Chapter 10:

Noise and Vibration

10.0 NOISE AND VIBRATION

10.1 INTRODUCTION

This chapter of the EIAR has been prepared by AWN Consulting Ltd. (AWN) to assess the potential noise and vibration impacts of the proposed development in the context of current relevant standards and guidance.

This assessment has been prepared by Mike Simms BE MEngSc MIOA MIET, Senior Acoustic Consultant at AWN, who has worked in the field of acoustics for over 19 years and has been a consultant since 1998. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial and residential.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development during both the short-term construction phase and the long-term operational phase on its surrounding environment.

The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

10.2 STUDY METHODOLOGY

The assessment of impacts has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter. In addition to specific guidance documents for the assessment of noise and vibration impacts which are discussed further in the relevant sections, the following guidelines were considered and consulted for the purposes of this chapter:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft August 2017
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015)

The study has been undertaken using the following methodology:

- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operational of the development at the most sensitive locations surrounding the development site; and
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.

10.2.1 Construction Phase Assessment Criteria

10.2.1.1 Construction Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In order to set appropriate construction noise limits for the development site, reference has been made to BS 5228 2009+A1 2014 Code of practice for noise and vibration control on construction and open sites. Part 1 of this document Noise provides guidance on selecting appropriate noise criteria relating construction works.

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 10.1 sets out the values which, when exceeded, signify a potential significant effect at the facades of residential receptors.

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A [A]	**Category B [B]**	**Category C [C]**
Daytime (08:00 – 19:00) and Saturdays (08:00 – 14:00)	65	70	75
Evenings and weekends [D]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Table 10.1 Example Threshold of Potential Significant Effect at Dwellings

A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

D. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. If the construction noise exceeds the appropriate category value, then a potential significant effect is deemed to occur.

10.2.1.2 Construction Vibration

In terms of vibration, British Standard BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis to use this lower value. Taking the above into consideration the vibration criteria in Table 10.2 are recommended.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:		
Less than 15Hz	15 to 40Hz	40Hz and above
12 mm/s	20 mm/s	50 mm/s

Table 10.2: Recommended Vibration Criteria During Construction Phase

Expected vibration levels from the construction works will be discussed further in Section 10.5.

10.2.2 Operational Phase Assessment Criteria

10.2.2.1 Traffic Noise

There are no specific guidelines or limits relating to traffic related sources along the local or surrounding roads. Given that traffic from the development will make use of existing roads already carrying traffic volumes – the permitted link road being part of a separate application - it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development. In order to assist with the interpretation of the noise associated with additional vehicular traffic on public roads, Table 10.3, taken from Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7, HD 213/11 (UK Highways Agency et al, 2011) offers guidance as to the likely short term impact associated with any change in traffic noise level.

Change in Sound Level (dB)	Subjective Reaction
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
+5	Major

Table 10.3: Significance in Change of Noise Level

The guidance outlined in Table 10.3 will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development and comment on the likely short-term impacts during the construction phase.

10.2.2.2 Building Services Plant Noise

During the operational phase, potential noise sources relate to building and mechanical services plant required for the development.

In order to set appropriate operational noise criteria for these potential sources, guidance has been taken from BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. The recommended internal noise levels for dwellings are set out in Table 10.4.

Activity	Rooms	Design Range, $L_{Aeq,T}$ dB	
		Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq,8hr}$ (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 $L_{Aeq,8hr}$

Table 10.4: Recommended Indoor Ambient Noise Levels for Dwellings from BS8233: 2014

To set an external noise level limit based on the internal criteria noted above, the degree of noise reduction afforded by a partially open window has been considered, which is suggested in BS 8233 as a 15dB reduction. Using this value, external noise levels of 50 and 45dB $L_{Aeq,T}$ are considered appropriate for day and night-time periods respectively. The time period for day-time noise levels has been set over a 1-hour period to provide a robust criterion. Given the higher sensitivity of people to noise at night, the time period for night-time levels is

set as 15mins. In this instance, the following criteria relate to noise from building service plant at the nearest noise sensitive properties external to the site.

- Daytime (07:00 to 23:00hrs) 50dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 45dB $L_{Aeq,15min}$

There shall be no audible tonal or impulsive noise at noise sensitive locations arising from operation of the building services plant.

10.2.2.3 Vibration

Considering the expected activities associated with the operational phase of the proposed development, it is not anticipated that there will be any outward impact associated with vibration.

However, as the site is bound to the south-west by the Dublin-Belfast railway line, the inward impact of vibration is considered as part of the assessment. Guidance relating to human response to vibration is contained within BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting.

BS 6472 uses the Vibration Dose Value (VDV) which is measured or forecast over the day or night-time periods in terms of $m/s^{1.75}$. The VDV parameter takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number of vibration events during an assessment period. Table 10.5, as set out in the standard, details the values of VDV where various comments from occupiers are possible. The standard notes that the values are applicable for both vertical and horizontal vibration with the appropriate weighting applied.

