WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Alternative Heat Assessments
Clondalkin Civic Offices

Noise Impact Assessment
03 June 2026

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Executive Summary

Wave Dynamics were engaged by Alternative Heat to undertake a noise impact assessment for the upgrade works on the existing Clondalkin Civic Offices, Ninth Lock Rd, Clondalkin, Dublin. The upgrade works consist of the addition of external heat pump units, to be located in the carpark of the existing development.

This report outlines the project criteria, survey results, assessment, and general guidance recommendations for:

- Operational noise from the proposed external heat pump units to nearby noise sensitive locations (NSLs).

Noise Impact Assessment

An attended background noise survey was undertaken to measure the existing noise levels in the area and quantify the existing baseline noise environment for both day and night-time periods.

The baseline noise survey was conducted to establish the existing noise environment and project criteria in accordance with BS 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound.*

A noise model of the proposed site has been developed to predict noise levels from new plant, consisting of 2 no. air source heat pumps (2 x POKER-P THAETP 250 P1 1mod, at 76dB L_{wA} per unit), to be located in the existing carpark, to surrounding noise sensitive receptors.

An acoustic enclosure to the 2 no. POKER-P THAETP 250 P1 1mod ASHPs is proposed to reduce the Heat Pump Sound Power Levels by a minimum 10dB, (to a maximum 66dB L_{wA}).

Predicted resulting daytime and nighttime operational noise levels from the proposed development and associated plant and equipment have been assessed using a BS 4142 assessment.

The highest predicted specific noise level at the nearest dwelling is 39dB $L_{Aeq,T}$ due to the operation of the proposed new heat pumps.

It has been predicted that there will be a **low impact** at all noise sensitive receptors during the daytime and nighttime periods. The predicted noise levels from the development have been compared with BS 4142 guidance, which is predicted to comply at all noise sensitive locations.

As additional assessment to the nearby office facades has been carried out, and calculated noise levels are expected to comply with the criteria at this receptor.

Based on the assessment and recommendations outlined in this report it is predicted that noise levels at the proposed development will comply with the project criteria outlined in this report.

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1 Introduction

Wave Dynamics were engaged by Alternative Heat to undertake a noise impact assessment for the upgrade works on the existing Clondalkin Civic Offices, Ninth Lock Rd, Clondalkin, Dublin. The upgrade works consist of the addition of external heat pump units, to be located in the carpark of the existing development.

An attended background noise survey was undertaken to measure the existing noise levels in the area and quantify the existing baseline noise environment. This report outlines the project criteria, survey results, assessment, and general guidance recommendations for:

- Operational noise from the proposed external heat pump units within the leisure centre.

Appendix A outlines a glossary of the acoustic terminology used in this report.

1.1 Statement of Competence

This report was completed by Wave Dynamics, an acoustic consultancy that specialises in noise and vibration. Our consultants have extensive experience in noise impact assessments.

This assessment and report were completed by Joe Potter | Technical Engineer with Wave Dynamics who has experience in noise measurement surveys and assessments across a wide range of sectors including environmental, residential and commercial projects. Joe has an MA in Music Technology, has the Institute of Acoustics Postgraduate Diploma in Acoustics and Noise Control.

This report was peer reviewed by James Mangan, who is Director (Acoustics) with Wave Dynamics. James has extensive experience in assessing noise and vibration impacts across a variety of sectors, including residential, industrial, commercial and renewable development. James has over 25 years' experience as an acoustic consultant, holds a Pg Diploma in Acoustics and Noise Control (Institute of Acoustics), is a Member of the Institute of Acoustics (MIOA) and is a former Chairman of the Irish Branch of the Institute of Acoustics.

2 Site Description

The proposed development is located at Ninth Lock Rd, Clondalkin, Dublin. The existing development is surrounded by a carpark to the north and east, residential buildings to the south and Clondalkin Civic Offices to the west of the development as outlined in Figure 1.

Figure 1: Site Location, Measurement Location A1-A2, ASHP Locations, Noise Sensitive Locations (NSL), and the Surrounding Area.

Table 1 shows the distance between the proposed ASHPs and the closest façade of the NSL.

Table 1: Distance Between NSLs and the centre of the site.

