10. NOISE AND VIBRATION

10.1 Introduction

This EIAR Chapter has been prepared by Traynor Environmental Ltd.to assess the potential noise and vibration effects of the proposed residential development at Woodtown, Ballycullen, Dublin 16, Co. Dublin. This assessment has been conducted in the context of current relevant standards and guidance, as detailed in the relevant sections below.

This assessment includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential 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. An assessment of noise from existing sources inward on the development has also been completed.

Mitigation and monitoring measures are included, where relevant, to ensure the proposed enabling works are completed and operated in an environmentally sustainable manner to ensure minimal impact on the receiving environment.

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) were considered and consulted in the preparation of this chapter.

10.2 Expertise and Qualifications

In accordance with Article 5(3)(a) of the EU Directive, by appointing Traynor Environmental, the applicant has ensured that this chapter has been prepared by “Competent experts”.

The monitoring and analysis of the data was conducted by Nevin Traynor a senior Acoustic consultant at Traynor Environmental Ltd. deemed to be a “competent person” as per criteria outlined by the EPA. The monitoring programme, data and report was carried out by Nevin Traynor who is certified as been competent in Environmental Noise Measurement by the Institute of Acoustics (IOA) with over 25 years’ experience in Environmental and Acoustic Consultancy.

10.3 Research Methodology

The following methodology has been prepared based on the requirements of the Environmental Protection Agency (EPA) Guidelines the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) and on Traynor Environmental Ltd. experience of preparing the noise and vibration chapters for similar developments. The following approach has been used for this assessment:

- Baseline noise monitoring has been undertaken at the development site in order to characterise the existing noise environment.
- A review of relevant standards and guidelines has been carried out 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 to estimate the likely noise emissions during the construction phase of the proposed development at the nearest Noise Sensitive Locations (NSLs) to the site.
- Predictive calculations have been performed to assess the potential effects associated with the operation of the proposed development at NSLs surrounding the site.
- An assessment has been completed of potential cumulative effects that may arise as a result of the proposed development and other existing or proposed plans and projects.(see Table 10.27)
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development.
- An inward noise impact assessment from the existing noise sources on the proposed development.

10.3.1 Construction Phase Noise Impacts

Local Authorities typically control construction activities by imposing limits on the hours of construction and consider noise limits at their discretion. Construction noise sources include construction plant and machinery, and construction related traffic on surrounding roads. Reference is made to the following guidelines and standards to inform the most appropriate construction noise and vibration significance thresholds and assessment methodologies:

- British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (BSI 2014a).
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (hereafter referred to as BS 5228 – 2) (BSI 2014b).
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385–2). (BSI 1993).
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472–1) (BSI 2008).

- UK Highways England (now National Highways) (UKHE) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHE 2020)

10.3.1.1 British Standard BS 5228 – 1: 2009+A1:2014

British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise (hereinafter referred to as BS 5228-1:2009+A1:2014) is referred to as appropriate criteria relating to permissible construction noise threshold levels for a development of this scale.

Potential noise impacts during the construction stage of a project are often assessed in accordance with BS 5228-1:2009+A1:2014. Various mechanisms are presented as examples of determining if an impact is occurring, these are discussed in the following paragraphs.

ABC Method

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing 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, depending on context.

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 significant effect at the facades of residential receptors.

Assessment category and threshold value period (LAeq)	Threshold value, in decibel(dB)		
	Category A [A]	Category B [B]	Category C [C]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends D	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Table 10.1 Threshold of Potential Significant Effect at Dwellings

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. 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 5 dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur. It should be noted that this assessment method is only valid for residential properties and if applied to commercial premises without consideration of other factors may result in excessively onerous thresholds being set.

The closest neighbouring noise sensitive property to the proposed development include dwellings (Stocking Wood Copse/Rise/Green housing estate) approximately 8m to the north of the proposed development site. The closest commercial receptors are located adjacent to the eastern boundary with others located some 25m to 40m from the development site.

Fixed Limits

Several commercial units are located 20-30m to the west of the subject site.

When considering non-residential receptors, reference is made to BS 5228-1:2009+A1:2014, which gives several examples of acceptable limits for construction noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states: -

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state: -

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: -*
>
> *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise; 75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

Proposed Threshold Noise Levels

Considering the criteria outlined above and making reference to the baseline noise environment monitored around the development site, BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise at Noise Sensitive Locations (NSLs).

The following Construction Noise Threshold (CNT) levels are proposed for the construction stage of this development: -

- For residential NSLs it is considered appropriate to adopt 65 dB(A) CNT depending on location. Given the baseline monitoring carried out, it would indicate that Category A and C values are appropriate using the ABC method.
- For commercial NSLs it is considered appropriate to adopt the 75 dB(A) CNT, in line with BS 5228-1:2009+A1:2014, however the proposed development is located in a predominantly residential area with no commercial NSLs identified.

Interpretation of the CNT

In order to assist with interpretation of significance relating a calculated construction noise level (CNL), Table 10.2 includes guidance as to the likely magnitude of impact associated with construction noise, relative to the CNT. This guidance is derived from DMRB: Noise and Vibration (UKHE 2020) and adapted to include the EPA EIAR Guidelines.

Construction Noise Level Per Period	Guidelines for Noise Impact Assessment Significance (DMRB)	EPA EIAR Significance of Effects	Determination
Below or equal to baseline noise level	Negligible	Not Significant	Depending on CNT, duration & baseline noise level
Above baseline noise level and below or equal to CNT	Minor	Slight to Moderate	
Above CNT and below or equal to CNT +5 dB	Moderate	Moderate to Significant	
Above CNT +5 dB	Major	Significant, to Very Significant	

Table 10.2 Construction Noise Significance Ratings

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely effects during the construction stage.

In accordance with the DMRB Noise and Vibration Guidance, construction noise and construction traffic noise effects shall constitute a significant effect where it is determined that a major or moderate magnitude of effect will occur for a duration exceeding:

- Ten or more days or night in any 15 consecutive day or nights, or
- A total number of days exceeding 40 in any six consecutive months.

10.3.1.2 Construction Traffic

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: DMRB Noise and Vibration (UKHE 2020) and the EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKHE 2020) document.

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant to Slight
3 – 4.9	Perceptible	Moderate	Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

Table 10.3 Likely Effect Associated with Change in Traffic Noise Level – Construction

10.3.1.3 Construction Vibration

Vibration standards address two aspects: those dealing with cosmetic or structural damage to buildings and those with human comfort. For the purpose of this scheme, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s. Rock breaking will be part of the construction works at the site.

Building Response

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 (BSI 2014b); and
- British Standard BS 7385-2 (BSI 1993)

BS7385-2 (BSI 1993) and BS5228-2 (BSI 2014b) advise that, for soundly constructed residential properties and similar light-framed 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 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 of BS5228-2 (BSI 2014b) might need to be reduced by up to 50%.

On a cautious basis, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges. For buildings or structures that are structurally unsound, lower vibration magnitudes will apply, typically 50% of those for structurally sound buildings. Protected or historic buildings are not automatically assumed to be more vulnerable to vibration unless they have existing structural defects. The recommend transient vibration thresholds from BS5228-2 (BSI 2014b) for the avoidance of cosmetic damage to light framed and residential buildings are summarised in table 10.4.

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**
15 mm/s	20 mm/s	50 mm/s

Table10.4 Recommended Vibration Criteria During Construction Phase

Expected vibration levels from the construction works will be discussed further in 10.6.1.3.

Human Perception

Human response to vibration stimuli occurs at orders of magnitude below those associated with any form of building damage, hence vibration levels lower than those indicated in table 10.5 can lead to concern. Table 10.5 presents the significance table relating to potential effects to building occupants during construction based on guidance from BS5228- 2 (BSI 2014b), the DMRB Noise and Vibration (UKHE 2020) document and the associated EPA significant ratings.

PPV range	BS 5228-2 (Note A, B, C)	DMRB Impact Magnitude	EPA Significance Ratings
10 mm/s PPV	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Very High	Very Significant
1 mm/s PPV	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents	High	Moderate to Significant
0.3 mm/s PPV	Vibration might be just perceptible in residential environments.	Medium	Slight to Moderate
0.14 mm/s PPV	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Low	Not significant to Slight
<0.14 mm/s PPV	Not perceptible	Very Low	Imperceptible to Not significant

Table10.5 Guidance on Effects of Human Response to PPV Magnitudes

Note A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

Note B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

Note C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472 (BS1 2008), and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

10.3.2 Operational Phase Noise Impacts

The main potential source of outward noise from the proposed development will be limited to traffic flows to and from the development site onto the public roads. There may also be an element of mechanical and electrical plant required to service the proposed new buildings. The relevant guidance documents used to assess potential operational noise, and vibration impacts on the surrounding environment are summarised below.

- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS 8233) (BSI 2014c).
- BS 4142: 2014 +A1 2019 Methods for Rating and Assessing Industrial and Commercial Sound (hereafter referred to as BS 4142) (BSI 2019).
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (ISO 2016).
- The UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1988).
- UK Highways England (UKHE) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (UKHE 2020).
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (ISO 1996).

10.3.2.1 Mechanical Plant

Receptors Outside the Proposed Development

The most appropriate standard used to assess the impact of a new continuous source (i.e., plant items) to a residential environment is BS 4142 *Methods for rating and assessing industrial and commercial sound* (2014). This standard describes a method for assessing the impact of a specific noise source at a specific location with respect to the increase in “background” noise level that the specific noise source generates. The standard provides the following definitions that are pertinent to this application:

- "*Specific sound level, LAeq, Tr*" is equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, *T*. This level has been determined with reference to manufacturers information for specific plant items.

- "*Rating level*" *LAr,Tr* is the specific noise level plus adjustments for the character features of the sound (if any), and;

- *"Background noise level"* is the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T.* This level is expressed using the LA90 parameter. These levels were measured as part of the baseline survey.

The assessment procedure in BS4142: 2014 is outlined as follows:

1. determine the specific noise level.
2. determine the rating level as appropriate.
3. determine the background noise level, and.
4. subtract the background noise level from the rating level in order to calculate the assessment level.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. A difference of +10 dB or more is likely to be an indication of a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, dependent on the context. Where the rated plant noise level is equivalent to the background noise level, noise impacts are typically considered to be neutral.

Receptors Inside the Proposed Development

In order to determine an appropriate noise criterion for residential receptors within the proposed development that will be built in future, guidance is taken from BS 8233. Recommended internal noise levels for residential settings are set out as follows:

Activity	**Location**	**Day (07:00 to 23:00hrs) dB LAeq,16hr**	**Night (23:00 to 07:00hrs) dB LAeq,8hr**
Resting	Living room	35 dB LAeq,16hr	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hr	30 dB LAeq,8hr

Table 10.6 BS 8233 Recommended Internal Noise Levels

For the purposes of this assessment, it is appropriate to derive external limits based on the internal criteria noted in the above. This is done by factoring in the degree of noise reduction afforded by a partially open window and typical 15 dB attenuation is noted in this British Standard. Using this correction value across an open window, the following external noise levels would achieve the internal noise levels noted in Table 10.6 above.

- Daytime (07:00 to 23:00 hours) 50 dB LAeq,1hr
- Night-time (23:00 to 07:00 hours) 45 dB LAeq,15min

10.3.2.2 Additional Vehicular Traffic on Roads

Vehicular movement to and from the proposed development will make use of the existing road network and new junction arrangement. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to consider the increase in traffic noise level that arises as a result of any additional vehicular movements associated with the development.

In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced DMRB Noise and Vibration (UKHE 2020) and the EPA EIAR Guidelines (EPA, 2022) which categorise the magnitude of effect relating to changes in road traffic. For the operational phase, traffic noise impacts are assessed against the 'long term' magnitude ratings from the DMRB. These are discussed in Table 10.7

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0	Inaudible	No impact	Imperceptible
0.1 – 2.9	Barely Perceptible	Negligible	Not significant
3 – 4.9	Perceptible	Minor	Slight, Moderate
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate to Significant
10+	Doubling of loudness and above	Major	Significant to Very significant

Table 10.7 Significance in Change of Noise Level

10.3.2.3 Vibration

The development is residential in nature; therefore, it is not anticipated that there will be any impact associated with vibration during the operational phase.

10.3.2.4 Inward Noise – ProPG Planning & Noise

The Professional Practice 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 government document, since its adoption 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.
  - **Element 4** – Other Relevant Issues.

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 elevated risk based on the pre-existing noise environment. Figure 10.1 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.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in table 10.8 and are based on annual average data, which is to say they omit occasional events where higher intermittent noisy events may occur.

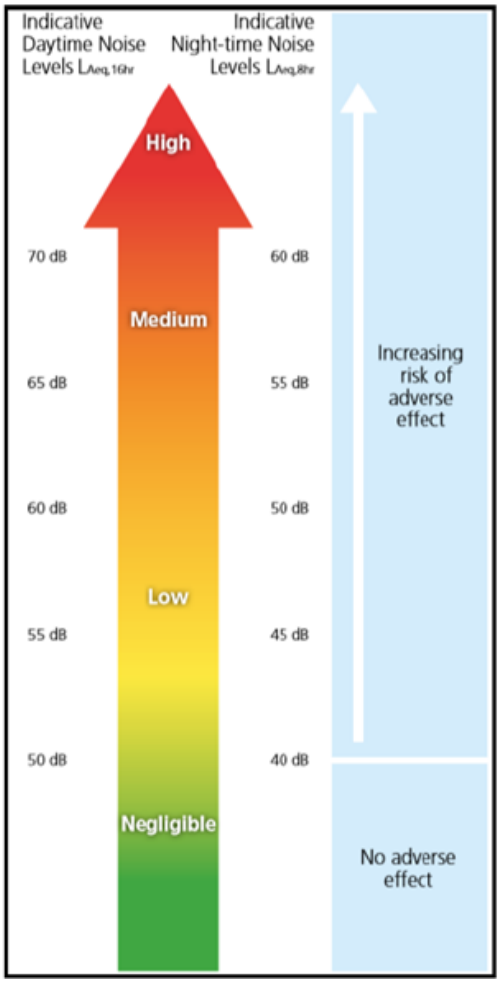

Figure 10-1 ProPG Stage 1- Initial Noise Risk Assessment

Activity	Location	(07:00 to 23:00)	(23:00 to 07:00)
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 $L_{Amax,\ T*}$

Table 10-8 ProPG Internal Noise Levels

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

The ProPG guidance provides the following advice with regards to 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 LAeq,16hr.'*

10.4 Receiving Environment

The subject site is located at Ballycullen, Dublin 16 approximately 420m south of the M50 motorway. The site is bounded to the north by Stocking Wood Manor, Green, Rise and Copse housing estates. To the south by the agricultural land. To the east by White Pines Park housing estate and to the west by Abbots Grove Park housing estate.

10.4.1 Baseline Noise Environment

10.4.1.1 Environmental Noise Survey

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. Specific details are set out below.

Choice of Measurement Locations

The measurement locations are described below and shown in Figure 10.2.

Three measurement locations were selected as shown in Figure 10.2 below and described below.

Location A - located on the west boundary.

Location B - located in the middle of the site.

Location C - located on the east boundary.

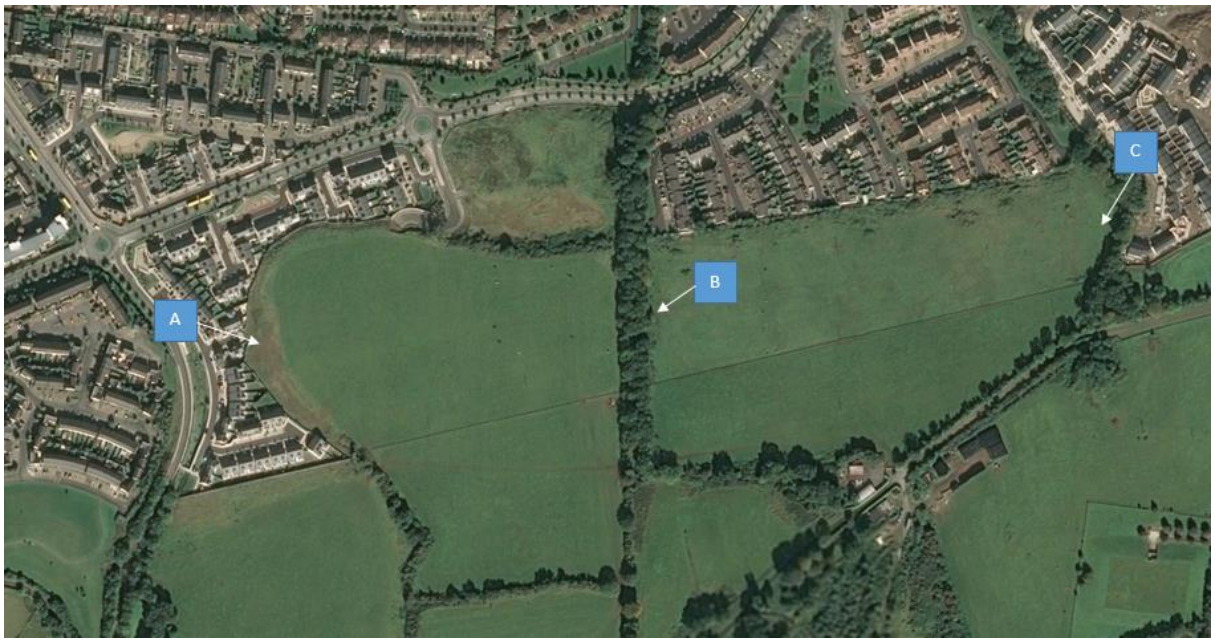

Figure 10-2 Baseline Noise Monitoring Locations

Survey Periods

Baseline noise survey measurements were conducted at Locations A – C over the following survey periods:

Location	Period	
	Start Time/Date	End Time/Date
A	07:00hrs on 13/11/24	11:00hrs on 15/11/24
B	07:00hrs on 13/11/24	11:00hrs on 15/11/24
C	07:00hrs on 13/11/24	11:00hrs on 15/11/24

Table 10-9 Baseline survey dates and times

Survey Results and Discussion

Location A				
Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
13/11/2024	47	58	49	43
14/11/2024	48	61	50	44
Average	**47**	**60**	**50**	**44**

Table 10-10 Location A: Average Night time Noise

Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
13/11/2024	53	61	55	50
14/11/2024	55	63	57	52
Average	**54**	**62**	**56**	**51**

Table 10-11 Location A: Average Day time Noise

The noise environment at the measurement location A was dominated by intensive short duration noise events which are characteristic of road traffic noise from the Abbots Grove Park housing estate and local roads. Daytime noise levels measured at 54 dB(A) L_{Aeq} and background noise levels measured 51 dB(A) L_{A90}. Night time noise levels were measured at 47 dB(A) L_{Aeq} and the measured background noise level was 44 dB(A) L_{A90}.

Location B				
Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
13/11/2024	45	54	48	42
14/11/2024	43	52	47	41
Average	**44**	**53**	**48**	**42**

Table 10-2 Location B: Average Night time Noise

Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
13/11/2024	52	62	54	50
14/11/2024	50	63	53	46
Average	**51**	**63**	**54**	**48**

Table 10-13 Location B: Average Day time Noise

The noise environment at the measurement location B indicates that the measured noise was dominated by intensive short duration noise events which are characteristic of road traffic noise from Stocking Wood Copse housing estate, Stocking Avenue Road and the neighbouring housing estate roads. Daytime noise measured at 51 dB(A) L_{Aeq} and background noise levels measured 48 dB(A) L_{A90}. Night-time measured at 44 dB(A) L_{Aeq} and the measured background noise level was 42 dB(A) L_{A90}.

Location C				
Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
13/11/2024	46	56	46	43
14/11/2024	45	54	44	41
Average	**46**	**55**	**45**	**42**

Table 10-14 Location C: Average Night time Noise

Date	**L_{Aeq}**	**L_{AFmax}**	**$L_{AF10.00}$**	**$L_{AF90.00}$**
08/12/2020	53	64	55	52
14/11/2024	50	62	51	49
Average	**52**	**63**	**53**	**51**

Table 10-15 Location C: Average Day time Noise

The noise environment at the measurement location C indicate that the measured noise was dominated by intensive short duration noise events which are characteristic of road traffic noise from the neighbouring housing estate roads and the Stocking Avenue Road. Daytime noise measured at 52 dB(A) L_{Aeq} and background noise levels measured 51 dB(A) L_{A90}. Night-time measured at 46 dB(A) L_{Aeq} and the measured background noise level was 42 dB(A) L_{A90}.

Discussion and conclusions

Location A, B and C all indicate that the dominate intensive short duration noise events are characteristic of road traffic noise from the neighbouring roads. The baseline noise environment will not require additional constraints to be imposed on the proposed project outside of the normal criteria applicable to a development of the scale and nature of that proposed.

Environmental Noise Survey

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*. Specific details are set out below. Six measurement locations were selected as shown in Figure 10.4 and described in Table 10.16 below.

Noise Measurement Location	Description
Location NM1	Located at Stocking Well residential housing estate, just off Stocking Avenue (R117), north of the proposed site.
Location NM2	Location at Stocking Lane (R115), south of the proposed site.
Location NM3	Location at cluster of residential housing, just off Stocking Lane (R115) and south of the proposed site.
Location NM4	Location at Hunters Grove residential housing estate, west of a local road and west of the proposed site.
Location NM5	Location at the Dalriada Park residential housing estate, east of Ballycullen road and northwest of the proposed site.
Location NM6	Location at green area between 26 Woodstown Way & Stocking Avenue to the north of the proposed site.

Table 10-16 Description of Noise Measurement Location

Figure 10-3 Noise Monitoring Locations (Image Source: Google Maps)

**NM: Noise measurement, NSL: Noise Sensitive Location*

Survey Periods

The noise survey was carried out at six locations over the following period:

08:00hrs to 18:00hrs on 16th November 2024.

For the purpose of this assessment, daytime is taken to be between 08:00 and 18:00.

Survey Results and Discussion

The noise survey results for the six monitoring locations are summarised in Tables 10.17 – 10.21 below.

Location NM - 1

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	08:00	70	56	63	58	62
	11:30	68	58	64	60	62
	15:00	66	57	62	59	61

Table 10-17 Measured Noise Levels at NM1

The dominant noise source at this location was traffic on Stocking Avenue and the M50. Background noise from the nearby roundabout was also significant noise source at this location. Other minor noise sources include gardening activities from the nearby housing estates to the east and west. The L_{Aeq} ranged from 61 to 62 dB. The L_{A90} ranged from 58 to 60 dB. The variation in L_{Aeq} can be attributed to the traffic on the roads near the measurement location.

Location NM - 2

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	08:30	64	55	62	60	61
	12:00	62	57	60	59	59
	15:30	65	56	61	58	63

Table 10-18 Measured Noise Levels at NM2

NM2 was location at Stocking Lane (R115), south of the proposed site. The ambient noise environment was primarily made up of background traffic noise from the R115. Other noise sources were typical activities within the white pines housing estate, these include cars on the estate roads, dogs barking, lawnmowers, children playing. The L_{Aeq} ranged from 59 to 63 dB. The L_{A90} ranged from 58 to 60 dB.

Location NM - 3

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	09:00	61	50	60	52	55
	12:30	64	53	61	54	56
	16:00	61	49	58	51	53

Table 10-19 Measured Noise Levels at NM3

The existing noise environment at NM3 is a residential house, just off Stocking Lane (R115) and south of the proposed site. Background traffic noise from the R113 to the south and Stocking Lane (R115) to the north as significant noise source at this location. Agricultural machinery noise from the nearby fields was also a contributing noise source. The L_{Aeq} ranged from 53 to 56 dB. The L_{A90} ranged from 51 to 54dB.

Location NM - 4

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	09:30	66	50	58	52	56
	13:30	68	52	60	54	58
	16:30	67	51	59	53	57

Table 10-20 Measured Noise Levels at NM4

NM4 was located in the Hunters Grove residential housing estate, west of a local road and west of the proposed site. The ambient noise environment was primarily made up of background traffic noise from the local road. Other noise sources included vehicle movement in the housing estate. The ambient noise fluctuated from volume of road traffic on the housing estate roads, lawnmowers and children playing. The L_{Aeq} ranged from 56 to 58 dB. The L_{A90} ranged from 52 to 54 dB.

Location NM - 5

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	10:00	82	52	67	57	65
	14:00	79	50	65	55	62
	17:00	78	51	66	54	63

Table 10-21 Measured Noise Levels at NM5

The existing noise environment at NM5 is made up of the various activities within Dalriada Park residential housing estate, east of Ballycullen road and northwest of the proposed site. These include cars on the estate roads, dogs barking, lawnmowers, children playing. Background noise from traffic on the Ballycullen Road and Stocking Avenue were audible and were a significant noise source at this location. The M50 lies north of this location and background noise from this was not a significant noise source. The L_{Aeq} ranged from 62 to 65 dB. The L_{A90} ranged from 52 to 57 dB. The variation in L_{Aeq} can be attributed to the traffic on the roads near the measurement location.

Location NM - 6

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	10:30	76	51	66	53	60
	14:30	79	53	69	56	66
	17:30	78	52	68	54	62

Table 10-22 Measured Noise Levels at NM5

The existing noise environment at NM6 is made up of the various activities within the Woodstown housing estate and traffic on Stocking Avenue. Noise in Woodstown estate included dogs barking, lawnmowers, children playing. The M50 lies northeast of this location and background noise from this was not a significant noise source. The L_{Aeq} ranged from 60 to 66 dB. The L_{A90} ranged from 53 to 56 dB.

Conclusion

The results of the environmental noise survey study suggest the noise environment will not require additional constraints to be imposed on the proposed project outside of the normal criteria applicable to a development of the scale and nature of that proposed.

10.4.3 Do-Nothing Scenario

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations will remain largely unchanged. The noise and vibration levels measured/noted during the baseline studies are considered representative of the Do-Nothing scenario. The Do-Nothing scenario is therefore considered neutral impact.

However, if the proposed development were not to proceed, then a different development, similar in nature may be constructed as the land is zoned for development in keeping with the national policy for compact growth.

10.5 Characteristics of the proposed Development

The proposed development will consist of 502 no. residential units (108no. 1-bed, 170no. 2-bed, 162 no. 3-bed; 62 no. 4-bed) comprising 197no. 2 storey houses (terraced/semi-detached/detached) (19no. 2-bed, 116no. 3-bed; 62no. 4-bed) and 28no. 3 and 4 storey simplex/duplex apartment blocks providing 305no. apartments (108no. 1-bed apartments, 151no. 2-bed apartments, 46no. 3-bed apartments). The proposed development also includes a crèche (475sq.m), public open space, car parking (surface/undercroft), bicycle parking, bicycle storage structures and lockers, bin stores, and 8no. ESB substations. All associated site development works and services provision. A detailed development description is included in Chapter 3 of this EIAR.

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.
- Operational Phase

10.6. Potential Impact of the Proposed Development

The potential noise and vibration impacts associated with the construction and operational phases of the proposed development are discussed in the following sections.

10.6.1 Construction Phase

10.6.1.1 Construction Phase Noise

During the construction phases of the proposed development, a variety of plant items will be in use, such as excavators, piling equipment, dumper trucks, compressors, and generators. Due to the nature of daytime activities undertaken on a construction site such as this, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels.

For the purposes of this assessment, the construction phase has been assessed as there is no demolition works to take place as part of the proposed development. The general construction phase of the proposed development will incorporate standard construction techniques to build the structures within the development.

Rock breaking will also form part of the site excavation works. The source noise levels used for each of these construction phases are discussed below.

Once the site clearance works have been completed, a large portion of the work will involve manual labour and cranes with lower overall noise levels. For the purpose of this assessment a combined sound pressure level of 78 dB LAeq, T at 10m has been used for construction noise calculations during ongoing site works and compounds once site clearance and demolition works are completed. This would include, for example, one item of plant at 75 dB LAeq and three items of plant at 70 dB LAeq operating simultaneously within a work area resulting in a total noise level of 78 dB LAeq along the closest works boundary.

Given the nature of the proposed works which will include standard building techniques across the site, the cumulative construction noise levels above represent conservative noise levels used to assess construction activities associated with the various stages of construction. This worst-case scenario is a robust assumption made for developments of this size, on the basis that it is unlikely that more than 5 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other at all times. In reality items of construction plant and machinery will be operating at varying distances from any one NSL.

Guidance on the approximate attenuation achieved by standard construction hoarding surrounding construction sites is also provided in BS 5228-1. It states that when the top of the plant is just visible to the receiver over the noise barrier, an approximate attenuation of 5 dB can be assumed, while a 10 dB attenuation can be assumed when the noise screen completely hides the sources from the receiver.

This scenario can be assumed in this case due to the proximity of the noise-sensitive locations, i.e., a hoarding height will be chosen so as to completely hide the source. Table 10.24 shows the potential noise levels calculated at various distances based on the assumed sound levels of the construction and attenuation provided by the barrier of 10 dB.

The closest noise sensitive locations have been identified as shown in Figure No. 5 and described below.

There are several residential receptors located surrounding the proposed development to the north, east and west. The proposed development site is surrounded by existing residential housing estates.

Review of the baseline noise survey, available noise mapping and the threshold values indicates that the appropriate daytime noise criteria for construction noise are as follows:

- Residential receptors 65 dB $L_{Aeq,T}$
- Commercial/industrial receptors 75 dB $L_{Aeq,T}$

A night-time threshold is not included as construction work will not be taking place at night.

Noise Sensitive Locations	Description
Location NSL1	This represents Stocking Wood Copse/Rise/Green housing estate located to the north of the proposed site approximately 8m from the nearest significant site work.
Location NSL2	This represents Stocking Wood Drive/Way/Manor housing estate located to the north of the proposed site approximately 9m from the nearest significant site work.
Location NSL3	This represents White Pines housing estate located to the east of the proposed site approximately 20m from the nearest significant site work.
Location NSL4	This represents a single residential house located off the R115 to the south of the proposed site approximately 245m from the nearest significant site work.
Location NSL5	This represents Abbots Grove Park estate located to the west of the proposed site approximately 7m from the nearest significant site works.
Location NSL6	This represents Abbots Grove Park estate located to the west of the proposed site approximately 8m from the nearest significant site works.

Table No. 10-23 Description of Noise Sensitive Locations

Figure 10.5 Noise Sensitive Locations

Predicted Noise Level at Various Locations

In order to assess the level of Environmental noise associated with the proposed development a number of noise sensitive locations were considered. Figure 10.5 details the locations from the nearest façade of the neighbouring building to the proposed development.

Table 10.24 below presents the predicted daytime noise levels from an indicative construction period at these noise sensitive locations (NSL).

Construction Phase	Item of Plant (BS5228-1 Ref)	L_{Aeq} at distance (m)					
		NSL1	NSL2	NSL3	NSL4	NSL5	NSL6
		8m	9m	20m	245m	7m	8m
		dB	dB	dB	dB	dB	dB
Site Preparation	Wheeled Loader Lorry (D3 1)	77	76	65	51	78	77
	Track Excavator (C2 22)	74	73	62	48	75	74
	Dozer (C2.13)	80	79	68	54	81	80
	Dump Truck (C4.2)	80	79	68	54	81	80
	Excavator mounted rock breaker (C9.12)	94	93	86	64	95	94
	Cumulative Site Preparation	**95**	**93**	**86**	**65**	**96**	**94**
General Construction	Dump Truck (C2.30)	81	80	69	55	82	81
	Tracked excavator (02.21)	73	72	61	47	74	73
	Compressor (D7.08)	72	71	60	46	73	72
	Telescopic Handler (C4.54)	81	80	69	55	82	81
	Handheld Circular Saw (C4.72)	81	80	69	55	82	81
	Diesel Generator (C4.76)	63	62	51	37	64	63
	Internal Fit out	72	71	60	46	73	72
	Cumulative General Construction	**86**	**85**	**74**	**60**	**87**	**86**
Road Works/ Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	77	76	65	51	76	77
	Electric Water Pump (C5.40)	70	69	58	44	71	70
	Vibratory Roller (C5.20)	76	75	65	51	77	76
	Cumulative General Landscaping and Road Work	**80**	**79**	**68**	**54**	**81**	**80**

Table 10-24 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

Taking into account these assumptions and allowing for the attenuation of sound over distance, the predicted construction noise level at the nearest sensitive properties is above the relevant construction noise criteria, i.e., the level at which a potential significant impact could be expected to occur, at noise sensitive locations within 20m of site work. Also, considering the proximity of NSL1 (approx. 8m at nearest point), NSL2 (approx. 9m at nearest point), NSL3 (approx. 20m at nearest point), NSL5 (approx. 7m at nearest point) and NSL6 (approx. 8m at nearest point) has a potential significant impact at all construction phases in the absence of mitigation.

Review of the predicted noise levels at these locations are above the criteria at which a significant impact is deemed to occur (65dB $L_{Aeq,T}$) and therefore, in the absence of noise mitigation, a **negative**, **significant** and **short-term** impact is likely.

