

Description	Plant Noise Impact Assessment (ASHP) - Gravesend - Galliard Ltd
Date	15 July 2026
Issued by	Bala Sarma
Issued to	Galliard Homes Limited
Ref No	BSB85/26025

1. INTRODUCTION

Galliard Homes Limited is developing 41 new residential properties at 48 Old Road East, Gravesend, DA12 1NR. Gravesham Borough Council (LPA) has granted permission for the development subject to conditions.

Galliard proposes to install Air Source Heat Pumps (ASHPs) instead of boilers at each property. Condition 13 (New Plant / Equipment) requires a noise impact assessment to be carried out and submitted to the LPA for any noise from fixed mechanical plant / equipment / building services.

Galliard has instructed Spectrum to carry out a noise impact assessment for the proposed installation of the ASHPs to discharge condition 13 of the decision notice against application 20240013.

Condition 13 reads:

Prior to commencement, a noise impact assessment shall be carried out and submitted to the LPA for approval demonstrating that the rating noise from fixed building services/mechanical plant/equipment associated with the development shall be at least 10 dB below the existing LA90 background level at the nearest noise sensitive receptors (i.e. dwellings) when measured and assessed in accordance with BS4142:2014+A1:2019.

Reason: In the interests of protecting the amenity of adjoining/nearby residential properties and safeguarding the amenities of the surrounding area in accordance Policy CS19 of the Gravesham Local Plan Core Strategy (September 2014).

2. RELEVANT STANDARDS AND GUIDANCE

2.1 BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

The principle of BS 4142¹ is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level (L_{A90} as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that 'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact [...]. A difference of around +5 dB is likely to be an indication of an 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.'

However, BS 4142 also advises that 'when making assessments and arriving at decisions [...] it is essential to place the sound in context' so in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly. For example it advises 'Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.' It also indicates that impacts estimated during 'the

¹ BS 4142:2014 Methods for rating and assessing industrial and commercial sound

middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.'

2.2 Domestic Air Source Heat Pumps Professional Advice Note (2026) – Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH)

The Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH) have issued guidance for assessing noise from domestic Air Source Heat Pumps (ASHPs). The guidance sets out assessment approaches that are suitable for supporting planning applications for ASHP installations.

The Town and Country Planning (General Permitted Development) (England) Order 2015 allows the installation of ASHPs on domestic premises, subject to compliance with the Microgeneration Certification Scheme (MCS) planning standards. MCS 020a sets out the assessment methodology and requires the absolute noise levels not to exceed 37 dB(A) for domestic ASHP installations.

This guidance provides alternative assessment options for proposed ASHP installations to which Permitted Development Rights (PDR) do not apply, as summarised in Table 1 below.

Method		When to Apply
PDR+ Installer led	MCS 020a	Where PDR is unavailable for non-acoustic reasons and no greater caution is needed, the installer shall submit a calculation following MCS 020a.
Level 1 SQA ² led	Desktop calculations	Where PDR+ indicates a minor exceedance, compliance with the Level 1 37 dB(A) ³ criterion can be demonstrated through appropriate sound propagation modelling carried out by an SQA. Reporting should include a clear site plan, photos, calculations, assumptions and diagrams as supporting evidence.
Level 2 Full Assessment SQA led	Survey and predictions	Use Level 2 in exceptional circumstances only, e.g. designated tranquil areas or quiet areas, or where there are multiple units with significant risk of cumulative impact. The BS 4142 methodology may be used to ensure the adverse impacts are minimised as far as is reasonable.

Table 1: Assessment methods as described in Domestic Air Source Heat Pumps Professional Advice Note (2026)

This alternative approach is supported by:

- The fixed 37 dB(A) threshold already incorporates a margin for tonal characteristics. The exclusion of tone audibility correction is based on experience from Scotland and other European countries. This remains under constant review.
- Established European and Scottish practice has not led to an increase in complaints.
- Appropriate sound propagation modelling by an SQA (which may include calculations using ISO 9613-2) allows for more accurate calculations than MCS 020a.

² Suitable Qualified Acoustician (SQA) or Environmental Health Practitioner (EHP) means either a Corporate Member of the Institute of Acoustics with at least 3 years relevant experience or Environmental Health Practitioner with at least 3 years of relevant experience of noise assessment and management, together with supporting qualifications.

³ The sound level threshold of 37 dB(A) is an incident sound pressure level, calculated at 1m in front of the centre of a window or door to a habitable room as described in MCS 020a. It excludes the effect of any reflections from the assessed façade.

