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Assessment of Ambient Traffic Noise Impact for Proposed Mixed Commercial / Residential Development,

Parkway Valley, Dublin Road, Limerick.

Technical Report prepared for;

C/O. Kirkland Developments Ltd.

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EXECUTIVE SUMMARY

Dalton Acoustics Ltd has been commissioned by Kirkland Developments Ltd. to carry out a study in relation to the potential noise impacts incident on a proposed mixed commercial and residential development located at Parkway Valley, Dublin Road, Limerick. The proposed development comprises 5 no. blocks with a total of 403 no. residential units, ranging from 5 to 8 floors in height; a medical centre located at the western edge of the site; a creche located at ground level within Block B; and all associated site works and development. The lands in question are in the authority of Limerick County Council.

Of particular concern is traffic noise coming from the nearby R445 (Dublin Road) that may be incident on the proposed noise sensitive residential dwellings contained within the proposed development. The main body of this acoustic report seeks to quantify these traffic noise emissions and evaluate not only their respective levels at these dwellings, but the need for mitigation if same is required, in order to achieve and maintain suitable levels of noise in and around the dwellings.

A baseline noise survey has been undertaken at the proposed development location to determine the existing ambient noise environment. A subsequent assessment has been undertaken based on the results of the measurement data as recommended in the **ProPG***: 'Planning & Noise'* guidance document. A calibrated noise contour map has also been constructed for the proposed site to assess the effects of traffic noise at the location. With the presence of the completed development including the proposed commercial buildings, the assessment concludes that all residents will enjoy a 'Good' internal noise environment within their homes in the event of the development proceeding. All residents will also be able to access external areas that are screened from the R445 road traffic noise, which will achieve the external noise levels recommended in the Pro PG document.

Yours sincerely,

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

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1.0 INTRODUCTION

Dalton Acoustics Ltd has been commissioned by Kirkland Developments to conduct a study in relation to the potential noise impacts incident on the proposed mixed residential / commercial development at Parkway Valley, Dublin Road, Limerick. The proposed development comprises 5 no. blocks of multi-storey units consisting of a total of 403 no. residential dwellings, ranging from 5 to 8 floors in height; a medical centre located at the western edge of the site; a creche located at ground level within Block B; and all associated site works and development. The lands in question are within the authority of Limerick County Council.

The main body of this acoustic report seeks to provide a detailed evaluation of the proposed sites residential units exposure to traffic noise from the nearby R445 road. Included within this report is an assessment of the impact of inward noise upon the residential dwellings from the R445 Roadway as per the guidance provided in the **ProPG**: 'Planning & Noise' document. The traffic noise from the R445 Dublin Road, is presently the dominant noise source at this location. To the North of the nearest proposed residential units the R445 road is situated at an approximate distance of 120 metres to the nearest noise sensitive dwellings elevations. The proposed site consists presently of level ground but it is dropped below the surrounding ground level and R445 road surface. The dwellings proposed are multi-storey and will range from below road level, to substantially above the road level in terms of line of sight.

The R445 road curves around the North boundary of the proposed site and is a sloped road surface, raising in height relative to the proposed site. **Illustration 1** presents the extent of the proposed development site and the surrounding area; it also shows the Noise Monitoring reference points used for this assessment / report **NML1 and NML2**. **Illustration 2** indicates the proposed overall development plan for the site with the 5 no. proposed multi-storey blocks of residential dwellings and additional commercial units superimposed.

Ill 1: Extent of proposed site at Parkway Valley, Dublin Road, Limerick with NML 1 & NML2 indicated.

Ill 2: Extent of proposed site at Parkway Valley with proposed development buildings superimposed

Initially, it is appropriate to examine the relevant noise criteria used for the assessment and to discuss the site in relation to the current noise environment. The duration of on-site monitoring has been determined by the availability and necessity of suitable weather conditions.

BS 7445-1: 2003 *"Description and measurement of environmental noise - Guide to quantities and procedures"* has been used for the measurement exercise. Additional Guidance where necessary, shall be obtained from the following relevant listed publications.

2.0 DESIGN CRITERIA

2.1 Limerick County Council Third Noise Action Plan 2019 – 2023 (superseded)

2.3 Noise Assessment for Action Planning

To address the lack of legislative measures and unify the approach taken by Action Planning Authorities the EPA have issued guidelines for the assessment of noise exposure and prioritising areas for noise mitigation measures. The suggested onset of assessment levels relating to road traffic noise are given below. EPA suggested onset levels for noise assessment:

- *70dB Lden*
- *57dB Lnight*

EPA suggested onset levels for measures to preserve the noise situation (quiet areas):

- *55dB Lden*
- *45dB Lnight*

These levels reflect an annual average 24-hour period.

2.1.1 Noise Action Plan 2024-2028 – Limerick Agglomeration

The proposed site location at Parkway is adjacent a significant commercial and transport hub (near the R445/Dublin Road), this is managed under the Limerick Noise Action Plan (NAP) 2024–2028 broader strategic framework rather than as a specific "place of interest" for quiet designation. Being near a major traffic artery (R445), it is

subject to the plan's general mitigation and prevention strategies to reduce harmful health effects from traffic noise.

NOISE POLICY STATEMENT:

Limerick City and County Council and Clare County Council will adopt a strategic approach to managing environmental noise within the Agglomeration of Limerick, and will aim to:

- *Mitigation – identify appropriate mitigation measures to reduce noise levels where they are potentially harmful to the health of communities.*
- *Prevention - prevent additional members of the community being exposed to undesirable noise levels where it is likely to have a significant adverse impact on health and quality of life, and where practicable, improve or maintain the quality of sound in the public realm.*
- *Protection - protect areas which are desirably quiet, or which offer a sense of tranquillity through a process of identification and validation followed by formal designation of "Quiet Areas".*

2.2 ProPG: 'Planning & Noise'

The Professional Guidance on Planning & Noise (ProPG) was released in May 2017, developed by a working group comprising representatives from the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA), and the Chartered Institute of Environmental Health (CIEH). While not an official Irish Government publication, it has been widely regarded as a best practice guideline since its release. The document does not directly reference English Building Regulations or legal frameworks. Nonetheless, it is gradually being adopted by local councils and planning authorities in the Republic of Ireland as a planning resource tool.

The ProPG guidance introduces a structured, risk-based, two-stage process for assessing noise exposure on potential residential development sites. The two main stages of this approach can be summarised as follows.