At greater distances (property represented by NSL4) predicted construction noise levels are lower for site preparation, general construction, and road works/Landscaping, therefore any impact is expected to be **negative, moderate and short-term.**

10.6.1.2 Construction Traffic

The noise levels associated with mobile plant items such as concrete mixer trucks, loaders etc. operational on site have been included as part of the construction noise assessment and calculated noise levels in Table 10.23. Consideration should also be given to the addition of construction traffic along the site access routes. Deliveries and access to the construction site will typically be made via the R113, Ballycullen Road, and Stocking Avenue. The proposed main access road is off Stocking Avenue via a spur road to the east of Abbots Grove. It is possible to calculate the noise levels associated with the passing vehicle using the following formula.

$$L_{Aeq,T} = L_{AX} + 10\log_{10}(N) - 10\log_{10}(T) + 10\log_{10}(r_1/r_2)dB$$

Where: $L_{Aeq,T}$ = is the equivalent continuous sound level over the time period Tin seconds.

L_{AX} = is the "A-weighted" Sound Exposure Level of the event considered(dB).

N = is the number of events over the course of time period T.

r_1= is the distance at which LAX is expressed.

r_2= is the distance to the assessment location

A calculation distance of 5m from the access roads has been used to assess noise levels at the closest buildings along the construction routes, this includes Stocking Avenue and the spur road running southwards to the east of Abbots Grove. The mean value of Sound Exposure Level for truck moving at low to moderate speeds (i.e., 15 to 45km/hr) is of the order of 82dB L_{ax} at a distance of 5 metres from the vehicle. This figure is based on a series of measurements conducted under controlled conditions. Construction vehicles are predicted in the table below for peak hours associated with each key phase. It has anticipated that HGV movements during the excavation

phase will vary between 45no. and 55no. trips per day. Table 10.25 below summarises the calculated noise level associated with passing haul vehicles during each phase, assuming the peak hour flows per day.

Construction Phase	No. of Trucks/peak hour	Calculated Noise at edge of road (Stocking Avenue & Stocking Wood Drive) (5m), dB $L_{Aeq, 1hr}$
Phase 1	7	55
Phase 2	7	54

Table 10-25 Calculated Construction Traffic Noise Levels at Edge of Road

The calculated noise levels associated with the various phases are in the range of 54 to 55dB $L_{Aeq,1hr}$. The calculated noise levels are below the construction noise criterion of 65dB. In addition, it should be noted that, in order to assess a worst- case scenario, a large proportion of the daily vehicle numbers have been assumed to arrive/depart over an hour-long period.

10.6.2.3 Construction Phase - Vibration

The main potential source of vibration during the construction programme is associated ground-breaking and rock breaking activities.

Considering the low vibration levels at very close distances to the ground-breaking activities, vibration levels at the nearby buildings are not expected to pose any significance in terms of cosmetic or structural damage to any of the residential or sensitive buildings in proximity to the development works. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings.

It is anticipated that excavations will be made using standard excavation machinery and rock breaking equipment, which typically do not generate >6mm/s vibrations levels 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 with these activities is considered to be **neutral** and **imperceptible.**

10.6.3 Operational Phase

10.6.3.1 Noise

There are four primary potential sources of noise associated with the development once operational these are:

- Additional vehicular traffic on public roads.
- Mechanical plant noise.
- Residential.
- Creche.

Each of these primary noise sources is addressed in turn in the following sections.

Note there is no significant source of vibration associated with the operational phase of the proposed development.

Additional Traffic on Adjacent Roads

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

A traffic impact assessment relating to the proposed development has been prepared by Waterman Moylan as part of this EIAR. Using this information and Project Appraisal Guidelines from Transport Infrastructure Ireland related noise impacts of the road links has been assessed.

Table 10.26 below displays the predicted change in noise level at different road links around the site for the year of opening and the design year using the Annual Average Daily Traffic (AADT).

Road Links	2028 Year Base		
	AADT Without Development	AADT With Development	Change in Noise Level
Ballycullen Road	8974	9459	0.3
Stocking Avenue	6154	7106	0.6
Road Links	**2043 Year Base**		
	AADT Without Development	**AADT With Development**	**Change in Noise Level**
Ballycullen Road	10231	10715	0.3
Stocking Avenue	7016	7967	0.6

Table 10-26 Predicted Change in Noise Level associated with Vehicular Traffic – Existing Road Network

With reference to Table 10.26, the predicted change in noise level associated with additional traffic accessing the proposed development, for the existing road network, has a negligible effect. The impact is therefore **imperceptible** and **long term.**

Mechanical Plant

Once operational, there will be building services plant items required to serve the development. These items of plant will be designed and located so that there is no negative impact on sensitive receivers within the development itself or on nearby sensitive receptors. The cumulative operational noise level from building services plant at the nearest noise sensitive locations external to the development will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods. (Day, dB LAeq,1hr – 45dB and Night, dB LAeq,15min – 35dB). The criteria has been selected so that the noise from items of plant does not exceed background noise levels during the day. An estimation of 10 dB difference between day and night has been used to determine night time noise levels. As per BS4142 these noise levels would be "an indication of the specific sound source having a low impact".

Residential

The noise impact of the residential aspect of the development on the receiving environment will be slight. It will be limited to internal vehicle movements entering and exiting the undercroft carpark, and residents using the public open space. The Acoustic Design Strategy for the development will protect resident in accordance with ProPG Internal Noise Levels. The impact is therefore imperceptible and long term.

Creche

The Creche which is located to the north of the site will serve the residents of the development. The opening hours of the creche is expected to be from 7am – 7pm Monday to Friday. No early morning noise associated with the creche is expected before 7am. The noise of children playing in any environment is regarded as a natural aspect of life in any area of a development.

Conclusion

Considering that sensitive receivers within the development are much 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.

10.7 POTENTIAL CUMULATIVE IMPACTS

There are several proposed or permitted developments in the wider area surrounding the proposed development under assessment. Table 10.27 listed the proposed or permitted developments.

PA. Ref. No.	Applicant	Description	Decision
LRD24A/0007	Capami Limited	523 no. residential units	Granted
SD23A/0260*	Ardstone Homes Limited	Construction of 75 no. residential units	Granted
DS23A/0083	Capami Ltd	71no. dwellings	Granted
ABP-311141-21 (SA21A/0137)	The Minister for Education & Skills	Provision of a temporary two-storey post-primary school.	Granted
ABP-309836-21	Ardstone Homes Limited	SHD – 241no. residential units in 5no. apartment blocks and a community building.	Granted
ABP-310398-21*	Ardstone Homes Limited	SHD – 114no. Build to Rent apartments in 6no. blocks.	Granted
ABP-310337-21 (SD20A/0149)	Capami Ltd	LED floodlighting system and all associated ducting, column foundations and bases and fixtures for a permitted sports pitch.	Granted
SD19A/0345	Ardstone Homes Limited	Neighbourhood Centre comprising a single storey convenience retail unit and a three-storey building comprising a creche.	Granted
ABP-302414-18 (SD18A/0204)	Jones Investments Ltd	65no. residential units and outline permission for a primary school and post primary school.	Refused
SD17A/0468	Capami Ltd	64 Dwellings	Granted (Ballycullen Gate)
ABP-247693-16 (SD16A/0059)	Capami Ltd	Playing pitch and associated site works. Site south of Oldcourt Road and east of Oldcourt Lane,	Granted

Table 10.27 Proposed or permitted developments in the Area .