The cumulative impact of multiple units installed in close proximity has been addressed in the document as below:

'Multiple units in close proximity may cause cumulative impact from combined sound. Greater care is needed in high-density environments where multiple units are likely to be co-located. Multiple ASHPs installed over time could cause background creep, which may be relevant in Level 2 assessments and local planning policy. Cumulative impact is unlikely to be a problem for detached, semi-detached and terraced properties based on recent research; it is only necessary to consider cumulative impact for courtyards or flats, depending on local context.'

The summary of the guidance is as follows:

- A limit of 37 dB(A) is acceptable for the Permitted Development Rights (PDR) and the two alternative assessment options (PDR+ and Level 1), which includes a margin for tonal characteristics.
- The third alternative assessment option (Level 2) recommends using the BS4142 methodology to ensure the adverse impacts are minimised as far as is reasonable. An adverse impact, as per BS4142 is likely to occur when the Rating Level exceeds the Background Sound Level by +5 dB. On that basis, noise levels less than +5 dB should be acceptable for this assessment.
- The proposed development consists of terraced houses. The cumulative impact from ASHP units are unlikely to be a problem for this development based on recent research.
- This guidance is based on established practice in Europe and Scotland and is recommended by CIEH for the use across the UK.

3. PLANT DETAILS

The sound power levels of the proposed ASHP units are summarised in Table 2 below, based on the manufacturer's datasheets provided in Attachment A.

Make	Model	Sound Power Level L_{wA} (dB)
Vaillant	aroTHERM plus 5kW	48
Vaillant	aroTHERM plus 7kW	49

Table 2: Sound power levels of the proposed ASHP Units from manufacturer's datasheets

Each property will have an ASHP unit installed to the rear garden as shown in Attachment B.

4. NOISE SURVEY DETAILS

As part of the planning application, an acoustic report issued by Anderson Acoustics has been submitted (ref: 6969_001R_3-0_GC⁴). The existing site conditions and background noise levels will be referenced from this report.

The measurement positions are shown in Figure 1 below and the measured noise levels at three measurement positions are provided in Section 4.3 of the above report and summarised in Table 3 below:

⁴ Anderson Acoustics - Planning Noise Impact Assessment – Old Road East, Gravesens Ref: 6969_001R_3-0_GC

Measurement Position	Residual Sound Level $L_{Aeq,T}$ (dB)		Modal Background Noise Level $L_{A90,5mins}$ (dB)		Description of positions
	Daytime	Night-time	Daytime	Night-time	
UP1	70	64	55	40	North site boundary
UP2	46	44	36	35	South-west site boundary
UP3	46	44	43	39	East site boundary

Table 3: Summary of modal background noise measurements from survey report ref: 6969_001R_3-0_GC



Figure 1: Noise survey measurement positions (ref: 6969_001R_3-0_GC)

5. ASSESSMENT

The proposal involves installing ASHP units to the rear garden of each residential property. Although the development comprises terraced properties, this assessment has considered the combined effect of multiple ASHP units operating in close proximity. A conservative full assessment has therefore been undertaken to address potential cumulative noise effects. The Vaillant aroTHERM plus 7kW unit has the higher sound power level of L_{WA} 49 dB and has been used for the assessment.

The ASHP units are assumed to be radiating in a quarter space and all units operating simultaneously for the whole 24-hour period. The screening attenuation from garden fence were calculated using chart 9a of CRTN⁵ at each property. These assumptions are expected to predict higher noise levels than typical noise levels during normal operation at the receptors and are therefore considered to represent a worst-case assessment.

⁵ Polynomial expressions for potential barrier correction - *Calculation of Road Traffic Noise Department of Transport, Welsh Office- 1988*
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5.1 Calculations

The cumulative impact of the ASHP units is expected to be greatest at first-floor windows of properties located near the centre of each terraced section, as these receptors are exposed to noise from more ASHP units than properties located towards the ends of the terraces. Therefore, properties A3, C2, A15 and C14 have been selected as representative worst-case receptors. Simple noise propagation calculations have been used to predict the noise impact at each of these properties, as summarised in Attachment C.

The highest predicted specific sound level at the site is $L_{Aeq,T}$ 27 dB. Intermittent operation is not expected to be sufficient to attract attention, nor are tonal components to the noise emission expected. The highest noise level of $L_{Aeq,T}$ 27 dB will be considered as the representative rating level for the assessment.