- **Stage 1** - involves a high-level preliminary assessment of noise risk at the proposed site, based on either measured or predicted noise levels.
- **Stage 2** - consists of a comprehensive evaluation of the proposed development, addressing four key elements;

- **Element 1** - Good Acoustic Design Process,
- **Element 2** - Noise Level Guidelines.
- **Element 3** - External Amenity Area Noise Assessment
- **Element 4** - Other Relevant Issues

An essential component of the assessment process is the creation and submission of an Acoustic Design Statement (**ADS**) to the Planning Authority. This document is designed to clearly present the methodology and outcomes of both Stage 1 and Stage 2 assessments, supporting the planning authority in making a well-informed decision.

Based on the findings presented in the Acoustic Design Statement (ADS), ProPG sets out several possible recommendations:

A. Planning consent may be granted - without noise conditions,

B. Planning consent may be granted – with suitable noise conditions,

C. Planning consent may be refused on noise grounds - to avoid significant adverse effects, (AVOID)

D. Planning consent may be refused on noise grounds - to prevent unacceptable adverse effects (PREVENT).

Section 3.0 of the ProPG document offers more detailed guidance to assist local authority planners in interpreting the findings presented in an accompanying Acoustic Design Statement (ADS).

A summary of the ProPG approach is illustrated in **Figure 1** below.

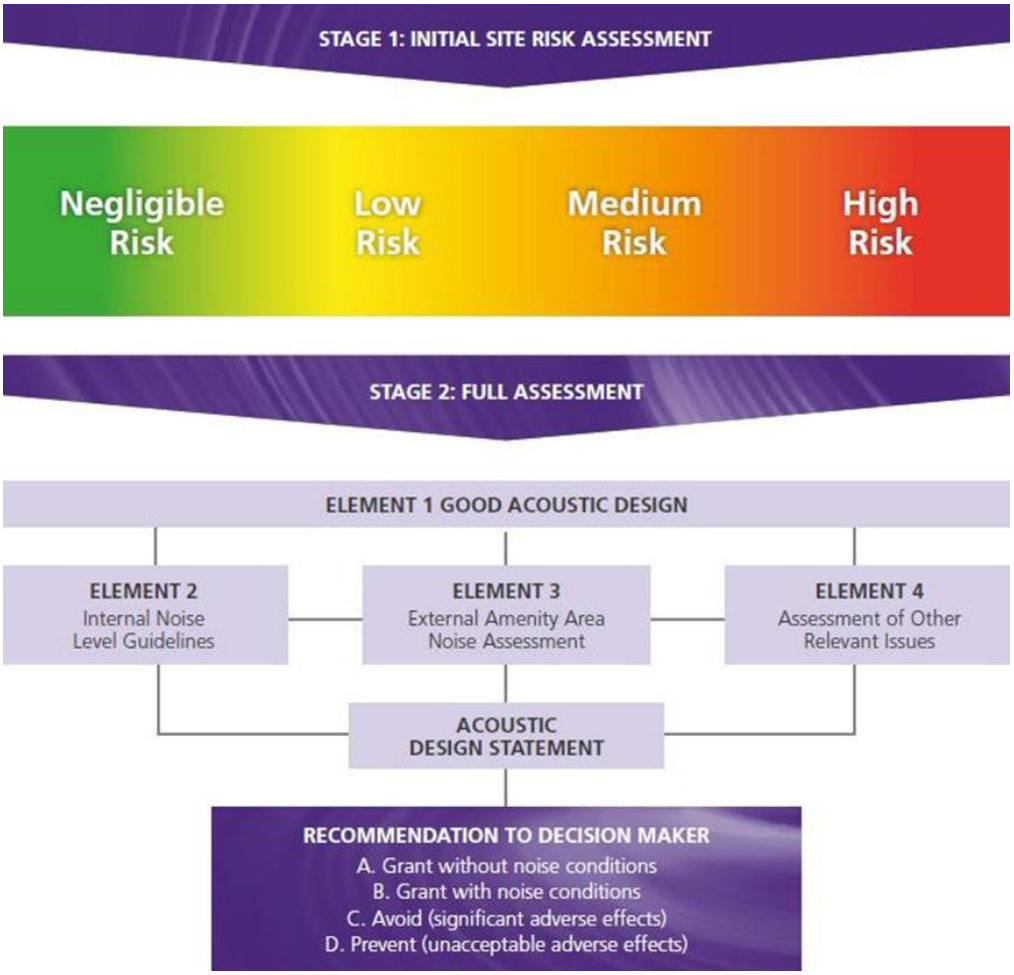


Fig 1: ProPG staged approach for the decision making process.

The (WHO) **World Health Organisation's** '*Community Noise Guidelines (Residential),* 1999' recommend evaluating external noise levels at residential properties using the LAeq(8hr) night-time metric, measured between 23:00 and 07:00 hours.

Table 1 replicated below provides acoustic comfort values for residential living spaces and bedrooms, but it does not include comparisons between daytime and night-time levels.

"Guideline values for community noise in specific environments"

Table 1 - Guideline values for community noise in specific environments

Specific Environment	*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***

BS 8233:2014 – '*Guidance on Sound Insulation and Noise Reduction for Buildings'* may be referenced, as it specifies internal noise criteria for bedrooms, recommending a level of 30 dB LAeq over an 8-hour period at night (23:00 to 07:00). **BS 8233:2014** also offers guidance for both night-time and daytime internal noise levels, as detailed in **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 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

BS8233: 2014 also offer a relaxation where development is considered as desirable.

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 / conditions on noise at Ne. 55dB LAeq during daytime and Ne. 45dB LAeq night-time externally. The above guidelines and

standards are based on the assumption of 15dB(A) attenuation being afforded by a partially opened (ajar) window on the elevation of a noise sensitive dwelling.

WHO 2018: Environmental Noise Guidelines

3.1 Road traffic noise Recommendations

For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below 53 dB Lden, as road traffic noise above this level is associated with adverse health effects. For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night-time below 45 dB Lnight, as road traffic noise above this level is associated with adverse effects on sleep.

This document is somewhat aspirational, as it assumes a reduction in traffic noise levels, which is beyond the control of the applicant in this case. The Local Council, however, may address traffic noise through measures such as improved road surfaces and managing road usage etc.