Construction Phase

During the construction phase of the proposed development, construction noise on site will be localised and will therefore likely be the primary noise source at the nearest noise sensitive receivers. In the event that construction activities associated with the developments noted in Table 10.27 occur simultaneous to the proposed development, they are at sufficient distances such that the cumulative noise levels will remain dominated by the localised works referred to in Table 10.24.

In the event that works on site and works associated with proposed or permitted developments listed in table 10.27 were ongoing simultaneously, there is potential for cumulative noise impacts at all NSLs. Under this scenario, construction activities will be audible at a number of facades of the residential areas due to their location with respect to works on construction sites.

The contractor will be required to control noise and vibration impacts associated with this development in line with the guidance levels included in Table 10.1 and Table 10.2 and follow the best practice control measures within BS 8228-2.The impact from any construction works associated with the other developments listed above is considered to be imperceptible as these works are expected to take place at large distances to the most exposed noise sensitive receivers to the proposed development under assessment.

Operational Phase

The operational phase of the development listed above have the potential to generate additional traffic on the roads in the vicinity of the local area. These additional vehicle movements have been considered in the traffic assessment in the operational phase of the potential impact section. The cumulative impact of this source is determined to be imperceptible and long term.

Noise Model Validation

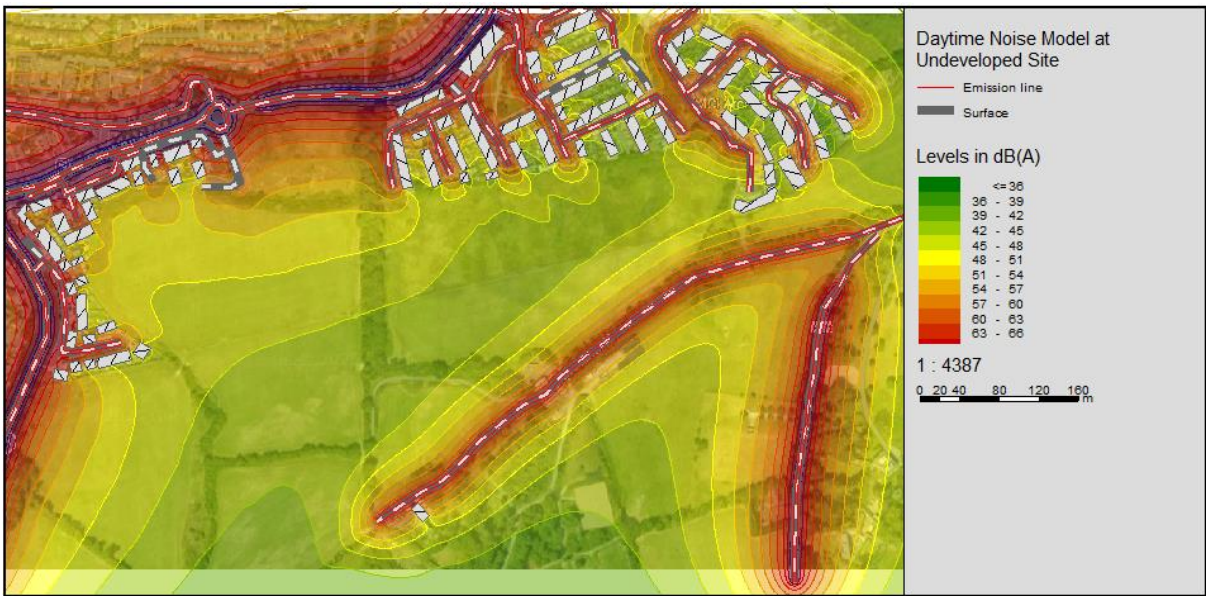

Figure 10.6 Noise Model of Daytime LAeq at the Undeveloped Site

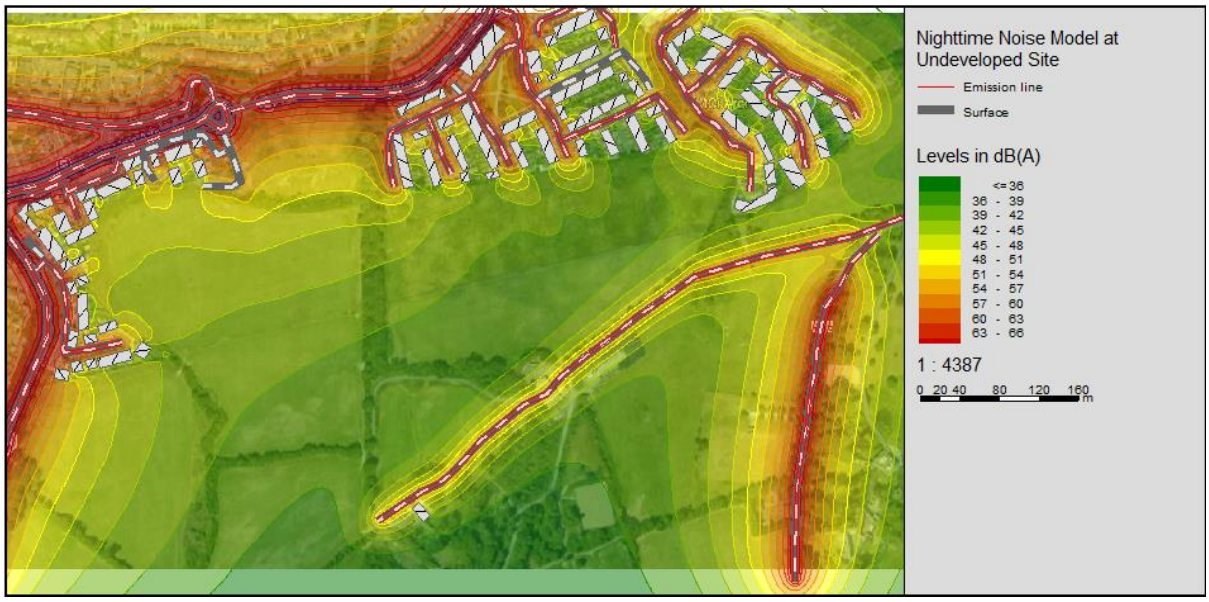

Figure 10.7 Noise Model of Nighttime LAeq at the Undeveloped Site

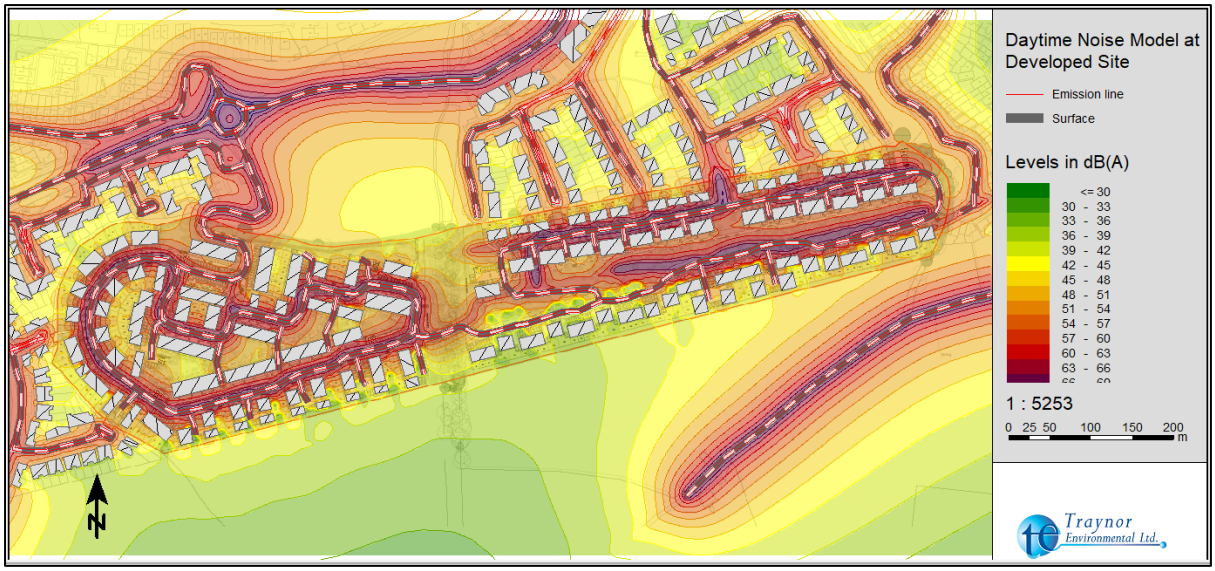

Figure 10.8 Noise Model of Daytime LAeq at the Developed Site

Figure 10.9 Noise Model of Nighttime LAeq at the Developed Site

10.8 PREDICTED IMPACTS

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 will have a negative, moderate and short-term impact on the surrounding environment.

Operational Phase

Additional Vehicular Traffic

The predicted change in 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 contribution of induced traffic is considered to be of neutral, imperceptible, and long-term impact to nearby residential locations.

Mechanical Plant & Creche

Noise levels associated with operational plants 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 impact from this source will be of neutral, Imperceptible, long-term impact.

10.9 MITIGATION MEASURES

Construction Phase - Noise

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2*. Whilst construction noise and vibration impacts are expected to vary during the construction phase depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228 (2009) Parts 1 and 2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant.
- Noise control at source.
- Screening.

- Liaison with the public
- Monitoring

A detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice mitigation measures should be considered:

- Site compounds will be located in excess of 30m from noise sensitive receptors within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.
- For mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed with in acoustic enclosures providing air ventilation.

- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
-

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed use standard plywood material to provide adequate sound insulation.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public

A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works. The neighbouring properties should be duly informed of the rock excavation works being carried out, the time period over which the works are expected to be carried out and the level of noise expected during the works.

Monitoring

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics - Description, measurement and assessment of environmental noise.*

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation or when other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Construction Phase - Vibration

The vibration from construction activities will be limited to the values set out in Tables 10.2 and 10.3. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Limit values have been provided for soundly constructed residential and commercial properties.

Operational Phase

Additional Traffic on Adjacent 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.

Mechanical Services Plant

Taking into account that sensitive receivers within the development are much 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, and therefore no further mitigation required.

10.10 'DO-NOTHING' SCENARIO

Should the project not proceed there would be no increase in noise emanating from the site.

10.11 'WORST-CASE' SCENARIO

The 'worst case' scenario is that the development is not constructed as per the drawings and details provided in the planning application. While one would expect the development is required to be constructed in accordance with the planning documents which includes various mitigation measures outlined above.

Daytime average noise levels from the baseline noise survey range from 50 - 53dB LAeq and the night-time levels ranged from 43 - 47dB LAeq across the proposed development site. These figures are in the low-risk area based on the ProPG guidelines. When the development becomes fully operational, due to people walking/running, dogs barking, children playing, mechanical plant, creche and addition vehicular traffic on surrounding roads noise will increase slightly.

The 'worst case' scenario would be that the attributes, mitigation measures were not carried out, the ProPG Internal Noise Levels guidelines, BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings are not met.

10.12 MONITORING AND REINSTATEMENT

Construction Phase

It is recommended that monthly noise and vibration monitoring surveys be carried along the boundary of the proposed site in order to monitor the effectiveness of noise and vibration management for the duration of the construction phase. Noise and vibration levels at Residential Sensitive Locations should not exceed the construction phase noise and vibration limit criteria in Table 10.1 and Table 10.2. Any breaches of these limits will require a review of operations and mitigation measures if the exceedance is due to the construction works on site.

In order to effectively manage noise and vibration at residential dwelling located approximately 20m of the proposed site, installation of continuous data logging live noise and vibration monitoring system is required. This software will require remote login, data download and text/email alert functionality. It will measure key noise and vibration parameters (e.g. LAeq, LAFMAX, LA90, LA10, PPV(mm/sec) and Frequencies as Hz.

Operational Phase

When the residential development is operational it will not result in an increase in noise and vibration levels at any of the sensitive locations beyond the site boundary therefore no monitoring is deemed necessary going forward.

10.13 DIFFICULTIES IN COMPILING INFORMATION

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

10.14 REFERENCES

- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1 - Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2 -Vibration.
- BS 6841 (1987): Measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock
- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound.
- Design Manual for Roads and Bridges, 2011
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).
- 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 Statements, (EPA, 2002).
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)

- ISO 1996: 2017: Acoustics - Description, measurement and assessment of environmental noise.
- The Transport Infrastructure Ireland (TII, formerly NRA) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014), the Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII, 2004) was also considered in the preparation of the assessment. This document sets out noise and vibration limits for the construction phase which are generally applied by planning authorities to all construction projects.
- The Professional Guidance on Planning & Noise (ProPG), May 2017