Chapter 14
Noise and Vibration

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14. NOISE AND VIBRATION

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) sets out the methodology used to undertake the assessment (Section 14.3), describes the existing environment herein referred to as the 'baseline environment' (Section 14.4), examines the predicted impacts of the proposed development (Section 14.5), proposes mitigation and monitoring measures (Section 14.6 and Section 14.7 respectively), and identifies residual effects (Section 14.8). This chapter should be read in conjunction with the other relevant Chapters of this EIAR.

This chapter examines the noise and vibration impacts of the construction and operational phases of the Proposed Development. Mitigation measures are then identified followed by an assessment of the residual impacts.

14.2 Legislation, Policy and Guidance

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 following Environmental Protection Agency (EPA) guidelines were considered and consulted in the preparation of this Chapter:

- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – (EPA, 2022); and
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018).

14.3 Methodology

The noise and vibration assessment has been undertaken using the following methodology:

- A review of baseline noise levels along the greenway route has been undertaken to determine the range of noise levels at locations and noise environments in proximity to the proposed development.
- 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.
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the project at the nearest sensitive locations (NSLs) to the route.
- Predictive calculations have been performed to assess the potential effects associated with the operation of the development at the most sensitive locations surrounding the proposed development site; and,
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with the construction and operation of the proposed development.

14.3.1 Construction Noise

ABC Method

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. Planning 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 route, 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 that 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 14.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 14.1 Example Threshold of Significant Effects at Dwellings

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

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 assessment of daytime periods the ambient noise level has been measured and rounded to the nearest 5 dB. Taking into account the construction noise criteria threshold values detailed in Table 14.1, and the measured baseline noise levels at the vast majority of survey locations along the proposed route described in Section 14.4, the following category value is appropriate:

- Daytime Category A value (i.e. 65 dB LAeq,T)
- It is noted that at location B3 the ambient noise level would categorise the location as Category C. However, it was observed during the survey period that nearby bus and heavy vehicle activity of brief duration dictated the LAeq value. As a conservative approach to categorisation, with consideration of typical prevailing ambient noise levels, category A has been applied for assessment of nearby NSLs.

Fixed Limits

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

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the proposed development site (see Section 14.4), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise.

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 existing noise level. Given the baseline monitoring carried out, it would indicate that Category A values are appropriate for NSLs located in the areas surrounding the majority of locations captured in the baseline noise survey. Category B values are appropriate at NSLs along the N67 at Moyasta, using the ABC method.
- For non-residential NSLs it is considered appropriate to adopt the 70 dB(A) CNT, given the urban environment in which the development resides, in line with BS 5228-1:2009+A1:2014.

Interpretation of the CNT

In order to assist with interpretation of CNTs, Table 14.2 includes guidance as to the likely magnitude of effect associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of *DMRB: Noise and Vibration* (UKHA 2020) and adapted to include the relevant significance effects from the *EPA Guidelines* (EPA 2022).

Table 14.2 Construction Noise Significance Ratings

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

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects	Determination
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	
	Above CNT +15 dB	Very Significant to Profound	

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 stages.

Construction Traffic Noise

In order to assist with the interpretation of construction traffic noise, Table 14.3**Table 14.3** includes guidance as to the likely magnitude of effect associated with changes in traffic noise levels along an existing road. In this regard, reference is made to Table 3.17 of the DMRB LA111 guidance, which defines the magnitude-of-impact categories (negligible, minor, moderate and major) associated with changes in road traffic noise levels.

Table 14.3 Likely Effect Associated with Change in Traffic Noise Level - Construction Phase

Magnitude of Impact	Increase in Traffic Noise Level (dB)
Negligible	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

In accordance with the *DMRB Noise and Vibration*, 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;
- A total number of days exceeding 40 in any six consecutive months.

14.3.2 Construction Vibration

Construction Traffic Vibration

Construction traffic will be managed in accordance with the Construction Traffic Management Plan (CTMP), as detailed in Chapter 5 – Traffic and Transportation. Relevant measures include restricting HGV movements to the N67 and N68 (save for essential local circulation), undertaking pre- and post-construction road condition surveys, and implementing reinstatement measures where required. These measures will minimise the potential for vibration impacts associated with HGV movements on local roads.

