AtkinsRéalis

Environmental Impact Assessment Report – (EIAR) Volume 2 – Chapter 13 – Noise and Vibration

Uisce Éireann

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0089328DG0045

BALLINA AND LOUGH TALT WATER SUPPLY UPGRADE

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Abbreviations

Abbreviation	Term
AADT	Annual Average Daily Traffic
ABL	Above Ground Level
BPS	Booster Pumping Station
BPT	Break Pressure Tank
BS	British Standard
CEMP	Construction Environmental Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CRTN	Calculation of Road Traffic Noise
dB	Decibel (a unit used to measure the intensity of a sound; on a logarithmic scale)
dBA	A-weighted decibel
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
GPG	Good practice Guide (Guidance)
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
$L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels
$L_{Aeq,T}$	Equivalent sound pressure level in terms of dBA for the time period T
$L_{Aeq(1hr)}$	Equivalent sound pressure level in terms of dBA for the time period (1 hour)
$L_{pA(max)}$	The maximum root-mean-square (RMS) sound pressure level measured during a given monitoring period.
$L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound
L_{day}	The A-weighted long-term average sound level as defined in ISO 1996-2, determined over all day periods of a year. The 12-hour daytime period is between 07:00 to 19:00hrs.

Abbreviation	Term
L_{den}	24-hour noise rating level determined by the averaging of the Lday with the $L_{evening}$ (plus a 5dB penalty) and the L_{night} (plus a 10dB penalty).
$L_{evening}$	A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year. The 4-hour evening period is between 19:00 to 23:00hrs.
L_{night}	A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year. The 8-hour night-time period is between 23:00 to 07:00hrs
mm/s	Millimetres per second
NAP	Noise Action Plan
NG4	EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities
NSL	Noise Sensitive Location
On-time	The time when equipment or machinery is in operation
PPV	Peak Particle Velocity
Receiver	Generic description of a location that is represented in a noise model
RWI&PS	Raw Water Intake and Pumping Station
TII	Transport Infrastructure Ireland
VDV	Vibration Dose Value
WHO	World Health Organisation
WTP	Water Treatment Plant

Glossary

Term	Meaning
Acoustic Enclosure	A fully or partially enclosed structure designed to contain noise generated by plant or equipment and reduce its transmission to the surrounding environment.
Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
Background Noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
Construction Noise	Noise generated by construction activities, including the operation of construction plant and equipment.
Noise Criterion	The specified noise level against which predicted or measured noise levels are assessed for a particular location and assessment period.
Operational Noise	Noise generated by fixed plant, equipment and other activities associated with the operation and maintenance of the Proposed Development.
Receiver	A generic description of a location that is represented in a noise model.
Residual Impact	The environmental impact remaining following implementation of the proposed mitigation measures.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak
L_{WA}	A-weighted Sound Power Level
R_W	Weighted sound reduction index - a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements

13. Noise and Vibration

13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the likely significant effects of the Ballina and Lough Talt Water Supply Upgrade (herein referred to as 'the Proposed Development') on Noise and Vibration. This Chapter also summarises the related regulatory and policy framework, describes the methods used to assess the identified impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant adverse impacts and the anticipated likely residual impacts after mitigation measures have been applied.

This Chapter examines how the Proposed Development may impact noise and vibration levels across various phases. The assessment focuses on the following key areas:

- Construction Operations: Analysing noise generated during the construction of the Proposed Development, specifically during trench excavation, installation works, and Horizontal Directional Drilling (HDD). It also covers upgrades to various reservoirs, treatment works and pumping stations.
- Logistics and Traffic: Assessing the impact of construction vehicle traffic on public roads, access routes, and necessary traffic diversions.
- Operational Phase: Evaluating permanent noise sources, primarily from the upgrades to various reservoirs, treatment works and pumping stations.

The study identifies potential noise and vibration effects on human receptors. While operational noise is reviewed, the most significant effects are anticipated during the construction stage. The assessment methodology is informed by established industry data and previous experience with similar infrastructure projects.

