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Acoustic Review of the Impact of Noise,

from,

1 no. Air-Water Heat pump and a thermal storage tank,

at the rear of,

Ballinasloe (Coral) Leisure Centre,

Sarsfield Rd, Cleaghmore, Ballinasloe, Co. Galway, H53 K718.

Revision:	GCCBLCAR3 1.1 (Issue)
Client:	Galway County Council
Author:	Ted Dalton, M.Sc., MAACI, MIOA.
Qualifications:	M.Sc. (Hons) Degree – Applied Acoustics Diploma in Acoustics & Noise Control (Hons) Member of the Association of Acoustic Consultants of Ireland (MAACI) Member of the Institute of Acoustics (MIOA) Certificate in Competence Environmental Noise Measurement IOA (Hons) B.Sc. (Hons) Degree – Surveying.
Organisation:	Dalton Acoustics Ltd.
Date:	Friday 4th. July 2025

Signature Approvals:

Ted Dalton, Dalton Acoustics Ltd.
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EXECUTIVE SUMMARY:

Dalton Acoustics Ltd have carried out a measurement exercise adjacent Ballinasloe Leisure Centre on behalf of Galway County Council. In an effort to reduce the carbon footprint of the Leisure Centre it is proposed that 1 no. Air-Water Heat pump and a thermal storage tank be installed at the rear of the existing building. Measurement undertaken adjacent the nearest noise sensitive dwellings (08/04/25 to 10/04/25) provides existing ambient noise levels for the vicinity. The LAeq 16-hour daytime and LAeq 8-hour night-time for the measurement location are as follows;

- **LAeq 16 Hour = 57dB**
- **LAeq 8 Hour = 49dB**

These levels measured at the nearest noise sensitive dwelling are above typically applied acoustic guidance and standards such as **BS8233: 2014 and WHO: 1999** which suggest;

- **LAeq 16 Hour Ne. 55dB**
- **LAeq 8 Hour Ne. 45dB**

The 1 no. proposed heat pump has had its1/1 octave band emission levels calculated for the process of evaluating the resultant noise levels at the 3 no. nearest noise sensitive dwellings, in the absence of mitigation and also, with the presence of a passive attenuation unit installed. In the absence of attenuation, noise levels will not be favourable. The inclusion of a passive attenuation housing on the unit (modelled using INoise software) suggests that noise levels at the nearby noise sensitive dwellings will remain substantially below the guidance and standards referenced above, for both the daytime and night-time metrics. These quoted metrics also being below what has been measured as presently existing at these dwellings.

This measurement and calculation exercise indicates that the installation of the 1 no. heat pump with passive attenuation, will remain favourable with those noise metrics commonly used for planning applications / conditions throughout the country, in accordance with the guidance and standards quoted within this document.

Yours sincerely,

Ted Dalton B.Sc., MAACI, MIOA. MInstSCE
(Senior Acoustic Consultant)

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1. 0 INTRODUCTION

Dalton Acoustics Ltd. have been commissioned by Galway County Council to carry out a noise study of the local ambient noise environment at Ballinasloe (Coral) Leisure Centre, Sarsfield Rd, Cleaghmore, Ballinasloe, Co. Galway, in the direction of the nearest noise sensitive dwellings. As a result of a pre-planning meeting for a part 8 planning application, which includes for 1 no. Air-Water Heat pump and a thermal storage tank at the rear of the existing building, this noise study was requested.

The purpose of the measurement assessment is to assess what the noise emission levels might be at these dwellings as a result of the proposed installation of the 1 no. Air-Water Heat pump and a thermal storage tank. The nearest noise sensitive dwellings which could be identified for the purpose of this report and assumed directly affected by the proposed installation, are located in a Westerly direction from the leisure centre facility.

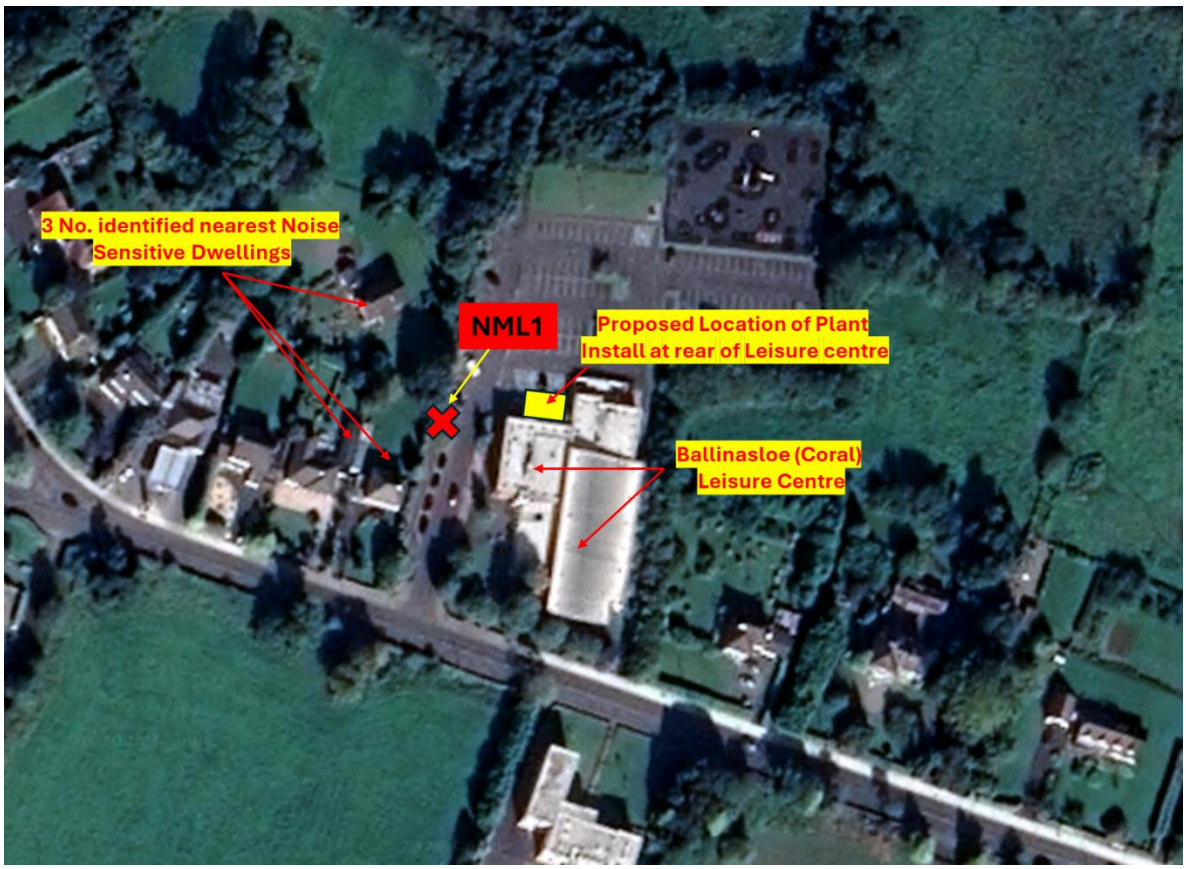


Fig 1: 3 No. NSLs relative to proposed installation at the Ballinasloe (Coral) Leisure Centre

A noise assessment (See NML1) of the current ambient noise environment was undertaken, at the side of the nearest dwellings rear garden boundary wall within the leisure centre carpark facility. The assessment was carried out commencing on 8th. April 2025 and ceased on 10th. April 2025 in order to obtain some full diurnal measurement cycles.

The method of measurement for the survey process is based on **BS EN ISO 1996-1: 2016** *"Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures".*

1.1 Relevant Acoustic Guidance

1.1.1 World Health Organisation – '*Community Noise Guidelines (Residential) 1999'* suggest assessment of the internal noise conditions at dwellings using the LAeq(8hr) night-time metric 23:00 hours to 07:00 hours and the LAeq (16hr) daytime metric 07:00 to 23:00 hours.

Table 1 *offers values for acoustic comfort in residential living areas and bedrooms; however, it does not offer daytime and night-time comparisons.*

"Guideline values for community noise in specific environments"

Table 1 - Guideline values for community noise in specific environments

Specific Environ	*Critical Health effect(s)*	*Leq [dBA]*	*Time Based Hrs.*	*LAfmax dB*
Dwelling, Indoors	*Speech intelligibility and moderate annoyance, daytime & evening*	*35*	*16*	*-------*
Inside Bedrooms	*Sleep disturbance, night-time*	*30*	*8*	*45*

1.1.2 BS 8233: 2014 – *'Guidance on Sound Insulation and Noise Reduction for Buildings'* may be considered, where specific internal room noise criteria for bedrooms is given at Ne. 30dB LAeq over 8 Hours at night from 23.00 to 07.00 Hours. **BS8233** provides both night-time and day-time internal noise guidance as per **Table 4** below.

BS8233: 2014 - Table 4 is replicated below.

Activity	Location	07:00 to 23:00 Hrs.	23:00 to 07:00 Hrs.
Resting	**Living Room**	**35dB LAeq 16Hr**	**----------**
Dining	**Dining Room / Area**	**40dB LAeq 16Hr**	**----------**
Sleeping (daytime resting)	**Bedroom**	**35dB LAeq 16Hr**	**30dB LAeq 8Hr**

Table 4: Indoor ambient noise levels for dwelling

However; **Section 7.7 Specific types of building**

7.7.2 Internal ambient noise levels for dwellings

NOTE 7 states;

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

These standards and guidelines used for assessment, are in line with current Planning Authority / Local County Council policies on noise at Ne. 55dB LAeq during daytime and Ne. 45dB LAeq night-time externally.

The above guidelines and standards are based on the standard assumption of 15dB(A) attenuation being afforded by a partially opened window on the elevation.

2.0 SURVEY DETAILS.

2.1 Noise measurement

Measurement was conducted using 1 No. NTI XL2 Class 1 sound level meter located in the following configuration. During the measurement process, the NTI XL2 Sound Level Meter at **NML1** was set up as follows;

The microphone and pre-amplifier were placed onto a tripod which was attached onto the boundary fence between the leisure centre and the nearest noise sensitive dwelling. The mic and preamp were located inside a weather shield and the applicable selection for same made on the SLM (WP30). The mic and preamp were connected back to the XL2 using a 5-metre cable and the sound level meter was locked inside a weatherproof pelitor for the duration of the measurement, which allowed for all weather measurement. Audio recording was set to **ON** for the full duration of the measurement process.

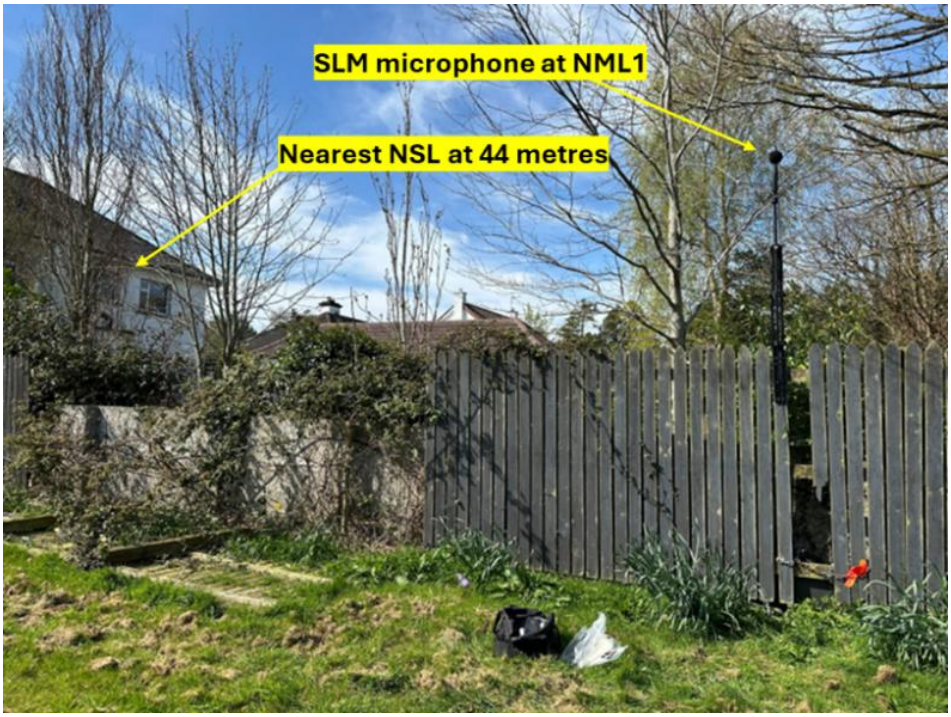


Fig 2: SLM setup at NML1 along boundary with NSL.

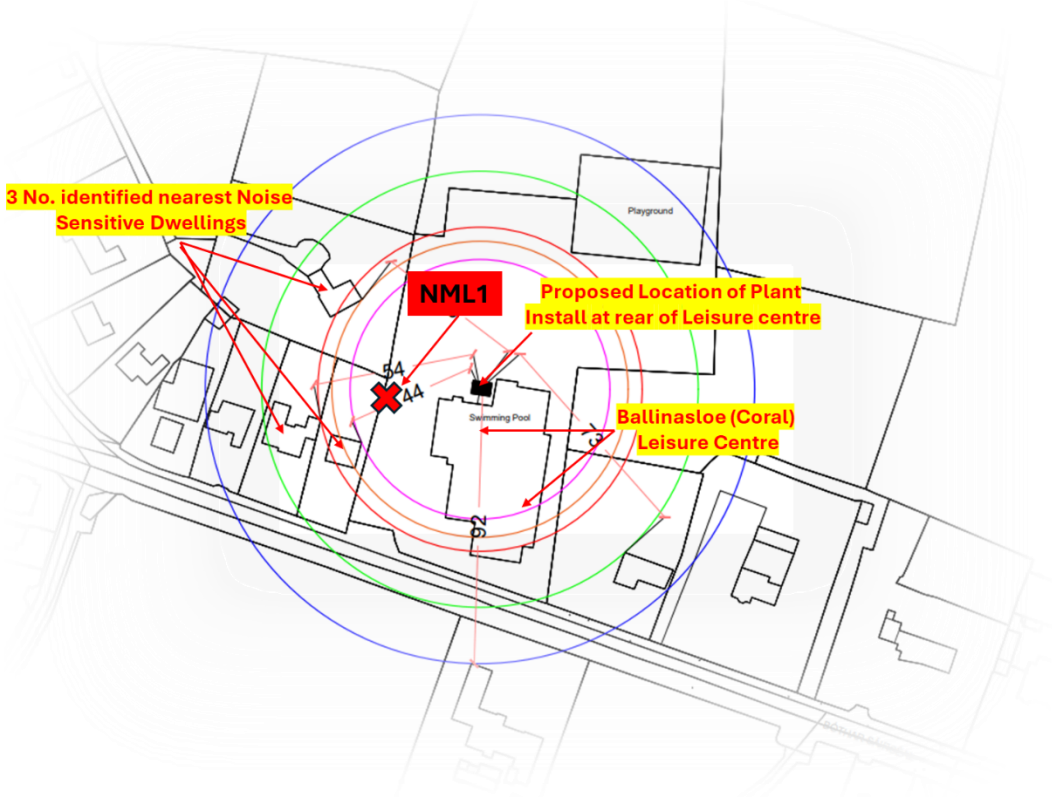


Fig 3: Indicates the proximity of the 3 No. NSLs & NML1 to the proposed plant

Figure 3 taken from data supplied by Galway County Council indicates that the 3 no. nearest noise sensitive dwellings are situated at 44 metres, 50 metres and 54 metres away respectively from the proposed plant installation. All 3 no dwellings are located off Sarsfield Road in a Westerly direction. The position of NML1 at the boundary fence to the nearest NSL is circa 20 metres from the corner of the leisure centre building and circa 30 metres from the proposed location of the plant items.

2.2 Survey Period

The measurement assessment commenced at 12:16 hours on 8th. April 2025 and ceased at 12:53 hours on 10th. April 2025. The provides 2 full diurnal cycles of measurement at the location.

2.3 Weather during measurement on site.

8th. to 10th. April 2025

Temperature 3 to 19° Centigrade,

Windspeed at Ne. 5.00 M/Sec,

Clear Skies with Dry Ground,

No Temperature inversion conditions present.

All weather conditions observed during the measurement period are considered as suitable for the gathering of reliable environmental noise data.

2.4 Personnel & Instrumentation

Ted Dalton (Dalton Acoustics Ltd.) commenced the acoustic measurement for the survey period intended, along with the setup of all measurement equipment at location.

Ted Dalton - Statement of Authority

- BSc Surv. (Hons) 1995 – Trinity College
- Diploma (Hons) in Acoustics & Noise Control 1999 (Institute of Acoustics).
- MSc (Hons) in Applied Acoustics 2016 (University of Derby).
- Member of Institute of Acoustics (MIOA) & Member of Irish branch committee (IOA).
- Chairperson of the Association of Acoustic Consultants of Ireland (MAACI).
- Diploma (Hons) in Environmental Noise Measurement & Assessment (IOA).
- 2014 to present: Principal at Dalton Acoustics Ltd.

2.4.1 Instrument (Sound Level Meter)

NTI XL2 Class 1 Integrating Sound Level Meter & Audio Analyzer,
Serial No. A2A-11604-EO
Calibration Cert SLM 240247
Calibration Certificate Dated: 25/06/24 (2-year calibration)

2.4.2 Calibrator

Calibrator Rion NC 74 with serial No. 34551704
Calibration Cert 1510212 - 2
Dated: 16/10/24
Valid for 1 year

2.4.3 Field Calibration

Using the Rion NC-74 Sound Level Calibrator, which produces a sound level of 94.0dB (re. 2x10-5) at a frequency of 1Khz. The instrument was calibrated before and after measurement with a recorded maximum deviation of -0.1dB.

These instruments meet the requirements of Annex B for Class 1 of IEC 60942: 2003 and BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications. See attached certs in **Appendix 1.**

2.5 Topography of Measurement Location.

The ground from the proposed location of the Air-Water Heat pump and thermal storage tank is level solid reflective ground across a carpark. There is a grass verge at the boundary between the carpark and the garden wall of the nearest noise sensitive dwelling where the SLM was situated at NML1. There is mainly clear unobstructed line of sight from source to receiver in terms of transmission pathway presently, in the direction of the NSLs.

3.0 MEASUREMENT PROCEDURE

The following readings were taken at the SLM microphone position – Unattended Measurement of 15 minute 1/3rd. Octave and Broadband samples for LAeq, LAfmax, LA10 & LA90. The SLM measurements were taken using “Fast” time weighting and “A” Frequency Weighting. The 1 No. XL2 SLM was also set to record all audio simultaneously

in compressed format, so that events can be examined in PC Data Explorer for their relevance / suitability and inclusion within the measurement samples. All measurement samples at NML1 are free-field measurement samples and were subject to all existing ambient noise sources subsequently.

The explanation for the most important descriptors is provided below;

ISO 1996-1:2016 *(Standard for this measurement data gathering)* ***Acoustics -*** *Description, measurement and assessment of environmental noise* ***Part 1:*** *Basic quantities and assessment procedures*

Where;

LAeq,T	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).
LAFmax	The maximum RMS A-weighted sound pressure level occurring within a specified time period. Measured using the "Fast" time weighting.
LAF90	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. Measured using the "Fast" time weighting.
LAF10	Refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. Measured using the "Fast" time weighting The "A" suffix denotes the fact that, the sound levels have been A-Weighted in order to account for the non-linear nature of human hearing ie. LAeq, LAfMax, LA90 & LA10
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 uPa).

4.0 THE PROPOSED DEVELOPMENT

The proposed development at the rear of the Ballinasloe Leisure Centre consists of 1 No. Air-Water Heat pump and a thermal storage tank to be situated at ground level. This proposed position will be within the confines of a reflective corner which will serve to

further increase the noise emissions from these units in the direction of the NSLs. The specification for the proposed air-water heat pump has been provided by Galway Co. Co. as;

Air-Water Heat Pump, Model - CXAF 190 SE XLN AC R454B

The noise data provided for these units is as follows;

Sound power measurements in accordance with ISO 9614:2009 (part 1)

Frequency (Hz)	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Lw (1 unit)	94 dB	91 dB	91 dB	87 dB	80 dB	78 dB	71 dB

As per the Manufacturer's supplied data;

Average sound pressure at 10 meter distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level = 59dB(A)

Figure 4 below provides a plan of the proposed setup for this proposed air-water heat pump and thermal storage tank at the rear of the leisure centre facility.

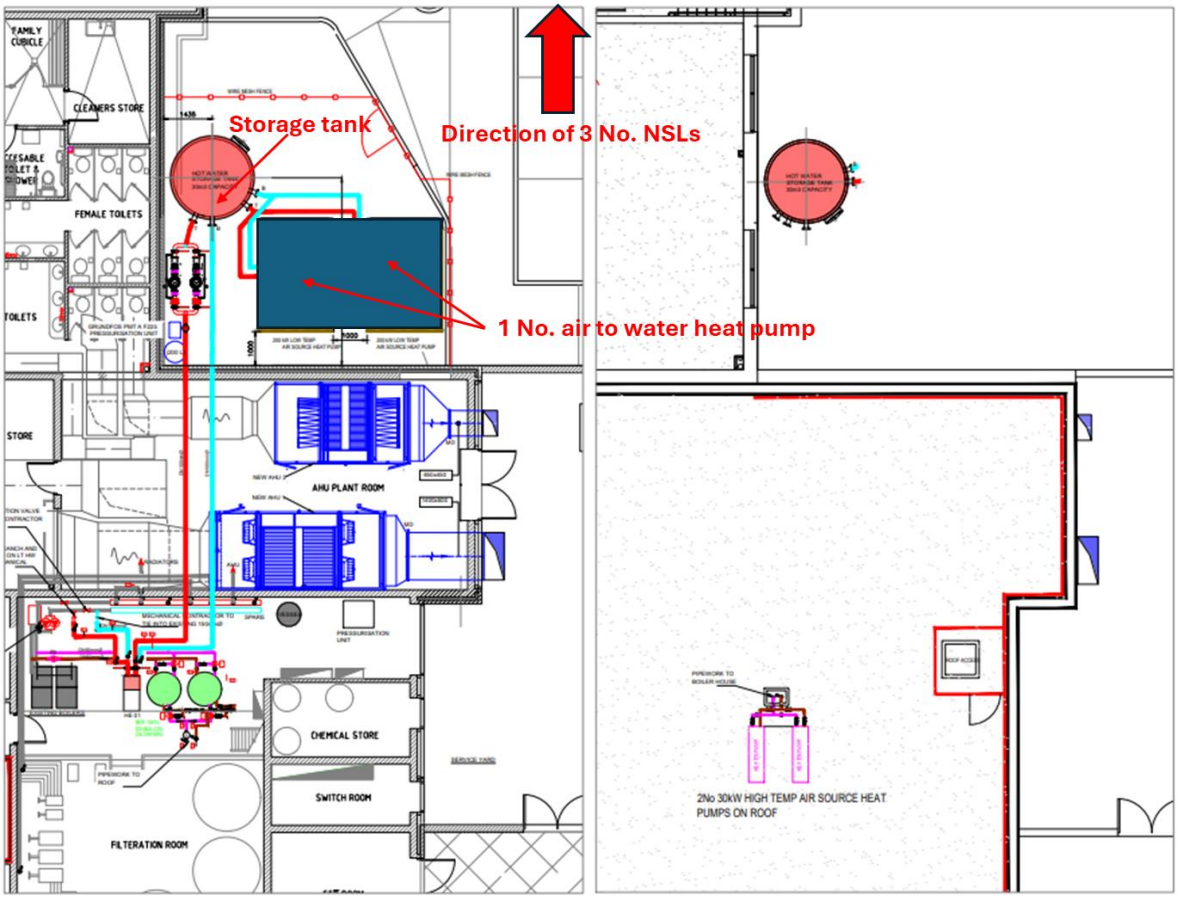


Fig 4: Proposed install of air-water heat pump & storage tank to rear of leisure centre

The noise measurement data provided by the Manufacturer for these heat pumps, shall be used for the calculation of resultant levels at the nearest noise sensitive dwelling and an assessment of the overall impact on same.

5.0 NOISE LEVELS

5.1 Existing Measured Noise Climate

The measurement data obtained over the period 8th. April to 10th. April 2025 provides a reliable indicator of the external noise levels experienced by the 3 no. identified noise sensitive dwellings adjacent the leisure facility. In order to reduce the amount of cells in **Table 1** below expressing the measurement data in relevant formats, the time segments have been broken up into 1 hour periods of evaluation. The full measurement data in 15 minute samples is contained within the Appendix of this report. **Table 1** below contains the LAeq(30 min) and LAfmax acoustic parameter for each hourly period.

Project Name:	30 min with Max levels
Device Info:	XL2, SNo. A2A-16360-E0, FW4.21 Type Approved NTi Audio M2230, SNo. 8569, User calibrated 2025-04-08 12:15,
Mic Type:	WP30(h)
Mic Sensitivity:	40.4 mV/Pa
Range:	20 - 120 dB

Results

Type	Start	Duration	LAeq [dB]	LAFmax [dB]
Recorded	**2025-04-08 12:16:32**	**2:0:36:36**	**57.4**	**105.5**
-Overload (2)		**0:00:03**	**96.2**	**105.5**
Project Result		**2:0:36:33**	**56.7**	**101.2**

Audit Intervals

Type	Start	Duration	LAeq [dB]	LAFmax [dB]
30'	2025-04-08 12:00:00	0:13:28	56.6	83.0
30'	2025-04-08 12:30:00	0:30:00	57.9	84.3
30'	2025-04-08 13:00:00	0:30:00	54.1	73.0
30'	2025-04-08 13:30:00	0:30:00	63.6	73.0
30'	2025-04-08 14:00:00	0:30:00	57.5	69.8
30'	2025-04-08 14:30:00	0:30:00	54.2	69.9
30'	2025-04-08 15:00:00	0:30:00	54.9	76.3

30'	2025-04-08 15:30:00	0:30:00	56.5	76.6
30'	2025-04-08 16:00:00	0:30:00	59.6	77.0
30'	2025-04-08 16:30:00	0:30:00	55.9	77.9
30'	2025-04-08 17:00:00	0:30:00	56.2	78.5
30'	2025-04-08 17:30:00	0:30:00	55.4	76.1
30'	2025-04-08 18:00:00	0:30:00	56.6	82.0
30'	2025-04-08 18:30:00	0:30:00	56.8	77.2
30'	2025-04-08 19:00:00	0:30:00	57.0	76.9
30'	2025-04-08 19:30:00	0:30:00	54.6	74.8
30'	2025-04-08 20:00:00	0:30:00	54.2	69.8
30'	2025-04-08 20:30:00	0:30:00	56.2	81.2
30'	2025-04-08 21:00:00	0:30:00	53.3	75.5
30'	2025-04-08 21:30:00	0:30:00	52.2	68.3
30'	2025-04-08 22:00:00	0:30:00	51.0	67.8
30'	2025-04-08 22:30:00	0:30:00	49.5	69.2
30'	2025-04-08 23:00:00	0:30:00	48.6	69.0
30'	2025-04-08 23:30:00	0:30:00	45.8	67.9
30'	2025-04-09 00:00:00	0:30:00	45.0	69.0
30'	2025-04-09 00:30:00	0:30:00	43.3	69.3
30'	2025-04-09 01:00:00	0:30:00	43.7	66.4
30'	2025-04-09 01:30:00	0:30:00	45.4	68.0
30'	2025-04-09 02:00:00	0:30:00	37.2	64.7
30'	2025-04-09 02:30:00	0:30:00	43.9	70.4
30'	2025-04-09 03:00:00	0:30:00	43.3	69.5
30'	2025-04-09 03:30:00	0:30:00	39.1	62.9
30'	2025-04-09 04:00:00	0:30:00	43.0	68.2
30'	2025-04-09 04:30:00	0:30:00	46.0	67.2
30'	2025-04-09 05:00:00	0:30:00	47.4	71.1
30'	2025-04-09 05:30:00	0:30:00	51.5	68.8
30'	2025-04-09 06:00:00	0:30:00	55.8	76.6
30'	2025-04-09 06:30:00	0:30:00	55.7	79.9
30'	2025-04-09 07:00:00	0:30:00	54.4	76.1
30'	2025-04-09 07:30:00	0:30:00	56.6	70.8
30'	2025-04-09 08:00:00	0:30:00	56.0	75.3
30'	2025-04-09 08:30:00	0:30:00	58.5	78.5
30'	2025-04-09 09:00:00	0:30:00	55.9	78.5
30'	2025-04-09 09:30:00	0:30:00	55.2	69.4
30'	2025-04-09 10:00:00	0:30:00	55.5	74.2
30'	2025-04-09 10:30:00	0:30:00	58.8	77.9
30'	2025-04-09 11:00:00	0:30:00	58.9	75.9
30'	2025-04-09 11:30:00	0:30:00	59.9	73.0
30'	2025-04-09 12:00:00	0:30:00	59.4	79.6
30'	2025-04-09 12:30:00	0:30:00	57.9	73.9
30'	2025-04-09 13:00:00	0:30:00	55.5	71.1
30'	2025-04-09 13:30:00	0:30:00	54.6	78.9
30'	2025-04-09 14:00:00	0:30:00	54.2	73.5

30'	2025-04-09 14:30:00	0:30:00	54.7	73.9
30'	2025-04-09 15:00:00	0:30:00	55.4	84.2
30'	2025-04-09 15:30:00	0:30:00	54.8	71.5
30'	2025-04-09 16:00:00	0:30:00	55.7	81.2
30'	2025-04-09 16:30:00	0:30:00	56.0	76.2
30'	2025-04-09 17:00:00	0:30:00	55.9	78.8
30'	2025-04-09 17:30:00	0:30:00	55.3	77.5
30'	2025-04-09 18:00:00	0:30:00	55.8	77.2
30'	2025-04-09 18:30:00	0:30:00	54.8	74.2
30'	2025-04-09 19:00:00	0:30:00	54.5	73.8
30'	2025-04-09 19:30:00	0:30:00	55.3	79.5
30'	2025-04-09 20:00:00	0:30:00	54.2	69.0
30'	2025-04-09 20:30:00	0:30:00	54.7	71.2
30'	2025-04-09 21:00:00	0:30:00	53.4	70.1
30'	2025-04-09 21:30:00	0:30:00	52.3	70.9
30'	2025-04-09 22:00:00	0:30:00	51.8	68.7
30'	2025-04-09 22:30:00	0:30:00	50.5	66.8
30'	2025-04-09 23:00:00	0:30:00	47.6	68.5
30'	2025-04-09 23:30:00	0:30:00	47.0	68.2
30'	2025-04-10 00:00:00	0:30:00	45.5	69.2
30'	2025-04-10 00:30:00	0:30:00	44.3	69.3
30'	2025-04-10 01:00:00	0:30:00	45.1	66.8
30'	2025-04-10 01:30:00	0:30:00	46.1	70.5
30'	2025-04-10 02:00:00	0:30:00	39.2	65.7
30'	2025-04-10 02:30:00	0:30:00	36.1	65.6
30'	2025-04-10 03:00:00	0:30:00	44.1	67.6
30'	2025-04-10 03:30:00	0:30:00	39.2	65.7
30'	2025-04-10 04:00:00	0:30:00	45.2	70.3
30'	2025-04-10 04:30:00	0:30:00	45.8	69.0
30'	2025-04-10 05:00:00	0:30:00	43.4	66.2
30'	2025-04-10 05:30:00	0:30:00	56.6	81.3
30'	2025-04-10 06:00:00	0:30:00	55.1	72.6
30'	2025-04-10 06:30:00	0:30:00	55.8	81.5
30'	2025-04-10 07:00:00	0:30:00	55.2	71.2
30'	2025-04-10 07:30:00	0:30:00	57.1	81.5
30'	2025-04-10 08:00:00	0:30:00	55.5	72.1
30'	2025-04-10 08:30:00	0:30:00	56.1	67.2
30'	2025-04-10 09:00:00	0:30:00	56.3	73.3
30'	2025-04-10 09:30:00	0:30:00	54.4	66.2
30'	2025-04-10 10:00:00	0:30:00	54.5	74.8
30'	2025-04-10 10:30:00	0:30:00	57.6	80.7
30'	2025-04-10 11:00:00	0:30:00	54.6	77.7
30'	2025-04-10 11:30:00	0:30:00	56.8	77.0
30'	2025-04-10 12:00:00	0:30:00	58.4	75.9
30'	2025-04-10 12:30:00	0:23:05	73.1	101.2

Table 1: 30 min results of LAeq and LAfmax at NML1

Note: The 1st. and last 1hour segments are in lighter type as these are somewhat affected by the calibration during installation and removal of the measurement kit and not fully true readings.

Blue Type – indicates daytime period typically 07:00 hours to 23:00 hours
Red Type – indicates night-time period typically between 23:00 hours and 07:00 hours

The ambient daytime LAeq(30 min) samples range from 49dB to 64dB and the ambient night-time periods range from 36dB to 57dB. The higher periods observed at night-time are typically commencing at 06:00 hours and specifically as a result of birdsong / dawn chorus taking place. Dawn chorus would be considered as a desirable sound and not an intrusive noise to the subjective observer at that time. The LAeq 16-hour daytime and LAeq 8-hour night-time are as follows;

- **LAeq 16 Hour = 57dB**
- **LAeq 8 Hour = 49dB**

5.2 The Proposed Development Noise Contributions

The main noise emissions from the proposed development will come from the presence of the proposed air-water heat pump - **CXAF 190 SE XLN AC R454B** being in-situ at the proposed location. The noise output / emissions from this pump has been outlined in **Section 4.0** previously as;

5.2.1 Non Mitigated Installation

The noise data provided for this unit is as follows;
Sound power measurement = 92dB(A)
Average sound pressure at 10 meter distance = 59dB(A) 1 pump

The suggested distance as per Galway Co. Co. for the nearest NSL is taken at 44 metres from the proposed pump. It is understood that this pump will not operate at full capacity for the majority of the time as per information provided to Dalton Acoustics Ltd. However, in order to allow for the greatest level of possible disturbance that might occur at the NSLs, the operating figures provided by the

Manufacturer are those used for predictive calculations (as the only figures presently available).

Formula 1: Total Sound Pressure for proposed pump at 44 metres

L2 = L1-20*Log(r2/r1) for point source

L2 = resultant level at NSL

L1 = level at reference distance measured by manufacturer

Where r2 = 44 metres (rear of nearest NSL)

Where r1 = 10 metres (measurement distance by manufacturer)

L2 = L1- 20*Log(44/10) = 59-20*Log4.4 = 59dB-13dB = 46dB(A) at NSL

The noise emissions from the air-water heat pump will be considered as steady state until the draw on the units drops and the unit adjusts accordingly. Thus noise emissions from this units will emit constant noise for a period.

5.2.2 Mitigated Installation

It is proposed that the air-water heat pump will be passively attenuated by the additional installation of a proprietary housing unit around the heat pumps.

This Attenuation Unit is proposed as follows;

Type AA303SX ENH (Uprated Performance)

The Suppliers quoted attenuation for this unit in each 1/1 octave band is stated below in **Figure 5.**

Octave Band Centre Frequency, Hz							
63	125	250	500	1k	2k	4k	8k
-5	-9	-16	-24	-26	-22	-18	-14

Fig 5: Heat Pump Attenuation 1/1 octave bands

An INoise, noise contour model of the proposed installation has been developed whereby the Sound Power (Lw 1/1 octave) Data provided for the air-water heat pump has been evaluated for the pump located at the proposed position beside the reflective surfaces of the existing leisure centre. The reflective tarmac surface of the

car park and the garden boundary walls have also been evaluated in the model. This model considers any directivity shading also provided by the leisure centre building itself. The above attenuation levels quoted in **Figure 5** have been attributed to the heat pump in the model calculations also.

Figure 6 below shows the INoise contour model with relevant receiver points calculated for 1.5 metres high and 4.00 metres high above ground level. 1.5 metres at standing above ground floor level and 4.00 metres representing first floor level bedroom windows.

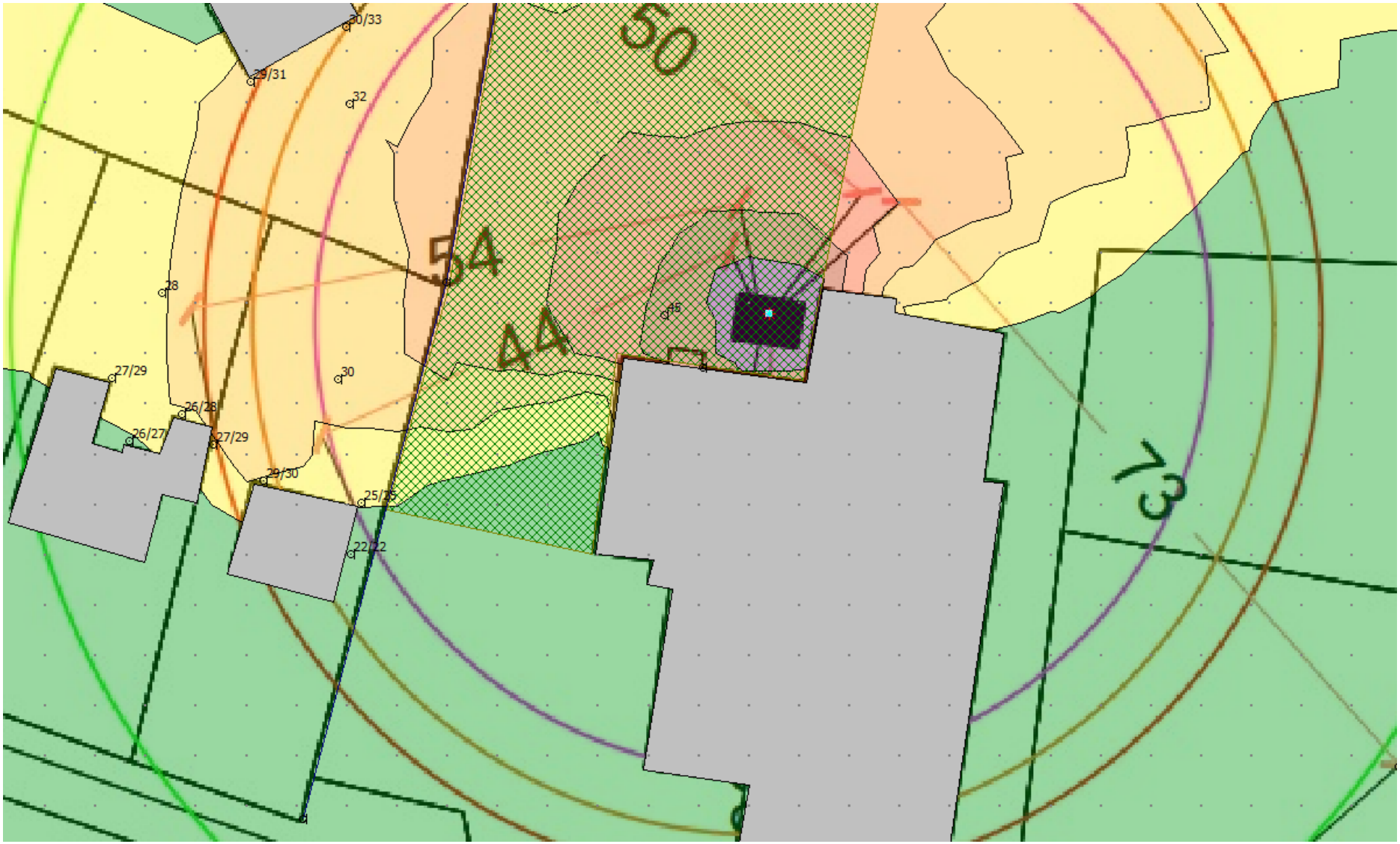


Fig 6: Noise contour model of the proposed installation with various receiver positions at NSLs and inside garden amenities.

6.0 CONSIDERATIONS

Calculation and noise contour modelling of the proposed location for the installation of the proposed air-water heat pump at the rear of the Ballinasloe Leisure centre suggests that the noise levels which may be experienced at the nearest noise sensitive dwellings during the daytime and night-time periods will be substantially below what currently exists for both daytime and night-time when passive attenuation has been utilised.

The following criteria are compared;

Existing Noise Levels at NML1.

- **LAeq 16 Hour = 57dB**
- **LAeq 8 Hour = 49dB**

The existing **ambient daytime LAeq(30 min) samples range from 49dB to 64dB** and the existing **ambient night-time periods range from 36dB to 57dB.** The higher periods observed at night-time are typically commencing at 06:00 hours and specifically as a result of birdsong / dawn chorus taking place. Dawn chorus would be considered as a desirable sound and not an intrusive noise to the subjective observer at that time

Guidance Noise Levels;

Based on the standard assumption of a 15dB(A) attenuation provided by a partially opened window.

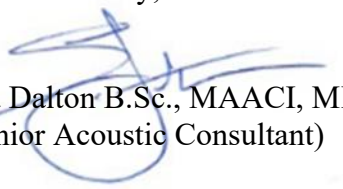
As per **BS8233: 2014 and WHO:1999** external levels at **Ne. 55dB LAeq(T) during daytime** (07:00 to 23:00 hours) and **Ne. 45dB LAeq(T) during night-time** (23:00 to 07:00 hours).

The mitigated noise levels calculated using the INoise modelling software, considering the attenuation provided by the passive attenuation housing (**Type AA303SX ENH)** unit, suggests that noise levels when the unit is operational will be substantially below both the existing ambient noise levels and the applicable guidance stated within this report. Levels of estimated noise will range from 22dB(A) to 33dB(A) across the elevations of the 3 no. noise sensitive dwellings. Such levels are below the lowest ambient noise sample measured and substantially below the applicable guidance and standards quoted.

7.0 CONCLUSION

The proposed installation of the Air-Water Heat pump at the rear location of Ballinasloe Leisure Centre as per the specified model, (contained within this report) along with the specified associated passive attenuation, shall result in noise levels at the nearest identified noise sensitive dwellings which are lower than those measured existing ambient noise levels. The resultant noise emission levels are calculated to be substantially below metrics contained within applicable guidance outlined in this report such as **BS8233:2014 and WHO:1999** outside these 3 no. identified nearest noise sensitive dwellings.

Yours sincerely,



Ted Dalton B.Sc., MAACI, MIOA. MInstSCE
(Senior Acoustic Consultant)

APPENDIX:

Instrumentation Calibration Certs.

Raw Data

Report Limitations

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Dalton Acoustics Ltd. Unit A3 JFK Trading Centre JFK Road JFK Industrial Estate Dublin 12	SLM230213

Test Date: 23/08/2023
Procedure: TP-SLM-1

Equipment

Item Calibrated:	Sound Level Meter	**Model**	XL2-TA
Make:	NTi-Audio	**Serial Number:**	16360

Calibration Procedure

The sound level meter was allowed to stabilize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound level meter was calibrated by carrying out the verification tests detailed in IEC 61672-3 (2013), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2013).

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	20D2877
Stanford Research DS360	123803

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

Ciaran McElroy

CALIBRATION CERTIFICATE

Issued By AcSoft Limited Calibration Laboratory

Date Of Issue: 16-10-2024 **Certificate No:** 1510212-2

Calibrated By: W. Jay

Approved By: W. Jay

CUSTOMER Dalton Acoustics

INSTRUMENT DETAILS

Manufacturer:	RION
Model:	NC-74
Serial No.:	34551704
Description:	Acoustic Calibrator accuracy class 1 with nominal level of 94 dB, and nominal frequency of 1000 Hz

P/O NUMBER N/A
DATE RECEIVED 16-10-2024
DATE CALIBRATED 16-10-2024

ENVIRONMENTAL CONDITIONS

Temperature:	20.2	°C
Humidity:	42.8	%rh
Pressure:	102.1	kPa

CALIBRATION RESULTS The calibrator submitted for testing has successfully completed the Periodic tests of IEC 60942:2003 (BS EN 60942:2003) (Annex B), for class 1 sound calibrators, for the environmental conditions under which the tests were performed.

REPORTED RESULTS The results contained in this Certificate refer only to the measurements made at the time of test for the instrument detailed above. These results do not reflect the instrument's ability to maintain calibration.

MEASUREMENT TRACEABILITY

The instrument under test was calibrated using the following equipment:
Svantek SV30A Acoustic Calibrator, ACS023, Certificate No. 06397/1
GRAS 40AG Reference Microphone, ACS009, Certificate No. 06448/2
LAB-EL LB-706B Thermo-Barometer, ACS029, Certificate No. 1148624

This calibration was performed by AcSoft Ltd, 11 Abbey Court, Fraser Road,
Priory Business Park, Bedford, MK44 3WH
T: 01234 639550 W: www.acsoft.co.uk E: sales@acsoft.co.uk

IAP 17/05/2024 Issue No. 4)

Report Limitations:

Dalton Acoustics Ltd, Unit A3, JFK Trading Centre, JFK Industrial Estate, D12, have prepared this report for the sole use of Galway County Council in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by Dalton Acoustics Ltd to any other third parties.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by Dalton Acoustics Ltd. has not been independently verified by Dalton Acoustics Ltd, unless otherwise stated in the report.

The methodology adopted and the sources of information used by Dalton Acoustics Ltd. in providing its services are outlined in this report. The work described in this report was undertaken between 8th. To 10th. April 2025 (measurement) and 04/07/25 (report issue) and are based on the conditions encountered and the information available during that said period.

The scope of this report and the services provided are accordingly factually limited by these circumstances. Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available. Dalton Acoustics Ltd. disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to Dalton Acoustics Ltd.'s attention after the date of the report issue.

Certain statements made in the report that are not historical facts may constitute, estimates and projections or other forward-looking statements, and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. Dalton Acoustics Ltd specifically does not guarantee or warrant any estimate or projections contained in this report.

Where field investigations are conducted, these have been restricted to a level of detail required to meet the stated objectives of the services within a reasonable time and cost frame. The results of any measurements taken may vary spatially or with time and further confirmatory measurement and calculations should be made before commencement of works for final verification of noise conditions at the proposed location.

Dalton Acoustics Ltd. have used acoustic software in this report which is predictive in nature. The INoise modelling software used is based on certain physical assumptions which may lead to certain discrepancies between the predicted levels and the required actual levels in certain circumstances. In the case of this report a noise source has been used for estimation / calculation purposes, this noise source is limited to manufacturers' information only. Dalton Acoustics Ltd. do not warrant any discrepancies between actual levels across the proposed site and those predicted into the future. The calculations used are based on the data obtained at the time of measurement which has been limited by the information provided / available to Dalton Acoustics Ltd. for the purposes of predictive calculation. Acoustic calculations are only indicative of results and do not guarantee results at receptors due to possible discrepancies. Dalton Acoustics do not warrant results at receptors in this report and levels quoted are only indicative for investigative purposes.

Dalton Acoustics Ltd, in issuing this report to Galway Co. Co. and Ballinasloe Leisure Centre, do not warrant or indemnify Galway Co. Co. or Ballinasloe Leisure Centre against any future noise complaint. The use or issuing of this report to any third party / all persons, by either Galway Co. Co. or Ballinasloe Leisure Centre is deemed as full acceptance of this condition. This report is not a defense of any kind in the event of noise complaints received or actions undertaken as a result of the proposed works. This report only assists with a basic evaluation of noise items specifically stated within this report such as absolute levels in the guidance and standards listed.

Project Name:	Ballinasloe LC NML1
Device Info:	XL2, SNo. A2A-16360-E0, FW4.21 Type Approved NTi Audio M2230, SNo. 8569, User calibrated 2025-04-08 12:15,
Mic Type:	WP30(h)
Mic Sensitivity:	40.4 mV/Pa
Range:	20 - 120 dB

Results

Type	Start	Duration	LAeq [dB]	LAeq 90.0% [dB]
Recorded	**2025-04-08 12:16:32**	**2:0:36:36**	**57.4**	
-Overload (2)		**0:00:03**	**96.2**	**92.7**
Project Result		**2:0:36:33**	**56.7**	**32.5**

Audit Intervals

Type	Start	Duration	LAeq [dB]	LAeq 90.0% [dB]
15'	**2025-04-08 12:15:00**	**0:13:28**	**56.6**	**44.6**
15'	**2025-04-08 12:30:00**	**0:15:00**	**57.0**	**44.3**
15'	**2025-04-08 12:45:00**	**0:15:00**	**58.7**	**42.5**
15'	**2025-04-08 13:00:00**	**0:15:00**	**54.8**	**44.8**
15'	**2025-04-08 13:15:00**	**0:15:00**	**53.2**	**44.9**
15'	**2025-04-08 13:30:00**	**0:15:00**	**63.1**	**53.5**
15'	**2025-04-08 13:45:00**	**0:15:00**	**64.0**	**63.2**
15'	**2025-04-08 14:00:00**	**0:15:00**	**59.4**	**44.5**
15'	**2025-04-08 14:15:00**	**0:15:00**	**54.4**	**44.3**
15'	**2025-04-08 14:30:00**	**0:15:00**	**54.1**	**43.2**
15'	**2025-04-08 14:45:00**	**0:15:00**	**54.4**	**42.8**
15'	**2025-04-08 15:00:00**	**0:15:00**	**54.8**	**45.7**
15'	**2025-04-08 15:15:00**	**0:15:00**	**55.0**	**46.6**
15'	**2025-04-08 15:30:00**	**0:15:00**	**55.0**	**46.0**
15'	**2025-04-08 15:45:00**	**0:15:00**	**57.6**	**46.8**
15'	**2025-04-08 16:00:00**	**0:15:00**	**61.1**	**51.7**
15'	**2025-04-08 16:15:00**	**0:15:00**	**57.4**	**50.5**
15'	**2025-04-08 16:30:00**	**0:15:00**	**56.1**	**49.3**
15'	**2025-04-08 16:45:00**	**0:15:00**	**55.7**	**48.1**
15'	**2025-04-08 17:00:00**	**0:15:00**	**56.3**	**48.5**
15'	**2025-04-08 17:15:00**	**0:15:00**	**56.1**	**48.9**
15'	**2025-04-08 17:30:00**	**0:15:00**	**55.0**	**46.3**
15'	**2025-04-08 17:45:00**	**0:15:00**	**55.7**	**48.4**
15'	**2025-04-08 18:00:00**	**0:15:00**	**57.2**	**51.1**
15'	**2025-04-08 18:15:00**	**0:15:00**	**55.9**	**48.7**
15'	**2025-04-08 18:30:00**	**0:15:00**	**58.4**	**49.2**

15'	2025-04-08 18:45:00	0:15:00	54.1	45.2
15'	2025-04-08 19:00:00	0:15:00	58.4	54.6
15'	2025-04-08 19:15:00	0:15:00	54.8	46.6
15'	2025-04-08 19:30:00	0:15:00	55.1	46.9
15'	2025-04-08 19:45:00	0:15:00	54.0	46.1
15'	2025-04-08 20:00:00	0:15:00	53.4	43.0
15'	2025-04-08 20:15:00	0:15:00	54.8	44.6
15'	2025-04-08 20:30:00	0:15:00	57.0	43.6
15'	2025-04-08 20:45:00	0:15:00	55.3	47.5
15'	2025-04-08 21:00:00	0:15:00	54.1	43.0
15'	2025-04-08 21:15:00	0:15:00	52.3	38.3
15'	2025-04-08 21:30:00	0:15:00	52.2	36.9
15'	2025-04-08 21:45:00	0:15:00	52.1	35.6
15'	2025-04-08 22:00:00	0:15:00	51.6	34.6
15'	2025-04-08 22:15:00	0:15:00	50.3	33.9
15'	2025-04-08 22:30:00	0:15:00	49.7	33.3
15'	2025-04-08 22:45:00	0:15:00	49.4	34.4
15'	2025-04-08 23:00:00	0:15:00	49.0	32.1
15'	2025-04-08 23:15:00	0:15:00	48.1	32.7
15'	2025-04-08 23:30:00	0:15:00	46.2	29.9
15'	2025-04-08 23:45:00	0:15:00	45.3	30.9
15'	2025-04-09 00:00:00	0:15:00	42.6	29.2
15'	2025-04-09 00:15:00	0:15:00	46.6	31.7
15'	2025-04-09 00:30:00	0:15:00	38.6	33.1
15'	2025-04-09 00:45:00	0:15:00	45.5	33.9
15'	2025-04-09 01:00:00	0:15:00	45.2	35.9
15'	2025-04-09 01:15:00	0:15:00	41.5	31.7
15'	2025-04-09 01:30:00	0:15:00	46.4	27.6
15'	2025-04-09 01:45:00	0:15:00	44.1	28.5
15'	2025-04-09 02:00:00	0:15:00	37.2	27.0
15'	2025-04-09 02:15:00	0:15:00	37.1	26.3
15'	2025-04-09 02:30:00	0:15:00	43.4	28.3
15'	2025-04-09 02:45:00	0:15:00	44.4	28.4
15'	2025-04-09 03:00:00	0:15:00	44.5	26.3
15'	2025-04-09 03:15:00	0:15:00	41.7	28.9
15'	2025-04-09 03:30:00	0:15:00	38.3	27.2
15'	2025-04-09 03:45:00	0:15:00	39.7	30.0
15'	2025-04-09 04:00:00	0:15:00	34.1	28.0
15'	2025-04-09 04:15:00	0:15:00	45.7	31.2
15'	2025-04-09 04:30:00	0:15:00	45.7	29.6
15'	2025-04-09 04:45:00	0:15:00	46.3	32.3
15'	2025-04-09 05:00:00	0:15:00	47.4	30.2
15'	2025-04-09 05:15:00	0:15:00	47.4	35.5
15'	2025-04-09 05:30:00	0:15:00	48.7	37.9
15'	2025-04-09 05:45:00	0:15:00	53.1	44.7
15'	2025-04-09 06:00:00	0:15:00	56.1	50.1

15'	2025-04-09 06:15:00	0:15:00	55.4	47.5
15'	2025-04-09 06:30:00	0:15:00	56.4	48.2
15'	2025-04-09 06:45:00	0:15:00	54.8	47.3
15'	2025-04-09 07:00:00	0:15:00	53.4	44.8
15'	2025-04-09 07:15:00	0:15:00	55.2	46.5
15'	2025-04-09 07:30:00	0:15:00	57.1	48.9
15'	2025-04-09 07:45:00	0:15:00	56.1	47.2
15'	2025-04-09 08:00:00	0:15:00	55.8	46.8
15'	2025-04-09 08:15:00	0:15:00	56.2	48.6
15'	2025-04-09 08:30:00	0:15:00	56.1	49.6
15'	2025-04-09 08:45:00	0:15:00	60.1	51.1
15'	2025-04-09 09:00:00	0:15:00	55.5	47.9
15'	2025-04-09 09:15:00	0:15:00	56.3	48.9
15'	2025-04-09 09:30:00	0:15:00	54.5	44.2
15'	2025-04-09 09:45:00	0:15:00	55.8	47.9
15'	2025-04-09 10:00:00	0:15:00	55.4	45.6
15'	2025-04-09 10:15:00	0:15:00	55.5	46.2
15'	2025-04-09 10:30:00	0:15:00	58.0	46.6
15'	2025-04-09 10:45:00	0:15:00	59.5	55.1
15'	2025-04-09 11:00:00	0:15:00	58.7	56.6
15'	2025-04-09 11:15:00	0:15:00	59.2	56.8
15'	2025-04-09 11:30:00	0:15:00	60.2	58.8
15'	2025-04-09 11:45:00	0:15:00	59.6	57.5
15'	2025-04-09 12:00:00	0:15:00	60.0	58.1
15'	2025-04-09 12:15:00	0:15:00	58.8	53.4
15'	2025-04-09 12:30:00	0:15:00	58.7	56.2
15'	2025-04-09 12:45:00	0:15:00	56.9	51.8
15'	2025-04-09 13:00:00	0:15:00	55.9	52.5
15'	2025-04-09 13:15:00	0:15:00	55.1	48.0
15'	2025-04-09 13:30:00	0:15:00	54.0	43.6
15'	2025-04-09 13:45:00	0:15:00	55.0	45.9
15'	2025-04-09 14:00:00	0:15:00	54.5	44.2
15'	2025-04-09 14:15:00	0:15:00	54.0	43.6
15'	2025-04-09 14:30:00	0:15:00	54.1	43.7
15'	2025-04-09 14:45:00	0:15:00	55.2	45.8
15'	2025-04-09 15:00:00	0:15:00	55.8	47.2
15'	2025-04-09 15:15:00	0:15:00	55.0	46.9
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15'	2025-04-09 16:00:00	0:15:00	55.8	48.2
15'	2025-04-09 16:15:00	0:15:00	55.6	47.9
15'	2025-04-09 16:30:00	0:15:00	55.3	45.5
15'	2025-04-09 16:45:00	0:15:00	56.5	48.6
15'	2025-04-09 17:00:00	0:15:00	56.2	48.9
15'	2025-04-09 17:15:00	0:15:00	55.5	48.0
15'	2025-04-09 17:30:00	0:15:00	54.8	45.7

15'	2025-04-09 17:45:00	0:15:00	55.8	48.0
15'	2025-04-09 18:00:00	0:15:00	56.2	49.7
15'	2025-04-09 18:15:00	0:15:00	55.2	48.3
15'	2025-04-09 18:30:00	0:15:00	54.2	43.3
15'	2025-04-09 18:45:00	0:15:00	55.3	46.5
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15'	2025-04-09 19:30:00	0:15:00	55.8	49.1
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15'	2025-04-09 20:30:00	0:15:00	55.1	46.5
15'	2025-04-09 20:45:00	0:15:00	54.2	43.2
15'	2025-04-09 21:00:00	0:15:00	52.7	41.7
15'	2025-04-09 21:15:00	0:15:00	54.0	41.5
15'	2025-04-09 21:30:00	0:15:00	52.7	38.2
15'	2025-04-09 21:45:00	0:15:00	52.0	36.9
15'	2025-04-09 22:00:00	0:15:00	50.8	35.1
15'	2025-04-09 22:15:00	0:15:00	52.6	37.6
15'	2025-04-09 22:30:00	0:15:00	50.7	37.4
15'	2025-04-09 22:45:00	0:15:00	50.4	34.8
15'	2025-04-09 23:00:00	0:15:00	46.3	34.3
15'	2025-04-09 23:15:00	0:15:00	48.6	32.8
15'	2025-04-09 23:30:00	0:15:00	48.1	33.5
15'	2025-04-09 23:45:00	0:15:00	45.4	31.2
15'	2025-04-10 00:00:00	0:15:00	44.5	36.5
15'	2025-04-10 00:15:00	0:15:00	46.4	35.0
15'	2025-04-10 00:30:00	0:15:00	46.2	31.0
15'	2025-04-10 00:45:00	0:15:00	41.2	27.6
15'	2025-04-10 01:00:00	0:15:00	43.8	29.3
15'	2025-04-10 01:15:00	0:15:00	46.0	29.4
15'	2025-04-10 01:30:00	0:15:00	48.0	30.0
15'	2025-04-10 01:45:00	0:15:00	42.8	27.4
15'	2025-04-10 02:00:00	0:15:00	39.5	26.4
15'	2025-04-10 02:15:00	0:15:00	39.0	26.6
15'	2025-04-10 02:30:00	0:15:00	31.4	27.2
15'	2025-04-10 02:45:00	0:15:00	38.3	25.7
15'	2025-04-10 03:00:00	0:15:00	43.6	28.2
15'	2025-04-10 03:15:00	0:15:00	44.5	27.4
15'	2025-04-10 03:30:00	0:15:00	36.6	29.7
15'	2025-04-10 03:45:00	0:15:00	40.8	28.7
15'	2025-04-10 04:00:00	0:15:00	45.1	30.8
15'	2025-04-10 04:15:00	0:15:00	45.3	29.2
15'	2025-04-10 04:30:00	0:15:00	45.1	30.4
15'	2025-04-10 04:45:00	0:15:00	46.4	30.6
15'	2025-04-10 05:00:00	0:15:00	44.0	32.6

15'	2025-04-10 05:15:00	0:15:00	42.8	30.8
15'	2025-04-10 05:30:00	0:15:00	57.9	37.9
15'	2025-04-10 05:45:00	0:15:00	54.8	46.7
15'	2025-04-10 06:00:00	0:15:00	55.4	49.2
15'	2025-04-10 06:15:00	0:15:00	54.8	46.8
15'	2025-04-10 06:30:00	0:15:00	56.6	45.8
15'	2025-04-10 06:45:00	0:15:00	54.8	46.7
15'	2025-04-10 07:00:00	0:15:00	55.1	47.0
15'	2025-04-10 07:15:00	0:15:00	55.3	47.9
15'	2025-04-10 07:30:00	0:15:00	58.3	49.8
15'	2025-04-10 07:45:00	0:15:00	55.4	46.5
15'	2025-04-10 08:00:00	0:15:00	55.6	45.5
15'	2025-04-10 08:15:00	0:15:00	55.4	45.3
15'	2025-04-10 08:30:00	0:15:00	56.2	47.9
15'	2025-04-10 08:45:00	0:15:00	56.0	46.7
15'	2025-04-10 09:00:00	0:15:00	56.3	47.6
15'	2025-04-10 09:15:00	0:15:00	56.3	47.2
15'	2025-04-10 09:30:00	0:15:00	54.8	44.5
15'	2025-04-10 09:45:00	0:15:00	54.1	45.2
15'	2025-04-10 10:00:00	0:15:00	54.9	45.3
15'	2025-04-10 10:15:00	0:15:00	54.0	44.5
15'	2025-04-10 10:30:00	0:15:00	58.8	47.6
15'	2025-04-10 10:45:00	0:15:00	56.0	46.1
15'	2025-04-10 11:00:00	0:15:00	55.8	44.1
15'	2025-04-10 11:15:00	0:15:00	52.9	42.3
15'	2025-04-10 11:30:00	0:15:00	53.5	44.7
15'	2025-04-10 11:45:00	0:15:00	58.7	47.0
15'	2025-04-10 12:00:00	0:15:00	60.3	51.6
15'	2025-04-10 12:15:00	0:15:00	54.8	45.9
15'	2025-04-10 12:30:00	0:15:00	54.8	45.1
15'	2025-04-10 12:45:00	0:08:05	77.6	45.8