Noise Sensitive Location	Distance from closest façade of the NSL to the plant (m)
NSL1 (dwelling)	14
NSL2 (dwelling)	42
NSL3 (office)	9
NSL4 (health centre)	50

3 Project Criteria

The acoustic criteria for the project are set out in this section; the purpose of the criteria is to ensure reasonable:

- Operational noise from the proposed heat pump units at the nearest NSLs.

To provide adequate conditions Wave Dynamics have developed the project criteria for:

- Operational noise.

Acoustic Standards

The acoustic standards for assessing noise impact for the project have been developed from the following:

- ✓ BS 4142 2014 A1+ 2019: *Methods for rating and assessing industrial and commercial sound.*
- ✓ Environmental Protection Agency NG4: Guidance note for Noise: *Licence Applications, Surveys and Assessments in Relation to Scheduled Activities.*
- ✓ BS 8233:2014: *Guidance on sound insulation and noise reduction for buildings.*
- ✓ ISO 1996-1:2016 Acoustics — *Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures.*
- ✓ Previous experience on similar projects.

3.1 Operational Noise Assessment Criteria

The operational noise criteria for the proposed development is outlined in this section. Operational noise criteria has been sought from industry relevant standards such as BS 4142 and EPA NG4.

BS 4142:2014+A1:2019

The standard describes a method for the assessment of commercial/industrial noise to quantify its impact on persons outside of a residential dwelling. BS 4142 has become the de facto standard for plant noise impact assessment and investigation. BS4142 considers the significance of impact of an industrial noise source by assessing the margin by which a noise source exceeds a background sound level. BS 4142 states that:

- *"Typically, the greater this difference, the greater the magnitude of the impact.*

In providing an initial estimate of impact, BS4142 advises that:

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *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".*

"Adverse impacts include, but are not limited to, annoyance and sleep disturbance".

In consideration of assessment context, BS 4142 advises that:

"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds

the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood".

BS4142 outlines guidance for penalty corrections to be applied to the sound sources in question should the noise source have one of the following characteristics:

- The sound contains a distinguishable, discreet, continuous tone (whine, or hum);
- The sound contains distinct impulses (i.e. bangs);
- The sound is intermittent or:
- The sound is irregular.

In this instance, it is advised that a warranty be sought from the heat pump supplier to confirm that the units do not emit tonal noise characteristics.

EPA NG4

In order to provide some context to the BS4142 assessment, reference is also made to the EPA NG4 guidelines which provide plant noise criteria for daytime, evening and night-time periods in terms of an 'absolute level'. NG4 advises that noise attributable to onsite activities from an EPA licenced premises should not exceed the following limits:

- *Daytime (07:00hrs – 19:00hrs)* *55dB $L_{Ar,T}$*
- *Evening (19:00hrs – 23:00hrs)* *50dB $L_{Ar,T}$*
- *Nighttime (23:00hrs – 07:00hrs)* *45dB $L_{Aeq,T}$*

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{Ar,T}$). In all cases, an assessment by a competent person will be required.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

BS 8233: 2014

Guidance for suitable noise levels at the adjacent offices can be sought from BS8233:2014, whereby an external daytime façade level not exceeding 50dB $L_{Aeq,T}$ is proposed, in order to achieve an internal office noise level ≤35dB $L_{Aeq,T}$ within the offices.

An external noise level ≤50dB $L_{Aeq,T}$ will result in an internal office noise level ≤35dB $L_{Aeq,T}$, on the basis of a minimum façade reduction of 15dB for a partially open window. The noise levels from the ASHP at the office facade have been assessed against this criteria.

4 Baseline Noise Survey

4.1 Noise Survey Details

An attended baseline noise survey was conducted to assess the background noise levels. The measurement location was chosen to establish the background noise at the closest noise sensitive locations to the proposed ASHPs at Clondalkin Civic Offices, Ninth Lock Rd, Clondalkin, Dublin.

4.1.1 Measurement Locations

The proposed development is located at Ninth Lock Rd, Clondalkin, Dublin. The existing development is surrounded by a carpark to the north and east, residential buildings to the south and Clondalkin Civic Offices to the west of the development as outlined in Figure 2.

Figure 2: Site Location, NSL Locations and Measurement Locations.

