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Assessment of Noise Impact at proposed Carlow Exchange Facility at "Old Tully's Yard", Potato Market, Carlow Town.

Technical Report prepared for,

Carlow County Council, County Buildings, Athy Road, Carlow

Revision: CECCCAR1 1.1 (Issue)

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EXECUTIVE SUMMARY:

Dalton Acoustics Ltd. have been commissioned by Carlow County Council as part of their Part 8 Planning process to assess the existing and future ambient noise conditions at the vacinity of the proposed Carlow Exchange Facility, Potato Market, Carlow. The proposed facility is to be located at the existing stone walled enclosure on Potato Market which faces out onto the carpark and fountain area adjacent, utilising the existing stone walls for the development. The proposal is to modernise the structure partially enclosing it with a glazed and metal clad roof system of various pitch levels. There will be an open gap above the perimeter stone walls and an additional gate access created in the carpark side of the structure on the South elevation.

The intent of the development is to bring inside the existing farmers market trade which happens at the vacinity, also available for use as a trade / craft fair, daytime activity centre. It is stated by Carlow County Council that the space will not be used as a late-night music venue but on annual festivals it may be used for a launch or special event, although this will not be the normal function. It is stated also that the facility will not typically open beyond 22:00 hours. Therefore, the facility will only open during the hours of acoustic daytime which is typically defined as 07:00 to 23:00 hours.

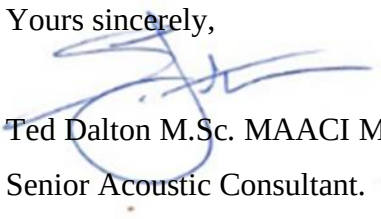
Noise measurement data obtained at the surrounding vacinity indicates it is typical of an urban location, with the predominant noise coming from traffic on Potato Market and Kennedy Avenue. The nearest noise sensitive dwellings could not be identified exactly along Potato Market, but acoustic measurement has been obtained at this location regardless. The apartments at 1st. and 2nd. Floor along Kennedy Avenue have also been assessed for current conditions. Daytime measurements at the proposed location are circa 63dB LAeq(12Hr) and evening time noise levels are also circa 63dBLAeq(4Hr), representing little change in the noisescape over the period of measurement.

The non-amplified proposed uses for the building will see little or no change in the ambient noisescape locally and will be similar to what exists at the Farmers Market presently. Proposed uses where a PA system may be utilised, could have the ability to raise noise levels at noise sensitive locations and careful management of events by Carlow County Council would be required to avoid this. Carlow County Council may seek a management plan for events requesting information and setting limitations for;

Limiting the number of such event types, limiting the noise levels to be allowed, limiting the periods of event (start and finish) and limiting the nature of such events (being beneficial to local community). It may be necessary for certain events to explore the use of temporary noise barriers or enclosing localised open areas of the building.

Initially each proposed event should be examined on its own merits for possible noise nuisance and a relevant mitigation plan drafted before commencement, the extent of same should be relative to the perceived risk of noise nuisance. The requirement for noise monitoring during certain types of events along with continued discussion and consultation with residents of local noise sensitive dwellings will allow for a pattern of event type and associated effects to be established and mitigated against subsequently if required. Refer to **Carlow County Council Noise Action Plan 2018** for additional guidance also referenced at **Section 2.1** in this document.

Yours sincerely,



Ted Dalton M.Sc. MAACI MIOA
Senior Acoustic Consultant.

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1. 0 INTRODUCTION

Dalton Acoustics Ltd. have been commissioned by Carlow County Council to assess the noise impact of the proposed Carlow Exchange Development at a vacant site referred to as "The Old Tully's Yard" located at Potato Market, Carlow Town, as part of Carlow County Councils part 8 planning process.

The proposed development is described as, a covered open space with potential for,

"exchange of information, culture, ideas and will become an economic and social hub, and could become a place to host public events, tell stories and share ideas. The possibilities are endless, and the space could be used for community debate, banter and incidental interactions, and could be used to display architectural models, drawings, maps, photographs and be an interesting space for architectural historians, researchers, geographers, poets, writers and thinkers".

The existing site maintains an 800mm thick stone wall to the perimeter of approx. 332 square metres on plan to be utilised as part of the proposed development. **Picture 1** and **Picture 2** illustrate the existing scenario at the proposed development site at Old Tully's Yard.

Pic 1: Beside indicates the elevation onto Potato Market of the proposed development location, with the existing stone wall present to be utilised into the development structure.

Pic 1: Existing Elevation to Potato Market

Pic 2: Beside indicates the existing side elevation of the proposed site onto the carpark in a Southerly direction. This carpark contains a water fountain feature and is a focal point for community socialising within the town.

Pic 2: Existing elevation from the Southerly carpark side

The proposed development is to maintain the existing perimeter stonewall and place a metal clad type pitched roof over same, containing various pitches with integrated glazing. Around the perimeter there is to remain an opening of circa 1 metre high, thus the development is partially enclosed. See **Picture 3** below for a perspective view of the proposed development.

Pic 3: Perspective view of the proposed Carlow Exchange at "Old Tully's Yard".

A noise study of the existing ambient noise levels around the vacinity of the proposed development was carried out on 25th. February 2021 in accordance with *International Standard ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels* (2017). This was predominantly carried out in the direction of identified and assumed domestic properties at FFL and higher on Potato Market and similar known dwellings on Kennedy Avenue at 1st. and 2nd. Floor levels. Also, adjacent the Hotel to the rear of the proposed development The Dinn Rí Hotel.

