Marshall Yards Development Company Limited

Noise Impact Assessment - Oranmore

Draft



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Document History:

Revision: 0 1 2

Date: 01.03.2024 17.04.2024 29.04.2024

Description: Draft Issued Minor Updates

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1.0 Introduction

As part of a planning application, Enfonic have been commissioned by Marshall Yards Development Company Limited to conduct a noise impact assessment for a proposed development at Oranmore Co. Galway. The proposed development is situated between the R338 and the Galway trainline. This report outlines the guidance, methodology, noise impact assessment and acoustic design statement.

2.0 Guidance

Following a review of relevant standards and guidance, this section sets out those applicable to this assessment as follows.

2.1 BS8233:2014

To assess the building envelope design, it is appropriate follow the guidance set out in *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* which is concerned with noise ingress into dwellings as summarised in Table 1.

Table 1. DS 6233.2014 Recommended internal hoise limits				
Activity	Location	07:00 – 23:00 hours	23:00 – 07:00 hours	
Resting	Living room	L _{Aeq,16hr} 35dB	-	
Dining	Dining room/area	L _{Aeq,16hr} 40dB	-	
Sleeping (daytime resting)	Bedroom	L _{Aeq,16hr} 35dB	L _{Aeq,8hr} 30dB L _{AFMax,8hr} 45 ¹ dB	

Table 1. BS 8233:2014 Recommended internal noise limits

¹"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night"

2.2 ProPG

An Acoustic Design Statement methodology is set out in the UK's Professional Practice Guidance on Planning and Noise (ProPG) which focuses on the adoption of Good Acoustic Design for dwellings when required as a result of high external noise levels.

ProPG also provides useful guidance on flexibility of the internal noise level targets set out in BS8233:2014. For instance, in cases where the development is considered necessary or desirable, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

It provides the following guidance regarding external noise levels for amenity areas in the 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 50-55dB $L_{Aeg, 16hr}$.

It offers further flexibility on the amenity noise targets provided that residents have access to a quiet recreational environment.

2.3 BS5228

To set appropriate construction noise limits for the development site, reference has been made to *BS 5228 - 1:2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites - Noise.* This provides basic information on the prediction and measurement of noise from construction sites and operations such as mines and quarries. It also includes a large

database of source noise levels for commonly used equipment and activities on construction sites.

The standard provides guidance on the 'threshold of significant effect' in respect of noise impact at dwellings. One suggested method for determining threshold noise levels is known as the 'ABC method'. This involves measuring existing ambient noise levels at noise sensitive locations and categorising them A, B or C accordingly, with the relevant threshold level derived from the category as set out in Table 2.

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Assessment category and threshold value period	Threshold value, in decibels (dB)			
(L _{Aeq})	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}	
Night-time (23.00-07.00)	45	50	55	
Evenings and weekends ^{D)}	55	60	65	
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75	

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

A)	Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
B)	Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
C)	Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.
D)	Category D: 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

In general, the noise impact due to the construction phase will be from the specific items of plant used, the duration and phasing of the construction methods, the time of day that each plant will be used and their location.

At this stage of the planning for the proposed development however, a definitive construction plan is not yet formalised. Typically, a worse-case scenario is adopted whereby the plant associated for each phase e.g., site perpetrations, demolition, piling, general construction etc, is assumed to operate simultaneously. This can then inform the construction management plan and be refined as required.

2.4 BB93

To assess the building envelope design for the creche/school, it is appropriate follow the guidance set out in *Acoustic design of schools: performance standards Building Bulletin 93:2014 (BB93)*. The guidance provides recommended levels for indoor ambient noise levels for childcare facilities as summarised in Table 3.

Table 3. BB93:2014 Recommended internal noise limits

Туре	Criteria Upper Limit New build
	L _{Aeq 30-mins} (dBA)
Nursery school rooms	35

2.5 WHO Guidelines

The World Health Organisation (WHO) in the 2018 publication Environmental Noise Guidelines for the European Region have proposed guidelines for community noise. These guidelines are designed to assist policymakers, city planners, and other relevant stakeholders in developing noise policies and implementing effective noise control measures.

In includes the following recommendations in relation to environmental noise:

- Community noise should not exceed a threshold noise limit of 53dB • L_{den} to protect against adverse health effects.
- Outdoor night-time noise levels should not exceed 45dB Lnight. This level is considered appropriate to protect sleep quality and minimise sleep disturbance.
- Indoor night-time noise level in bedroom should not exceed 30dB L_{night}. This includes noise from both internal and external sources, such as road traffic, railway noise, or neighbours. Maintaining low noise levels indoors is essential for creating a quiet and conducive sleep environment.