4.1.2 Noise Measurement Location Description

A1: Measurement Position A1 was selected to provide a representative and robust baseline of the existing acoustic climate. Position A1 represents the closest noise sensitive receptor to the proposed development.

A2: Measurement Position A2 was selected to provide a representative and robust baseline of the existing acoustic climate. Position A2 represents the closest worst case noise sensitive receptor to the proposed development during the nighttime period as it is a residential location.

The data captured at this location effectively encapsulates the ambient and background noise levels at the location closest to the proposed ASHPs and is therefore representative of the worst-case NSLs. To ensure high-quality, accurate data, the measurement position was established at a strategic distance from the road source.

This placement was designed to minimise incident air wave reflections on the microphone capsule, thereby providing a clear and representative data set of the acoustic environment at the closest receptor.

4.1.3 Survey Methodology and Personnel

The survey was completed by Jack Nolan (Field Engineer) on the 15th of May 2026 between the hours of 05:00hrs – 08:00hrs.

Attended Noise Measurements

Measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were taken for 15 durations in the locations A2 during nighttime measurements (23:00hrs – 07:00hrs) and 30 minutes at A1 during daytime hours (07:00hrs – 23:00hrs). Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately 1.5m above the ground level. The weather conditions were calm (wind less than 5m/s) with no rain, a windshield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.

Figure 3: Attended Measurement Location A1.

Figure 4: Attended Measurement Location A2.

4.1.4 Survey Period

The survey was completed by Jack Nolan (Field Engineer) on the 15th of May 2026 between the hours of 05:00hrs – 08:00hrs

4.1.5 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended measurements. Table 2 summarises the measurement equipment used.

Table 2: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Calibrator	Cal 7	Cirrus CR:515	107358	AC260323	25/03/2027
Sound Level Meter	SLM2	Nor140	1406532	UCRT25/2495	20/10/2027

4.1.6 Subjective Noise Environment

During the attended noise survey following noise sources were identified:

- Road traffic from surrounding road network.
- Distant road traffic from M50.
- Birdsong.

4.1.7 Weather Conditions for Monitoring Period

Good weather conditions were noted during the attended survey, with winds typically less than 5 m/s and no rain and clear skies.

4.2 Noise Measurement Results

This section outlines the results of the attended noise measurements.

Attended Measurement Results

Table 3 outlines the results of the attended measurement survey.

Table 3: Attended Noise Measurement Results.

Measurement					Measured Noise Levels (re 20µPa)		
Location	Coordinates	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
A2	53.323559,-6.394213	15/05/2026	05:34	15	57	68	45
A2	53.323559,-6.394213	15/05/2026	05:50	15	56	70	46
A2	53.323559,-6.394213	15/05/2026	06:05	15	56	69	47
A2	53.323559,-6.394213	15/05/2026	06:21	15	55	69	48
A2	53.323559,-6.394213	15/05/2026	06:36	15	56	70	48
A1	53.323784,-6.394545	15/05/2026	07:01	30min	56	66	54
A1	53.323784,-6.394545	15/05/2026	07:32	30min	54	68	52

Discussion of Measurement Results

The dominating noise source in the area is road traffic noise from the surrounding road network, weather conditions observed throughout the attended survey were dry, calm conditions with wind speeds less than 5m/s with no rain.

Night-time background level (L_{A90}) measurements (05:30hrs-07:00hrs) remained consistent at location A2 measuring 45 - 48 dB(A) and raised to 52 - 54 dB(A) during the daytime measurement period (07:00hrs-08:00hrs) at A2, which correlates directly with the onset of morning commuter traffic on Fortunestown Way.

Ambient noise levels (L_{Aeq}) were consistent throughout the measurement period with values ranging from 54 – 57 dB(A).

4.3 Proposed Criteria

Guidance from BS 4142 and EPA NG4 has been considered in the assessment, it has been determined BS 4142 as being the more onerous criteria for this development, and as such has been selected as the operative criteria for this assessment.

5 Noise Impact Assessment

Following the survey a model of the development using SoundPLAN 9.1 modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc)
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source,
- Atmospheric attenuation and meteorological effects.

The acoustic model for the site has been developed based on the site proposals, site location and predicted noise sources.