This chapter should be read in conjunction with:

- Chapter 6 – Population and Human Health;
- Chapter 7 – Biodiversity;
- Chapter 15 - Roads, Traffic & Transportation; and
- Appendix 13-1 (Volume 3 of this EIAR) to this Chapter, which provides figures illustrating the Proposed Development corridor and the construction noise assessment distance bands.

13.2 Legislation and Policy Context

This assessment has been undertaken with consideration of the requirements of key legislative and policy documents, and relevant Legislation that were considered during the assessment process for this project are as follows:

- Environmental Protection Agency (EPA) NG4: Guidance note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities
- BS 4142 2014 A1+ 2019 Methods for rating and assessing industrial and commercial sound
- ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
- British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise
- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration.
- BS 6472-1:2008 Guide to evaluation of human exposure to vibration in building).
- Transport Infrastructure Ireland (TII) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004).
- Institute of environmental management and assessment (IEMA) Guidelines for noise impact assessment 2014.
- Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration (formerly HD 213/11, IAN 185/15) Revision 2.
- World Health Organisation (WHO) Guidelines for Community Noise 1999, Night Noise Guidelines for Europe, 2009 and Noise Guidelines for the European Region, 2018.
- Mayo County Council Noise Action Plan 2024-2028.
- Sligo County Council Noise Action Plan 2024-2028.
- Previous experience on similar projects.

A summary of the planning policy, legislation, technical guidance and standards relevant to Noise and Vibration is provided below in Table 13-1.

Table 13-1 — Planning policy, legislation, technical guidance and standards

Document Title	Description / Relevance
Policy	
Environmental Protection Agency (EPA) NG4: Guidance note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities	The EPA NG4 Guidance Note serves as the main national reference for evaluating, measuring, and reporting environmental noise from industrial and commercial operations licensed by the Environmental Protection Agency (EPA).
BS 4142 2014 A1+ 2019 Methods for rating and assessing industrial and commercial sound	BS 4142:2014+A1:2019 is the British Standard used to measure and assess the impact of sound from industrial and commercial sources on people in nearby residential areas. It is a critical tool for local authorities and acoustic professionals when evaluating planning applications or investigating noise complaints
ISO 1996-1:2016 Acoustics — Description, measurement and	ISO 1996-1:2016 is the primary international standard for defining, measuring, and assessing environmental noise in community settings. It provides a harmonised

Document Title	Description / Relevance
Policy	
assessment of environmental noise — Part 1: Basic quantities and assessment procedures	framework to ensure noise measurements and assessments are consistent and comparable globally.
British Standard 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 is the British Standard providing a code of practice for the prediction, measurement, and control of noise from construction, demolition, and open sites. It is the primary guidance used by developers, local authorities, and contractors to manage the impact of construction noise on nearby residential areas and other sensitive receptors
Transport Infrastructure Ireland (TII) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004)	The Transport Infrastructure Ireland (TII) (formerly National Roads Authority, or NRA) guidelines provide a standardised framework for managing the impact of noise and vibration during the design, planning, and construction of national road schemes in Ireland.
Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration (formerly HD 213/11, IAN 185/15) Revision 2	LA 111 Noise and Vibration is a core document within the Design Manual for Roads and Bridges (DMRB) that sets out the requirements for assessing and reporting the noise and vibration effects of road projects. It was last significantly updated in 2020 (Revision 2) to streamline and replace older guidance like HD 213/11.
Mayo County Council Noise Action Plan 2024-2028	The Mayo County Council Noise Action Plan 2024–2028 is a four-year strategic framework designed to monitor and manage environmental noise from major roads within the county. Developed under the Environmental Noise Regulations, it focuses on protecting public health by identifying areas of high noise exposure and implementing mitigation measures.
Sligo County Council Noise Action Plan 2024-2028	The Sligo County Council Noise Action Plan 2024–2028 is a strategic framework developed to manage and reduce the harmful effects of environmental noise from major road traffic within the county. Prepared under the Environmental Noise Regulations, it follows a mandated four-year cycle to align with European-wide noise management standards.