2.6 Traffic Noise

The most appropriate criteria for assessing disturbance or annoyance from noise arising from the site would be related to the significance of perceived changes in noise levels.

The Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Noise Impact Assessment' gives appropriate impacts which have been summarised with relevant guidance in Table 4.

Change in Noise Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Effects ¹
0	No change	None	Imperceptible
0.1 to 2.9	Barely perceptible	Minor	Not Significant - Slight
3.0 to 4.9	Noticeable	Moderate	Moderate
5.0 to 9.9	Up to a doubling of loudness	Substantial	Significant
10+	More than a doubling of loudness	Major	Very Significant - Profound

Table 4. Summary of impact for changes in traffic noise levels

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would be noticeable in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant.

¹ EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (May 2022)



The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.

2.7 Galway County Council – Noise Action Plan 2019-2023

Irish local authorities, including Galway County Council, are obliged to consider the above document when reviewing planning applications. It sets out the noise mitigation and protection measures the Council intends to follow in order to manage, within its area, noise issues and effects, including noise reduction if necessary and states the following:

The purpose of the action plans is to manage environmental noise from the major sources, to improve noise levels where necessary on a prioritised basis, to preserve satisfactory noise environments where they exist and to protect the future noise environment.

It goes on to state:

The proposed onset levels for assessment of noise level preservation for quiet areas, where the existing noise level is considered good are as follows:

- 55dB, L_{DEN} and
- 45dB, L_{Night}

It should be noted that mitigation measures can be applied if the above criteria are exceeded in order to bring a scheme into alliance.

3.0 Development Description

The proposed development is a situated on a 4.53 Ha site off the Coast Road, Oranmore Co. Galway and consists of a 171no. residential units, creche facility and residential amenity areas.

The site is bordered by the Galway Railway line to the north and the R338 to the south. There are also a number of existing residences surrounding the site. These residential dwellings are considered as the nearest Noise Sensitive Locations (NSLs) for the purposes of this assessment.

The proposed development is illustrated in Figure 1 below.



Figure 1. Proposed Development

4.0 Receiving Environment

This section set out the methodology undertaken to quantify the existing acoustic receiving environment, the basis of which is used to assess the likely impact of the proposed scheme.

4.1 Noise Survey

To quantify the existing baseline noise levels, an unattended noise survey was conducted at the site. The survey was conducted in general accordance with *ISO 1996: 2017: Acoustics - Description, Measurement and Assessment of Environmental Noise* between 08/11/2023 until 12/11/.2023. Weather conditions remained calm and dry throughout the survey.

Monitors were installed at 2no. Noise Monitoring Locations (NMLs) with microphones at a height of 4m as shown in Figure 2 – GPS co-ordinates are given in Table 5.



Figure 2. Proposed Development and Noise Monitoring Location

Table 5. GPS Co-ordinates of Noise Monitoring Locations

Monitoring Location	GPS Co-ordinates
NML1	53.274281, -8.953819
NML2	53.273135, -8.953486

The Sound Level Meters (SLMs) used were class 1 Bruel & Kjaer Type 2250s. Each SLM was calibrated prior to measurements and the sensitivity checked afterwards.

4.2 Noise Survey Results

Noise data was analysed and the results are presented in Table 6 in terms of L_{Day} and L_{Night} values.

Table 6. Noise Monitoring Results

Location	L _{Day} dBA	L _{Night} dBA	Noise Sources
NML1	65	47	Constant local RTN Coast Road, Occasional trains passing
NML2	63	54	Constant local RTN Coast Road, Occasional trains passing

5.0 Noise Impact Assessment

The potential noise impact on the surroundings are considered for both the construction and operational phases of this development. The construction phase has the greatest potential noise impact however will be short-term.

During the operational phase of the development, the primary source of noise relates to any changes in traffic flows along the local road network and building services noise.

5.1 Construction Phase

5.1.1 Noise Limits

It is anticipated that the normal operational times of the construction site are: 08:00 - 19:00 Mon-Fri. Following a review of the baseline noise survey results given in Table 6 and the criteria detailed in Table 2, the appropriate noise limit at NSLs for construction noise are given in Table 7 below.

Table 7. Appropriate Construction Noise Limits

Ambient Noise Level Rounded to	BS 5228-1	Construction Noise			
Nearest 5dB L _{Aeq}	Category	Threshold Value (L _{Aeq})			
65dB	В	70dB			

5.1.2 Construction Plan & Site Limits

A Construction Environmental Management Plan (CEMP) has yet to be completed and the specific noise impact cannot be assessed at this point. However, the above limit is considered easily achieved for construction works typical of this type and the limit and guidance set out in *BS 8228-1* will form part of the CEMP in due course.