Building Type	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential building – Day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential building – Night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 10.5: VDV ($m/s^{1.75}$) above which various degree of adverse comment may be expected in residential buildings.

10.2.3 Inward Noise Impact Assessment Criteria

The Professional Guidance on Planning & Noise (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a UK or Irish government document, since it's publication it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2-stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;

- Element 3 - External Amenity Area Noise Assessment, and;
- Element 4 - Other Relevant Issues.

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

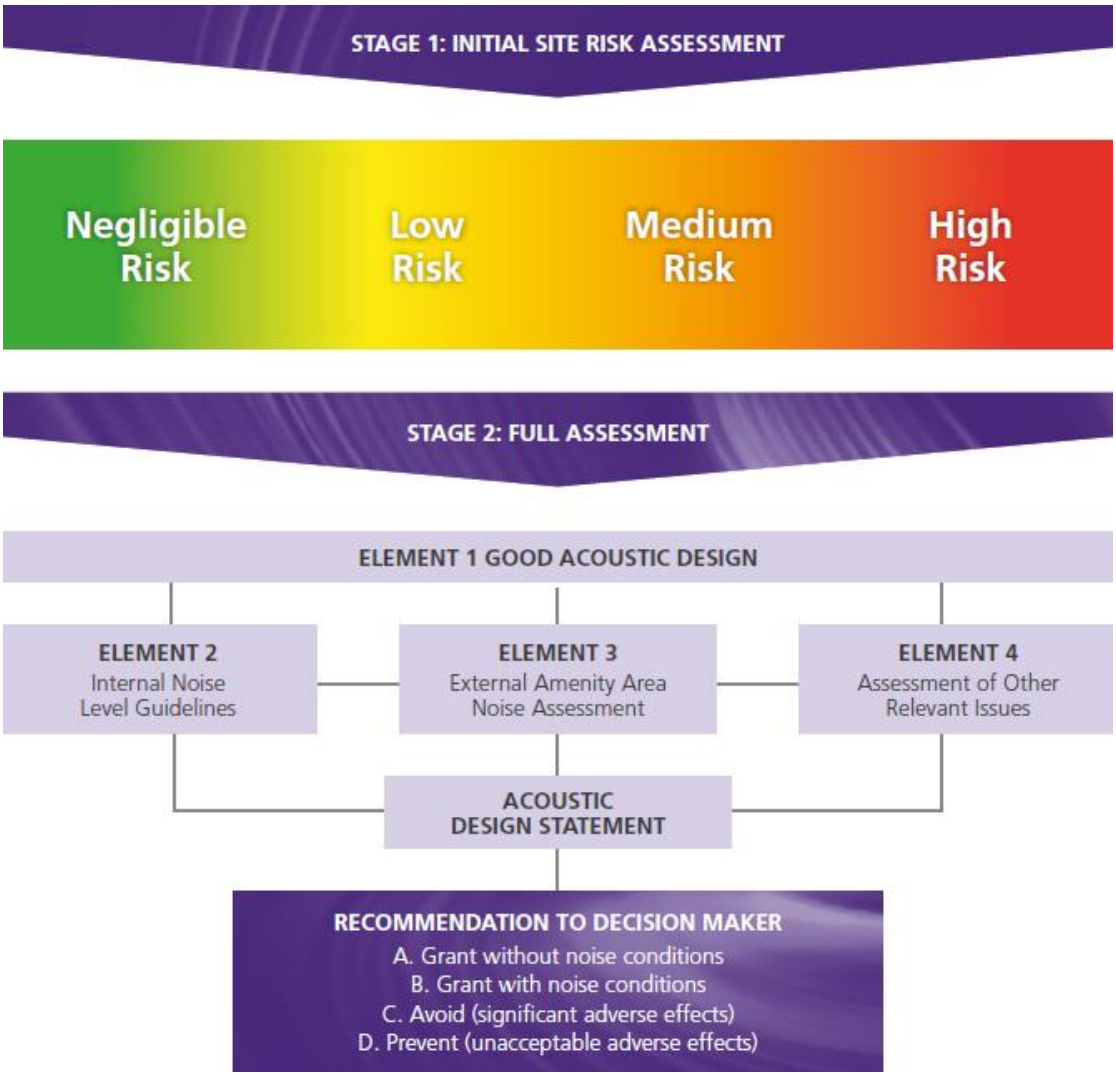


Figure 10.1: ProPG Approach (Source: ProPG)

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 10.2 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

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.”