The modal background noise levels measured from a previous noise survey at three different locations range from $L_{A90,T}$ 36 – 55 dB during daytime and $L_{A90,T}$ 35 – 40 dB during night-time. The quietest night-time background noise is measured at $L_{A90,T}$ 35 dB. This will be considered as the representative background sound level for the assessment.

5.2 BS 4142:2014+A1:2019 Assessment

The predicted specific sound level from the proposed ASHP units is $L_{Aeq,Tr}$ 27 dB. A BS 4142 assessment for the ASHP units based on the highest predicted specific sound level as the rating level and the quietest night-time background sound level as the representative background sound level is summarised in Table 4 below. No tonal, impulsive or intermittent acoustic characteristics components are expected to be sufficient to attract attention at the nearest receptors.

Rating Level $L_{Ar,Tr}$ (dB)	Background sound level $L_{A90,5mins}$ (dB)	Excess of rating over background sound level	BS 4142 assessment
27	35	-8	Low Impact

Table 4: BS 4142 assessment of the proposed ASHP units.

BS 4142 assessment indicates that the rating level is 8 dB below the background sound level. This is 13 dB below the threshold for an adverse impact and 8 dB below the threshold for a low impact as per the assessment methodology in BS 4142, as discussed in section 2.1. This indicate that the noise from the operation of the proposed ASHP units will not have any impact to the existing background sound levels at the nearest noise sensitive receptors. This result is also consistent with the Level 2 assessment as discussed in Section 2.2

The significance of noise from the ASHP units depends on both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs, as discussed in Section 2.1. As both the rating level and the background level are low, BS 4142 recommends considering absolute sound levels as well as the margin by which the rating level exceeds the background sound level to determine the extent of impact.

The latest guidance issued by CIEH and IOA recommend using the absolute level of 37 dB(A) for assessing noise from ASHPs. The rating level is 10 dB below this absolute level and compliant with MCS 020a assessment and the Level 1 assessment carried out by an SQA as discussed in section 2.2. Therefore considering the difference in the absolute level to the background level and the context of the existing ambient noise environment, the noise from the ASHP units is assessed not to cause any significant impact.

5.3 Condition 13 – Assessment

Condition 13 of the decision notice require the rating level to be 10 dB below the existing $L_{A90,T}$ background level at the nearest noise sensitive receptor. An assessment based on Condition 13 of the decision notice is summarised below in Table 5.

Rating Level $L_{Ar,Tr}$ (dB)	Background sound level $L_{A90,5mins}$ (dB)	Condition 13 criteria (10 dB below background sound level)	Excess of rating over condition 13 criteria	Comments
27	35	25	+2	Negligible exceedance

Table 5: Condition 13 assessment for fixed mechanical plant units.

6. DISCUSSION

The guidance issued by the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)⁶ recommends a fixed threshold of 37 dB(A) as the recommended noise limit for assessing ASHP units along with the methodologies set out in BS 4142. The guidance also considers the cumulative impact from multiple units operating in close proximity and the potential for background creep. Based on recent research, cumulative impact is not expected to be a problem for detached, semi-detached and terraced properties, which means setting lower limits to avoid background creep in this context is not normally necessary. This indicates that noise levels below the fixed threshold of 37 dB(A) are unlikely to cause adverse impacts at the nearest noise-sensitive receptors. The rating level is 10 dB below this threshold and 8 dB below the representative background sound level.

A level 2 full assessment, as discussed in section 2.2 require the assessment to follow the methodologies set out in BS 4142 to ensure that the adverse impacts are minimised as far as is possible. An adverse impact as per BS 4142, is likely when there is a difference of around +5dB between the rating level and the background sound level. The rating level is 13 dB below the threshold for an adverse impact. Therefore, the rating level from the proposed ASHP units will not have any impact to the existing background sound levels

The predicted specific sound level is just 2 dB above the Condition 13 criterion and on a numerical comparison, marginally exceeds the criterion. This exceedance is not likely to cause any adverse impact at the nearest noise sensitive receptors. The actual noise level is expected to be lower than the predicted level as the predicted specific sound level assumes a 'worst case scenario' when all the ASHP units are working simultaneously in heating mode. This operating condition is unlikely to occur in practice, particularly at night when the demand is low and background sound levels are lowest, as assumed in this assessment.