13.3 Study Assessment and Methodology

13.3.1 Methodology

The study identifies potential effects on “Noise Sensitive Locations” (NSLs) which comprise of residential properties and community facilities distributed along the full extent of the Red Line Boundary. While operational noise is reviewed, the most significant impacts are anticipated during the construction stage. The assessment methodology is informed by established industry data and previous experience with similar infrastructure projects.

The noise and vibration impact assessment has followed the overall methodology and guidance relating to the EIA process and preparation as set out in Chapter 1 - Introduction of this EIAR. The impact of the Proposed Development arising from noise and vibration effects has been assessed for both the construction and operational phases by considering the requirement to use heavy plant and machinery during the construction of Ballina and Lough Talt Water Supply Upgrade.

Decommissioning has not been assessed as part of this assessment. The Proposed Development comprises long-term water supply infrastructure that is intended to remain in operation for the foreseeable future (see Chapter 3 – Project Description). Any future decommissioning requirements would be subject to the operational requirements and condition of the infrastructure at that time and would be undertaken in accordance with the applicable environmental and regulatory requirements.

Following industry-standard noise assessment procedures, this Chapter evaluates the Proposed Development in distinct phases. These include the installation of water trunk mains and the construction or upgrading of various stations along the main corridor, as detailed below;

- Upgrades to Wherrew Raw Water Intake and Pumping Station (Wherrew RWI&PS);
- Upgrade of Lisglennon Raw Water Storage and Pumping Station (Lisglennon RWS&PS);
- New raw water transfer mains from Lisglennon RWS&PS to Lisglennon Water Treatment Plant (Lisglennon WTP);
- Upgrades to Lisglennon Water Treatment Plant & Treated Water Storage;
- New and upgraded trunk mains from Lisglennon WTP to Bonniconlon Booster Pumping Station (Bonniconlon BPS);
- New Booster Pumping Station near Bonniconlon;
- New Bonniconlon Treated Water Reservoir (Bonniconlon Reservoir);
- New trunk main from Bonniconlon BPS to new Windy Gap Break Pressure Tank (Windy Gap BPT) and on to Lough Talt Water Treatment Plant (WTP); and
- Existing Lough Talt WTP Site & Reservoir.

13.3.2 Noise Assessment Criteria

The noise and vibration impact assessment will consider the effect of construction and operational noise and vibration on nearby receptors. The methodologies and guidance within the following documents have been referred to within the assessment.

13.3.2.1 Construction Noise Assessment Criteria

There is currently no statutory Irish guidance for construction noise requirements from noise during the construction phase of a project.

In the absence of specific noise limits, the appropriate criteria for the allowable construction noise levels may be found in British Standard 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).

The standard provides examples of acceptable limits for construction and/or demolition noise in both subjective and objective form. For example, paragraph E.2 of the standard 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".

Local planning authorities typically use BS 5228-1:2009+A1 to regulate construction noise impact. Consequently, this serves as the de facto standard when explicit regulatory guidance is unavailable. For specific noise limits, Transport Infrastructure Ireland (TII) outlines permissible construction noise levels across various operating hours in Table 13-2 of its *Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004)*.

As an infrastructure development, this project adopts a daytime limit of 70 dB(A) L_{eq1hr} in accordance with the TII Guidance. The corresponding maximum allowable construction noise levels at dwelling façades are detailed in Table 13-2.

Table 13-2 — TII Maximum noise levels permissible at the façade of dwellings during construction

Day	Noise Levels dB	
	$L_{Aeq(1hr)}$ dB	$L_{pA(max)}$ dB
Monday to Friday 07:00 to 19:00hrs	70	
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 13:00hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60*	65*

Note: *Work at these times will require the permission of the local authority.

Construction noise predictions are undertaken following the following methodology:

$$SPL_2 = SPL_1 - 20\log(R_2/R_1)$$

Where:

SPL2 is the sound pressure level at the receptor.

SPL1 is the sound pressure level at the measurement location (10m for construction noise predictions).

R2 is the distance from the noise source to the receptor.

R1 is the distance from the noise source to the measurement location (10m).