Building Damage

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 14.4** are recommended. For any protected structures located in proximity to the proposed works, there is a greater potential for these to be more vulnerable than modern structures. Therefore, on a precautionary basis, the guidance values for structurally sound buildings are reduced by 50% in line with the guidance documents referred to above.

Table 14.4 Recommended Vibration Criteria During Construction Phase

Category of Building	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
Structurally sound and non-protected buildings	12 mm/s	20 mm/s	50 mm/s
Protected and /or potentially vulnerable buildings	6 mm/s	10 mm/s	25 mm/s

Human Perception

People are sensitive to vibration stimuli at levels which are orders of magnitude below those which have the potential to cause any cosmetic damage to buildings. There are no current standards which provide guidance on typical ranges of human response to vibration in terms of PPV for continuous or intermittent vibration sources.

BS5228-2:2009+A1:2014, provides a useful guide relating to the assessment of human response to vibration in terms of the PPV. Whilst the guide values are used to compare typical human response to construction works, they tend to relate closely to general levels of vibration perception from other general sources.

Table 14.5**Table 14.5** below summarises the range of vibration values and the associated potential effects on humans.

Table 14.5 Guidance on Effects of Human Response to PPV Magnitudes

Vibration Level, PPV	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3mm/s	Vibration might be just perceptible in residential environments.
1mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments

Vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin and or the duration of vibration is known. For example, ground breaking can typically be tolerated at vibration levels up to 2.5 mm/s if adequate public relations are in place and timeframes are known. These values refer to the day-time periods only.

During surface construction works (ground breaking etc.) the vibration limits set within Table 14.6**Table 14.5** would be perceptible to building occupants and have the potential to cause subjective effects. The level of effect is, however, greatly reduced when the origin and time frame of the works are known and limit values relating to structural integrity are adequately communicated. In this regard, the use of clear communication and information circulars relating to planned works, their duration and vibration monitoring can significantly reduce vibration effects to the neighbouring properties.

In order to assist with interpretation of vibration thresholds, Table 14.6**Table 14.6** presents the significance table relating to potential effects to building occupants during construction based on guidance from BS5228-2:2009+A1:2014.

Table 14.6 Human Response Vibration Significance Ratings

Criteria	Impact Magnitude	Significance Rating
≥10 mm/s PPV	Very High	Very Significant
≥1 mm/s PPV	High	Moderate to Significant
≥0.3 mm/s PPV	Medium	Slight to Moderate
≥0.14 mm/s PPV	Low	Not significant to Slight
Less than 0.14 mm/s PPV	Very Low	Imperceptible to Not significant

14.3.3 Operational Noise

Once operational, the primary source of noise will be associated with vehicles moving to and from car parking areas. Other potential noise sources will include members of the public using the greenway. Any potential noise levels from this activity, however, will be low considering the proposed usage and noise sources will comprise cycling of bicycles and the sound of voices. This is typically in line with surrounding ambient sources in a typical semi-rural and rural environment. On this basis, noise limits are applied only to the car parking areas at the trailhead at Kilrush and Moyasta.

For the purposes of assessing the potential noise impact of the operational phase 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 14.7**.

Table 14.7 Summary of Recommended Internal Noise Levels from BS 8233:2014

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)
Livings rooms	35 – 40	n/a
Bedrooms	35	30

In order to set an external noise level based on the internal criteria noted above, consideration has been given to the degree of noise reduction afforded by a partially open window, which BS 8233 suggests as 15 dB.

Using this value, external noise levels of 50 dB $L_{Aeq,T}$ are considered appropriate for the daytime period for activity associated with fixed areas (e.g. car parking areas) associated with the greenway. The time period for day-time noise levels has been set over a 1-hour period to provide a robust criterion. It is assumed that the greenway will not be in use during the night-time period, i.e., after 23:00hrs.

Therefore, on the basis of the above discussion, the following criterion is set to the facades of the nearest noise sensitive properties external to the site:

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

14.4 Baseline Environment

14.4.1 Survey methodology

An environmental noise survey has been conducted along the proposed development route in order to quantify the existing noise environment. The survey was conducted on 16 December 2025 in accordance with ISO 1996: 2017: Acoustics – *Description, measurement and assessment of environmental noise*. Specific details are set out below.