With the existing residual sound level at $L_{Aeq,T}$ 44 dB at site, the difference in the effective contribution of the rating level of $L_{Aeq,T}$ 27 dB and the condition 13 criterion of 25 dB to the resulting ambient sound level using simple logarithmic addition is calculated to be 0 dB. Similarly, the difference in the effective contribution of the rating level of $L_{Aeq,T}$ 27 dB and the condition 13 criterion of 25 dB to the lowest background sound level of $L_{A90,T}$ 35 dB is 0.2 dB, which is negligible and imperceivable to human ears.

The context of the acoustic environment is also relevant when assessing noise impact from the ASHP unit. As the difference in effective contribution from the predicted specific sound level and the condition 13 criterion is less than 1 dB, there is no practical or perceptible difference between achieving 10 dB below or 8dB below the background sound level. Therefore, in our view, the predicted specific sound level from the ASHP units are acceptable and compliant to the condition 13 requirements

⁶ Domestic Air Source Heat Pumps – Professional Advice Note (2026) – prepared jointly by Institute of Acoustics and Chartered Institute of Environmental Health (CIEH)

7. CONCLUSION

Galliard (Gravesend) Ltd propose to install Air Source Heat Pumps (ASHPs) instead of boilers at each of the 41 new residential properties at 48 Old Road East, Gravesend, DA12 1NR. Permission has been granted by Gravesham Borough Council subject to conditions. Condition 13 (New Plant / Equipment) requires a noise impact assessment to be carried out and submitted to the LPA for any noise from fixed mechanical plant / equipment / building services.

A BS4142 assessment has been carried out to assess the proposed ASHP units against the requirements of Condition 13 of decision notice 20240013 issued by Gravesham Borough Council. The assessment indicates a low impact as the noise level from the proposed ASHP units are 8 dB below the existing background level and 13 dB below the threshold for an adverse impact. Therefore, the noise from the ASHP units will not contribute to any increase in the background sound levels at the nearest noise sensitive receptors.

Condition 13 require noise levels from any new plant units to be 10 dB below the existing background sound levels. This would require the rating level not to exceed L_{A,r,T_r} 25 dB. The predicted specific sound level of 27 dB is 2 dB above this numerical criterion; however, it remains 8 dB below the representative background sound level and 10 dB below the 37 dB(A) threshold referenced in the IOA and CIEH guidance. With the existing residual sound level of $L_{Aeq,T}$ 44 dB, the marginal exceedance of the rating sound level of L_{A,r,T_r} 27 dB to the condition 13 criterion of 25 dB is assessed not to have any significance. Therefore the assessment concludes that the noise from the ASHP units will not have any impact at the nearest noise sensitive receptor and to be in line with Policy CS19 of the Gravesham Local Plan Core Strategy.



Heating



Hot water



Renewables

aroTHERM plus

Air source heat pump

Dimensions

Model	Width	Height	Depth
aroTHERM plus 3.5kW aroTHERM plus 5kW	1100mm	765mm	450mm
aroTHERM plus 7kW		965mm	
aroTHERM plus 10kW aroTHERM plus 12kW		1565mm	



Overview

The aroTHERM plus is our flagship air source heat pump range, available in a wide range of heat output sizes for many times types of property with 3.5, 5, 7, 10 and 12kW models available.

This heat pump continues to win awards around the world for its innovative use of the refrigerant R290, which gives it a Global Warming Potential (GWP) of just three. This refrigerant is already used in household appliances all over the world and offers many advantages over refrigerants traditionally used in heat pumps. Coupled with market leading technical features that improve efficiency and deliver higher flow temperatures, the aroTHERM plus is perfect for new and existing heating systems (including hybrid). It's also impressively quiet in operation and has been certified by Quiet Mark*, making it suitable for use even in densely built-up terraced housing estates.

Features & benefits



High performance ASHP range

With a flow temperature of up to 75°C, the aroTHERM plus can deliver more usable hot water with high hot water comfort levels whilst removing the need for direct electric immersion to sterilise the water, protecting from legionella.



Super quiet operation

From just three metres away, the acoustic pressure level is less than 30 dB(A) for easier planning and siting.



Higher energy-efficiency performance

With a SCoP of up to 5.03, the aroTHERM plus is extremely energy efficient, enabling high energy savings against certain fossil fuels.



R290 natural refrigerant with Low GWP

Already fulfilling the next NZEB requirements, the aroTHERM plus uses monobloc technology with a hermetically sealed refrigerant circuit.



Fully adaptable system approach

The aroTHERM plus can also be combined with photovoltaic systems and integrated into smart power grids (SG-ready), so your customers can enjoy the benefits of variable electricity tariffs.



Quality by design

Suitable for installations less than 150m away from the sea with salt resistant construction C5 class.

* Models 3.5, 5 and 12kW.



Technical data	Unit	3.5kW	5kW	7kW	10kW (230v)	12kW (230v)	10kW (400v)	12kW (400v)
General								
Weight, ready for operation	kg	114		128	194		210	
Connection, heating circuit		G 1 1/4"						
Rated voltage		230 V (+10%/- 15%), 50 Hz, 1~/N/PE					400 V (+10%/-15%), 50 Hz,3~/N/PE	
Rated current, maximum	A	14.3		15.0	23.3		15	
Fuse size	A	16			25		16	
Fuse type		Characteristic C, slow-blow, singlepole switching						
RCD type		Type B rated to 20kHz or greater and with a minimum trigger point of 150mA above 1kHz						
eBUS (2-core communication cable)	mm²	0.75						
Maximum length eBUS cable (polarity sensitive)	m	50						
IP rating		IP 15 B						
Fan power consumption	W	40			50			
Fan quantity		1			2			
Fan air flow, maximum	m³/h	2300			5100			
Heating pump, power consumption	W	2 - 50			3 - 87			
Heating circuit								
Heating water temperature, minimum/maximum	°C	20 - 75						
Basic length of the heating water pipe, maximum, between the outdoor unit and indoor unit	m	20						
Maximum static height difference between outdoor unit and the highest point in the heating system	m	18			13			
Minimum operating pressure	bar	3.0			2.5			
Maximum operating pressure	bar	20						
Minimum volume flow	l/h	400		540	995			
Maximum volume flow	l/h	860		1205	2065			
Water volume, in the outdoor unit	l	1.5		2.0	4.5			
Minimum open water volume	l	15		20	45			
Refrigerant circuit								
Fluid type		R290						
Fluid fill quantity	kg	0.6		0.9	1.3			
Refrigerant, Global Warming Potential (GWP)		3						
CO ₂ equivalent	t	0.0018		0.0027	0.0039			
Permissible operating pressure	bar	31.5						
Compressor type		Rotary piston			Scroll compressor			
Compressor oil type		Specific polyalkylene glycol (PAG)						
Compressor, control		Electronic						
Noise emissions, heating mode								
Sound power, EN 12102, EN 14511 LWA, A7/W35	dB(A)	48		49	51			
Sound power, EN 12102, EN 14511 LWA, A7/W55	dB(A)	48		49	51			
Efficiency								
Energy efficiency class 35°C	(A+++ to F)	A++	A+++					
Energy efficiency class 55°C	(A+++ to F)	A+	A++					
Combination with uniTOWER								
Energy efficiency class	(A+++ to F)	A+		A++				
Energy efficiency class, hot water	(A+ to F)	A		A				



LEGEND

 AIR SOURCE HEAT PUMP LOCATION



TYPICAL REAR ELEVATIONS- (HOUSE TYPE A)
SCALE 1:100

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Notes:
All dimensions are to be checked on site.
This drawing is to be read in conjunction with all relevant consultants and/or specialists drawings/documents and any discrepancies or variations are to be notified to the architects in writing before the affected work commences.
The workmanship and materials of all trades and building operations shall comply with the recommendations of British Standard (BS)8000 and with Approved Document to support Regulation 7 (current edition). All design and construction is to be in accordance with the Construction (Design and Management) Regulations 2015.

rev.	date	by	description
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PRELIMINARY TENDER CONSTRUCTION	ST JOSEPHS GRAVESEND		scale	date/drawn
	ASHP LOCATIONS		1:500 @ A1	MAY 26
			drawing no.	rev.
		ASHP		

Simple noise propagation calculation



Project:	Gravesend
Project number:	26025
Date:	27/05/2026

Operating condition/scenario:	Full load & operating simultaneously
Receptor:	A3

Source	Sound Power Level, dB(A)	Distance to receptor (m)	Directivity Index, dB	Attenuation			% On-Time	Predicted noise level, dB(A)
				Geometric spreading, dB(A)	Screening, dB(A)	Total attenuation, dB(A)		
Condensor Unit A4	49	5	6	18	9	27	100%	22
Condensor Unit A2	49	9	6	24	1	25	100%	24
Condensor Unit A1	49	9	6	24	13	37	100%	12
Condensor Unit A5	49	13	6	28	6	34	100%	15
Total								27

$$L_p = L_{WA} - 20 \log(r) - 11 + DI - A_{misc}$$

where L_p is the predicted noise level; L_{WA} is the sound power level; r is distance; DI is the directivity index; and A_{misc} is the attenuation from other miscellaneous factors (i.e. screening/ground effect/atmospheric absorption/foliage).