5.1 Noise Model Inputs

Plant & Equipment

The plant and equipment specification provided by Alternative Heat, which outlines unit sound power levels for assessment purposes. The plant is assumed to operate at 100% load as no specific load conditions have been provided and operate 100% of the time to simulate a worst-case scenario.

Table 4: Plant and Equipment Sound Power Levels

Item	Model	Octave Band Sound Power Level L_W dB at Centre Frequency (Hz)								Overall Sound Power Level L_{WA} dB
		63	125	250	500	1000	2000	4000	8000	
Air Source Heat Pump	POKER-P THAETP 250 P1 1mod	71	76	76	75	70	66	64	52	76

(1) Sound power spectrum assumed from single figure values provided in mechanical technical submittal.

Attenuation

An acoustic enclosure to the 2 no. POKER-P THAETP 250 P1 1mod ASHPs is proposed to reduce the Heat Pump Sound Power Levels by a minimum 10dB, (to a maximum 66dB L_{wA}).

3D Acoustic modelling

Following the site measurements and model, a noise impact assessment was undertaken. This considers the contribution to the noise environment at the nearest noise sensitive locations from noise from the operation of the proposed heat pump units and comparison to the background noise. The following section outlines the assessment and findings. Figure 5 outlines the 3D acoustic model.

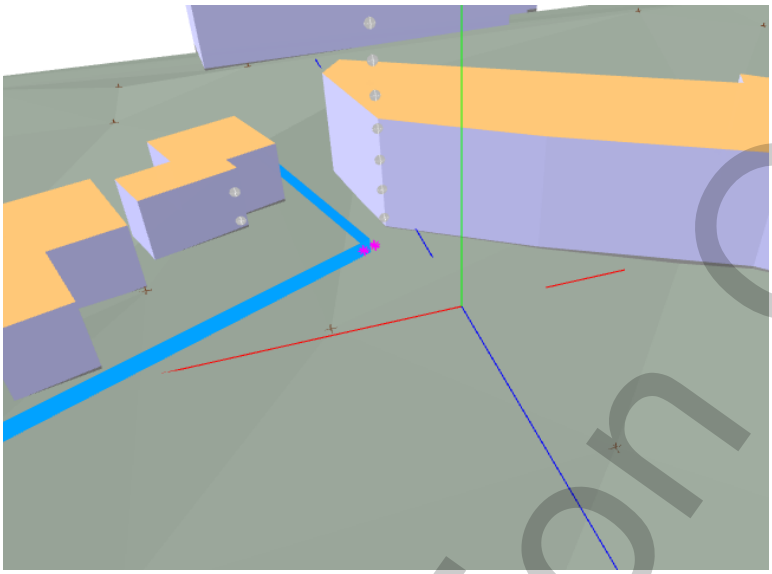

Figure 5: SoundPLAN 9.1 Model of the Proposed Development.