Construction noise calculations are based on assumed site construction works and a combination of the plant operating at the same time i.e. worst-case scenario.

13.3.2.1.1 Construction Traffic Noise Criteria

There is currently no Irish legislation that limits noise levels from construction traffic to a limit value. Hence the impact of off-site traffic associated with construction phase of the Proposed Development has been assessed with respect to the UK Highways Agency publication, *Design Manual for Roads and Bridges LA111 – Noise and Vibration* Revision 2, (2020). This document presents details on the classification of magnitude of noise impacts and noise level changes and associated magnitude of impact are presented in Table 13-3.

Table 13-3 — Noise Level – Magnitude of Impact (Highway Agency, UK)

Magnitude of Impact	Increase in Baseline Noise Level of Closest Public Road Used for Construction Traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Source: UK Highways Agency publication, Design Manual for Roads and Bridges LA111 – Noise and Vibration Revision 2, UK Highways Agency (2020)

The thresholds will apply to residential buildings and receptors with a high sensitivity as described in Table 13-8. Commercial buildings (offices, industrial facilities, sport clubs, etc.) are considered less noise sensitive and can tolerate greater increases in baseline noise level.

13.3.2.2 Construction Vibration Criteria

Best practice guidance is taken from the TII *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes* (2004).

The standard recommends that for a soundly constructed residential property and similar structures (in good repair), the threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a Peak Particle Velocity (PPV) (in frequency range of predominant pulse) of 8 mm/s at 10Hz increasing to 12.5 mm/s at 10-50Hz and 20 mm/s at 50-100Hz and above. Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration is outlined in Table 13-4.

Table 13-4 — Likely Construction Vibration Impact

	Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:		
Building Type	**<10Hz**	**10-50Hz**	**50-100Hz (and above)**
Light framed structures/ residential buildings	8 mm/s	12.5 mm/s	20 mm/s

Source: Transport Infrastructure Ireland (TII) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2004), Table 2: Allowable vibration during road construction in order to minimise the risk of building damage.

13.3.2.3 Operational Plant Noise

Noise limits for new developments are typically sought from the planning authority's Noise Action Plan, EPA NG4/BS 4142. On review of the Mayo County Council Noise Action Plan 2024-2028 and Sligo County Council Noise Action Plan 2024-2028 no specific guidance has been outlined for noise limits from commercial premises and therefore the criteria from EPA NG4/BS 4142 have been adopted for the project.

13.3.2.3.1 EPA NG4

The EPA NG4 Guidance establishes the standard for measuring, assessing, and managing industrial noise at sensitive locations in Ireland. It mandates a multi-stage approach to determine baseline noise environments, including screening for quiet areas, assessing low background noise, and setting specific daytime and nighttime noise limits.

Quiet Area Screening

The screening phase determines if a development site is located within an officially recognised "Quiet Area" to ensure its natural tranquillity is preserved. To be classified as a Quiet Area, a location must meet specific distance-based exclusion criteria from urban areas, industry, and major roads (ranging from 3 km to 15 km depending on size). Failure to meet these criteria leads directly to baseline testing.

Low Background Noise Assessment

If not a "Quiet Area," a survey determines if the site has naturally low background noise, defined as meeting specific L_{AF90} thresholds:

- Average Daytime Background Noise Level ≤40dB L_{AF90}, and;
- Average Evening Background Noise Level ≤35dB L_{AF90}, and;
- Average Night-time Background Noise Level ≤30dB L_{AF90}.

If all three of the above criteria are satisfied for any of the measurement locations, then those locations are deemed to be in areas of low background noise, and reduced noise limit criteria (in comparison to the EPA NG4 Standard Noise Limits) would apply.

EPA NG4 Standard Noise Limits:

EPA NG4 outlines that noise attributable to onsite activities from an EPA licenced premises should not exceed the following limits:

- Daytime (07:00hrs – 19:00hrs): 55dB $L_{Ar,T}$
- Evening (19:00hrs – 23:00hrs): 50dB $L_{Ar,T}$
- Night time (23:00hrs – 07:00hrs): 45dB $L_{Aeq,T}$

During daytime and evening periods, effort must be made to eliminate clearly audible tonal and impulsive noise components at all sensitive receptors. To account for these characteristics, a 5 dB penalty should be applied to the measured daytime and evening $L_{Aeq,T}$ values to determine the final rating level ($L_{Ar,T}$), in the event that tonal/impulsive noise exists. In all cases, this assessment must be conducted by a competent person.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

13.3.2.3.2 BS 4142:2014+A1:2019

The standard describes a method for the assessment of commercial, industrial and background noise to quantify its impact on persons outside of a residential dwelling. BS 4142 has become the de facto standard for compliance

investigation. In addition to the specified broadband noise levels the standards provide objective and subjective methods for the assessment of the impulsivity and tonality of the noise sources. This allows for an acoustic feature correction to be applied to the measured noise level of the source (L_{Aeq}) to give the rating level ($L_{Ar,T}$).

BS 4142 outlines guidance for penalty corrections to be applied to the noise sources in question should the noise source have one of the following characteristics:

- The noise contains a distinguishable, discreet, continuous tone (whine, or hum);
- The noise contains distinct impulses (i.e. bangs),
- The noise is intermittent or:
- The noise is irregular.

BS 4142 considers the likelihood of impact by considering the margin by which the rated noise source exceeds the background sound level. BS 4142 states that:

- "Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context, and;
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance".

BS4142 also requires the consideration of "context" and comments that:

> *"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"*
>
> *"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood".*

The introduction of "context" to the BS 4142 assessment includes consideration of what is commonly acceptable in terms of the "absolute level of sound", the sound emission characteristics and the sensitivity of the receptor. In this regard the "absolute level of sound" limits presented in the EPA NG4 Guidelines are proposed for this project.

13.3.2.4 Operational Vibration

Operational vibration criteria have been established in accordance with BS 6472-1:2008 (Guide to evaluation of human exposure to vibration in buildings). This standard is utilised to assess human response to internal building vibration through Vibration Dose Values (VDV), measured in metres per second to the power of 1.75 ($m.s^{-1.75}$). The specific assessment criteria for residential buildings during both daytime (16-hour) and night-time (8-hour) periods are presented below in Table 13-5.

Table 13-5 — Vibration Dose Value Ranges Which Might Result In Various Probabilities Of Adverse Comment Within Residential Buildings

Place and time	Low probability of adverse comment m·s-1.75	Adverse comment possible m·s-1.75	Adverse comment probable m·s-1.75 2
Residential buildings 16 h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

13.3.2.5 Acoustic Modelling

A model of the Proposed Development using SoundPLAN 9.1 modelling software will be developed to establish the noise levels from the Proposed Development in operation in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc),
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source,
- Atmospheric attenuation and meteorological effects.

The SoundPLAN 9.1 predictive model uses methodology via a ray tracing method, in principle the modelling follows the general principles of the following formula outlined in ISO 9613 Part 1 and Part 2: *Acoustics -Attenuation of sound during propagation outdoors*:

$$L_p=L_w\text{-}20\ \log_10\ 〖(R)\text{-}11\text{-}A\text{-}B〗\ \text{-}G$$

Where:

Lp is the sound pressure level at a particular point.

Lw is the sound power level of the plant and equipment.

R is the distance from the noise source at which the sound pressure level is predicted.

11 is a constant based on a noise source with omnidirectional directivity.

A considers the correction reduction in noise levels via atmospheric conditions.

B considers the correction reduction in noise levels due to noise barriers.

G considers the correction reduction in noise levels due to ground absorption and topography.

The acoustic model for the Proposed Development has been developed based on attended and unattended noise surveys and the proposed site location and predicted noise sources. As the site has potential to create noise impact at both day and nighttime, a worst-case scenario has been developed for both predicting the noise impact at the nearest NSLs.

Noise levels at the NSLs were assessed to the height of the worst-case façades (4m for all NSLs), to predict the noise levels at the first-floor bedrooms of the nearest NSLs.

13.3.3 Desktop Study

Information on potential NSLs within the surrounding area of the Proposed Development was collected through desktop review of the data sources summarised within Table 13-6 below. NSLs were identified as residential properties in proximity to the Proposed Development. Further information on NSLs is outlined in Section 13.6.1 of this Chapter.

Table 13-6 — Summary of desktop study sources

Title	Source	Year
OS Open Data Mapping & Terrain	Ordnance Survey	2026
Google Earth Imagery	Google Earth	2026

13.3.4 Baseline Surveys

Unattended and attended baseline noise monitoring surveys were conducted to quantify the existing noise environment. The attended measurement surveys included measurements across the site and attended measurements of traffic noise from local roads. The purpose of the measurements was to quantify the existing noise environment to assess the impact of the Proposed Development from operational noise and construction noise. Attended and unattended measurement locations are representative of the areas across the Proposed Development site. The unattended and attended noise monitoring locations are listed below;

- L1 – Lisglennon WTP
- L2 – Lough Talt WTP
- A1 – Windy Gap BPT
- A2 – Bonniconlon Reservoir
- A3 – Bonniconlon BPS
- L3 – Bonniconlon BPS
- A4 – Wherrew RWI&PS

The unattended noise measurements were undertaken on Friday the 21st of November 2025 at 09:00hrs at L1– Lisglennon WTP and 10:15hrs at L2– Lough Talt WTP and collected on Tuesday 25th of November 2025 at 13:00 at L1 – Lisglennon WTP and 12:00hrs at L2 - Lough Talt WTP. Unattended noise measurements were undertaken at L3 – Bonniconlon BPS at 18:30hrs on Tuesday 16th June 2026 and collected on Wednesday 17th of June 2026 at 11:07hrs. Attended measurements were taken on Thursday 20th and Friday 21st November 2025 at A1 - Windy Gap BPT, A2 – Bonniconlon Reservoir, A3 - Bonniconlon BPS and A4 – Wherrew RWI&PS.

Supplementary attended monitoring was conducted between the 25th – 26th May 2026 at noise monitoring location A4 - Wherrew RWI&PS. This included 30mins of attended monitoring at 17:37hrs on Monday 25th May 2026 and 30mins of attended monitoring at 00:56hrs on Tuesday 26th May 2026. Figure 13-1 below illustrates baseline noise monitoring survey locations.