2.0 REVIEW OF RELEVANT GUIDANCE

Reference has been made to the following documents relating to planning and noise considerations:

2.1 Carlow County Council "Noise Action Plan 2018"

County Planning Policy

Development Plan Environmental – Policy 4

It is the policy of Carlow County Council to:

- *Regulate and control activities likely to give rise to excessive noise, other than those activities which are regulated by the Environmental Protection Agency.*
- *Ensure new development does not cause an unacceptable increase in noise levels affecting noise sensitive properties. Proposals for new development with the potential to create excessive noise will be required to submit a construction and/or operation management plan to control such emissions.*
- *Require activities likely to give rise to excessive noise to install noise mitigation measures and monitors. The provision of a noise audit may be required where appropriate.*
- *Require an assessment of impact of the developments on noise levels.*
- *Restrict development proposals causing noise pollution in excess of best practice standards.*

2.2 British Standard BS8233: 2014 - Guidance on sound insulation and noise reduction for buildings: states,

specific internal room noise criteria for bedrooms at Ne. 30dB LAeq over 8 Hours at night from 23.00 to 07.00 Hours. Daytime which is classed as 07:00 hours to 23:00 hours, 16-hour LAeq is suggested at Ne. 35dB.This guidance does not have provision for maximum levels and only suggests the steady state level internally.

BS8233: 2014 Section 7.7 "Specific Types of Building" Table 4 provides recommended maximum levels for indoor ambient noise levels for dwellings.

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 16 Hour**	----------
Dining	**Dining Room / Area**	**40dB LAeq 16 Hour**	----------
Sleeping (daytime resting)	**Bedroom**	**35dB LAeq 16 Hour**	**30dB LAeq 8 hour**

Table 4 Indoor ambient noise levels for dwelling

Also, ***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.

2.3 WHO 1999 "Community Noise Guidelines"

World Health Organisation (Residential) 1999 – Community Noise Guidelines
Recommends internal levels of - Ne. 30dB LAeq in bedrooms and Ne. 45 dB LAmax for single sound events over 8 Hours at night from 23.00 to 07.00 Hours.
This standard allows for; "At night, sound pressure levels at the outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmax, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB".

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

3.0 SURVEY DETAILS

Baseline measurement data was obtained on Thursday 25th. February 2021, the measurement was fully attended and witnessed by Mr. Ted Dalton the Author of this report.

3.1 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).
- Secretary and Member of the Association of Acoustic Consultants of Ireland (MAACI).
- Diploma in Environmental Noise Measurement & Assessment (IOA).
- 2014 to present: Principal at Dalton Acoustics Ltd.

3.2 Survey Period

The period of measurement was partially manned with full audio recording facilities running concurrently with the logging of data on the NTI XL2 Class 1 SLM. Fully manned measurements were also taken using a Rion NA28 Class 1 SLM. Measurement commenced at 11:00 hours 26/02/21 and ceased at 22:30 hours on 26/02/21. 1 second LAeq logging was used on the XL2 for the complete period so that analysis of the measurement samples could be carried out on PC Data Explorer. Post analysis of the measured parameters were subsequently examined in NTI PC Data Explorer software for the full measurement period. The use of full audio recording on the XL2 makes it possible to listen back to various events, assessing relevance, periods / durations, and noise levels simultaneously.

3.2.1 Weather During Measurement

11:00 Hrs.	8 °C, mainly clear skies, dry ground, windspeed 19Km/Hr Westerly Direction.
12:15 Hrs.	9 °C, mainly clear skies, dry ground, windspeed 18Km/Hr Westerly Direction.
14:00 Hrs.	9 °C, slight cloud, dry ground, windspeed 21Km/Hr Westerly Direction.
18:00 Hrs.	7 °C, slight cloud, dry ground, windspeed 11Km/Hr Westerly Direction.
19:00 Hrs.	6 °C, slight cloud, dry ground, windspeed 10Km/Hr South South Westerly Direction.
21:00 Hrs.	4 °C, slight cloud, dry ground, windspeed 8Km/Hr Westerly Direction.

3.3 Measurement Equipment & Arrangement

Instrument (Rion NA28 Sound Level Meter)

Rion NA-28 Class 1 Integrating Sound Level Meter & Real Time Octave/Third Octave Analyser, Serial No. 00370298 Calibration Cert SLM200108

Calibration Certificate Dated: 21/08/20 (2-year calibration)

Rion Preamplifier NH-23 Serial No. 60307

Rion Microphone UC-59 Serial No. 00388

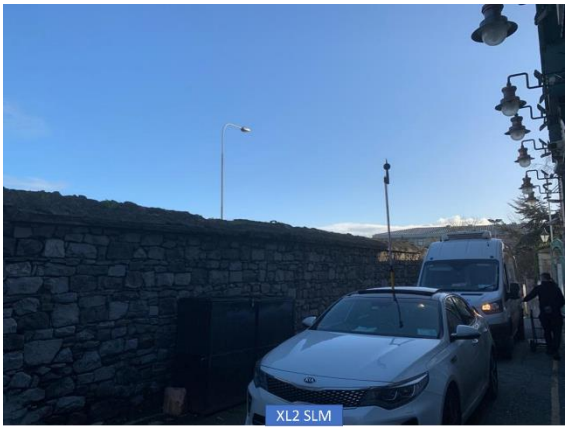
Calibration Certificate Dated: 21/08/20 (2-year calibration)

Arrangement: The SLM was situated on a tripod at 1.5 metres above ground level and fully attended during measurement periods. **Picture 4** provides an illustration of the NA28 setup at measurement locations.

Pic 4: NA28 SLM on tripod at Potato Market

Instrument (NTI XL2 Sound Level Meter)

NTI XL2 Class 1 Integrating Sound Level Meter & Audio Analyser,
Serial No. A2A-14622-EO
Calibration Cert SLM 200097
Calibration Certificate Dated: 17/06/20 (2-year calibration)



Pic 5: XL2 Mic on extended pole

Arrangement: The microphone and preamp were situated inside a weather shield and extended using a 5-metre-long cable onto a pole out to an approximate height of 3.5 metres above ground level to avoid reflection, through the sunroof of the Authors car to allow for mobile positioning at various measurement locations.

Field Calibration

Calibrator Rion NC 74 with serial No. 34551704
Calibration Cert AC200109
Dated: 17/11/2020
Valid for 1 year

Using the Rion NC74 Sound Level Calibrator, which produces a sound level of 94.0dB (re. $2x10^{-5}$) at a frequency of 1Khz. The 2 No. SLM instruments were calibrated before and after measurement.

