42.5
10/03/2020 00:00	70.7	49.5	47.4	42.5
10/03/2020 00:15	68.5	48.0	47.8	41.6
10/03/2020 00:30	66.4	44.0	45.8	40.0
10/03/2020 00:45	71.1	49.6	47.1	40.3
10/03/2020 01:00	55.3	42.3	44.5	39.8
10/03/2020 01:15	60.9	43.9	46.7	39.9
10/03/2020 01:30	71.4	50.0	49.1	44.2
10/03/2020 01:45	73.1	51.9	50.6	46.5
10/03/2020 02:00	66.3	48.9	50.4	46.8
10/03/2020 02:15	73.8	54.3	54.3	48.7
10/03/2020 02:30	69.7	54.6	55.9	49.0
10/03/2020 02:45	75.6	54.8	57.0	51.0
10/03/2020 03:00	79.1	58.5	58.6	52.2
10/03/2020 03:15	78.9	58.2	58.0	52.8
10/03/2020 03:30	67.4	54.6	56.0	52.4
10/03/2020 03:45	66.9	54.4	55.9	52.1
10/03/2020 04:00	72.8	56.0	57.3	52.8
10/03/2020 04:15	68.6	55.3	57.2	52.7
10/03/2020 04:30	74.2	55.8	56.4	52.2
10/03/2020 04:45	68.3	53.6	55.0	51.0
10/03/2020 05:00	79.0	57.8	57.0	51.0
10/03/2020 05:15	72.4	56.2	57.6	53.3
10/03/2020 05:30	69.6	55.0	56.5	50.0
10/03/2020 05:45	77.0	56.4	55.8	49.4
10/03/2020 06:00	74.5	57.0	56.2	49.8
10/03/2020 06:15	76.8	57.7	57.1	51.3
10/03/2020 06:30	78.8	59.8	60.2	50.4
10/03/2020 06:45	79.7	60.9	62.4	50.1
10/03/2020 07:00	79.1	62.8	65.7	50.0
10/03/2020 07:15	79.2	63.8	67.7	50.6
10/03/2020 07:30	82.5	64.9	67.6	49.9
10/03/2020 07:45	81.5	65.2	69.2	50.3
10/03/2020 08:00	78.1	63.4	66.6	51.0
10/03/2020 08:15	81.3	64.1	67.3	51.4
10/03/2020 08:30	79.1	63.9	67.9	52.1
10/03/2020 08:45	78.9	62.9	66.0	52.5
10/03/2020 09:00	77.1	59.8	63.4	51.9
10/03/2020 09:15	81.5	63.7	67.8	50.7

Start Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A10,15min} dB	L _{A90,15min} dB
10/03/2020 09:30	79.7	61.5	64.0	50.3
10/03/2020 09:45	79.0	66.5	68.0	59.9
10/03/2020 10:00	80.0	62.9	66.5	49.8
10/03/2020 10:15	76.9	58.2	59.7	48.0
10/03/2020 10:30	82.3	61.4	63.5	49.2
10/03/2020 10:45	81.6	60.9	63.1	48.8
10/03/2020 11:00	79.3	60.6	63.7	48.4
10/03/2020 11:15	75.7	59.5	62.1	48.2
10/03/2020 11:30	85.3	62.5	62.9	50.0
10/03/2020 11:45	80.0	63.3	66.7	50.2

Appendix C

Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Background sound level	The sound level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured as $L_{A90,T}$.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific sound source	Sound source being assessed.
Specific sound level	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T.
Rating level $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.