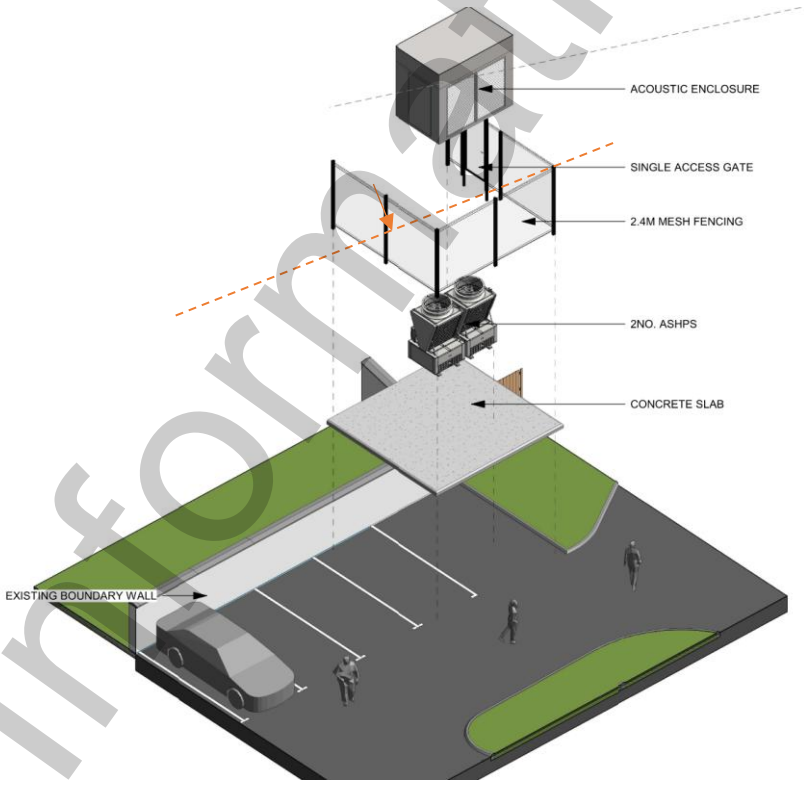

Figure 6: Screenshot of figure received from Alternative Heat depicting the proposed ASHPs and acoustic enclosure.

5.2 Modelling Assumptions

The following assumptions were made throughout the modelling and assessment:

- Assessment based on the site baseline noise survey, detailed in Section 4.
- Noise source sound power levels and unit quantities of plant and equipment provided by Alternative Heat for use in the assessment.
- Acoustic enclosure performance as outlined above.
- Model assumes plant and equipment operating 100% of the time, at 100% capacity.

- Modelling based on the drawings and layouts provided.
- Model assumes worst-case operating conditions as outlined in Section 5.
- Model and assessment conducted for the proposed development only.
- Heat pump sources set to a height of 2.2m above ground level based on mechanical submittal.
- Worst-case scenario where heat pumps operate in free field conditions with noise wall in place as proposed.

5.3 Noise Assessment: Daytime Scenario (Residential)

The noise impact at the nearest residential noise sensitive locations have been assessed in accordance with BS 4142. NSL1 has been selected to be outlined in the BS4142 daytime assessment as this NSL has the highest predicted noise level from the proposed development. All other NSL's are predicted to have lower onset noise levels from the development and therefore NSL1 is the worst-case. Noise levels have been measured over 30 minute periods at measurement location A2, the worst-case daytime 30 minute measurement was used in the assessment outlined in Table 5.

The daytime situation assumes the following noise sources:

- Heat pumps operating 100% of the time at 100% capacity, based on spectra outlined in Table 4 with the addition of an acoustic enclosure with a minimum of 10dB L_{wA} noise level reduction.

5.3.1 BS 4142 Assessment (Daytime)

Table 5: BS4142 Assessment for daytime period.

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (daytime)	$L_{Aeq(30min)}$ = 39dB	7.3.6	As the proposed development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL1 as this is closest to the proposed development.
Residual sound level (daytime)	$L_{Aeq(30min)}$ = 54dB	7.3.2	The residual sound level was dominated by road traffic noise. Measurement location A2 was assessed as this is representative of background noise for worst case daytime receptor (NSL1).
Background sound level (daytime)	$L_{A90(30min)}$ = 52dB	8.1.2 8.4	The L_{A90} sound level was taken from the attended survey results and calculated at the NSL locations.
Specific sound level as predicted	$L_{Aeq(30min)}$ = 39dB	7.3.6	The specific sound has been predicted by calculation alone as the proposed development is not yet existing.
Acoustic feature correction	+0dB	9.2 9.3.2	With the information provided, it is not envisaged that there will be any tonal or impulsive characteristics to the proposed noise sources, therefore no penalty has been applied to the predicted specific source results.

Results		Relevant BS 4142 Clause	Commentary
Rating level	(39 + 0) dB = 39dB	9.2	
Background sound level	$L_{A90(30min)}$ = 52dB	8	
Excess of rating over background sound level	(39 - 52) dB = -13dB	11	Assessment indicates that there is likely a low impact on the noise sensitive locations as the specific sound is 13dB below the background levels and is lower than the residual sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment is based on the worst-case usage of 100% plant load using the sound power levels listed in Table 4.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will have a **low impact** during the daytime period.

Tonality & Impulsivity

Based on the predicted noise levels and the nature of the proposed plant and equipment within the provided technical data sheets, there will likely be no tonal / impulsive characteristics audible at surrounding sensitive receptors during daytime hours, as the predicted noise levels are 13dB below the measured background noise levels and significantly below the residual levels.