3.4 Measurement Positions

6 no. measurement positions were used for the assessment period on 25/02/21, see **Illustration 1** below for locations of same.

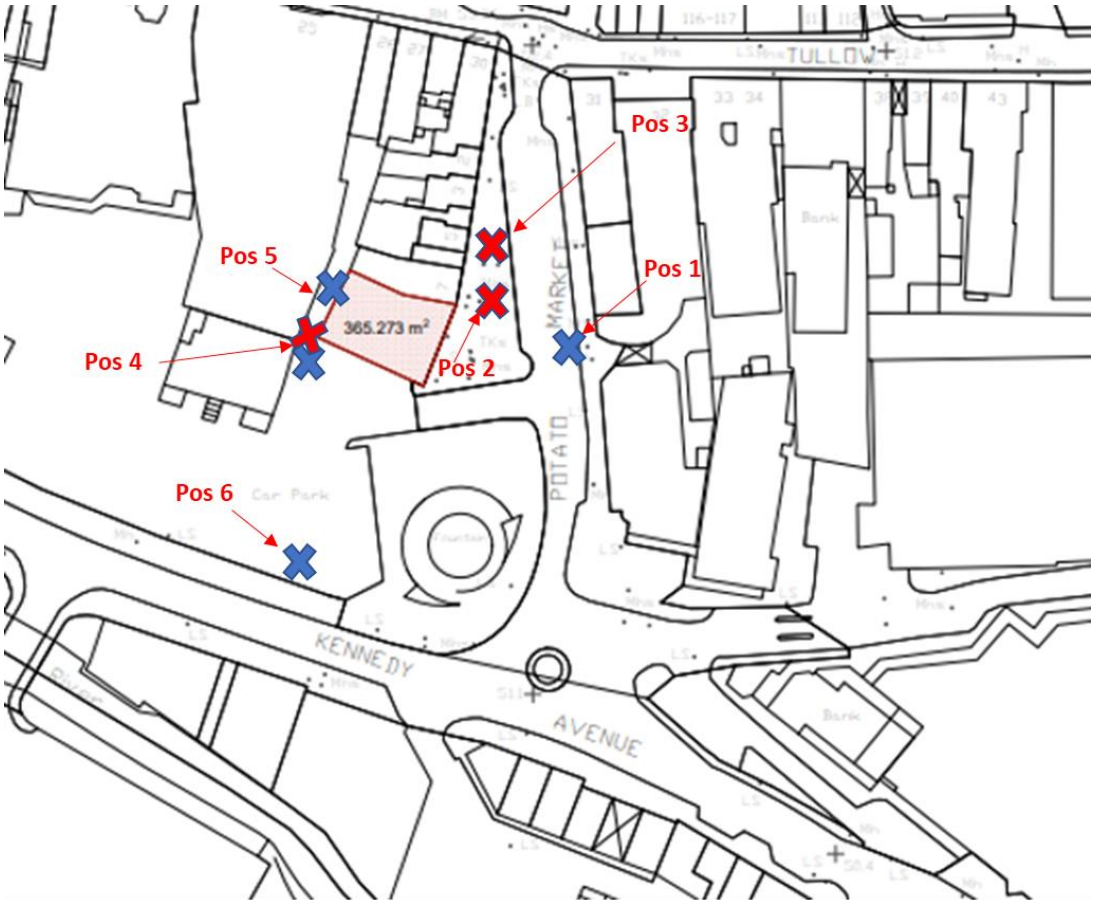


Illustration 1: Locations of 6 no. measurement positions for both NA28 and XL2 SLMs.

The blue marked **X** positions contained on **Illustration 1**, indicate the locations of XL2 prolonged periods of partially manned measurement (Positions 1, 4, 5 & 6). The red marked **X** positions contained on **Illustration 1**, indicate the locations of NA28 periods of fully manned measurement (Positions 2, 3 & 4).

4.0 MEASUREMENT PROCEDURE

The following readings were taken at the SLM microphone positions – **Partially and Fully Attended 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 XL2 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 are external. The NA28 does not have an audio recording facility but its measurement positions were fully attended, and notes taken during the measurement sampling.

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).

4.1 Site Measurement Data

Results

Type	Start	Duration	LAeq [dB]	LAFmax [dB]	L 90.0 % [dB]
Recorded	**25/02/2021 11:00**	**11:29:17**	**63.1**	**107.1**	
-Pause (6)		**0:38:44**	**63.3**	**80.9**	**56.5**
-Pause	25/02/2021 16:02	0:05:24	61.3	80.9	
-Pause	25/02/2021 18:00	0:17:00	63.4	77.6	

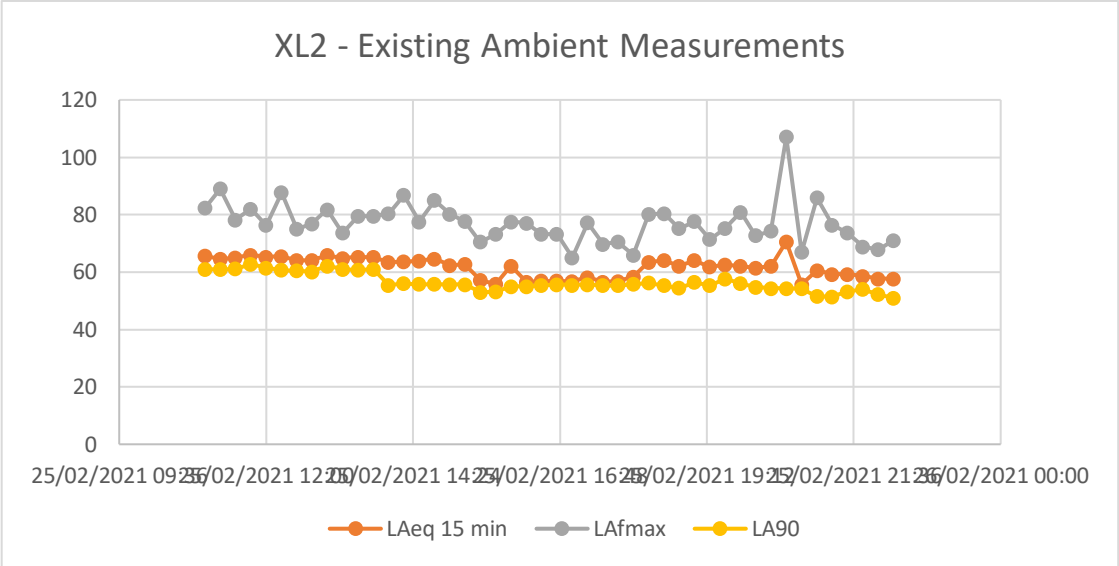
-Pause	25/02/2021 19:05	0:09:42	64.2	75.7	
-Pause	25/02/2021 20:29	0:01:04	59	65.8	
-Pause	25/02/2021 21:00	0:01:19	58.5	69.4	
-Pause	25/02/2021 21:29	0:04:15	64.4	73.2	
Project Result		**10:50:33**	**63.1**	**107.1**	**54.6**

Audit Intervals

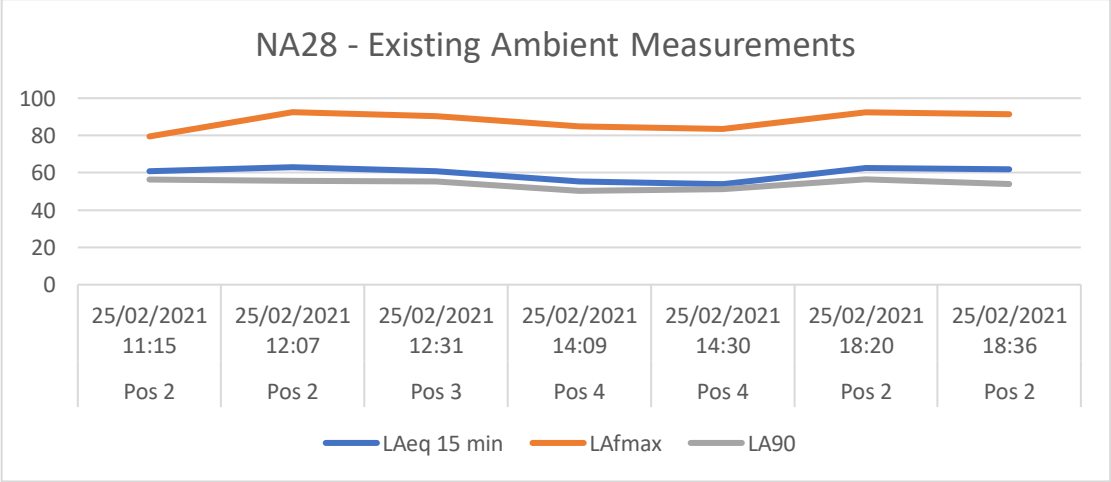
XL2	Start	Duration	LAeq [dB]	LAFmax [dB]	L 90.0 % [dB]
Pos 1	**25/02/2021 11:00**	**0:14:10**	**65.7**	**82.4**	**61**
Pos 1	**25/02/2021 11:15**	**0:15:00**	**64.5**	**89**	**60.9**
Pos 1	**25/02/2021 11:30**	**0:15:00**	**65**	**78.2**	**61.2**
Pos 1	**25/02/2021 11:45**	**0:15:00**	**66**	**82**	**62.8**
Pos 1	**25/02/2021 12:00**	**0:15:00**	**65.3**	**76.3**	**61.5**
Pos 1	**25/02/2021 12:15**	**0:15:00**	**65.5**	**87.7**	**60.7**
Pos 1	**25/02/2021 12:30**	**0:15:00**	**64**	**75**	**60.5**
Pos 1	**25/02/2021 12:45**	**0:15:00**	**64.2**	**76.9**	**60.2**
Pos 1	**25/02/2021 13:00**	**0:15:00**	**65.8**	**81.8**	**62.1**
Pos 1	**25/02/2021 13:15**	**0:15:00**	**64.8**	**73.7**	**61**
Pos 1	**25/02/2021 13:30**	**0:15:00**	**65.3**	**79.4**	**60.7**
Pos 1	**25/02/2021 13:45**	**0:15:00**	**65.2**	**79.6**	**61**
Pos 1	**25/02/2021 14:00**	**0:15:00**	**63.5**	**80.3**	**55.5**
Pos 1	**25/02/2021 14:15**	**0:15:00**	**63.6**	**86.8**	**56**
Pos 1	**25/02/2021 14:30**	**0:15:00**	**63.9**	**77.5**	**55.8**
Pos 1	**25/02/2021 14:45**	**0:15:00**	**64.6**	**85**	**55.8**
Pos 1	**25/02/2021 15:00**	**0:15:00**	**62.4**	**80.2**	**55.7**
Pos 1	**25/02/2021 15:15**	**0:15:00**	**62.7**	**77.7**	**55.7**
Pos 4	**25/02/2021 15:30**	**0:15:00**	**57.3**	**70.5**	**53**
Pos 4	**25/02/2021 15:45**	**0:15:00**	**55.8**	**73.2**	**53.1**
Pos 5	**25/02/2021 16:00**	**0:09:36**	**62.1**	**77.5**	**55**
Pos 5	**25/02/2021 16:15**	**0:15:00**	**56.6**	**77.1**	**55**
Pos 5	**25/02/2021 16:30**	**0:15:00**	**56.9**	**73.2**	**55.4**
Pos 5	**25/02/2021 16:45**	**0:15:00**	**56.9**	**73.3**	**55.7**
Pos 5	**25/02/2021 17:00**	**0:15:00**	**56.8**	**65.1**	**55.5**
Pos 5	**25/02/2021 17:15**	**0:15:00**	**58.1**	**77.2**	**55.7**
Pos 5	**25/02/2021 17:30**	**0:15:00**	**56.6**	**69.7**	**55.3**
Pos 5	**25/02/2021 17:45**	**0:15:00**	**56.8**	**70.5**	**55.4**
Pos 1	**25/02/2021 18:00**	**0:00:14**	**58.4**	**66**	**55.8**
Pos 1	**25/02/2021 18:15**	**0:12:46**	**63.5**	**80.1**	**56.2**
Pos 1	**25/02/2021 18:30**	**0:15:00**	**64**	**80.5**	**55.4**
Pos 1	**25/02/2021 18:45**	**0:15:00**	**62.2**	**75.2**	**54.5**
Pos 1	**25/02/2021 19:00**	**0:05:25**	**64**	**77.7**	**56.5**
Pos 6	**25/02/2021 19:15**	**0:14:53**	**61.8**	**71.4**	**55.4**
Pos 6	**25/02/2021 19:30**	**0:15:00**	**62.6**	**75.3**	**57.7**
Pos 6	**25/02/2021 19:45**	**0:15:00**	**62**	**80.9**	**56**
Pos 6	**25/02/2021 20:00**	**0:15:00**	**61.5**	**72.8**	**54.8**
Pos 6	**25/02/2021 20:15**	**0:14:40**	**62**	**74.3**	**54.3**
Pos 5	**25/02/2021 20:30**	**0:14:16**	**70.6**	**107.1**	**54.3**
Pos 5	**25/02/2021 20:45**	**0:15:00**	**55.7**	**67**	**54.2**
Pos 1	**25/02/2021 21:00**	**0:13:41**	**60.6**	**85.9**	**51.6**
Pos 1	**25/02/2021 21:15**	**0:14:55**	**59.2**	**76.4**	**51.5**
Pos 6	**25/02/2021 21:30**	**0:10:50**	**59.3**	**73.7**	**53.2**
Pos 6	**25/02/2021 21:45**	**0:15:00**	**58.6**	**68.8**	**54**
Pos 6	**25/02/2021 22:00**	**0:15:00**	**57.7**	**67.8**	**52.2**

Pos 6	**25/02/2021 22:15**	**0:15:00**	**57.7**	**71.1**	**51**

NA28	Start	Duration	LAeq [dB]	LAFmax [dB]	L 90.0 % [dB]
Pos 2	**25/02/2021 11:15**	**0:15:00**	**60.7**	**79.5**	**56.3**
Pos 2	**25/02/2021 12:07**	**0:15:00**	**63**	**92.5**	**55.7**
Pos 3	**25/02/2021 12:31**	**0:15:00**	**60.7**	**90.3**	**55.5**
Pos 4	**25/02/2021 14:09**	**0:15:00**	**55.3**	**84.9**	**50.3**
Pos 4	**25/02/2021 14:30**	**0:15:00**	**53.9**	**83.5**	**51.1**
Pos 2	**25/02/2021 18:20**	**0:15:00**	**62.7**	**92.3**	**56.5**
Pos 2	**25/02/2021 18:36**	**0:15:00**	**61.9**	**91.5**	**53.9**



Graph 1: XL2 measurements taken at positions 1, 4, 5 & 6.



Graph 2: NA28 measurements taken at positions 2, 3 & 4.

A brief description of the noise at the proposed development consists of traffic noise, passers by on the streets, alarms from properties, distant works being carried out, noise from the water fountain and taxis leaving their engines running at Potato Market taxi rank.

5.0 THE PROPOSED DEVELOPMENT

The proposed development at the Old Tully Yard intends to maintain the existing perimeter stone wall in place. It will utilise a metal frame support system for a clad roof with glazing at vertical sections between the various pitches of the roof. There will be an approximate gap of 1 metre open area on top of the stone perimeter wall below the eaves of the roof. See Picture 6 below which is a montage of images from Carlow County Councils information provided.

Pic 6: Montage of images for the proposed Carlow Exchange

5.1 Receiving Environment (Noise Sensitive Locations)

In the vacinity of the proposed Carlow Exchange development at Old Tully's Yard, along Potato Market, Carlow Town. Several assumptions had to be made about noise sensitive dwellings.

The present location is surrounded by retail stores at GFL along Potato Market (to the East), with assumed FFL offices and an odd dwelling at FFL in this direction (circa 35 metres). To the South is a car park with water fountain bordered by the proposed site (Northerly) and Kennedy Avenue on the opposite side of the carpark to the South.

Along GFL of Kennedy Avenue there are numerous shops / retail outlets and a McDonalds Restaurant, it could be clearly identified that there are dwellings situated at FFL and SFL (circa 65 metres) in this direction.

To the West of the proposed development is the Dinn Rí Hotel which has some bedrooms facing onto the direction of the proposed development at FFL and SFL, partially overlooking the site location (circa 5 – 6 metres).

The North of the proposed site contains a similar scenario to that described for Potato Market with retail, shops, office and possibly FFL dwellings. The only absolutely identified dwellings were those described on Kennedy Avenue.

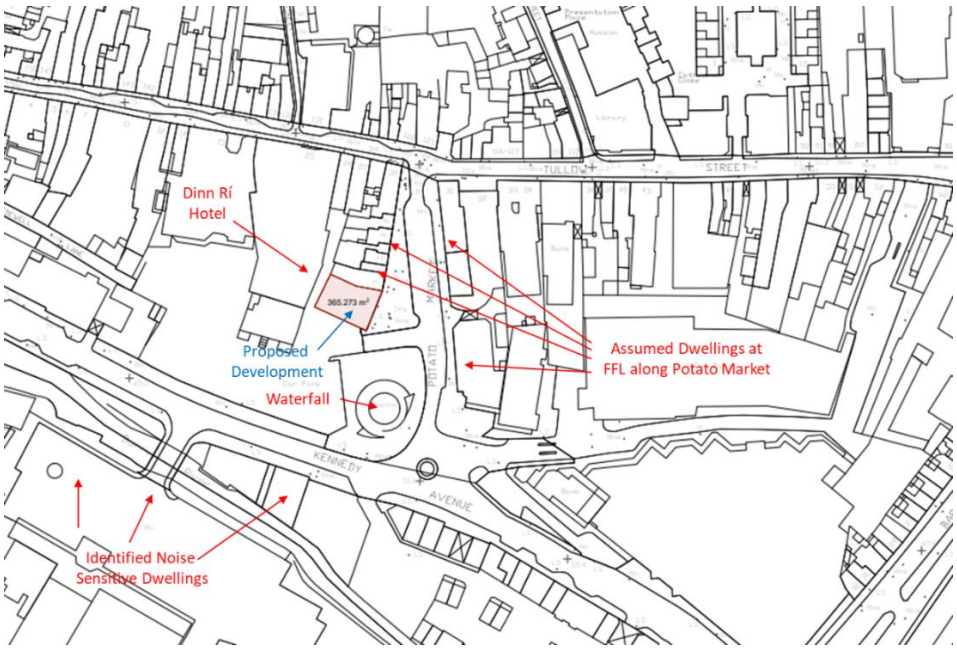


Illustration 2: Noise sensitive receptors around the proposed development.

The measured levels in the direction of these noise sensitive locations vary slightly throughout the daily period sampled, based on the 15 min LAeq samples as per **Sub-Section 4.1 Site Measurement Data.** The levels vary slightly over the time of the day and the proximity of existing ambient noise sources. The daytime measurement evaluation typically from 07:00 hours to 19:00 hours is 63dB LAeq (12Hrs) and the evening time typically from 19:00 to 23:00 hours is also 63dB LAeq (4Hrs). Such measured levels are considered typical of an Urban location with traffic and other localised noise sources such as the water fountain etc.

These existing measured levels are above prescribed guidance offered by **WHO 1999 "Community Noise Guidelines" and BS8233: 2014 sub-section 7.7** (allowing for an additional 5dB on **WHO 1999** recommended guideline levels from 55dB to 60dB LAeqT). At the Dinn Rí Hotel bedrooms should be considered as per **BS8233: 2014,**

> ***7.7.5.1.1 General***
> *The recommendations for ambient noise in hotel bedrooms are similar to those for living accommodation (see 7.7.2).*
> *In hotels and other multi-occupancy premises containing rooms for residential purposes, it is desirable to avoid intrusive noise, both airborne and impact, in bedrooms especially when occupants are sleeping (typically assumed to be at night-time).*

The current daytime level measured is 63dB LAeq(12Hr) and evening time 63dB LAeq(4Hr), which are above the recommended external noise levels at facades of noise sensitive premises. Therefore, it is critical not to create a creeping ambient noisescape at the vacinity of the locations by introducing noise sources of similar or higher levels.

5.2 The Construction Phase

As the perimeter stone wall is intended to be maintained there is likely to be minimum demolition carried out on the site. A large proportion of the support steelwork and roof cladding will be prepared off site along with glazed sections. Thus, primarily site works will consist of assembly of prefabricated building enclosure components.

There are no national mandatory noise limits relating to the construction phases of projects. In granting planning permission, a local authority may stipulate construction phase noise limits applicable to daytime, evening, night-time and weekend hours as appropriate. There are no national guidelines available regarding the selection of such limits. Many local authorities chose to apply a 65 dB LAeq T limit, often being from 07:00 hours to 19:00 hours.

The chief noise guidance document applied in Ireland and the UK in construction phase noise assessments is ***British Standard BS 5228:2009+A1:2014*** *Code of*

practice for noise and vibration control on construction and open sites Part 1: Noise (2014). Annex E sets out several methods to draw up suitable noise criteria applicable to the construction phase of a project. The most appropriate method here is the 'ABC method', which provides for the selection of criteria based on existing ambient noise data. Based on noise data recorded in the vicinity of the study site, a daytime $L_{Aeq\ 1\ h}$ criterion of 63 dB is identified. This criterion is sufficiently close to that typically applied by local authorities and is thus applied in this assessment. The $L_{Aeq\ 1\ h}$ parameter describes the total noise emissions from all construction sources occurring during any 1 h period, averaged over that period.

BS 5228:2009+A1:2014 states that the 65 dB criterion is applicable to the periods Monday-Friday 0700-1900 h and Saturday 0700-1300 h. For the purposes of this assessment, the criterion may be extended to include Saturday afternoons, to facilitate possible local onsite activities required to complete the project. Construction operations are unlikely to be undertaken during evening or night-time hours, or on Sundays. This assessment therefore suggests the 65 dB LAeq(T) criterion in respect of all construction works.

This standard notes that the criterion is recommended with respect to residential receptors only. In this regard, the Environmental Protection Agency (EPA) document *NG4 Guidance note for noise: License applications, surveys and assessments in relation to scheduled activities* (2016) defines a noise sensitive location (NSL) as:

'Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels'.

Thus the 65 dB LAeq(T) criterion is considered applicable to surrounding residential receptors, in the immediate curtilage. As construction projects tend to be relatively short, and as construction zones are typically localized and mobile, the 65 dB limit is usually not subject to any additional criteria such as tone or impulse restrictions.

5.2.1 Construction Phase Noise Sources

The existing stone wall curtilage of the Old Tully's Yard will form the perimeter wall boundary of the proposed Carlow Exchange Building. Therefore, this structure is most likely to act as the site perimeter and compound, whereby much of the proposed works will be carried out behind same (internally). This existing walling will provide partial height barrier noise attenuation for local business at street level in the vacinity, for works carried out at ground level. The design of the proposed building is mainly steelwork with clad roof and glazing, which will be predominantly prefabricated off site. On the Southern boundary there is to be an additional access doorway created in the existing stone wall which will require some short-lived demolition.

During the construction phase, most noise emissions will be from plant used onsite. While sporadic emissions may arise from other sources such as voices and hammering, plant emissions may continue for periods of time and may therefore potentially cause nuisance. Consequently, the assessment of noise impacts associated with construction phase emissions relates chiefly to plant sources. Although as previously stated these may be for shorter periods of time due to the prefabricated nature of the proposed structure.

Construction plant required onsite at various stages of the project are listed in **Table 1.** The table includes details of typical sound pressure levels, taken from British Standard **BS 5228:2009+A1:2014**. It is likely that more than one item of several plant examples listed are likely to be operating simultaneously.

Plant	$L_{Aeq\ T}$ at 10 m dB
Aerial platform (diesel scissors 6 t)	78
Crane (35 t)	70
Consaw (various activities)	79-84
Delivery truck (18-26 t) (drive by)	83
Diesel generator	61
Discharging concrete mixer truck	75
Roller (drive by)	73
Small cement mixer	61
Telescopic handler	71
Tower crane	76
Truck (tipping)	79
Truck (maneuvering, various sizes)	70-80
Wheeled backhoe loader (9 t)	62-67

Table 1: Examples of plant for site use on site

In addition to the above plant, breaking out of the existing perimeter wall may be required. Such activity is expected to be short term and local only. Noise data recorded at other sites indicate that emissions from a hydraulic breaker mounted on a mid-sized excavator are typically in the order of 88 dB at 10 m. However, there may be other options for breaking out of the small area required for the additional access doors.

5.3 Operational Phase

As with construction phase noise, there are no national mandatory noise limits applicable to commissioned developments. While several guidance documents have been issued with respect to certain sectors, none specifically relate to the development such as assessed in this report (multi-usage).

Most environmental noise guidance documents issued across Europe ultimately derive limits from guidance issued by the **World Health Organization (WHO).** The WHO document *Guidelines on community noise* (1999) set out guideline values considered necessary to protect communities from environmental noise. With respect to residential settings, the document notes that an outdoor $L_{Aeq\ 16\ h}$ level of 55 dB as an indicator of serious annoyance during daytime and evening hours, with 50 dB being an indicator of moderate annoyance. The 55 dB criterion was first suggested by the WHO in their 1980 document *Environmental Health Criteria 12*.

Since 1980, the 55 dB criterion (at the façade) has become the de facto daytime limit applied by most Irish regulatory authorities to commercial and industrial operators. Although the WHO criterion applies to daytime periods of 16 hours, authorities typically specify shorter periods, and thus limits as $L_{Aeq\ 15\ min}$, $L_{Aeq\ 30\ min}$ and $L_{Aeq\ 1\ h}$ are variously applied. A similar daytime limit is usually included in noise conditions attached to planning permission issued by local authorities.

British Standard BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* (2014) sets out a procedure which may be used to assess the impact of noise emissions from a proposed development on dwellings. The standard provides for the comparison of specific $L_{Aeq\ T}$ levels with background levels and provides an indication of impact depending on the difference. Specific levels may be rated to take

tonal, impulsive, and other characteristics into account. The standard notes that the background noise environment may include existing industrial emissions unrelated to the specific source.

British Standard **BS 8233:2014** provides guidance for the control of noise in and around buildings, chiefly with a view to designing the building envelope to allow specified criteria to be met within the building. The standard explicitly states that it is not applicable to the assessment of impacts arising from a proposed development on offsite receptors. The standard is therefore not relevant to this assessment.

5.3.1 Operational Phase Noise Sources

The intended use for the proposed development is outlined by Carlow County Council as, *"The Carlow Exchange" will provide a:*

- *A space of endless possibilities in Carlow Town Centre*
- *A 332 square meter Semi-Covered managed outdoor space created for all to experience.*
- *A space that is suitable for Micro Festivals, Performances, Cinema screenings, Product launches, Student & Youth Events, Photography & Film Location Markets, Fairs & Tourism events, Farmers Market*
- *A space operated on a Not-for-Profit Basis by Carlow County Council coordinated by the Economic Development Unit/Local Enterprise Office*
-

It is envisaged the space will be used for Cultural , Economic , Community and Social Activities. Carlow County Council Officials state the proposed development "will not be used as a late-night music venue" and the usual expected latest time for closing in the evening time is typically 22:00 hours. The uses of the proposed development can be broken up into two subcategories.

1) Public Gatherings (No Amplification / Public Address System)

Community Centre	Playground
Craft Space	Recreational Space
Cultural Use	Restaurant/Café

2) Public Gatherings. (Amplified / Public Address System)

Cinema	Conference Centre
Dance Classes	Gaming Uses
Science/Technology	

5.3.2 Public Gatherings (No Amplification / Public Address System)

Such gatherings would be organised events that do not avail of a Public Address amplified system. The ambient noise levels of these events would be circa 70 – 75dB(A) internally and when adjusted for expected attenuation provided by the proposed structure the levels externally would be similar to those measured on Thursday 25th. Feb 2021. These levels are already in existence at the facades of assumed noise sensitive locations.

5.3.3 Public Gatherings (Amplified / Public Address System)

Of the two scenarios proposed for the development, this scenario has the greatest potential to create noise nuisance for the nearest noise sensitive locations (being Hotel Bedrooms). Amplified systems brought into the Carlow Exchange for various individual events may vary substantially in intended use and overall ability to generate greater levels of noise at the location.

Cinema requires a broad spectrum of sound frequencies in order to fulfil the emotional intent of the movie scene being shown, typically war movies contain substantial low frequency content for example, during explosion scenes. Dance classes may rely heavily at times on low frequency bass beats for rhythm. While use as a Conference Centre is more likely to rely on a PA for vocal announcements etc. like a Science and Technology Fair. Gaming uses would heavily depend on the nature of the game but again could rely on substantial low frequency noises for sound effects.

The use of the facility by private operators would leave the control, level and type of noise emission completely in the hands of the operators and possess the opportunity to cause nuisance locally.

Therefore, Carlow County Council should give serious consideration to the intended use for the facility, as the presented partially open design does not lend itself to providing any substantial levels of attenuation, from inside to outside propagation toward noise sensitive locations.

6.0 NOISE MITIGATION

6.1 Construction Phase

Noise emissions arising from construction phase operations at the proposed development site will typically not exceed the identified 65 dB LAeq 1 h criterion at residential receptors. Additional consideration may need to be given to nearby hotel rooms during the specific construction processes incl. the erection of a noise barrier on the boundary toward same. Daily timing of operations / construction processes in this direction will assist and such information for programming can be liaised with the Hotel Management.

The nature of the building design suggests that there will be minimal excavation or ground-breaking works to take place. The design uses structural steel supports with a metal clad roof partially glazed whereby, most components are likely to be formed off site and assembled upon arrival. Thus, much of the plant used on site will be handheld machinery. There is a possibility that an additional opening will be formed in the existing perimeter stone wall and this will involve breaking out. An examination of the breaking process may take place before commencement, to assess if there is a need for temporary partial height barrier to be erected around the localised area. It will be possible to use the existing stone wall curtilage as a partial height barrier for all works that take place inside of the boundary wall at ground level.

A robustly developed construction management plan developed before commencement on site consulting with concerned residents, will assist in reducing noise nuisance during the construction phase. Such measures of good practice may be written into the plan to avoid such noise nuisance / disturbance during the construction phase to include the items listed below but not exclusively.

- Construction operations will in general be confined to the period Monday-Friday 0800-1900 h, and Saturday 08:00-14:00 h.

- Specific noisy works shall be confined even further if necessary.
- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. Exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- During the construction phase, an increased number of trucks may arrive at the site with prefabricated components. It is recommended that the construction management plan prevent unnecessary congregation of trucks around the site entrance, and that queuing is prohibited.

6.2 Operational Phase

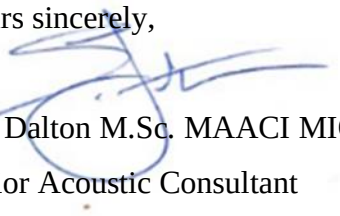
The proposed development is for civic use and understood to remain under the direct control of Carlow County Council. As described in **5.3.1 Operational Phase,** noise sources from the partially enclosed building may be generated by a wide range of activities. The partially open nature of the proposed development means there will be little attenuation afforded by the structure for noise emanating from within and travelling in the direction of the nearest noise sensitive locations. Non amplified events will contain similar amounts of noise to those experienced presently at the vacinity and would not be expected to have any negative effect on the local amenity, therefore there would be no specific mitigation recommended. Such events would be similar to the open-air events which take place presently around the carpark beside the development – Farmers Market.

Events proposed utilizing PA systems will have the capability to cause noise disturbance by excessive level emissions, tonal components, and impulsive occurrences as previously mentioned. It would be necessary before letting the use of the proposed building for such events, that a detailed noise management plan be submitted by the proposers for that specific intended event. Control measures such as time of day / evening, period of event, loudness of the event and necessary mitigation should be considered. It is possible that a reduced number of louder events are acceptable locally especially if they are for the greater benefit of the local community. Each proposed event must be considered individually, but a cumulative noise effect must also be taken into account. Multiple events of a particular noisy nature may lead

to complaint about the presence of the development. Placement of the PA system speakers can reduce noise levels in the direction of the nearest noise sensitive location by up to 10dB(A) where there are no reflective surfaces acting, simply by facing speakers in the opposite direction at times.

Carlow County Council may consider the use of absorptive treatments to the underside of the roof structure to reduce internal noise reflections and additionally noise breakout. Temporary permission may allow for the erection of localized noise barriers around the building, or in specific directions, as necessary. Carlow County Council may require noise monitoring of events for future informative decisions about such events. The data from such noise monitoring requested to be provided back to Carlow County Council. The proposed intended uses for the development and the development remaining within the control of Carlow County Council means there can be greater control of events and the noise emissions from such events. However, it is the PA amplified events that will have the greatest ability to cause a local noise disturbance if not managed with careful planning and an understanding that, a partially opened building provides little to no attenuation for noise.

Yours sincerely,



Ted Dalton M.Sc. MAACI MIOA
Senior Acoustic Consultant

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Dalton Acoustics Unit A3 JFK Trading Centre JFK Road Dublin 12	SLM200097

Test Date: 17/06/2020
Procedure: TP-SLM-1

Equipment

Item Calibrated:	Sound Level Meter	**Model**	XL2-TA
Make:	Nti-Audio	**Serial Number:**	A2A-14622-E0

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 (2006), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2003).

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
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:

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Dalton Acoustics Unit A3 JFK Trading Centre JFK Road Dublin 12	SLM200108

Test Date: 21/08/2020
Procedure: TP-SLM-1

Equipment

Item Calibrated:	Sound Level Meter	**Model**	NA-28
Make:	Rion	**Serial Number:**	00370298

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 (2006), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2003).

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
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:

SONITUS SYSTEMS

Certificate of Calibration

Issued to:	Certificate Number
Dalton Acoustics Ltd Unit A3 JFK Trading Centre JFK Road JFK Industrial Estate Dublin 12	AC200109

Test Date: 17/11/2020

Equipment Information

Item Calibrated:	Acoustic Calibrator	**Model:**	NC-74
Make:	Rion	**Serial Number:**	34551704

Calibration Procedure

The above calibrator was verified in line with the requirements of BS EN 60942:2003. The calibrator was allowed to stablize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound pressure level in the cavity (half-inch). The operating frequency and signal distortion were also measured.

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
GRAS 42AA Pistonphone	227947
GRAS 46A0 Pressure Field Microphone	228216

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:

Report Limitations:

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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 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 on 25th. February 2021 (measurement) and 11th. March 2021 (report issue) and is based on the conditions encountered and the information available during the said period of time. Dalton Acoustics Ltd. accept no liability which may accrue on the basis of a more elongated period of measurement into the future, affording different results to those used for this report. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of results, 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 issue of the report.

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Where field investigations have been carried out, these have been restricted to a level of detail required to meet the stated objectives of the services and required timelines. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made before commencement of the development or after any significant delay in issuing this report. Restriction in the information about previous measurement positions may cause results to differ somewhat to those calculated and quoted in this report, such predictions are purely indicative in nature and do not warrant against, changes in transmission paths, or changes of source noise levels at present or into the future.