Following a review of the vibration criteria given in *BS 5228-2*, the nearest NSLs are sufficiently distance for vibration from any construction plant to be negligible.



5.2 Operational Phase

Once operational, there may be some noise-generating items of building services plant and some additional traffic on the Coast Road associated with the development.

No significant sources of vibration associated with the operational phase are expected.

5.2.1 Additional Traffic

It is appropriate to consider the increase in traffic noise level that may arise as a result of vehicular movements related to the development.

Specific Annual Average Daily Traffic (AADT) data for the adjacent R338 road is not available. Nevertheless, an estimated value of approximately 11,000 – 13,000 has been taken from *Galway County Council's N6 Galway City Transport Project Phase 2 Traffic Modelling Report*² for the R338.

The likely increase in the AADT as a results of the 171no. residential units and creche is of the order of <2%. This represents a negligible increase in associated noise levels. For information purposes, a 25% increase in traffic volumes would equate to a 1dB increase in noise level which would be imperceptible.

The traffic noise impact is therefore expected to be imperceptible and long-term.

5.2.2 Building Services and Plant

The selection, location and treatment of the plant will be considered in the detailed design stage. The associated noise impact assessed should follow procedures set out in BS4142:2014 to ensure no associated adverse impact occurs at any NSL.

This will include any plant including Air Handling Units (AHUs) from the creche or any Air Source Heat Pumps (ASHPs) from the houses which may be included in the development.

A guidance for any future BS4142 assessments of proposed plant is presented below in Table 8.

Table 8. Specific Noise Limits for proposed plant				
Period	Existing Background Levels L _{A90} dB	Maximum Specific Noise levels at closest NSL L _{Aeq T}		
Daytime	52	52dB		
Night-Time	40	40dB		

Table 8. Specific Noise Limits for proposed plant

6.0 Building Envelope Specification

The acoustic design of the building envelope should consider the external noise levels with a view to achieving appropriate internal design goals.

The façades of the buildings includes several critical elements including glazing, walls, ventilation and where appropriate the roof/ceiling. By calculating the combined effect of these it's possible to predict the internal noise level.

² <u>https://www.pleanala.ie/publicaccess/ABP-302848-18%20-%20FI%20Response/ABP-302848-18%20-%20Volume%203%20-%20RFI%20Documentation/A.2.1%20RSR/Vol%203/Volume%203A%20-%20Part%201/A.3.1%20Traffic%20Modelling%20Report.pdf</u>



The acoustic performance of the individual building element is usually rated in terms of the Weighted Sound Reduction Index (R_w) which is a single number index used to rate the effectiveness of a soundproofing system or material. Increasing the R_w by one translated to a reduction of approximately 1dB in transmitted noise level. Therefore, the higher the R_w number, the better the sound insulation.

6.1 Design Goals

The internal noise level design criteria are set out in Table 1 and summarised as follows:

- Living/Dining/Kitchen (daytime): 35dBA
- Bedrooms (night-time): 30dBA

6.2 Acoustic Design Statement

By applying the guidelines in ProPG and BS8223, an Acoustic Design Statement (ADS) provides the predicted interior noise levels based on the proposed construction and inform the building design. It will also present options to achieve the attenuation required should the predicted internal noise level exceed the required criteria.

The ADS does not consider the sound attenuation of internal elements such as walls and floor/ceiling or other acoustic topics; these are covered by Building Regulations, Technical Guidance Document, Part E.

6.3 Noise Propagation Model

The external façade levels are dependent on their orientation and proximity to the roads and railway track adjacent to the site and a noise propagation model was created to plot façade noise levels across the development. The measured noise levels are used to 'calibrate' the noise propagation model.

The property software used, Type 7810-C Predictor, calculates noise levels in accordance with *ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*

The resultant noise levels are calculated considering a range of factors affecting the propagation of the sound, including:

- The magnitude of the noise source in terms of Traffic and Rail flows in accordance with CNOSSOS
- The distance between the source and the receiver
- The presence of obstacles such as buildings in the propagation path.
- Topography of the site and area
- The presence of reflecting surfaces
- The acoustic property of the intervening ground between the source and the receiver
- Attenuation due to atmospheric absorption

A noise propagation model was developed which included the road traffic noise from the R338 to the south and the railway line to the north.

6.3.1 Model Results

Colour noise contour plots are presented in Appendix A and the are presented in

Table 9.

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Table 9. Predicted Noise Levels.