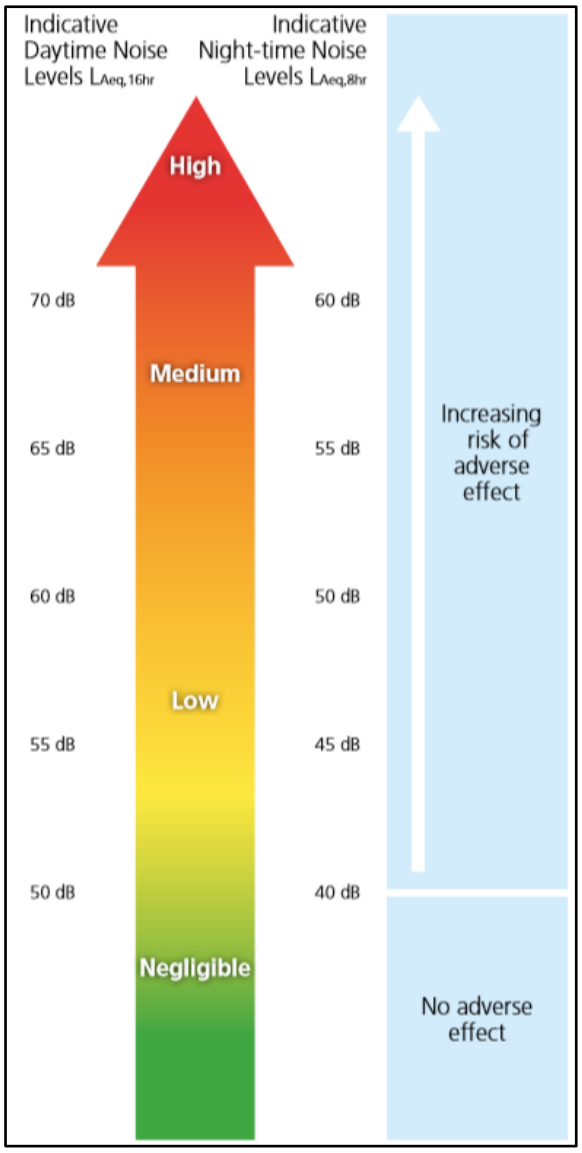


Figure 10.2: ProPG Stage 1 - Initial Noise Risk Assessment

10.3 EXISTING RECEIVING ENVIRONMENT

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

10.3.1 Noise Survey Locations

A representative noise measurement location was chosen at a distance of approximately 10m from the boundary of the Dublin-Belfast railway line. An unattended noise level meter was installed at the location marked UN1 in Figure 10.3. This location lies outside the development site but is an appropriate proxy location due to its distance from the main noise sources, i.e. the rain line and the surrounding road network.