14.4.2 Choice of Measurement Locations

Baseline noise monitoring was undertaken at eleven Noise Monitoring Locations (NML's) described below and illustrated in Figure 14.1.

Location A1 Adjacent to NSLs along Chapel Street, Kilkee, Co. Clare.

Location A2 Adjacent to NSLs in Gurrane estate, Kilkee, Co. Clare.

Location A3 Adjacent to NSLs on Lisdeen Road, Co. Clare.

Location B1 Adjacent to NSLs off the L20161 near Kilkee, Co. Clare.

Location B2 Adjacent to NSLs on Baunmore Road, Co. Clare.

Location B3 Adjacent to NSLs along N67 and L2036 Moyasta, Co. Clare.

Location C1 Adjacent to NSLs along L6090 Carrowncalla, Co. Clare.

Location C2 Adjacent to NSLs along Carrowncalla South, Co. Clare.

Location C3 Adjacent to NSLs along Carrowncalla South and Ferry Road, Co. Clare.

Location D1 Adjacent to NSLs along Merchants Quay, Kilrush, Co. Clare.

Location D2 Adjacent to NSLs along Cappa Drive and R473, Kilrush, Co. Clare.

14.4.3 Survey Periods

The noise surveys were carried out over the following periods, with each attended measurement undertaken over a 15-minute duration:

- Locations A1 – A3: 16 December 2025
- Locations B1 – B3: 16 December 2025
- Locations C1 – C3: 16 December 2025
- Locations D1 – D2: 16 December 2025

14.4.4 Instrumentation

The following instrumentation was used during the baseline surveys:

Table 14.8 Instrumentation Details

Manufacturer	Model	Serial Number
RION	NL52	586940

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_{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.

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.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

14.4.5 Survey Results and Observations

The measured noise results and observations are presented in Table 14.9 below.

Table 14.9 Measured Noise Levels

Location Ref.	Time	Measured Noise Levels (dB re. 2x10-5 Pa)					Observations
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
A1	12:00	54	77	36	54	39	The noise environment at this location comprised intermittent traffic noise from nearby Kilkee Road and Chapel Street, pedestrian activity, birdsong, seagulls, and distant reversing vehicle noise. Occasional children playing near the adjacent schoolyard were also audible. The ambient noise level was 54 dB L_{Aeq}. The background noise level was 39 dB L_{A90}.
A2	12:18	42	60	34	44	37	The noise environment at this location comprised distant traffic noise from vehicles around Kilkee, birdsong, and intermittent construction noise with radio broadcasts from a nearby site. Brief vehicle movements entering and exiting the estate were also noted. The ambient noise level was 42 dB L_{Aeq}. The background noise level was 37 dB L_{A90}.
A3	12:40	48	76	24	34	26	The noise environment at this location comprised very quiet rural road noise, distant dog barking, and birdsong. Weather conditions were calm with low wind speeds. The ambient noise level was 48 dB L_{Aeq}. The background noise level was 26 dB L_{A90}.
B1	13:01	61	83	31	60	34	The noise environment at this location comprised intermittent fast-moving vehicle traffic on a rural road, birdsong, foliage noise, and distant traffic. The ambient noise level was 61 dB L_{Aeq}. The background noise level was 34 dB L_{A90}.
B2	13:20	41	63	27	42	29	The noise environment at this location comprised a very quiet rural road, birdsong, and brief overhead aircraft noise. No vehicle traffic was recorded during the measurement period. The ambient noise level was 41 dB L_{Aeq}. The background noise level was 29 dB L_{A90}.
B3	13:40	71	85	38	76	49	The noise environment at this location comprised dominant traffic noise from the busy N67 road including large buses and heavy goods vehicles, birdsong during quiet periods, and occasional aircraft noise. The ambient noise level was 71 dB L_{Aeq}. The background noise level was 49 dB L_{A90}.