N.B. If attenuation values for both screening and ground effect are entered, only the higher value is used in the calculation of total attenuation.

Simple noise propagation calculation



Project:	Gravesend
Project number:	26025
Date:	27/05/2026

Operating condition/scenario:	Full load & operating simultaneously
Receptor:	C2

Source	Sound Power Level, dB(A)	Distance to receptor (m)	Directivity Index, dB	Attenuation			% On-Time	Predicted noise level, dB(A)
				Geometric spreading, dB(A)	Screening, dB(A)	Total attenuation, dB(A)		
Condensor Unit C3	49	5	6	18	9	27	100%	22
Condensor Unit C1	49	9	6	24	1	25	100%	24
Condensor Unit A6	49	9	6	24	13	37	100%	12
Condensor Unit A9	49	18	6	30	3	33	100%	16
Condensor Unit A10	49	11	6	26	13	39	100%	10
Condensor Unit A8	49	19	6	31	5	36	100%	13
Condensor Unit A7	49	19	6	30	6	36	100%	13
Total								27

$$L_p = L_{WA} - 20 \log(r) - 11 + DI - A_{misc}$$

where L_p is the predicted noise level; L_{WA} is the sound power level; r is distance; DI is the directivity index; and A_{misc} is the attenuation from other miscellaneous factors (i.e. screening/ground effect/atmospheric absorption/foilage).

N.B. If attenuation values for both screening and ground effect are entered, only the higher value is used in the calculation of total attenuation.

Simple noise propagation calculation



Project:	Gravesend
Project number:	26025
Date:	27/05/2026

Operating condition/scenario:	Full load & operating simultaneously
Receptor:	A15

Source	Sound Power Level, dB(A)	Distance to receptor (m)	Directivity Index, dB	Attenuation			% On-Time	Predicted noise level, dB(A)
				Geometric spreading, dB(A)	Screening, dB(A)	Total attenuation, dB(A)		
Condensor Unit A16	49	5	6	18	9	27	100%	22
Condensor Unit A17	49	13	6	28	4	32	100%	17
Condensor Unit A18	49	14	6	28	14	42	100%	7
Condensor Unit B2	49	24	6	32	7	39	100%	10
Condensor Unit A14	49	9	6	24	1	25	100%	24
Condensor Unit A13	49	9	6	24	13	37	100%	12
Condensor Unit A12	49	19	6	30	6	36	100%	13
Total								27

$$L_p = L_{WA} - 20 \log(r) - 11 + DI - A_{misc}$$

where L_p is the predicted noise level; L_{WA} is the sound power level; r is distance; DI is the directivity index; and A_{misc} is the attenuation from other miscellaneous factors (i.e. screening/ground effect/atmospheric absorption/foilage).

N.B. If attenuation values for both screening and ground effect are entered, only the higher value is used in the calculation of total attenuation.

Simple noise propagation calculation

Project:	Gravesend
Project number:	26025
Date:	27/05/2026

Operating condition/scenario:	Full load & operating simultaneously
Receptor:	C14

Source	Sound Power Level, dB(A)	Distance to receptor (m)	Directivity Index, dB	Attenuation			% On-Time	Predicted noise level, dB(A)
				Geometric spreading, dB(A)	Screening, dB(A)	Total attenuation, dB(A)		
Condensor Unit C15	49	5	6	19	9	28	100%	21
Condensor Unit C16	49	13	6	28	4	32	100%	17
Condensor Unit C17	49	19	6	30	6	36	100%	13
Condensor Unit B4	49	24	6	32	7	39	100%	10
Condensor Unit C13	49	9	6	24	1	25	100%	24
Condensor Unit C12	49	13	6	28	4	32	100%	17
Condensor Unit B3	49	19	6	30	6	36	100%	13
Total								27

$$L_p = L_{WA} - 20 \log(r) - 11 + DI - A_{misc}$$

where L_p is the predicted noise level; L_{WA} is the sound power level; r is distance; DI is the directivity index; and A_{misc} is the attenuation from other miscellaneous factors (i.e. screening/ground effect/atmospheric absorption/foilage).

N.B. If attenuation values for both screening and ground effect are entered, only the higher value is used in the calculation of total attenuation.