Façade description	Height m	L _{Day} dB	L _{Night} dB
North	4	66	46
Northwest	4	66	46
Northeast	4	65	45
Amenity Area SW	1.5	61	54
West	4	60	48
Southwest	4	60	53
Creche	4	60	53
Southeast	4	59	52
South	4	59	52
East	4	58	41
Amenity Area Central	1.5	54	37

For daytime, the northern façades encounter the highest noise levels from the trainline. For night-time, the southern façades are experiencing the highest noise levels from the R338.

6.4 Glazing Assessment

The identified façades requiring the minimum glazing performance³ is given in Figure 3 below.



Figure 3. Minimum glazing performance mark-up

The minimum glazing performance required and a sample glazing construction to achieve this minimum performance are set out in Table 10.

³ Glazing specifications apply to habitable rooms only i.e. Living/Dining and Bedrooms. It does not apply to bathrooms or other rooms

Table 10. Glazing acoustic performance for identified facades.

Minimum Required R _w	Glazing Type	Sample Construction				
36	Double	6 - 16 - 6				
30	Double	6 - 16 - 4				
Assumed: Room volume = $45m^3$, Window area = $2.4m^2$, RT = 0.5s						

The exact glazing system to be used shall be consolidated in the detailed design phase.

6.5 Ventilation Specification

Ventilators on railway facing façades marked-up in red in Figure 3 should include internal baffles and acoustic insulation to achieve a minimum sound insulation performance of 36dBA $D_{n,e,w}$.

6.6 Windows Open

Opening a window will compromise the acoustic performance of the façade but it is a desirable feature or necessary to provide purge ventilation. Following the ProPG/BS8233 guidelines, the performance of the façade with windows open should be considered initially.

The World Health Organisation (WHO) Environmental Noise Guidelines for European Region (WHO, 2018) document describes the typical reduction of an open window as being 15dB. An assessment for internal noise levels with windows opened for night-time is presented below in Table 11.

Description	LNight	Open Window Reduction dB	Internal Levels	BS8233 Compliant?
North	46	15	31	marginal
Northwest	46	15	31	marginal
Northeast	45	15	30	Yes
West	48	15	33	marginal
Southwest	53	15	38	No
Southeast	52	15	37	No
South	52	15	37	No
East	41	15	26	Yes

Table 11. Open Window Assessment

It was found that with an open window, the internal noise criteria will not be satisfied at façades directly facing the R338. For these dwellings, the design goal will however be achieved with a closed window and the option remains for the windows to be opened at the resident's discretion.

For dwellings not directly facing the R338, the design criteria will be achieved with open windows.

6.7 Other Façades

There are no specific acoustic glazing or ventilator requirements for façades not marked-up or mentioned above i.e. dwellings situated central to the development.



6.8 Wall Construction

In general, all wall constructions, i.e. block work or concrete, offer a high degree of sound insulation, much greater than that offered by the glazing or ventilation systems. Therefore, noise intrusion via the wall construction will be minimal.

The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 51dB Rw for this construction.

6.9 Creche

The creche façade is also assessed to ensure the internal levels are in compliance with the criteria set out previously in Table 3.

The predicted external noise level is 60dBA and Table 12 gives the required glazing performance to satisfy the design criteria.

Table 12. Summary of predicted noise levels at creche

Description	Predicted	Design	Minimum Required
	Level (dB)	Criteria (dB)	Performance (R _{w)}
Creche façade	60	35	30dB

6.10 Amenity Areas

The amenity areas consist of outdoor residential spaces e.g. gardens and playground areas. The maximum criteria of 55dB set out in ProPG will be satisfied at all dwellings in the development.

There is also a shared central amenity area. The noise level at this amenity area is calculated as 54dB which also satisfies the amenity criteria in ProPG.

7.0 Conclusion

The site has been identified as having a range of noise levels associated with a Medium to High Risk of noise impacts based on the proximity to the Trainline to the north and the Coast Road to the south. An Acoustic Design Statement has been prepared for the proposed development site following the guidance set out in ProPG.

Minimum sound insulation specifications for building elements have been provided to ensure that internal noise levels will be within the design criteria with windows closed.

The appropriate systems and specifications for all façade elements i.e., glazing, ventilation, and façade systems, will be reviewed and selected at the detailed design stage to ensure that the internal noise criteria are achieved in sensitive spaces.

For most of the site the noise levels in external amenity areas will be within the threshold for desirably low noise levels as set out in the Galway County Council NAP. It is considered that the design of the proposed development site has been developed to achieve the lowest practical noise levels in external amenity spaces.

Any external plant provided at the dwellings and creche will be assessed following BS4142 guidelines to ensure no adverse noise impact.

Appendix A Noise Contours



Figure 4. L_{Day} Noise Contours



Figure 5. L_{Night} Noise Contours