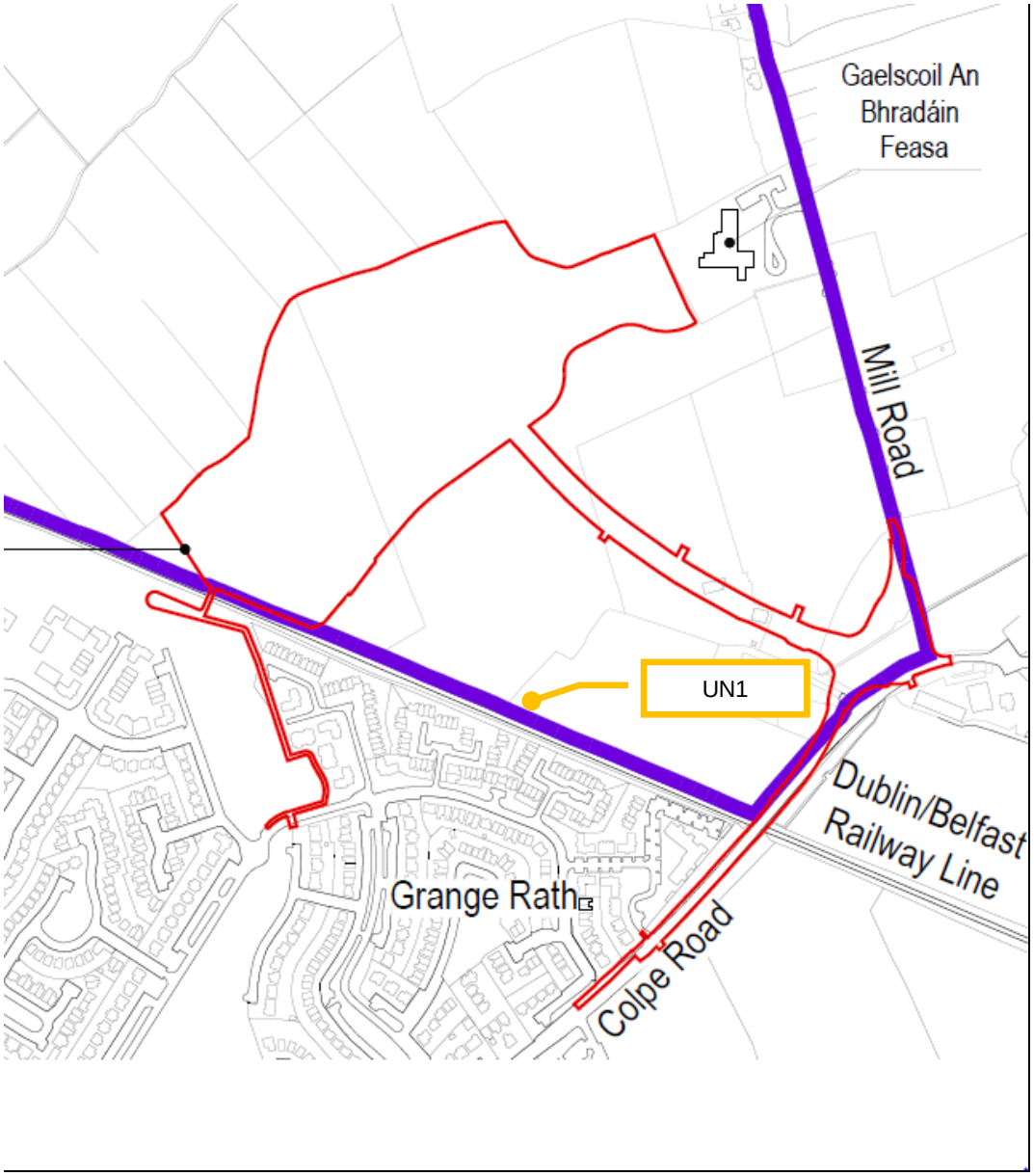


Figure 10.3: Noise Measurement Location

10.3.2 Survey Periods

Unattended noise measurements were conducted between 15:35hrs on Wednesday 12 June and 15:25hrs on Thursday 13 July 2019.

The weather during the survey period was dry with varying cloud cover. Wind speeds were moderate; however they were not considered to have had a detrimental effect on the noise measurements.

10.3.3 Personnel and Instrumentation

AWN installed and collected the noise and vibration monitoring equipment. The following instrumentation were used in conducting the noise and vibration surveys. Instrumentation details are shown in Table 10.6

Equipment	Type	Serial Number	Calibration Date
Sound Level Meter	Rion NL-42	586944	Aug 2018
Sound Calibrator	Larson Davis CAL200	13532	Nov 2017
Vibration Meter	VX-56RT	680043	Sept 2018

Table 10.6: Instrumentation Details

10.3.4 Noise Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq} 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.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

L_{AFmin} is the instantaneous minimum sound level measured during the sample period using the 'F' time weighting.

VDV is the vibration dose value in in $m/s^{1.75}$

The "A" suffix for the noise parameters 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 $2x10^{-5}$ Pa.

10.3.5 Survey Results

The results of the daytime unattended monitoring survey at Location AN1 are summarised in Table 10.7.

Monitoring Period / Range		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
Weds. 12 June	Highest	57	81	52	44
	Lowest	48	72	44	40
	Average	52	77	48	42
Thurs. 13 June	Highest	54	87	49	44
	Lowest	48	75	45	39
	Average	52	79	47	41

Table 10.7: Summary of Daytime Noise Measurements at Location UN1

The average daytime ambient noise levels over the course of the survey period were of the order of 52dB L_{Aeq} with average background noise levels measuring in the range 41 to 42dB L_{A90}. The main source of noise noted

during setup and collection of the equipment was distant traffic from the surrounding area and occasional train movements along the Dublin-Belfast line.

The results of the night-time unattended monitoring survey at Location AN1 are summarised in Table 10.8.

Monitoring Period/ Range		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
Weds. 12 to Thurs 13 June	Highest	54	87	49	44
	Lowest	48	75	45	39
	Average	52	79	47	41

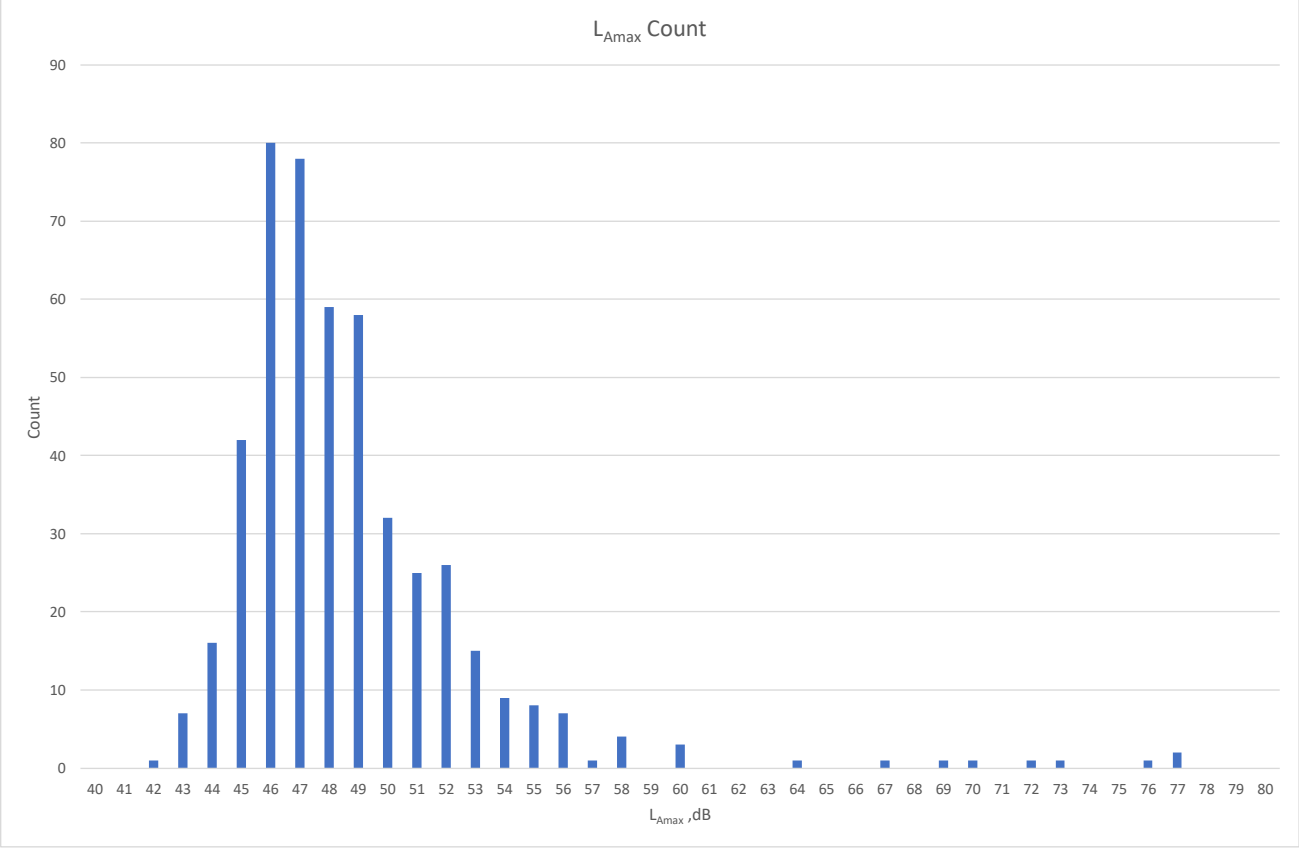
Table 10.8: Summary of Night-time Noise Measurements at Location UN1

The average night-time ambient noise levels over the course of the survey period were of the order of 52dB L_{Aeq} with average background noise levels being of the order of 41dB L_{A90}.

Assessment of Inward Noise Impact

In respect of the inward noise assessment, daytime noise level was 53dB $L_{Aeq,16hr}$ and the night-time noise level was 47dB $L_{Aeq,8hr}$. Comparing these levels with the scale in Figure 10.2 puts the site in the Low Risk category for daytime and night-time noise impact.

The frequency distribution of $L_{AFmax,1min}$ values in Figure 10.4 shows that fewer than 10 values were greater than 60dB.



Taking this into account, according to the criteria in ProPG, a Stage 2 inward impact noise assessment is not required for this development.

Assessment of Inward Vibration Impact

Measurement of vibration dose value was also undertaken over the survey period. The results are summarised in Table 10.9. The day and night VDV values are calculated taking account of the maximum VDV measured and number of passing trains over day and night-time periods as taken from Irish Rail timetable information.

Monitoring Period/ Range		Vibration Dose Value in the Z-direction, $m/s^{1.75}$
Weds. 12 to Thurs 13 June	Highest	0.0058
	Average	0.0033

Table 10.9: Measured Vibration Dose Values at the survey location

The calculated VDV day and night-time values measurement location, taking account of the number of train pass-bys per day and assuming the maximum VDV value per train pass by are as follows:

- 0.018 $m/s^{1.75}$ for daytime and
- 0.008 $m/s^{1.75}$ for night-time.

These values are below a value where a low probability of adverse comment would be expected within a building as defined within BS 6472-1 (2008).

In summary, whilst vibration levels may be perceptible at low levels during passing of commuter trains, the overall vibration dose value at the closest location of the building is deemed to be below levels whereby an adverse comment would be expected, based on the measured specific rail pass-by data. Vibration mitigation measures are not considered necessary based upon a review of measured VDV values.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed development is presented in Chapter 2 of this EIAR. Briefly The proposed development consists of 357 no. residential units, a childcare facility and associated playground, road infrastructure, a pedestrian bridge over the railway line, all associated open space, cycle and pedestrian infrastructure, services and all other associated development on a site of c. 13.44 hectares at Colp West, Drogheda, Co Meath. An overview of the site is shown in Figure 10.5.

When considering a development of this nature, the potential noise and vibration impact on the surroundings is considered for each of two distinct stages:

- Construction Phase; and
- Operational Phase.

The construction phase will involve site clearing and excavations, services installations, construction of building frame and envelope landscaping and construction of internal roads. This phase will generate the highest potential noise impact due to the works involved, however, the phase is short to medium term and expected to be completed within in phases over the 10-year permission period.

The primary sources of outward noise in the operational context are long term and will comprise traffic movements to site using the existing road network and building services plant noise. These issues are discussed in detailed in the following sections.

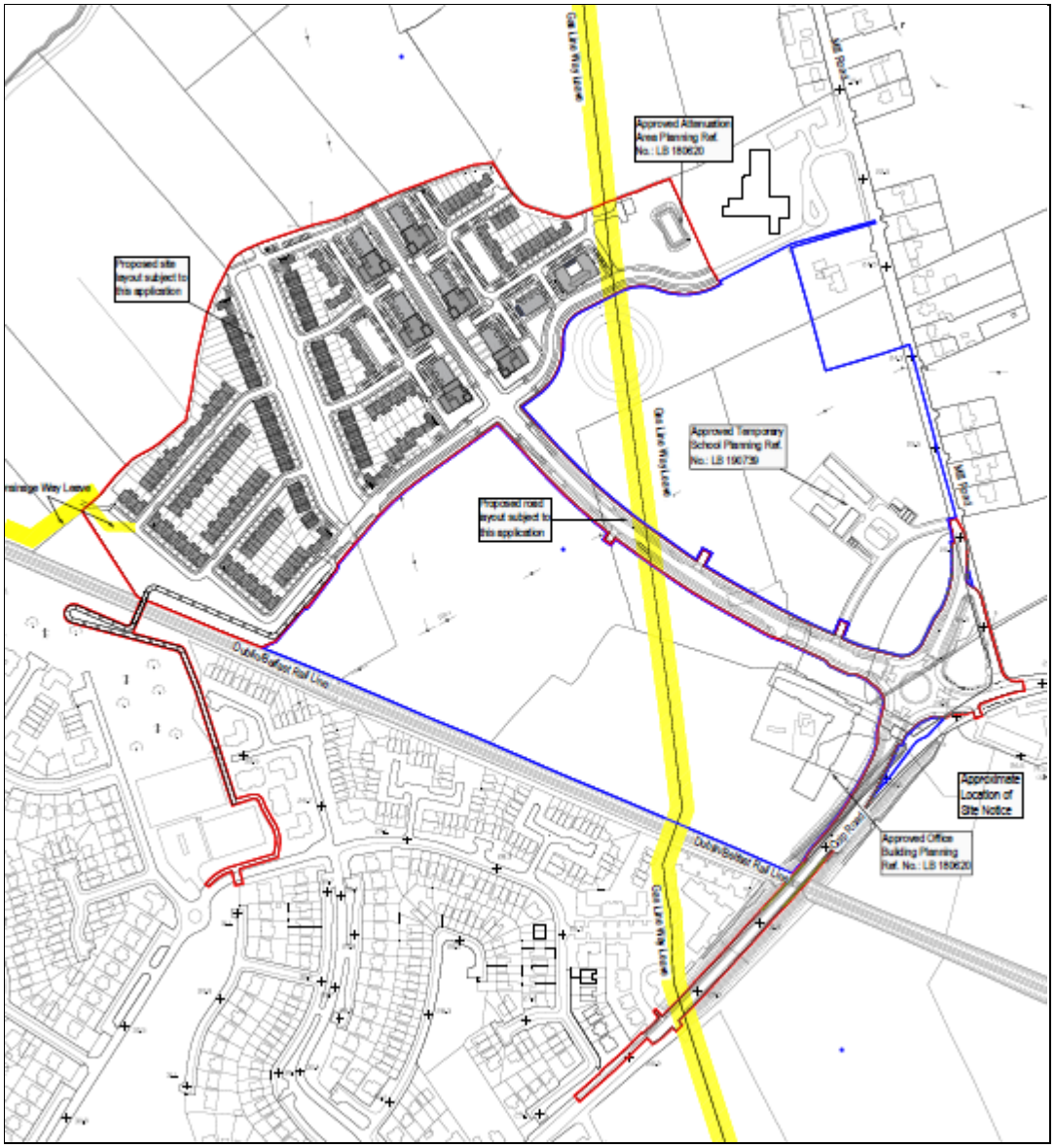


Figure 10.5: Proposed Site Layout

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

The potential impacts of the proposed development are considered for the short-term construction phase and long-term operational phase. These are set out in the following sections.

10.5.1 Construction Phase

10.5.1.1 Noise

The nearest inhabited dwellings are the houses at Park Green, which are approximately 40m from the edge of the estate road within the proposed development. For the purpose of assessing a worst-case scenario, we have assumed that the nearest noise sensitive location from future proposed development is at this distance of 40m from areas where significant works are anticipated at on site.

Considering the construction noise criteria threshold values detailed in Table 10.1 and the measured baseline noise levels on the proposed site described in Section 10.3, the Category A value (i.e. 65dB(A)) is deemed appropriate for all the assessed noise sensitive receivers and other receivers in their respective vicinities.

During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, dumper trucks, compressors and generators. Due to the nature of activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The potential for

vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces.

A detailed construction programme has not been established, therefore it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS 5228-1:2009+A1:2014. Table 11.10 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Activity	Item of Plant *(BS5228 Ref)*	L_{Aeq} at 40m
Site Clearance/Demolition	Tracked excavator (C2.21)	52
	Dump Truck (C2.30)	60
	Diesel Generator (C4.76)	42
General Construction	Dump Truck (C2.30)	60
	Tracked excavator (C2.21)	52
	Compressor (D7.8)	51
	Telescopic Handler (C4.54)	60
	Hand Held Circular Saw (C4.72)	60
	Diesel Generator (C4.76)	42
	Internal Fit out	51
Road Works/Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	56
	Electric Water Pump (C5.40)	49
	Vibratory Roller (C5.20)	56

Table 10.10: Reference Construction Plant Noise Emissions

For the purposes of the assessment it has been assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this chapter.

Table 10.11 presents the predicted daytime noise levels from an indicative construction period on site at the nearest off-site receptors. The calculations also assume that the equipment will operate for 66% of the 12-hour working day (i.e. 8 hours) and that a standard site hoarding, typically 2.4m height will be erected around the perimeter of the construction site for the duration of works. It is assumed that construction works will take place during normal working hours only.

The predictions have been prepared for the worst-case future nearest residential noise sensitive locations and are presented as follows:

Construction Phase	Item of Plant (*BS 5228-1* Ref)	L_{Aeq} at distance 25m distance
Site Clearance	Tracked excavator (C2.21)	56
	Dump Truck (D2.30)	64
	Diesel Generator (C4.76)	46
	Cumulative Site Clearance	65
General Construction	Dump Truck (C2.30)	64
	Tracked excavator (D2.21)	56
	Compressor (D7.08)	55
	Telescopic Handler (C4.54)	64

Construction Phase	Item of Plant (*BS 5228-1* Ref)	L_{Aeq} at distance 25m distance
	Hand Held Circular Saw (C4.72)	64
	Diesel Generator (C4.76)	46
	Internal Fit out	55
	Cumulative General Construction	69
Road Works/ Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	60
	Electric Water Pump (C5.40)	53
	Vibratory Roller (C5.20)	60
	Cumulative Landscaping and Road Works	64

Table 10.11: Predicted Construction Noise Levels

Taking into account the assessment assumptions and allowing for the attenuation of sound over distance, the worst-case construction noise levels at nearest sensitive properties at 25m from significant works are predicted to be slightly above the threshold for significant impact during the general construction phase. The distance of 25m assumes the nearest noise sensitive location of proposed development north of the site boundary. At distances greater than 40m the predicted levels are below the threshold. The assessment is worst-case at it assumes that other proposed development which are subject to planning approval will be constructed and operational prior to construction of the proposed development.

For any noise sensitive locations within 40m of the construction activity, potential ***negative***, ***moderate*** and ***short-term*** effects are likely.

However, for much of the construction works, the noise-generating activity will be at greater distances to the noise-sensitive locations.

10.5.1.2 Vibration

In terms of construction vibration, it is anticipated that excavations will be made using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Taking this into account and considering the distance that these properties are from the works and the attenuation of vibration levels over distance, the resultant vibration levels are expected to be well below a level that would cause disturbance to building occupants or even be perceptible. The associated impact is considered ***neutral***, ***imperceptible*** and ***short-term***.

10.5.2 Operational Phase

10.5.2.1 Additional Vehicular Traffic on Public Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site and other planned developments on surrounding roads.

The predicted change in noise levels due to an increase in road traffic has been calculated for each of these roads. Projected traffic data used for the purpose of this assessment has been provided by DBFL and includes traffic generated by permitted and planned developments in the vicinity of the project site of this EIAR including the commercial development Ref. LB/180620, the new primary school SA130927, and temporary secondary school Ref. LB190739.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads surrounding the subject site with and without development using the Annual Average Daily Traffic (AADT) data.

The impact from the increase in traffic from the proposed development has been assessed for the year of 2021 and the year of 2036 along the sections of road.

In terms of the overall traffic data as described by the AADT parameter, in order to increase traffic noise levels by 1dB, traffic volumes would need to increase by the order of 25% approximately. Table 10.12 shows the expected changes in noise levels due to traffic movements on local roads.

Road Name	Noise level (dB $_{LA10}$) Increase between Do Nothing and Do Something based on AADT Traffic Data	
	2021	2036
Colpe Road	0.4	0.7
Marsh Road	0.7	-0.3
Dublin Road	0.2	0
Permitted Link Road	2.5	0.8

Table 10.12: Predicted changes in noise levels due to traffic on local roads

For the year 2021 (the opening year), predicted increase in traffic flows associated with the development will result in an increase of less than 1dB along Colpe Road, March Road and Dublin Road. Along the Permitted Link Road, the predicted change in noise level is 2.5dB.

For the year 2036 (the design year), predicted increase in traffic flows associated with the development will result in an increase less than 1dB in all cases. The effect is therefore ***neutral***, ***imperceptible*** and ***long-term***.

As the effect of the development on noise-sensitive locations along the nearby road network is imperceptible, the noise effects along the road network in the wider area is also imperceptible.

10.5.2.2 Building Services Plant

It is expected that the principal items of building and mechanical services plant will be for heating and ventilation of the buildings. These items and their location will be selected at the detailed design stage to ensure that noise emissions to sensitive receivers both external and within the development itself will be within the relevant criteria set out in Section 10.2.2.2. The effects are considered ***neutral***, ***not significant*** and ***long-term***.

10.5.3 Cumulative Impact

10.5.3.1 Construction Phase

There are several proposed and permitted developments within the local area development scheme. Considering the distances between the proposed and permitted developments, there is potential for cumulative construction impacts should the construction phases of the subject sites coincide with other developments. In order to minimise potential impacts mitigation measures are outline in Section 10.7.1.

For any noise sensitive locations within 40m of the proposed development potential ***negative***, ***moderate*** and ***short-term*** effects are likely.

10.5.3.2 Operational Phase

The key potential noise source associated with the proposed development relates to additional traffic on the surrounding road network. The cumulative noise impacts associated with existing and development related traffic has been considered within this assessment and the effects are considered ***neutral***, ***not significant*** and ***long-term*** in for the design year 2036.

10.6 DO NOTHING IMPACT

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged resulting in a neutral impact in the long-term.

10.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

10.7.1 Construction Phase Mitigation

N&V CONST1: The assessment has found that predicted levels of construction noise at the nearest noise sensitive locations are likely to be above the proposed threshold values, mitigation measures are recommended to minimise or reduce any potential impacts.

Reference will be made to BS5228: 2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1 Noise for appropriate mitigation measures, which offers detailed guidance on the control of noise and vibration from construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development to ensure noise and vibration limit values are complied with:

- Limiting the hours during which site activities likely to create high levels of noise are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise during critical periods and at sensitive locations;
- All site access roads will be kept even to mitigate the potential for noise and vibration from lorries.

Furthermore, a practicable noise control measures will be employed where necessary. These will include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors;
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.
- Erection of construction site hoarding along noise sensitive boundaries where works are taking place in proximity to existing residential properties where no substantial screening exists.

10.7.1 Operational Phase Mitigation

N&V OPER1: Additional Vehicular Traffic on Public Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary. Furthermore, the site design includes a cycling and pedestrian infrastructure and a pedestrian bridge over the railway line.

N&V OPER2: Building Services Plant

With consideration at the at the detailed design stage the selection and location of plant items will ensure that noise emissions to sensitive receivers both external and within the development itself will be within the relevant criteria, therefore no further mitigation required.

Considering that sensitive receivers within the development are closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site.

10.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

10.8.1 Construction Phase

During the construction phase of the project there is the potential for significant and moderate impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact are minimised. For any noise sensitive locations within 25m of the proposed development potential ***negative***, ***significant*** and ***short-term*** effects are likely.

10.8.2 Operational Phase

10.8.2.1 Additional Vehicular Traffic on Public Roads

The predicted change noise levels associated with additional traffic is predicted to be of imperceptible impact along the existing road network. In the context of the existing noise environment, the overall effects from noise contribution of increased traffic is considered to be of ***neutral***, ***imperceptible*** and ***long-term*** effect to nearby noise sensitive locations.

10.8.2.2 Building Services Plant

Noise levels associated with operational plant are expected to be well within the adopted day and night-time noise limits at the nearest noise sensitive properties taking into account the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise effects from this source will be of ***neutral***, ***not significant***, **long-term** impact.

10.9 MONITORING

During the construction phase, noise and vibration monitoring shall be carried out by the contractor to ensure that the recommended threshold levels set out in the EIAR Chapter or any conditioned noise and vibration limits are not exceeded.

10.10 REINSTATEMENT

Reinstatement is not applicable to this environmental factor.

10.11 INTERACTIONS

In compiling this impact assessment, reference has been made to the project description provided by the project co-ordinators, project drawings provided by the project architects and traffic flow projections associated with the development provided by the traffic consultants.

10.12 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered during the preparation of the EIAR chapter.

10.13 REFERENCES

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017);
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration;
- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound;

- Design Manual for Roads and Bridges, 2011;
- ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- Professional Guidance on Planning & Noise (ProPG) (Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health, 2017)