Technical data sheets provided specified the octave band data only, therefore tonality is not shown in the frequency spectrums. It is advised that a warranty be sought from the heat pump supplier to confirm that the units do not emit tonal noise characteristics.

5.4 Noise Assessment: Nighttime Scenario (Residential)

The noise impact at the nearest residential noise sensitive locations have been assessed in accordance with BS 4142. Baseline night-time noise levels have been measured over a 15 minute period at measurement location A1, the worst-case nighttime measurement was used in the assessment outlined in Table 5.

The nighttime situation assumes the following noise sources:

- Heat pump units operating 100% of the time at 100% capacity, based on spectra outlined in Table 4.

5.4.1 BS 4142 Assessment (Nighttime)

Table 6: BS4142 Assessment for nighttime period.

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (nighttime)	$L_{Aeq(15min)}$ = 39dB	7.3.6	As the proposed development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL1 as this is closest sensitive nighttime receptor to the proposed development.
Residual sound level (nighttime)	$L_{Aeq(15min)}$ = 55dB	7.3.2	The residual sound level was dominated by road traffic noise. Measurement location A1 was assessed as this is representative of background noise for worst case nighttime receptor (NSL1).
Background sound level (nighttime)	$L_{A90(15min)}$ = 45dB	8.1.2 8.4	The L_{A90} sound level was taken from the attended survey results and calculated at the NSL locations.
Specific sound level as predicted	$L_{Aeq(15min)}$ = 39dB	7.3.6	The specific sound has been predicted by calculation alone as the proposed development is not yet existing.
Acoustic feature correction	+0dB	9.2 9.3.2	It is not envisaged that there will be any tonal or impulsive characteristics to the proposed noise sources, therefore no penalty has been applied to the predicted specific source results.
Rating level	(39 + 0) dB = 39dB	9.2	
Background sound level	$L_{A90(15min)}$ = 45dB	8	
Excess of rating over background sound level	(39 - 45) dB = -6dB	11	Assessment indicates that there is likely a low impact on the noise sensitive locations as the specific sound is 6dB below the background levels and is lower than the residual sound. Context has also been considered.

Results		Relevant BS 4142 Clause	Commentary
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment is based on the worst-case usage of 100% plant load using the sound power levels listed in Table 4.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will have a **low impact** during the nighttime period.

Tonality & Impulsivity

The tonality and impulsivity of the proposed development in operation have been considered as part of the assessment. Based on the predicted noise levels and the nature of the proposed plant and equipment it is not expected that there will be tonal or impulsive characteristics at surrounding sensitive receptors as the predicted noise levels are 6dB below the measured background noise levels and also below the residual levels. It is advised however that a warranty be sought from the heat pump supplier to confirm that the units do not emit tonal noise characteristics.

5.5 Noise Levels at Office Facades

As the proposed heat pumps are located next to office (non-residential) noise sensitive locations, BS 8233 internal office noise levels have been considered. An assessment using the SoundPlan noise modelling software indicates that noise levels will be 45dB $L_{Aeq,T}$ at the nearest office façade. This is 5dB below the targeted ≤50dB $L_{Aeq,T}$ levels.

6 Conclusion

Wave Dynamics were engaged by Alternative Heat to undertake a noise impact assessment for the upgrade works on the existing Clondalkin Civic Offices, Ninth Lock Rd, Clondalkin, Dublin. The upgrade works consist of the addition of external heat pump units in the carpark of the existing development.

An attended day and night-time background noise survey was undertaken to measure the existing noise levels in the area and quantify the existing baseline noise environment. The measured acoustic environment was then compared to predicted noise emissions from the proposed heat pump units, at nearby sensitive receptors.

Based on the predicted noise levels from the heat pump units, including the proposed noise mitigation, the project achieves compliance with BS 4142 criteria on the surrounding noise sensitive receptors. Predicted plant noise levels are below the measured background noise levels in the area. Additionally, the assessment assumes a worst-case approach with all heat pumps operating simultaneously at maximum load.

Appendix A outlines a glossary of the acoustic terminology used in this report.

Appendix A- Glossary of Terms

Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
Background Noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak
R_W	Weighted sound reduction index - a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements