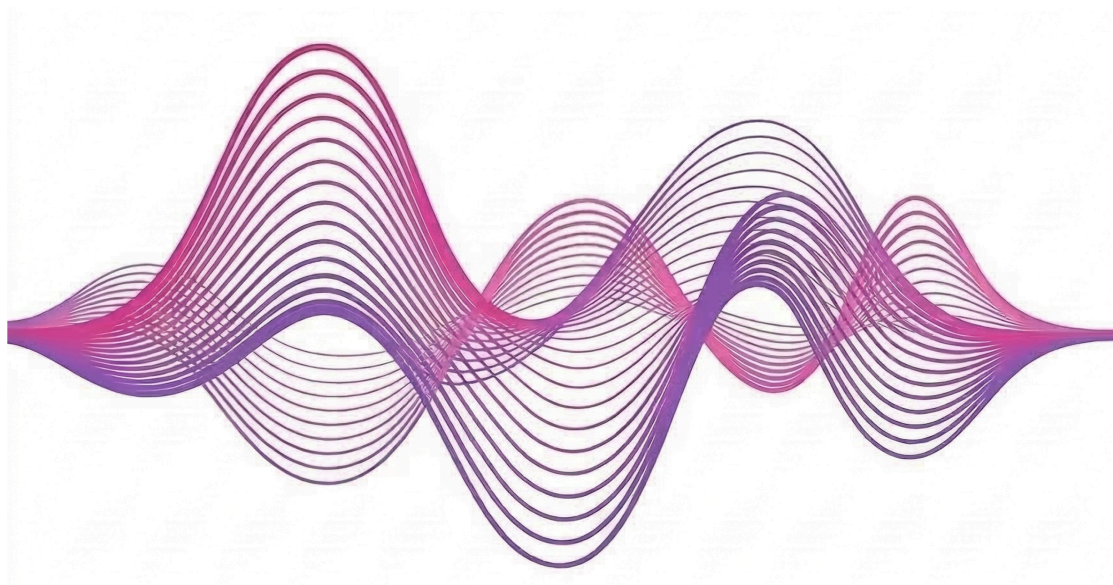


NOISE IMPACT ASSESSMENT



Project: Residential Heat Pump Installation – 7 Rowden Lane

Subject: Technical Methodology and Results Analysis for Planning Application

Date: 13th of April, 2026

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1. INTRODUCTION AND EXECUTIVE SUMMARY

1.1. This Technical Note has been prepared to support a planning application regarding the installation of a **Cosy 6** Air Source Heat Pump (ASHP) at **7 Rowden Lane**. The primary objective of this assessment is to quantify, using a robust and conservative estimation, the potential acoustic impact of the proposed unit on the surrounding residential amenity through rigorous computational modeling.

1.2. The assessment utilises the internationally recognized **ISO 9613-2:1996** standard for sound propagation. To ensure the robustness of the application, the model employs a highly conservative "worst-case" scenario approach. This includes the use of hard ground assumptions and high facade reflection coefficients to ensure the predicted levels represent a definitive upper limit of potential noise impact.

1.3. Comprehensive modeling confirms that the predicted external **Rating Noise Level (L_{Ar,Tr})** at the critical neighboring assessment position (**9 Rowden Lane**) is **38 dB(A)**.

1.4. These results demonstrate that the proposed installation achieves an external noise level that remains **12-17 dB below** the prevailing ambient noise climate indicated by DEFRA strategic mapping (50-55 dB). Furthermore, the internal noise level in the nearest bedroom is calculated at **28 dB(A)**, which falls below the **BS 8233:2014** target of 30 dB for sleeping conditions. Consequently, the proposal preserves residential amenity and complies with National Planning Policy.

2. REGULATORY FRAMEWORK AND **NATIONAL POLICY CONTEXT**

The assessment has been conducted with strict adherence to national planning policies and recognized acoustic standards. Detailed definitions of these policies are provided in Appendix A.2.

2.1. National Planning Policy Framework (NPPF) (2024)

Paragraph 198 mandates that planning decisions must "mitigate and reduce to a minimum potential adverse impact resulting from noise from new development". This report demonstrates compliance by proving the unit operates below the background noise floor and within acceptable internal limits.

2.2. British Standard BS 8233:2014

This standard establishes internal ambient noise level targets to safeguard rest and sleep. The relevant criterion for this application is:

- **Sleeping (Bedrooms):** 30 dB LAeq, 8hr

2.3. British Standard BS 4142

While BS 4142 is a common standard for industrial noise, the World Health Organization (WHO) Guidelines for Community Noise establish that serious annoyance in outdoor living areas (gardens) typically begins at **50-55 dB LAeq**. The predicted external rating level of **38 dB(A)** is significantly below this threshold for outdoor annoyance. Therefore, the proposal protects both internal sleep amenity (per BS 8233) and external garden amenity (per WHO guidelines).

3. SOURCE NOISE DATA SPECIFICATION

3.1. Data Selection

To provide a technically defensible assessment, this report utilizes the manufacturer's certified sound power data. Specifically, we have selected the data for a water outlet temperature of **55°C** (Test No. HV324-107), which represents the most accurate operational condition for the proposed system design.

3.2. Sound Power Verification

Unlike "nominal" pressure data which requires geometric conversion, the data utilized here is provided as **Sound Power Level (L_W)**. This eliminates uncertainty regarding measurement distance or hemispherical conversion. To ensure robustness, the total Sound Power (LWA) of **58.1 dB(A)** has been used directly in the propagation model.

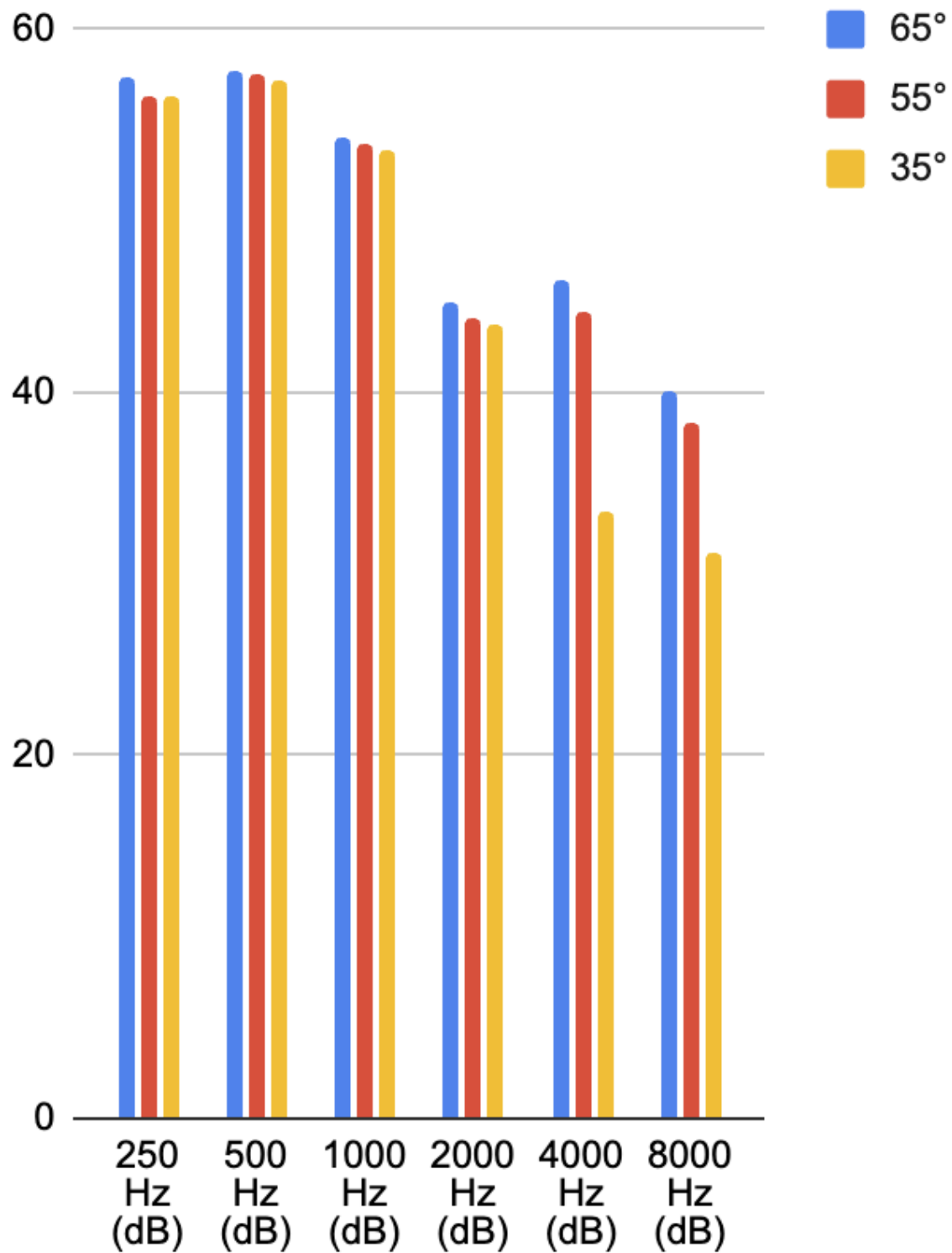
3.3. Spectral Analysis

Full octave band data (125Hz – 8kHz) has been input into the model to accurately predict the propagation of different frequencies over distance.

Table 1: Cosy 6 Sound Power Spectral Data (55°C Flow)

Cosy 6 Spectral Data							
Frequency Hz	125	250	500	1000	2000	4000	8000
dB Level	55.1	56.4	57.6	53.7	44.1	44.5	38.4
Total	62.1						
A-weighted dB Level	39	47.8	54.4	53.7	45.3	45.5	37.3
Total	58.1						

Cosy 6 octave bands



Sound power (Lw) octave band centre...

4. COMPUTATIONAL MODELING

METHODOLOGY

The noise map and propagation calculations were generated utilizing the ISO 9613-2:1996 standard.

4.1. Facade Reflection (Coefficient 0.982):

A reflection coefficient of 0.982 was strictly applied to all vertical surfaces (brickwork/glazing). This assumes 98.2% of sound energy is reflected back into the environment, effectively modeling the building envelope as a near-perfect acoustic mirror.

4.2. Ground Factor (G=0):

A global Ground Factor of $G=0$ (Hard Ground) was applied to the entire propagation path. This treats the ground as reflective, negating attenuation provided by garden turf.

4.3. Directivity (Q=4):

Hemispherical radiation ($Q=4$) is assumed to account for source directivity resulting from installation in close proximity (250mm) to the reflective host facade as well as the ground.

4.4. Acoustic Feature Correction:

In accordance with BS 4142, a dB tonal correction has been applied to the specific sound level to derive the Rating Level ($L_{Ar,Tr}$). In accordance with the joint CIEH and IOA guidance on heat pump installations, a +2dB correction has been applied to account for tonality. As tonal intermittency is proven to be low, this minimal correction is considered appropriate for the character of the sound.

5. PREDICTED RESULTS AND ANALYSIS

Predictions were calculated at the critical receiver locations. The values below represent the **Rating Level (L_{Ar,Tr})**, which includes the **+2 dB** tonality penalty.

Property Address	Assessment Position	Ground Floor	First Floor
5 Rowden Lane	Position 1	35 dB(A)	34 dB(A)
	Position 2	-	32 dB(A)
	Position 3	-	30 dB(A)
	Position 4	29 dB(A)	-
9 Rowden Lane	Position 5	-	38 dB(A)
11 Rowden Lane	Position 6	-	36 dB(A)

5.1. External Assessment

Critical Receptors: 5, 9 and 11 Rowden Lane

Worst Case Predicted Rating Level (L_{Ar,Tr}): 38 dB(A)

5.2. Internal Noise Level Calculation

It is standard acoustic practice (accepted by the World Health Organization and BS 8233) to assume that a partially open window provides **10-15 dB** of attenuation from external noise sources. A conservative attenuation factor of **10 dB** has been adopted to ensure a robust assessment.

Internal Level = External Rating Level - Open Window
Attenuation

Internal Level = 38dB(A) - 10dB

Internal Level = 28dB(A)

6. CONTEXTUAL ASSESSMENT AND AMBIENT ENVIRONMENT

6.1. Ambient Noise Climate:

Strategic noise data from **DEFRA** identifies the ambient noise baseline for this location (LAeq,16hr) as falling within the **50 to 55 dB(A)** bands.

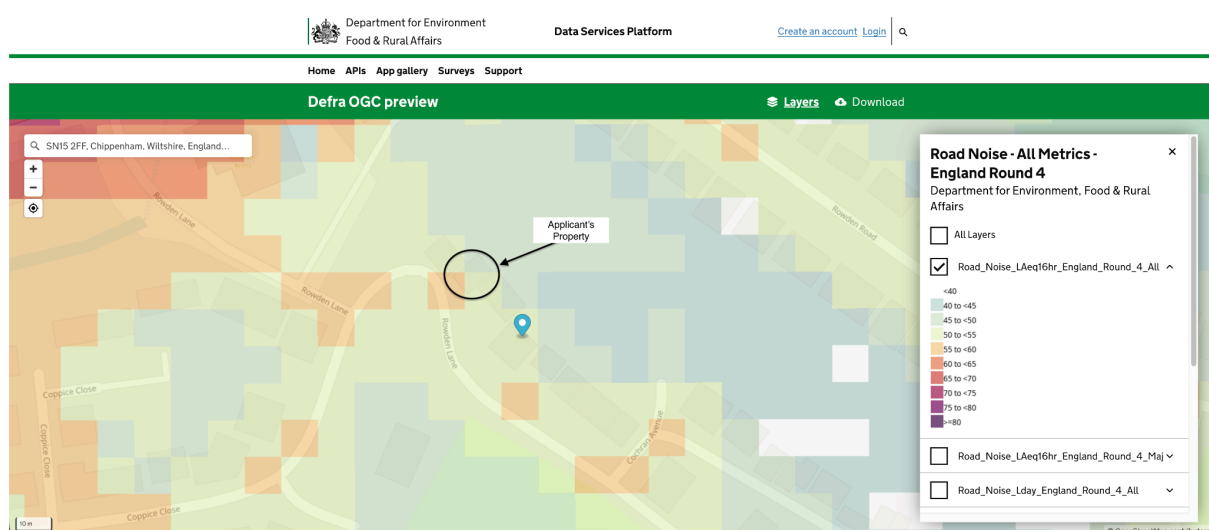
6.2. Assessment of Impact:

- Prevailing Ambient Noise Climate: 50–55 dB(A).
- Plant Rating Level: 38 dB(A).
- Differential: **12 to 17 dB**.

6.3. Discussion:

The phenomenon of Acoustic Masking dictates that the broadband noise of the environment (traffic) will mask the lower-level sound of the heat pump. A source operating below the ambient floor is generally rendered acoustically indistinguishable from the background.

DEFRA Noise Modeling:



7. CONCLUSION

7.1. This comprehensive computational assessment demonstrates that the proposed installation of the Cosy 6 at 7 Rowden Lane complies with all relevant national planning policies regarding noise.

7.2. External Impact:

The worst-case Rating Level (38 dB) is lower than the prevailing ambient noise levels (50–55 dB).

7.3. Internal Amenity:

The indoor noise level (28 dB) is well within the **BS 8233** sleep protection limit (30 dB).

7.4. The proposal preserves residential amenity and should be considered acceptable for planning approval.

APPENDIX A: TECHNICAL REFERENCES AND MODELING DATA

A.1. SOURCE NOISE DATA SPECIFICATION

- **Unit Model:** Cosy 6 Air Source Heat Pump.
- **Spectral Data:** Full octave band data (125Hz - 8kHz) has been utilized for the calculation rather than a single weighted figure to ensure low-frequency content is accurately propagated.
- **Reference Pressure:** 0 dB = 20μPa.

A.2. LEGISLATIVE AND STANDARDS FRAMEWORK

- **NPPF (2024):** Paragraph 198 mandates that planning decisions must "mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development".
- **NPSE:** Defines NOAEL (No Observed Adverse Effect Level); results place this development within this acceptable range where no significant adverse impact occurs.
- **BS 8233:2014:** Recommends a criterion of 30dB LAeq,8hr for sleeping conditions in bedrooms.
- **BS 4142:2014:** Methodology for rating and assessing industrial and commercial sound.

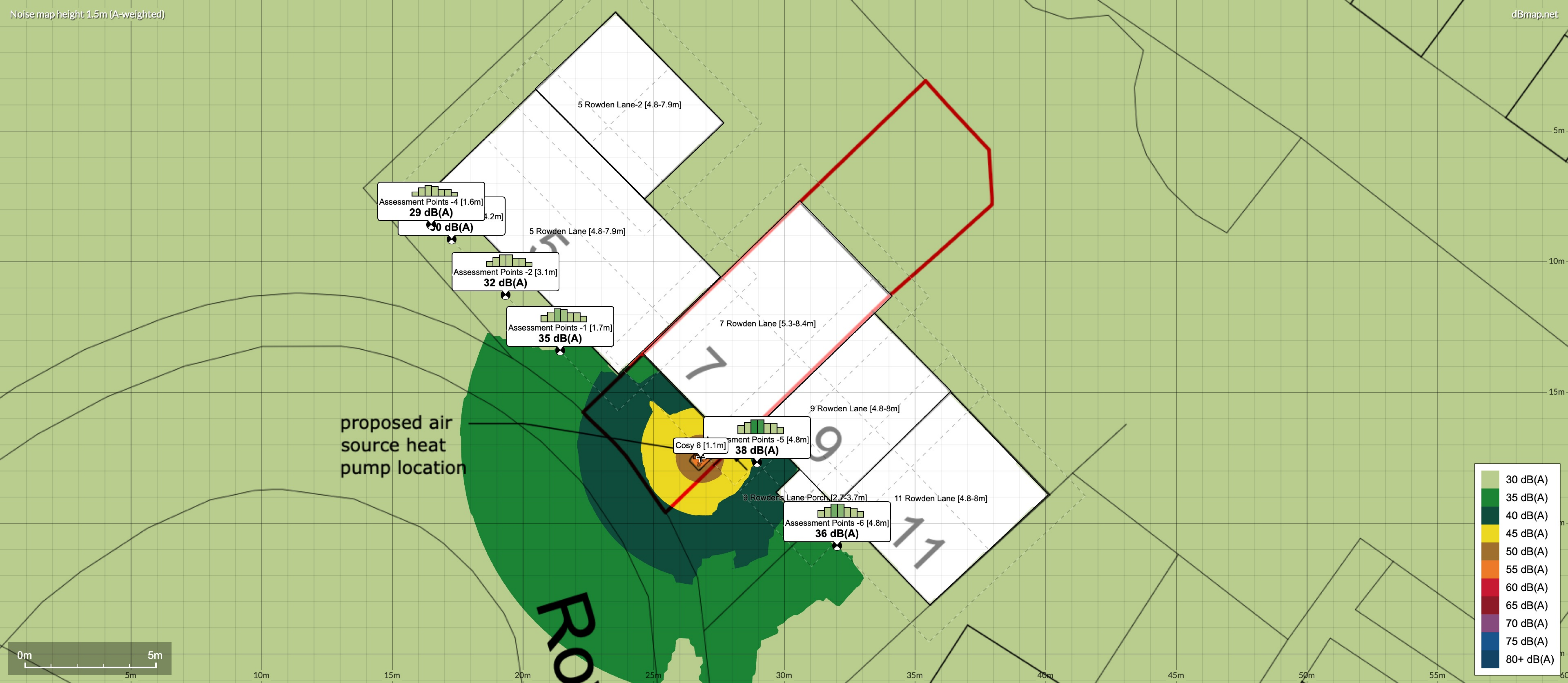
A.3. COMPUTATIONAL MODELING ASSUMPTIONS (ISO 9613-2)