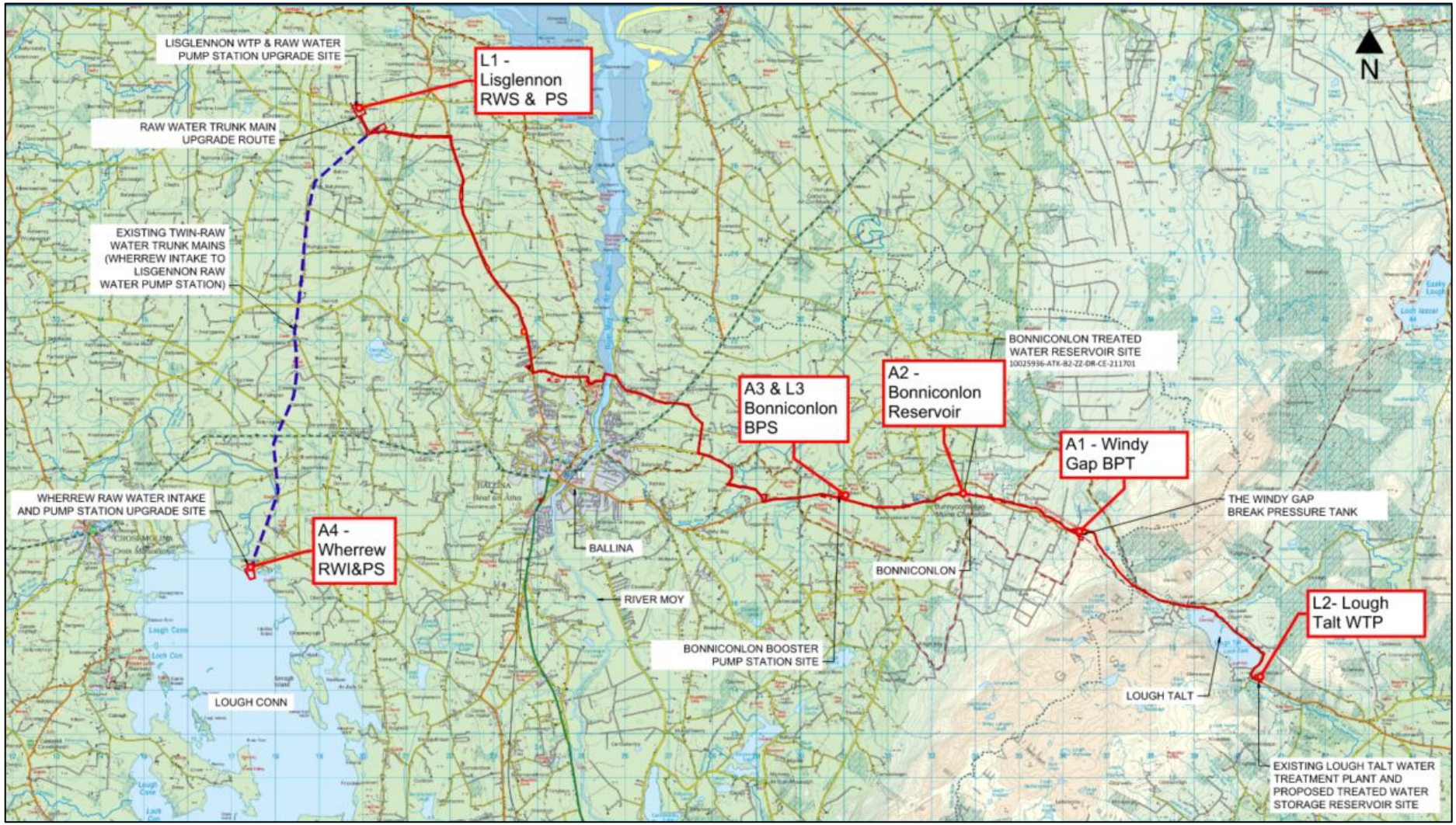


Figure 13-1 — Noise Monitoring Survey Locations

13.3.4.1 Survey Methodology and Personnel

The attended survey was conducted on the 20th and 21st of November 2025 by Paraic Hayden (Field Engineer) and the unattended survey was completed by Paraic Hayden (Field Engineer) on the 21st of November 2025 to the 25th of November 2025, and by Dan Cousins (Field Engineer) at L3 – Bonniconlon BPS between Tuesday 16th June 2026 and Wednesday 17th of June 2026. Supplementary monitoring was conducted between the 25th – 26th May 2026 at noise monitoring location A4 – Wherrew RWI&PS by Jack Nolan (Field Engineer).

13.3.4.1.1 Unattended Noise Measurements

For unattended noise monitoring at locations L1 – Lisglennon WTP, L2– Lough Talt WTP and L3 – Bonniconlon BPS, the loggers were positioned in a free field position at approximately 1.5 m above the ground. The logger was calibrated before and after the measurements and no significant drift was noted. Measurements were filtered for periods of unsuitable weather conditions (where appropriate).



Figure 13-2 — Unattended Noise Monitoring Locations L1 – Lisglennon WTP and L2 – Lough Talt WTP



Figure 13-3 — Unattended Noise Monitoring Location L3 – Bonniconlon BPS

13.3.4.1.2 Attended Noise Measurements

Attended noise measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were recorded in durations of 15 minutes at all noise monitoring locations as noted in Figure 13-1. Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately 1.5 m above ground level (ABL). The weather conditions were calm (wind less than 5 m/s) with no rain, a wind shield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.



Figure 13-4 — Attended Noise Monitoring Locations A1 - Windy Gap BPT and A2 – Bonniconlon Reservoir (representative)



Figure 13-5 — Attended Noise Monitoring Locations A3 - Bonniconlon BPS and A4 - Wherrew RWI&PS

13.3.4.2 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended and unattended measurements. Table 13-7 summarises the measurement equipment used.