3.0 ProPG STAGE 1 – NOISE RISK ASSESSMENT

3.1 Methodology

The initial noise risk assessment aims to offer an early indication of potential acoustic challenges. It requires categorizing the site's risk level as negligible, low, medium, or high, based on the existing noise environment. **Figure 3** illustrates the framework for this assessment, showing suitable risk categories for various continuous noise levels, whether measured or predicted on site.

It is important to recognize that a site should not be classified as low risk if there are over 10 LAfmax events exceeding 60 dB during the night. Additionally, the site should be deemed high risk if the LAfmax events surpass 80 dB more than 20 times in one night.

The site at NML1 does exceed LAfmax 60dB by more than 10 events during the night-time period (23:00 to 07:00 hours) but does not exceed LAfmax 80dB more than 20 times per night.

This site is neither negligible or high risk but medium to low risk as per the gathered measurement data.

Paragraph 2.9 of ProPG states that,

"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24-hour day, either now or in the foreseeable future."

In this instance 1 no. 24-hour diurnal cycle of noise measurement assessment has been obtained at 1 no. monitoring location (NML1) along with a review of noise mapping information available for the site to predict the noise levels at the nearest relevant dwellings on the proposed site in order to investigate the initial noise risk.

"The risk assessment should not include the impact of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds."

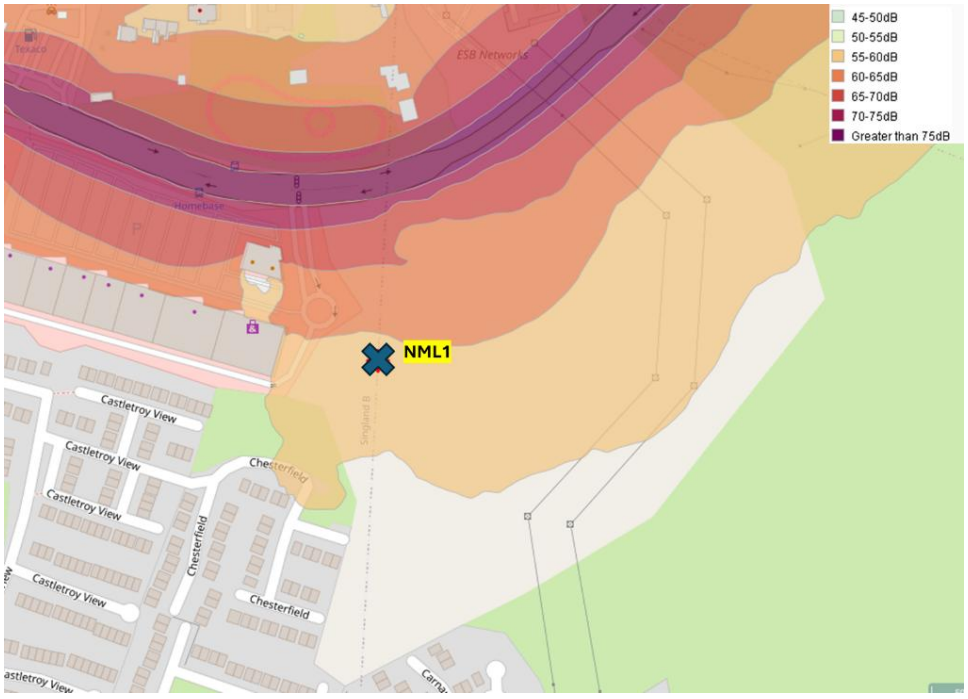


Fig 2A: Above shows the results of the measurement assessment compared with Round 4 agglomeration noise mapping which indicates that NML1 (full diurnal at 120M) is situated within the 55 – 60dB Lday noise band. The measured Lday is 54dB for NML1 which is lower than the EPA mapping for the same location.

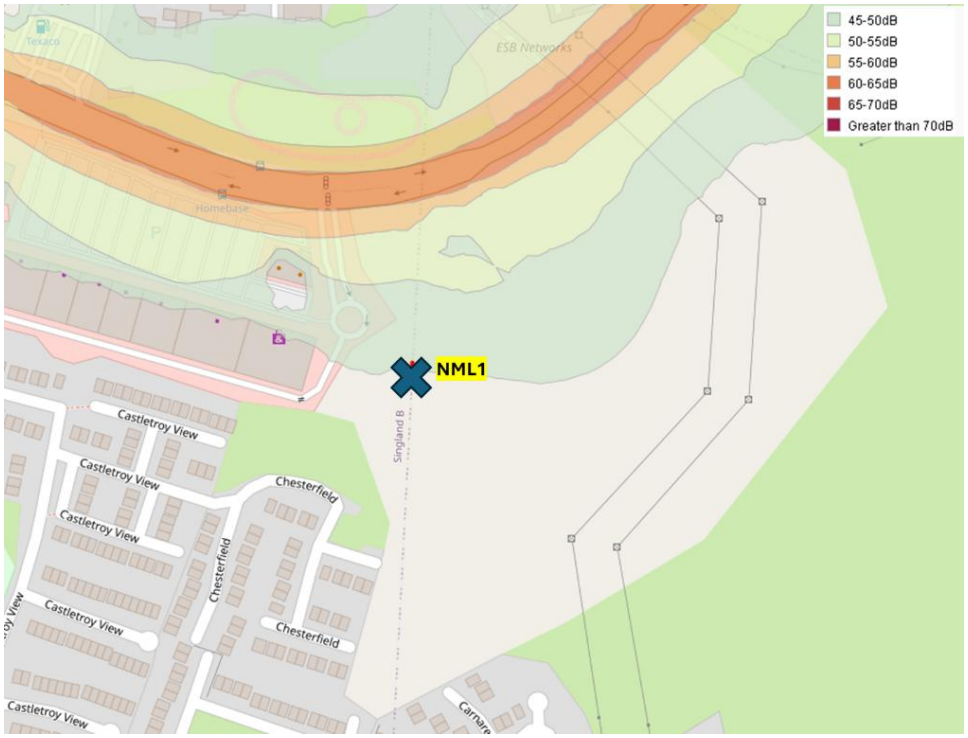


Fig 2B: Above shows the results of the measurement assessment compared with Round 4 agglomeration noise mapping which indicates that NML1 (full diurnal at 120M) is situated outside of the 45 – 50dB Lnight noise band. The measured Lnight is 48dB for NML1 which is agrees with the EPA mapping for the same location.