Location Ref.	Time	Measured Noise Levels (dB re. 2x10-5 Pa)					Observations
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
C1	14:03	36	58	26	39	29	The noise environment at this location comprised construction noise from roofing and sawing activities approximately 120 meters from the noise meter, birdsong, and occasional overhead aircraft noise. No vehicle traffic was recorded during the measurement period. Construction activities ceased after the first five minutes. The ambient noise level was 36 dB L_{Aeq}. The background noise level was 29 dB L_{A90}.
C2	14:25	39	57	35	41	38	The noise environment at this location comprised birdsong and quiet rural road noise at the end of the road. The site was subject to slightly windier conditions. No vehicles passed during the measurement period. The ambient noise level was 39 dB L_{Aeq}. The background noise level was 38 dB L_{A90}.
C3	14:43	50	78	38	47	41	The noise environment at this location comprised quiet small car park noise down a rural road, bird calls, and noise from vehicles entering and exiting the car park. Two cars entered during the measurement period and one idled briefly. The ambient noise level was 50 dB L_{Aeq}. The background noise level 41 dB L_{A90}.
D1	15:04	48	73	35	50	38	The noise environment at this location comprised distant construction noise, distant traffic in Kilrush, reversing lorry noise, pedestrians, birdsong, brief vehicle idling nearby, and occasional overhead aircraft noise. The ambient noise level was 48 dB L_{Aeq}. The background noise level was 38 dB L_{A90}.
D2	15:25	56	74	29	58	33	The noise environment at this location comprised vehicle traffic passing along the R473, birdsong, pedestrians, and activity within the Cappa Drive estate, including a loader truck passing likely contributing to the maximum noise level. The noise meter was positioned on a grass patch within the estate. The ambient noise level was 56 dB L_{Aeq}. The background noise level was 33 dB L_{A90}.

In summary, the prevailing ambient noise environment varied at different locations across the study area which are broadly summarised as follows:

- Quiet rural roads and more remote areas with minimal vehicle traffic, dominated by natural sounds such as birdsong, occasional aircraft overhead, distant dog barking, and foliage noise. Noise levels in these areas were typically measured in the range of 36 to 50 dB L_{Aeq}.
- Small rural settlements and residential estate areas where noise sources included local road traffic, pedestrian movements, light vehicle activity, and occasional construction noise. Noise levels in these areas were typically measured in the range of 42 to 56 dB L_{Aeq}.
- Busy road locations adjacent to main routes such as the N67 and R473, where dominant noise sources were heavy traffic including buses and heavy goods vehicles. Noise levels in these areas were typically measured in the range of 56 to 71 dB L_{Aeq}.

14.5 Description of Potential Impacts

14.5.1 Do Nothing Scenario

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

14.5.2 Potential Impacts

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.

14.5.2.1 Potential Construction Impacts

Overview of Construction Activities

It is anticipated that the construction phase will comprise the following activities:

- Paving works along the length of the greenway route.
- Earthworks, formation of cuttings and paving works along the length of the proposed greenway route, predominantly within the former West Clare Railway corridor.
- Construction of new bridge structures and culverts at various locations along the route, including in the vicinity of Lisdeen and Carrowncalla.
- Construction of agricultural overpasses, underpasses and accommodation structures, including works in the Moyasta area.
- Construction of retaining walls and associated works in sections where the greenway is proposed in cutting.
- Modification and upgrade works to existing bridge structures, including parapet works and screening.
- Construction works at the proposed trailheads at Kilrush and Moyasta, including excavation, surfacing and ancillary infrastructure.

During the construction phase of the proposed development, a variety of items of plant will be in use, such as road pavers, dumper trucks, compressors, and generators. Due to the nature of daytime activities undertaken on a construction site, 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/topsoil stripping, where required, and lorry movements on uneven road surfaces.

Construction programme and sequence information has been provided by Roughan & O'Donovan Consulting Engineers and are used to calculate the magnitude of noise emissions to the local environment in this assessment. There may be some variations depending on the actual construction methodology implemented by the successful contractor however these are not likely to be change significantly and will be required to be agreed with the local authority prior to construction.

Construction Noise Assessment Methodology

Predicted construction noise levels are calculated based on various assumptions, including soft-ground attenuation along the route, no allowance for acoustic barriers or screening, plant operating at the closest practical point to receptors, and concurrent operation of all relevant plant items. Standard BS 5228 sound power levels have been used, and realistic on-time corrections have been applied to avoid unrealistically continuous operation. These assumptions provide a robust basis for assessing construction noise impacts.

Using the provided information, it is possible to predict typical noise levels using guidance set out in BS 5228-1:2009+A1:2014. Table 14.10**Table 14.10** outlines typical plant items and associated noise levels that are anticipated for this aspect of the construction programme.

Construction Activities and Associated Plant

The construction activities are expected to comprise preparation and paving of the proposed greenway surface and carpark construction. This comprises excavation, the removal of old rails, paving and landscaping along the proposed development. The bridges, overpasses, underpasses and footbridges will also be constructed using piling and pre-cast elements.

Table 14.10 Reference Plant Noise Emissions

Activity	Item of Plant (BS5228 Ref)	L_{Aeq} at 10m
Rail Removal and Track Preparation	Tracked excavator (C2.21)	71
	Dump Truck (C2.30)	79
	Diesel Generator (C4.76)	61
	Telescopic Handler (C4.54)	78
Paving and landscaping, car park construction	Asphalt Paver & Tipping Lorry (C5.30)	75
	Electric Water Pump (C5.40)	68
	Vibratory Roller (C5.20)	75
Bridges, Underpass and Footbridge Construction	Tracked excavator (C2.21)	71
	Dump Truck (C2.30)	79
	Tracked Mobile Crane (C3.28)	67
	Piling (C.3.14)[1]	83

Note 1 : A reasonable on-time of 50% has been assumed for piling activities for the purposes of the construction noise assessment.

Table 14.10 presents the predicted daytime noise levels from an indicative construction period on site at various distances from the works. The calculations also assume that the equipment will operate for 66% of the 12-hour working day (i.e. 8 hours). It is assumed that construction activities described above will take place during normal working hours only.

Predicted General Construction Noise Levels

Noise predictions have been prepared for various distances from the proposed works which will typically be within rural areas along the former West Clare Railway. Rail removal and track preparation activities are anticipated at distances of 10m and greater from nearby NSLs.

Table 14.11 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations during Rail Removal, Track Preparation Phase and Paving, Landscaping and Car Park Construction Phase.

Construction Phase	Item of Plant (*BS 5228-1* Ref)	L_{Aeq} at distance (m)				
		10m	20m	40m	60m	100m
Rail Removal and Track Preparation	Tracked excavator (C2.21)	71	63	57	54	49
	Dump Truck (D2.30)	79	71	65	62	57
	Diesel Generator (C4.76)	61	53	47	44	39
	Telescopic Handler (C4.54)	78	70	64	61	56
	Cumulative Rail Removal and Track Preparation	**80**	**74**	**68**	**65**	**60**
Paving and Landscaping, Car Park Construction	Asphalt Paver & Tipping Lorry (C5.30)	75	67	61	58	53
	Electric Water Pump (C5.40)	68	60	54	51	46
	Vibratory Roller (C5.20)	75	67	61	58	53
	Cumulative Paving and Landscaping Works	**72**	**71**	**65**	**61**	**57**

Taking into account the assumptions outlined above and allowing for attenuation of sound over distance, predicted construction noise levels at noise-sensitive properties within approximately 60m of rail removal and track preparation works would exceed the relevant construction noise criteria. The rail removal and track preparation phase will be limited to areas where existing rail occurs. The majority of the former West Clare Railway infrastructure has already been removed, with rail and sleeper removal works limited to short, isolated sections where remnants of the railway remain. These works are generally located in rural areas, set back from residential receptors, and will be temporary and localised in nature. On this basis, in the absence of noise mitigation, a *negative, significant to very significant, and temporary* impact is likely.

At distances greater than 60 m, predicted construction noise levels fall below the relevant construction noise criteria, and therefore any impact is expected to be *negative, slight to moderate, and temporary.*

Predicted construction noise levels at noise-sensitive properties within approximately 40 m of Paving and Landscaping, Car Park Construction works would exceed the relevant construction noise criteria. These receptors occur primarily within the built-up areas of Kilkee, Moyasta and Kilrush, with occasional individual dwellings located along rural sections of the route. Paving and Landscaping works are assumed to progress in a linear manner, limiting the duration of construction in proximity to a given NSL, within the duration of the construction programme. Therefore, in the absence of noise mitigation, a *negative, significant to very significant, and temporary* impact is likely.

At distances greater than 40 m, predicted construction noise levels fall below the relevant construction noise criteria, and therefore any impact is expected to be *negative, slight to moderate, and temporary.*

Table 14.12 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations during Bridge and Underpass Construction

Construction Phase	Item of Plant (*BS 5228-1* Ref)	L_{Aeq} at distance (m)					
		35m	50m	70m	90m	120m	150m
Bridges, Underpass and Footbridge Construction	Tracked excavator (C2.21)	58	55	52	50	48	46
	Dump Truck (C2.30)	66	63	60	58	56	54
	Tracked Mobile Crane (C3.28)	54	51	48	46	44	42
	Piling (C.3.14)	69	69	62	62	58	56
	Cumulative Bridges and Underpass Construction	**71**	**70**	**65**	**64**	**61**	**58**

Bridge, overpasses and underpass structures are proposed in the vicinity of Lisdeen, Carrowncalla and Moyasta. A footbridge structure is also proposed at Moyasta. The distance of the nearest bridge / underpass to the nearest NSLs is 50m. At 50m to 70m from this phase of construction the impacts will be *negative, significant and temporary.*

The majority of NSLs in the vicinity of the proposed bridge and underpass works are located at distances of approximately 70m or greater from the works, where construction noise impacts are predicted to be *negative, not significant to moderate, and temporary.*

Footbridge structures are proposed in the vicinity of Moyasta. The distance of the nearest footbridge to the nearest NSLs is 35m. At 35m to 70m from this phase of construction the impacts in the absence of mitigation will be *negative, very significant and temporary.*

The majority of NSLs in the vicinity of the proposed footbridge works are located at distances of approximately 500m or greater from the works, where construction noise impacts are predicted to be *negative, not significant and temporary.*

Construction Traffic

Baseline traffic flows and construction traffic volumes were obtained from Chapter 5 – Traffic and Transportation. The predicted change in traffic noise level was calculated using the standard DMRB formula for changes in flow. Even under a conservative assumption that all construction HGVs occur within the peak hour, the resulting change in traffic noise level is less than 1 dB, which corresponds to a negligible magnitude of impact under DMRB LA111. This is well below the threshold for a significant effect.

On this basis, with reference to Table 14.3, construction traffic noise is expected to have a *neutral*, *imperceptible* and *short-term* impact on the surrounding environment.

Vibration

In terms of construction vibration, excavations will be undertaken using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Based on the ground conditions encountered along the route — predominantly soft soils overlying rock — vibration attenuates rapidly with distance. Taking this into account, and considering that the nearest sensitive receptors are located at least 10 m from the works, the resultant vibration levels are expected to remain well below levels that would cause disturbance to building occupants or be perceptible.

Piling at areas where bridges will be constructed will be done using augured piling methods. This piling method is less intrusive than other piling methods by minimising vibration at nearby receptors. This activity lends itself to lower levels of vibration compared to other impact methods. For the purposes of this assessment, vibration levels during rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock taken from BS 5228 – Part 2*: Vibration* has been referenced (BS 5228:2 Table D.6, Ref. No. 106). The associated vibration levels are summarised below:

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, 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.

Vibration levels associated with piling works are also orders of magnitudes below the more onerous threshold recommended for protected structures however care should be taken when heavy works are taking place in close proximity.

The associated impact is considered to be *neutral, imperceptible,* and *temporary*.

14.5.2.2 Potential Operational Impacts

Once operational, potential impacts associated with the greenway will be low in noise, i.e. people walking and cycling, limited vehicular activity at car parking areas and occasional maintenance works comprising management of surface and vegetation along the route.

Walking and Cycling

The primary activity during the operational phase will comprise members of the public walking and cycling along the West Clare Railway Greenway.

Noise generated by walking and cycling cannot be readily quantified, as there is no significant noise source associated with these activities. It is therefore expected that noise levels at nearby noise sensitive receivers will remain well below the recommended external noise criteria set out in Section 14.3.3. As a result, no significant change in the existing noise environment is anticipated.

Activity at Car Parking Areas

Car parking facilities are proposed at the trailheads at Kilrush and Moyasta, with additional informal parking provision already available in Kilkee. Vehicular movements associated with these facilities will be intermittent and limited in nature.

The proposed trailhead car parking areas at Kilrush and Moyasta are generally located at a distance from the nearest noise sensitive receivers. Typical noise levels measured approximately 20 m from the boundary of a busy car park during peak periods are of the order of 42 dB $L_{Aeq,T}$, which is comfortably below the recommended external noise criteria set out in Section 14.3.3. On this basis, noise impacts arising from the operation of the car parking areas are not predicted to be significant.

The associated impact is considered to be negative, slight, and long-term.

Routine Maintenance

Routine maintenance activities will be undertaken on an occasional basis to ensure the continued safe operation of the greenway and will include works such as vegetation management, surface repairs and inspection activities. These works will typically be short-term and intermittent and will involve the use of light maintenance vehicles and hand-held equipment.

Noise levels associated with routine maintenance activities are expected to be low in magnitude, temporary in duration and localised in extent. As such, significant noise impacts are not anticipated.

14.6 Mitigation Measures

14.6.1 Construction Phase

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. Whist construction noise and vibration impacts are expected to vary during the construction phase depending on the distance between the activities and noise sensitive receptors. The contractor will ensure that 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 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.
- Programme.
- Monitoring.

Detailed comment is offered on these items in the following paragraphs. Monitoring is discussed in Section 14.7 below.

(i) 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.

(ii) 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 migration measures should be considered:

- The use of machinery for lifting bulky items, dropping, and loading of materials within work 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 compressors, generators, and pumps, these can be surrounded by acoustic lagging or enclosed within 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 will 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.
- Care will be taken when cleaning augers of piling rigs. Shaking and banging of the auger to loosen earth will be avoided.
- Use of pneumatic hand tools will be avoided at night-time and fixings should be manually tightened where possible.

(iii) 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. The use of temporary hoarding or mobile screens can aid in reducing noise levels from potential high levels of construction activity. The use of screening is recommended when works are occurring in proximity to noise sensitive dwellings, or high amenity areas during high noise activities. This can be undertaken using standard site hoarding or using mobile / demountable screens around noisy items of plant or works.

Screening will be provided at locations where predicted construction noise levels exceed the relevant Construction Noise Threshold (CNT), including works in proximity to residential receptors at Lisdeen, Carrowncalla, Moyasta and the Kilrush trailhead. Temporary hoarding or mobile/demountable acoustic screens will be installed around high-noise activities such as breaking or bridge works in the vicinity of sensitive receptors to reduce noise at nearby dwellings and high-amenity areas.

(iv) Piling

Piling at areas where bridges will be constructed will be done using augured piling methods. This piling method is less intrusive than other piling methods by minimising vibration at nearby receptors.

(v) Liaison with the Public

As part of the Construction Environmental Management Plan (CEMP) proposed as part of the project 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 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.

(vi) 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, piling or other high noise generating works that 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.

14.6.2 Operation Phase

No activities that would generate significant levels of noise are associated with the operational phase of the proposed development, therefore no mitigation measures are required.

14.7 Monitoring

14.7.1 Construction Phase

During the Construction Phase, the appointed contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017). The selection of monitoring locations will be based on the nearest representative NSLs to the working area which will progress along the length of the Proposed Development.

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the Proposed Development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, monitoring will be undertaken at a selection of sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

14.7.2 Operational Phase

There are no noise and vibration monitoring or reinstatement requirements during the operational phase.

14.8 Residual Effects

14.8.1 Construction Phase

Noise

During the construction phase of the proposed development there is the potential for significant impacts on nearby noise sensitive properties due to noise emissions from construction activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise impacts are minimised and will have a *negative*, *not significant* to *significant,* and *temporary to short-term impact* on the surrounding environment.

Vibration

Taking into account the low levels of vibration generated at close distances to piling rigs and excavations the vibration impacts are *neutral*, *imperceptible,* and *temporary*.

14.8.2 Operation Phase

Once operational, potential impacts associated with the greenway are expected to be low in noise, i.e. people walking and cycling, limited to vehicular activity near car parking areas and occasional maintenance works along the route. The following residual impacts are predicted:

Walking and cycling

The associated impact is considered to be *negative, imperceptible,* and *long-term*.

Car parks and routine maintenance works

The associated impact is considered to be *negative, slight,* and *long-term*.

14.9 References

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

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 ground-borne vibration.

BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.

Design Manual for Roads and Bridges, Volume 11 – Environmental Assessment, 2020.

ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.