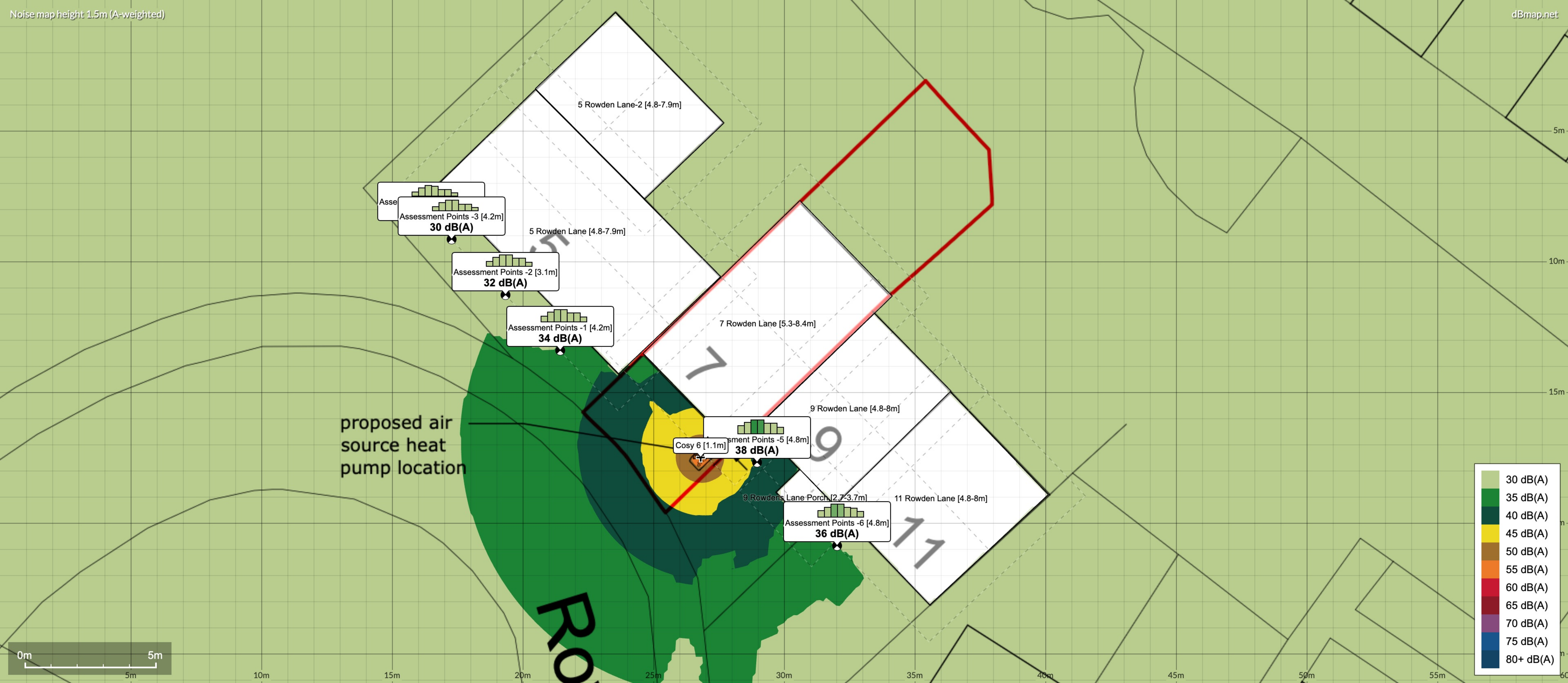
- **Reflection Coefficient (0.982):** Applied to all vertical surfaces, assuming 98.2% of sound energy is reflected back into the environment.
- **Ground Factor (G=0):** Hard ground applied to the entire propagation path to negate soft ground attenuation, ensuring the predicted levels are conservative.
- **Directivity (Q=4):** Hemispherical radiation assumed due to proximity (250mm) to the reflective host facade as well as the ground
- **Atmospheric Absorption:** Standard ISO conditions (10°C, 70%RH) applied.

A.4. GLOSSARY OF ACOUSTIC TERMS

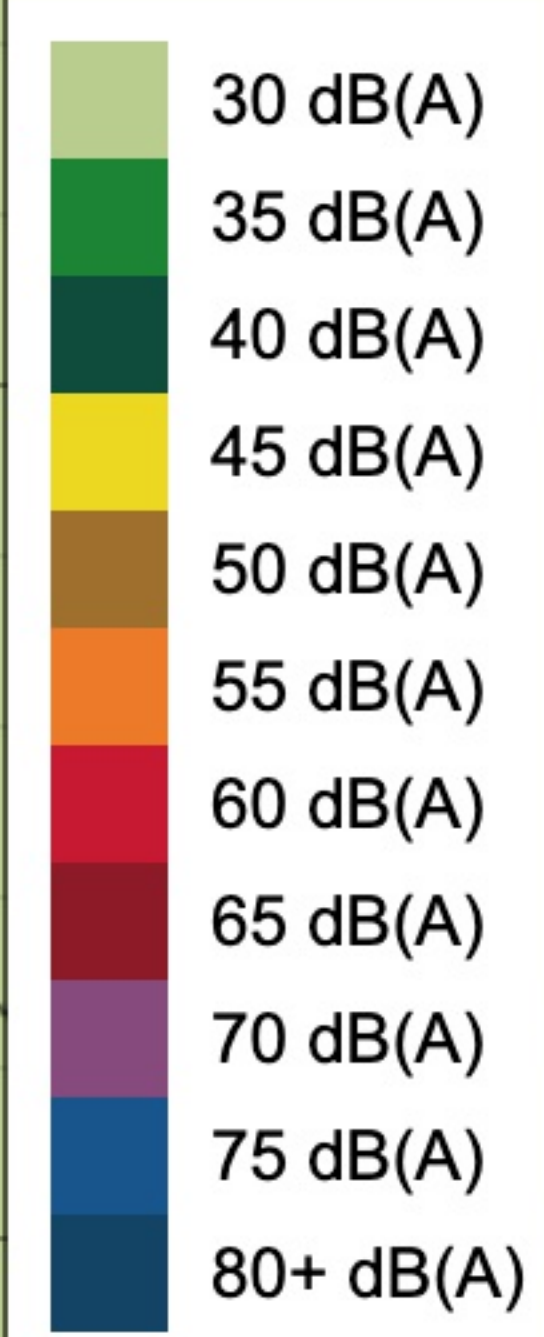
- **dB(A):** A-weighted decibels; a logarithmic scale reflecting the frequency response of the human ear.

- **$L_{Aeq,T}$** : The "Equivalent Continuous Sound Level" over a specified time period "T".
- **Rating Level (L_{Ar}, Tr)**: The specific noise level of the source plus any adjustment for characteristic features.
- **Sound Power Level (L_W)**: The total sound energy radiated by a source per unit of time.





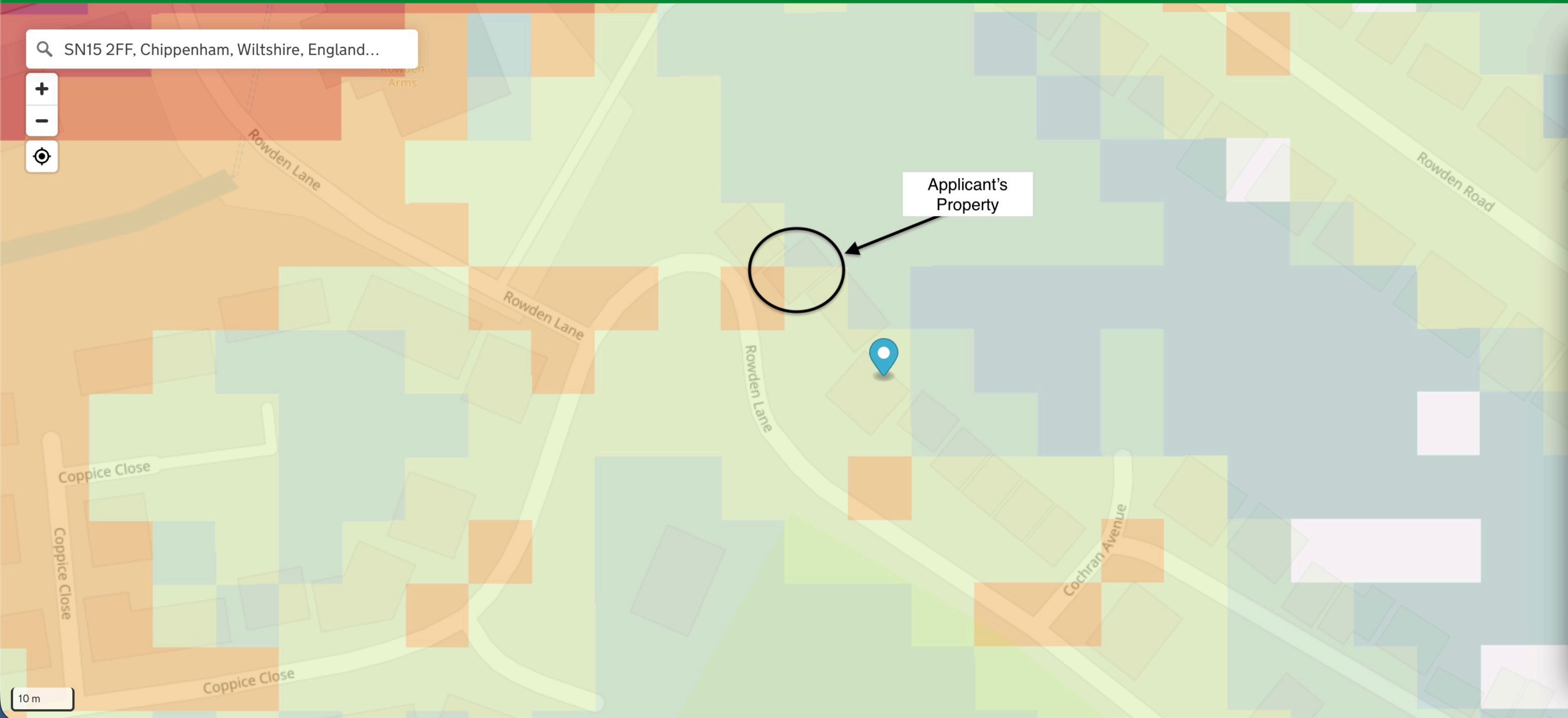
proposed air
source heat
pump location





Defra OGC preview

[Layers](#) Download



**Road Noise - All Metrics -
England Round 4**

Department for Environment, Food & Rural
Affairs

- ☐ All Layers
- ☒ Road_Noise_LAeq16hr_England_Round_4_All ^



☐ Road_Noise_LAeq16hr_England_Round_4_Maj v

☐ Road_Noise_Lday_England_Round_4_All v

Noise Mapping Results																	
--- Receiver Results - Summary ---																	
Receiver Name	Height (m)	Total dB(A)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz							
Assessment Points -1		1.7	35.18		16.04	24.91	31.46	30.73	22.29	22.37	13.71						
Assessment Points -1		4.2	34.2		14.98	24.01	30.5	29.72	21.25	21.32	12.62						
Assessment Points -2		3.1	31.9		12.8	21.59	28.18	27.47	19.03	19.05	10.18						
Assessment Points -3		4.2	29.54		10.46	19.25	25.83	25.11	16.65	16.62	7.54						
Assessment Points -4		1.6	29.3		10.21	19	25.59	24.86	16.4	16.36	7.24						
Assessment Points -5		4.8	38.19		19.14	27.9	34.46	33.73	25.3	25.42	16.93						
Assessment Points -6		4.8	35.88		15.58	24.54	32.31	31.55	23.03	22.96	14.03						
--- Receiver Results - Sources Analysis ---																	
Receiver Name	Height (m)	Total dB(A)	Cosy 6														
Assessment Points -1		1.7	35.18	35.18													
Assessment Points -1		4.2	34.2	34.2													
Assessment Points -2		3.1	31.9	31.9													
Assessment Points -3		4.2	29.54	29.54													
Assessment Points -4		1.6	29.3	29.3													
Assessment Points -5		4.8	38.19	38.19													
Assessment Points -6		4.8	35.88	35.88													
--- Receiver Results - Full Detail ---																	
Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	Weighting	Lp	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	500	57.6	-27.65	-0.02	2.69	0 -	-	-	-	2	-3.2	31.42	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	1000	53.7	-27.65	-0.03	2.69	0 -	-	-	-	2	0	30.71	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	250	56.4	-27.65	-0.01	2.69	0 -	-	-	-	2	-8.6	24.83	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	4000	44.5	-27.65	-0.18	2.69	0 -	-	-	-	2	1	22.36	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	2000	44.1	-27.65	-0.06	2.69	0 -	-	-	-	2	1.2	22.28	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	125	55.1	-27.65	0	2.69	0 -	-	-	-	2	-16.1	16.04	
Assessment Points -1	Cosy 6	6.8	1.7	1.1	8000	38.4	-27.65	-0.64	2.69	0 -	-	-	-	2	-1.1	13.7	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	500	57.51	-28.54	-0.02	2.74	-19.54	-19.54	-	-	2	-3.2	10.96	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	250	56.31	-28.54	-0.01	2.74	-16.65	-16.65	-	-	2	-8.6	7.26	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	1000	53.61	-28.54	-0.03	2.74	-22.56	-22.56	-	-	2	0	7.22	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	4000	44.41	-28.54	-0.2	2.74	-25	-25	-	-	2	1	-3.58	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	2000	44.01	-28.54	-0.07	2.74	-25	-25	-	-	2	1.2	-3.65	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	7.53	1.7	1.1	8000	38.31	-28.54	-0.7	2.74	-25	-25	-	-	2	-1.1	-12.29	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	500	57.6	-28.44	-0.02	2.42	0 -	-	-	-	2	-3.2	30.36	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	1000	53.7	-28.44	-0.03	2.42	0 -	-	-	-	2	0	29.65	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	250	56.4	-28.44	-0.01	2.42	0 -	-	-	-	2	-8.6	23.77	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	4000	44.5	-28.44	-0.2	2.42	0 -	-	-	-	2	1	21.29	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	2000	44.1	-28.44	-0.06	2.42	0 -	-	-	-	2	1.2	21.22	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	500	57.51	-29.19	-0.02	2.5	-14.26	-14.26	-	-	2	-3.2	15.34	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	125	55.1	-28.44	0	2.42	0 -	-	-	-	2	-16.1	14.98	
Assessment Points -1	Cosy 6	7.45	4.2	1.1	8000	38.4	-28.44	-0.7	2.42	0 -	-	-	-	2	-1.1	12.58	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	1000	53.61	-29.19	-0.03	2.5	-17.02	-17.02	-	-	2	0	11.87	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	250	56.31	-29.19	-0.01	2.5	-11.71	-11.71	-	-	2	-8.6	11.3	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	2000	44.01	-29.19	-0.07	2.5	-19.9	-19.9	-	-	2	1.2	0.55	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	4000	44.41	-29.19	-0.21	2.5	-20	-20	-	-	2	1	0.5	
Assessment Points -1	Cosy 6 (reflected by 7 Rowden Lane)	8.12	4.2	1.1	8000	38.31	-29.19	-0.76	2.5	-20	-20	-	-	2	-1.1	-8.24	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	500	57.6	-30.93	-0.02	2.73	0 -	-	-	-	2	-3.2	28.18	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	1000	53.7	-30.93	-0.04	2.73	0 -	-	-	-	2	0	27.46	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	250	56.4	-30.93	-0.01	2.73	0 -	-	-	-	2	-8.6	21.59	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	4000	44.5	-30.93	-0.26	2.73	0 -	-	-	-	2	1	19.04	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	2000	44.1	-30.93	-0.09	2.73	0 -	-	-	-	2	1.2	19.01	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	125	55.1	-30.93	0	2.73	0 -	-	-	-	2	-16.1	12.8	
Assessment Points -2	Cosy 6	9.92	3.1	1.1	8000	38.4	-30.93	-0.93	2.73	0 -	-	-	-	2	-1.1	10.17	
Assessment Points -2	Cosy 6 (reflected by 7 Rowden Lane)	10.44	3.1	1.1	1000	53.61	-31.37	-0.04	2.75	-24.19	-24.19	-	-	2	0	2.76	
Assessment Points -2	Cosy 6 (reflected by 7 Rowden Lane)	10.44	3.1	1.1	4000	44.41	-31.37	-0.27	2.75	-25	-25	-	-	2	1	-6.48	
Assessment Points -2	Cosy 6 (reflected by 7 Rowden Lane)	10.44	3.1	1.1	2000	44.01	-31.37	-0.09	2.75	-25	-25	-	-	2	1.2	-6.5	
Assessment Points -2	Cosy 6 (reflected by 7 Rowden Lane)	10.44	3.1	1.1	8000	38.31	-31.37	-0.98	2.75	-25	-25	-	-	2	-1.1	-15.39	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	500	57.6	-33.32	-0.03	2.78	0 -	-	-	-	2	-3.2	25.83	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	1000	53.7	-33.32	-0.05	2.78	0 -	-	-	-	2	0	25.11	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	250	56.4	-33.32	-0.01	2.78	0 -	-	-	-	2	-8.6	19.25	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	2000	44.1	-33.32	-0.11	2.78	0 -	-	-	-	2	1.2	16.65	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	4000	44.5	-33.32	-0.34	2.78	0 -	-	-	-	2	1	16.62	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	125	55.1	-33.32	0	2.78	0 -	-	-	-	2	-16.1	10.46	
Assessment Points -3	Cosy 6	13.07	4.2	1.1	8000	38.4	-33.32	-1.22	2.78	0 -	-	-	-	2	-1.1	7.54	
Assessment Points -4	Cosy 6	13.65	1.6	1.1	500	57.6	-33.7	-0.03	2.92	0 -	-	-	-	2	-3.2	25.59	

Assessment Points -6	Cosy 6 (reflected by 5 Rowden Lane)	15.52	4.8	1.1	125	55.01	-34.82	-0.01	2.82	-3.67	-3.67	-	-	2	-16.1	5.24
Assessment Points -6	Cosy 6 (reflected by 9 Rowden Lane)	7.87	4.8	1.1	8000	38.31	-28.92	-0.74	2.41	-7.97	-7.97	-	-	2	-1.1	4
--- Objects ---																
Receivers	x	y	Height													
Assessment Points -1		54.17	24.42	4.2												
Assessment Points -2		52.09	22.31	3.1												
Assessment Points -3		50	20.17	4.2												
Assessment Points -4		49.23	19.61	1.6												
Assessment Points -5		61.7	28.69	4.8												
Assessment Points -6		64.75	31.89	4.8												
Point Sources	x	y	Height	Lw	Hz	Adjust Level										
Cosy 6		59.56	28.52	1.1	-	31.5	2									
-	-	-	-	-		63										
-	-	-	-		55.1	125										
-	-	-	-		56.4	250										
-	-	-	-		57.6	500										
-	-	-	-		53.7	1000										
-	-	-	-		44.1	2000										
-	-	-	-		44.5	4000										
-	-	-	-		38.4	8000										
Buildings	x	y	Height	Reflection Coefficient												
7 Rowden Lane		66.87	22.34	5.3	0.98	31.5										
-		60.87	28.16	8.4	0.98	63										
-		57.34	24.52	-	0.98	125										
-		63.34	18.7	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
9 Rowdens Lane Porch		64.64	30.32	2.7	0.98	31.5										
-		63.35	28.97	3.7	0.98	63										
-		62.44	29.84	-	0.98	125										
-		63.78	31.24	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
9 Rowden Lane		61.73	27.31	4.8	0.98	31.5										
-		66.2	23	8	0.98	63										
-		69.13	25.98	-	0.98	125										
-		64.69	30.34	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
5 Rowden Lane		53.23	14.45	4.8	0.98	31.5										
-		49.42	18.15	7.9	0.98	63										
-		56.41	25.32	-	0.98	125										
-		60.31	21.58	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
5 Rowden Lane-2		53.22	14.4	4.8	0.98	31.5										
-		57.42	18.61	7.9	0.98	63										
-		60.45	15.71	-	0.98	125										
-		56.28	11.5	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
11 Rowden Lane		64.68	30.33	4.8	0.98	31.5										
-		69.09	26	8	0.98	63										
-		72.84	29.94	-	0.98	125										
-		68.32	34.16	-	0.98	250										
-	-	-	-		0.98	500										
-	-	-	-		0.98	1000										
-	-	-	-		0.98	2000										
-	-	-	-		0.98	4000										
-	-	-	-		0.98	8000										
-	-	-	-		0.98	16000										
--- Configuration ---																
Calculation Method ISO9613-2:2024 (New)																
Hard Ground (Ground Factor = 0)																
15.0°C Temperature																
70% Humidity																
Results are A-weighted																
Second order reflections are included																
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)																
ISO9613-2 barrier attenuation limit (20/25dB) is enabled																
Vertical edges (lateral paths) are included																
Limited to convex paths																
Limited in distance (ISO17534-3 recommendation)																
Ground reflections are not screened (ISO17534-3 recommendation)																
--- Key ---																
Lw	Sound Power Level (dB)															
Lp	Sound Pressure Level (dB)															
Ad	Distance attenuation (geometric divergence) ISO9613-2 (dB)															
Ab	Barrier attenuation ISO9613-2 (dB)															
Ag	Ground effect ISO9613-2 (dB)															
Aa	Air absorption ISO9613-1 (dB)															