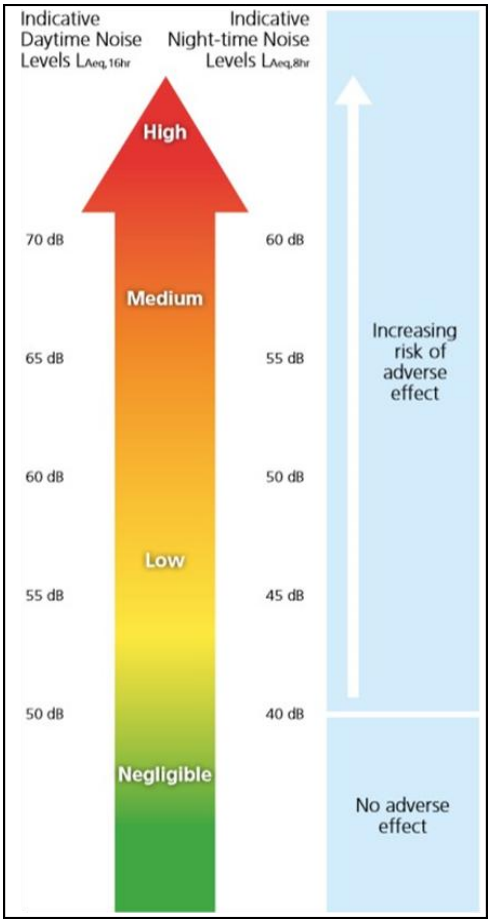


Fig 3: ProPG Stage 1 - Initial Noise Risk Assessment

3.2 Baseline Noise Survey

An environmental noise measurement assessment has been conducted in order to quantify noise emissions at the proposed development site. The survey was conducted in general accordance with **ISO 1996-2:2017** *"Acoustics - Description, Measurement and Assessment of Environmental Noise -- Determination of Environmental Noise Levels".* Specific details are set out in the following sections.

3.2.1 Methodology

Attended and partially attended measurements were undertaken between 30th. April & 1st. May 2025. The complete measurement process commended at 12:13 hours on 30th. April 2025 and ceased at 13:23 hours on 1st. May 2025.

The approximate noise measurement locations for NML1 and NML2 are as shown in **Illustration 1**.

3.2.2 Personnel & Instrumentation

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

3.2.3 Instrument (Sound Level Meter)

NML1 – NTI XL2 Class 1 Integrating Sound Level Meter & Audio Analyser,

Serial No. A2A-16360-EO

Calibration Cert SLM 230213

Calibration Certificate Dated: 23/08/23 (2-year calibration)

NML2 - NTI XL2 Class 1 Integrating Sound Level Meter & Audio Analyzer,

Serial No. A2A-14622-EO

Calibration Cert 220166

Calibration Certificate Dated: 22/06/24 (2-year calibration)

Field Calibration

Calibrator Rion NC 74 with serial No. 34551704

Calibration Cert 1510212 - 2

Dated: 16/10/24

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 instruments were both calibrated before and after measurement with a recorded maximum deviation of -0.1dB.

The microphone and preamp for each of the XL2 SLMs (NML1 taking a full diurnal cycle and NML2 partial), was situated into a weather protection windshield and connected back to the SLM using a 5-metre extension cable. During the measurement process, the NTI XL2 Sound Level Meters (Class 1) were set up as follows;

The microphone and pre-amplifier were placed onto ranging rods and extended to 4.0 metres high above ground level. The microphone and pre-amplifier was set inside a weather shield and the settings for same accordingly selected on the sound level meter (WP30 - environmental noise). An extension cable was run from the mic / preamp to the NTI XL2 SLM located within a tamper / weather-proof pelitor. This allowed for all weather monitoring and partially manned measurement to occur right throughout the process, as the SLMs were set to record all audio and log noise measurement metrics simultaneously. **Figures 4 & 5** indicate the location / setup of the microphone measurement positions on the proposed site at **NML1 & NML2**.

Fig 4: NML1 position free field

Fig 5: NML2 position free field

3.3 Measurement Parameters

The NTI XL2 Sound Level Meters (NML1 & NML2) have the capability to record continuous audio for the full period of the measurement sample and this was turned on. The sound level meters were also set to continuously log 1 second intervals of measurement data throughout the sample period. This method of storing data onto the sound level meter allows for manipulation of the stored data into numerous acoustic parameters useful for advanced assessment purposes.

PC Data Explorer software allows examination of all the data logged and recorded audio playback whereby, occurrences and noises can be identified and analysed etc. This process allows for unattended measurement.

PC Data Explorer software also allows the information recorded on the XL2 to be included, or excluded from the measurement sample if contaminated, and allows the data to be compiled into various useful acoustic parameters for analysis as used by various acoustic guidelines / standards and planning conditions.

The following acoustic parameters are used for analysis – 15-minute samples of 1/3rd. broadband samples for LAeq, LAfmax, LA10 & LA90 at the measurement locations located at NML1 and NML2 within the proposed site. All measurements were taken using "Fast" time weighting and "A" Frequency Weighting. 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 is the steady noise level which, over a period of time under consideration, contains the same amount of sound energy as the time -varying noise, over that same period of time. "A Weighted on Fast time response". (Often used to measure environmental Ambient & Residual Noise levels)

LAFmax is the maximum "A Weighted" fast time response sound level measured during that measurement period.

LA90 Is the A-Weighted noise levels that are exceeded for 90% of each sample period. This is the term used to measure background noise level in an area. Typical day time background noise levels range from an LA90 =18dB in remote rural areas, through 30 to 40 LA90 in "typical" or "quiet" areas and 50dB to 60dB LA90 for busy urban areas.

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

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).

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. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5Pa.

3.4 Survey Results

The noise measurement locations were both set at 120 metres back from the R445 roadway. NML1 situated at circa 120 metres from the R445 to measure the traffic noise incident on the proposed nearest residential dwellings elevations. NML2 was similarly set at 120 metres from the R445 to allow for a cross check of measurement data due to NML1s location being closer to the Parkway Retail Park entrance. NML1 is the full diurnal sample taken on the site whereas NML2 is used primarily for reference (cross checking) purposes only.

The following are expressions of the various commonly used acoustic parameters applicable in this instance for both Noise Monitoring Locations.

For the purposes of accuracy 15-minute samples were taken over the measurement period, subsequently the measurement data may be converted into an hourly representation using the equation.

10*Log((L1+L2+L3+L4)/4) = Hourly Average of 15 min samples.

This hourly average may then be used to calculate the **Lden** whereby;
Lden has been suggested as the standard noise metric for assessing annoyance under the **EU Directive (2002/49/EC)** concerning Environmental Noise Assessment and Management. This metric, known as the Day-Evening-Night Sound Level (**Lden**) or Community Noise Equivalent Level (**CNEL**), represents the average noise level over a 24-hour period. It includes a 5dB penalty for noise occurring during the evening (19:00–23:00) and a 10dB penalty for noise during the night (23:00–07:00) to reflect increased sensitivity during these hours

Lden Calculation as follows;

10*Log (((12/24 x (10*Ld/10)) + (4/24 x (10*Le+5/10)) + (8/24 x (10*Ln+10/10)))

NML1 - Resultant Lden and Lnight for 30th. April to 1st. May 2025
NML1 = 56dB

Lnight : Leq. A-weighted, Sound Level, measured overnight 23.00 - 0700 hours.
NML1 = 48dB

WHO 1999 & BS8233:2014 results are based on the free field measurement results for the average LAeq (16hr) daytime and the average LAeq(8hr) night-time, at the nearest façade.

Daytime **NML1 = 54dB LAeq (16hr) external**

Night **NML1 = 48dB LAeq (8hr) external**

3.5 Noise Risk Assessment Conclusion

Considering the measured noise levels presented in the earlier section the initial site noise risk assessment has concluded that the level of risk across the site varies from medium to low noise risk. Medium risk located at dwellings nearest the R445 roadway.

Furthermore, the Stage 1 Noise Risk Assessment includes an analysis of LAfmax noise levels. The findings indicate that while it is unlikely that LAfmax levels will exceed 80 dB more than 20 times per night on facades facing the R445 road, levels exceeding 60 dB(A) after 23:00 may occur more than 10 times per night. These elevated levels are primarily caused by passing traffic on the R445, which produces a typical rise-and-fall noise pattern. This type of noise generally lacks impulsive or tonal elements, meaning it does not contribute to additional annoyance or startling effects. Therefore, ProPG recommends that the site is considered as low to medium risk still.

ProPG states the following with respect to low and medium risks:

Low Risk: *At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.*

Medium Risk*: As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*

Based on the above findings, the development site can be classified as presenting a Medium to Low Noise Risk. Consequently, an Acoustic Design Strategy will be necessary to show that appropriate measures have been taken to reduce and manage noise impacts, ensuring that the final development avoids any adverse noise effects. It is also important to note that ProPG provides guidance on how the initial noise risk assessment should be interpreted and applied;

*"**2.12** It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

4.0 ProPG STAGE 2 – ACOUSTIC DESIGN STATEMENT

4.1 Element 1 – Demonstrating a "Good Acoustic Design Process"

4.1.1 ProPG Guidance

In practical terms, effective acoustic design should achieve the best possible acoustic performance for a specific site without negatively impacting residential amenity, occupants' quality of life, or conflict with other sustainable design goals. ProPG emphasizes that good acoustic design is not the same as overdesign or "gold plating" of a new development. Instead, it aims to create the optimal acoustic environment for each particular site.

Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design (GAD): "Planning applications for new residential development should include evidence that the following aspects of good acoustic design have been properly considered:"

- *Check the feasibility of relocating, or reducing noise levels from relevant sources,*
- *Consider options for planning the site or building layout,*
- *Consider the orientation of proposed building(s),*
- *Select construction types and methods for meeting building performance requirements,*
- *Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design, and management) etc,*
- *Assess the viability of alternative solutions; and,*
- *Assess external amenity area noise.*

In relation to the proposed development, each of the considerations mentioned above is addressed in the following subsections.

4.1.2 Application of GAD Process to Proposed Application

Relocation or Reduction of Noise from Source

The R445 Road is located outside the redline boundary of the site and therefore it is beyond the scope of this development to introduce any noise mitigation at source. However the nearest dwelling elevations have been located back 120 metres from same as per the calibrated noise model contained within this report. Traffic noise

coming from the R445 measured at NML1 representing the nearest proposed residential elevations results in;

- Lday 16Hr = 54dB
- Lnight 8Hr = 48dB

Planning, Layout and Orientation

Consideration has been given to the location of both the buildings and external amenity areas. This proposed development is a mixture of both commercial and residential buildings with the residential buildings set back 120 metres from the R445 and partially acoustically sheltered by the proposed commercial units being closer to the roadway.

None of the proposed residential elevations are exposed to above 55dB LAeq 16hr daytime. However they may be exposed to above 45dB LAeq 8hr night-time, but this noise level is deemed acceptable as per **BS8233:2014- Section 7.7.2** which states;

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.*

Furthermore the presence of the proposed commercial multi-storey buildings, being placed closer to the R445 and directly in the line of traffic noise propagation, will serve to reduce levels even further than those measured at NML1.

Calculation of the additional attenuation offered by the presence of these commercial buildings suggests that traffic noise levels from the R445 will drop by an additional 8dB(A) at the proposed nearest dwellings elevations against those physically measured at NML1. Thus the resultant for same as a result of R445 traffic noise is calculated at;

- Lday 16Hr = 46dB

- Lnight 8Hr = 40dB

See Figure 6 and Figure 7 below of the proposed site with the inclusion of the commercial units contained within the noise contour map indicating levels at NML1 down by 8dB(A) as a result of their presence within the proposed development.

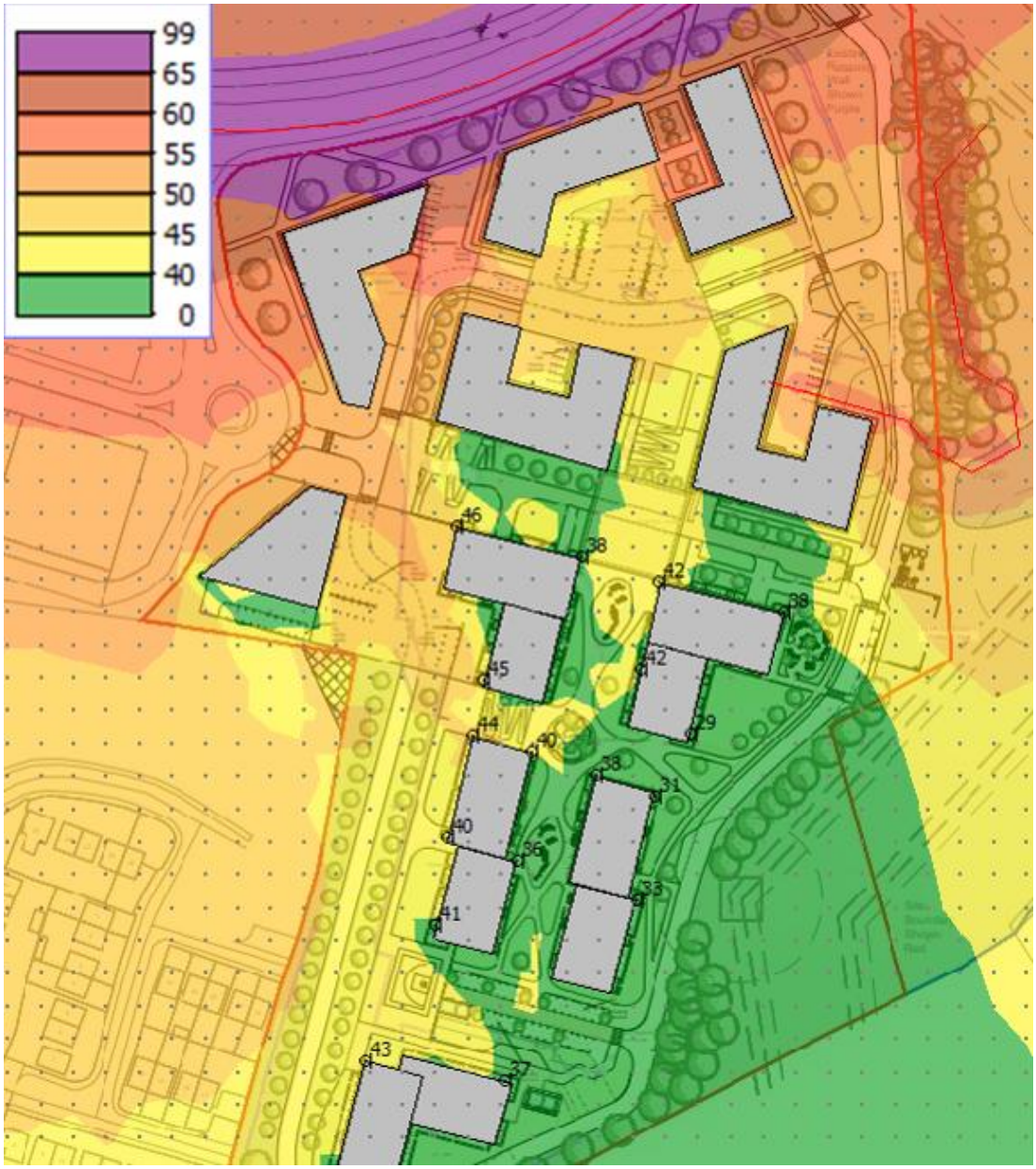


Fig 6: Daytime noise levels when commercial development is present

Such traffic noise levels from the R445, would typically be considered acceptable at the facades of residential development for the daytime period.

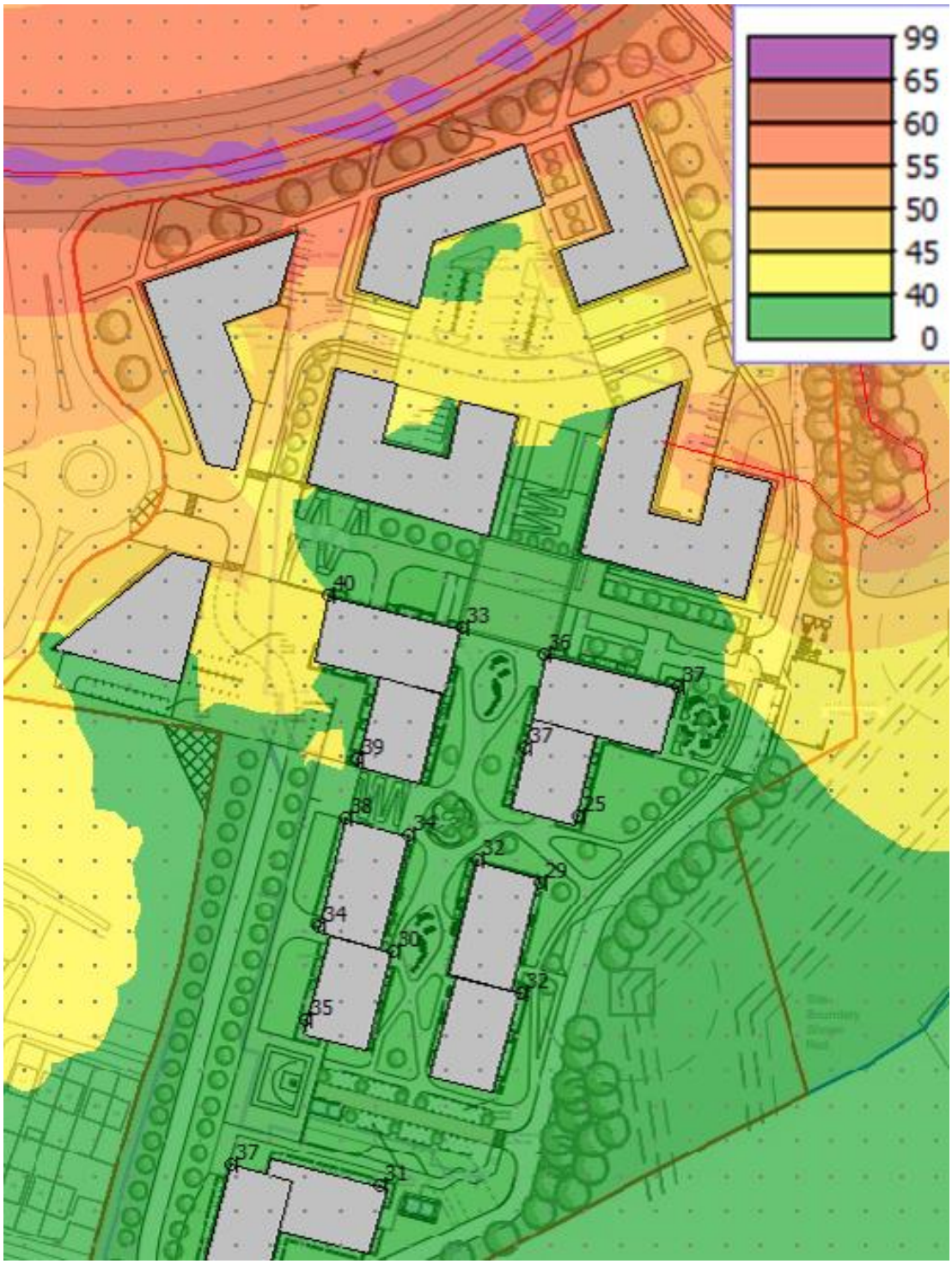


Fig 7: Night-time noise levels when commercial development is present

Such traffic noise levels from the R445, would typically be considered acceptable at the facades of residential development for the night-time period.

Building Envelope Construction

Masonry construction will be used for the external walls of the residential development, offering strong sound insulation performance. However, as is commonly the case, the glazed elements and ventilation will be the weakest components of the façade in terms of sound insulation. Based on the predicted noise levels on the nearest elevations of these dwellings, it will not be necessary to specify acoustic glazing performance above typical standard glazing units.

To maintain indoor air quality, a mechanical ventilation system with heat recovery may be proposed, in accordance with Part F of the Building Regulations, to provide the required air changes per hour. Fresh air supplied to all dwellings will be tempered and filtered as part of such a system; thus it will not be necessary for residents to open their windows for ventilation purposes regardless of if this is installed. All bathrooms, kitchens, and utility spaces will be continuously ventilated to the outside via the mechanical system for extraction purposes. Residents in all cases will have the option to open their windows, doing so may increase internal noise levels. However the measured external levels at the nearest dwellings elevations are measured at 54dB LAeq 16hr daytime and 48dB LAeq 8hr night-time, such levels are deemed as acceptable as per **BS8233: 2014** for both daytime and night-time levels externally.

ProPG, which states the following regarding glazing:

Note 5 "*Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design".*

With the presence of the proposed commercial units on the site, these levels are predicted to be lower again (See Figures 6 and 7) as a result of acoustic shading with resultant levels at;

- Lday 16Hr = 46dB
- Lnight 8Hr = 40dB

Impact of noise control measures on fire, health and safety etc

The good acoustic design measures implemented on site - such as the positioning of residential dwellings away from the R445 road and locating outdoor spaces at quieter locations within the proposed sites curtilage are regarded as cost-neutral and do not significantly affect other design considerations or the overall project objectives.

Assess Viability of Alternative Solutions

The layout and overall extent of the site, allow for placing the nearest dwellings at a distance of 120 metres from the R445 roadway acoustically sheltered by proposed commercial buildings. In this case the use of partial height acoustic barriers either close to the traffic source noise, or close to the nearest elevations, would be considered to have minimal acoustic benefit in this instance and are not recommended as necessary.

Assess External Amenity Area Noise

ProPG offers the following guidance regarding acceptable external noise levels in the amenity areas of a development:

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."

External noise levels around the elevations of these proposed dwellings, will achieve compliance with the above as measured at NML1. Additional attenuation will be afforded by the presence of the proposed commercial buildings, situated between these dwellings and the R445 roadway. A calibrated noise map for the site has been developed with the additional acoustic effects of the proposed commercial buildings and also considers the dwellings in-situ. This map (**Figure 6**) indicates that levels around every dwelling will comfortably achieve the recommendations, being well below what is required by ProPG externally. Thus consideration has been given to both the absence (measurement at NML1) and presence of these proposed commercial buildings (**Fig 6**) within the development.

Summary:

Considering the site's constraints, the principles of Good Acoustic Design have been applied as much as feasible, without restricting the overall development area. Based on the overall design the internal ambient noise level targets within dwellings as outlined in **BS8233:2014** for residential properties (including with windows partially ajar), will be achieved in every instance.

4.2 Element 2 – Observing Internal "Noise Level Guidelines"

4.2.1 Internal Noise Criteria

Element 2 of the ProPG document outlines suggested internal noise level targets, which are based on BS 8233:2014 and the WHO Community Noise Guidelines (1999). These recommended indoor ambient noise levels are presented in the **Table 4 extract** below and are based on yearly average figures.

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T}$*

Summary of recommended internal noise levels from BS8233: 2014

Note: The document states that the internal LAfmax,T noise level, when exceeded more than 10 times nightly, may cause a significant adverse impact.

Considering the proximity of the nearest dwellings to the R445 and the resultant external noise levels on their elevations, it will not be necessary to use enhanced acoustic glazing as internal levels will comply with **Table 4 of BS8233: 2014** as outlined above.

4.2.2 Façade Levels

The most exposed facades to R445 traffic noise are situated at 120 metres from the roadway. Noise measurement at NML1 representing these most exposed elevations suggests existing noise levels of 54dB LAeq 16hr daytime and 48dB LAeq 8hr. The presence of the proposed commercial buildings on the site will offer additional attenuation for traffic noise, resulting in levels at the nearest residential dwellings of 46dB LAeq 16hr daytime and 40dB LAeq 8hr based on attenuation calculation.

4.2.3 Proposed Façade Treatment

The international acoustic standard **ISO 12354-3:2017:** Building acoustics — Estimation of acoustic performance of buildings from the performance of elements; Part 3: Airborne sound insulation against outdoor sound, provides a methodology allowing the determination by calculation, of the sound insulation performance of the external envelope of a building. The elemental analysis methodology of the building envelope considers both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed considering the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principals outlined in **ISO 12354-3:2017** are also referred to in **BS8233:2014** within Annex G. **G.1 Typical design problem: Simple calculation**, provides a simple calculation methodology to establish the internal noise level within rooms. The simple calculation methodology outlined in Annex G.1 of BS8233 has been adopted here to determine the required performance of the building facades. Based on the suggested traffic noise levels when the development is completed in its entirety, there are no specific requirements for enhanced acoustic performance of the structure.

Glazing

Typically in residential buildings, the glazed elements of the buildings elevations are the weakest acoustic element. In the case of this proposed development, considering the residential properties, the levels of traffic noise expected from the R445 are significantly below good guidance as indicated previously (values for both day and night-time) and therefore, standard glazing details commonly used may achieve sufficient sound insulation performance similar to those set out in **Table 1** below.

		Sound Reduction Index						
Glazing		Octave Band Centre Frequency (Hz)						
Type	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	Rw
4/12/4mm	20dB	23dB	20dB	30dB	40dB	44dB	37dB	34dB

Table 1: Standard glazing performance for residential elevations - 4/12/4mm detail

BS 8233: 2014 G.1 Extract:

"The windows, and any trickle ventilators, are normally the weakest part of a brick and block facade. Glazing units have an insulation of approximately 33dB Rw and, assuming suitable sound attenuating trickle ventilators are used, the resulting internal noise level, roughly 30 dB, ought to be determined by the windows. This level is acceptable with the windows closed and attenuated background ventilation, even with the correction for first floor level. If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB resulting in the target levels being exceeded. However, windows may still be openable for rapid or purge ventilation, or occupant's choice".

The assessment indicates that the suggested internal noise levels can be met by incorporating the proposed façade elements during the design phase. The glazing specifications outlined in **Table 1** are initial specification / estimated requirements, intended to guide noise reduction strategies during the detailed design phase. As such, these specifications may be revised as the project develops along with the overall ventilation strategy.

The predicted external noise levels for daytime and night-time based on the additional attenuation provided by the presence of the proposed commercial buildings is;

- Lday 16Hr = 46dB
- Lnight 8Hr = 40dB

Based on the standard premise of 15dB(A) attenuation provided by a partially ajar window, the daytime and night-time levels internally within all proposed dwellings shall be below those recommended by **BS8233: 2014**.

Wall Construction

BS 8233: 2014 G.1 Extract: *"To reduce the noise exposure inside the houses, attention needs to be given to the sound insulation of both the roof and facade. A*

traditional pitched roof with concrete tiles and a 9 mm plasterboard ceiling, covered in thermal insulating material, has an insulation of approximately 43 dB Rw".

The detailing for the roof construction of the residential blocks is not yet decided upon in detail. The above **BS8233: 2014** extract is expected to be the minimum acoustic performance that may be specified. It is quite possible that these residential dwellings shall have a concrete roof structure providing substantially greater acoustic performance than that of a carcass pitched roof. These acoustic performance levels are substantially higher than the window performance and therefore considered suitable with no mitigation required.

Ventilation

The development's ventilation strategy is currently assumed to involve mechanical ventilation (Heat Recovery Systems). These systems generally perform well in limiting external noise intrusion, so no specific noise assessment for ventilation has been conducted. However, like the glazing specification, this is a preliminary assumption made during the design phase. It may be feasible to revise this to include natural ventilation openings on the building elevations by incorporating passive vents with the inclusion of acoustic attenuation if necessary. Such changes can be considered through consultation as the project advances.

Internal Noise Levels

Based on the external façade noise levels and the proposed building envelope construction, internal noise levels have been assessed. In all cases, the recommended internal noise standards are met for both daytime and night-time periods. For rooms nearest the R445 internal noise levels are expected to be approximately 30dB(A) during the day and 25dB(A) at night with windows partially ajar. Other homes further away from the R445 may achieve even lower internal noise levels even with windows slightly ajar (See the previous glazing section).

4.3 Element 3 – External Amenity Area Noise Assessment

In terms of the public external amenity spaces proposed within the development, all of the external locations will comfortably achieve the guidance contained within Pro-Pg being below the recommended range of noise levels of between 50 – 55dB LAeq,16hr. The measured daytime noise levels gathered at NML1 indicate this

compliance. Additionally see the daytime calibrated noise map for the proposed full site development in Figure 6, which indicates daytime noise levels externally across the external amenities of the residential part of the development are predicted at between 46dB(A) to 31dB(A) when the development is fully complete.

4.4 Element 4 – Assessment of Other Relevant Issues

Element 4 considers additional factors that may be relevant to the assessment. The items outlined in the document that apply in this context include:

- 4(i) compliance with relevant national and local policy
- 4(ii) magnitude and extent of compliance with ProPG

These items are discussed below.

4.4.1 Compliance with Relevant National and Local Policy

There are no national policy documents specifically addressing the acoustic design of residential dwellings. However, at the local level, the Agglomeration of Limerick Noise Action Plan 2024-2028 indicates that the guidance provided in ProPG may be used to assess noise impacts on new residential developments. This Acoustic Design Statement has been prepared in accordance with ProPG guidelines and, as such, aligns with the requirements of local policy.

4.4.2 Magnitude and Extent of Compliance with ProPG

The following conclusions have been derived from the discussion contained within this report on the extent of compliance with ProPG:

- All residential dwellings forming part of the proposed development have been designed in such manner to provide the satisfactory internal noise levels specified within ProPG.
- All external amenity areas in and around these proposed residential dwellings shall have external noise levels that comply with the recommended noise metrics set out in ProPG.

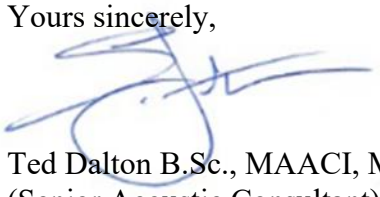
Thus it may be considered that the proposed residential development contained within this report will be in full compliance with the recommendations of ProPG.

4.5 Acoustic Design Statement Conclusion

A preliminary noise risk assessment has been conducted for the proposed residential development. The results indicate that the site is subject to varying levels of noise risk, ranging from low to medium. This conclusion was based on on-site noise level measurements and the creation of a calibrated noise map reflecting the planned site layout.

The report further explores the anticipated noise impact on both the internal and external areas of the proposed residential portion of the development. It has been determined that residents will have access to quiet outdoor spaces, which are shielded from traffic noise coming from the R445 by the positioning of the complete developments buildings themselves (commercial and residential). All habitable rooms will meet appropriate internal noise standards in accordance with BS8233:2014 further assisted by the presence of the proposed commercial buildings to be located between the R445 and these residential buildings.

Yours sincerely,



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

APPENDIX A

CALIBRATION CERTIFICATES

REPORT LIMITATIONS

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Dalton Acoustics Ltd Unit A3 JFK Trading Centre JFK Road JFK Industrial Estate	SLM240248

Test Date: 25/06/2024
Procedure: TP-SLM-1

Equipment

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

Calibration Procedure

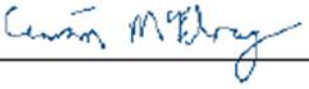
The sound level meter was allowed to stabilize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound level meter was calibrated by carrying out the verification tests detailed in IEC 61672-3 (2013), Periodic tests, specification of sound level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



Unit C7, Citylink Business Park, Old Naas Rd, Inchicore, Dublin 12, D12 VK10
www.sonitussystems.com Email: info@sonitussystems.com

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

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National Instruments PXI-4461	20D2877
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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:

Cormac 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

(AP 17/05/2024 Issue No. 4)