Table 13-7 — Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM 11	NTI XL3	A3A-01753-F0	UCRT25/1878	12/06/2027
Sound Level Meter	SLM 4	NTi XL2-TA	A2A-23316-E1	TRAC25/09419	18/09/2027
Calibrator	Cal 3	Nor 1251 Calibrator	32096	AC250308	22/07/2026

13.3.5 Data Limitations

13.3.5.1 Construction Methodology

While the specific number and type of plant and working methods utilised during the construction phase of the Proposed Development cannot be specified at this stage, assumptions have been made based on professional judgement and experience with similar projects. The Design at this stage is presented in Chapter 3 – Project Description. The assessment has been based on typical construction activities for this type of infrastructure, using sound source terms from BS 5228-1:2009+A1:2014 and professional judgement. This is a standard approach and is considered to be an acceptable and robust method. Details on the assumed plant items are provided in Section 13.6.2 of this Chapter.

The construction methodology evaluates all aspects of the proposed works—including water trunk main installation and infrastructure upgrades and new infrastructure —using a linear assessment model. This approach predicts noise impact levels at various distance bands from the site boundary, specifically accounting for distinct project stages: site setup, demolition, substructure, superstructure, and external finishes.

13.3.5.2 Noise Sensitive Locations (NSLs)

To provide a robust impact analysis, a distance-band assessment methodology has been adopted for the construction noise assessment relating to the linear pipeline construction works. For the seven infrastructure sites, site-specific modelling was undertaken. Predicted construction noise levels have been calculated at 25 m, 50 m, and subsequent 50 m increments up to a boundary of 400m from the works. This method allows for a clear categorisation of potential noise impacts for all receptors based on their specific proximity to construction activities. Individual receptors (typically the closest NSLs) to the proposed fixed infrastructure sites have been assessed for both construction and operational phases.

13.3.5.3 Operational Sound Source Data

A quantitative assessment has been undertaken based on source levels provided by the client, plant manufacturer and measurement data on similar types of equipment from the Wave Dynamics (WD) database. The WD database contains noise source data compiled from previous, similar acoustic modelling projects.

13.3.5.4 Prediction Methods and Assessment

The calculated noise levels presented in this Chapter have been established using BS 5228-1:2009+A1 and SoundPlan 9.1 noise modelling software for operational noise level predictions using ISO 9613-2:1996 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*.

13.3.6 Impact assessment criteria and significance of effects

13.3.6.1 Significance of Effects

The significance of noise and vibration effects means the importance of the outcome of the noise and vibration effects on the receptors. The significance is a function of the magnitude and quality of the effect, positive or adverse, the geographical extent and duration of the effect, the frequency and likelihood of the effect occurring and the sensitivity of the receptor. The significance is assessed by weighing up these attributes and categorising it according to the generalised degree of impact significance set out in the EPA 2022 guidance.

13.3.6.2 Determining value and sensitivity of Noise Receptors

There is currently no statutory guidance document on the sensitivity of receptors in Ireland. Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and other noise sensitive locations. Site and project specific considerations play a part in determining the sensitivity of a receptor. The sensitivity of receptors to noise and vibration commonly used for noise impact assessments in Ireland is defined in Table 13-8.

Table 13-8 — Criteria to Define Receptor Sensitivity

Sensitivity	Description	Examples of Receptors	Modifiers
High	Receptors where people or operations are particularly susceptible to noise	Residential, including private gardens where appropriate. Hospitals/residential care homes. Schools during the	Magnitude and Character of Baseline Noise and period of occupancy

		daytime. Quiet outdoor areas used for recreation. Places of worship	
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices/Bars/Cafes/Restaurants where external noise may be intrusive. Community facilities and amenity areas. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, fishing and golf). Wildlife refuges. Recording studios and concert halls are also included in this category	Magnitude and Character of Baseline Noise and period of occupancy
Low	Receptors where distraction or disturbance from noise is low	Buildings not occupied during the daytime. Sports grounds when spectator noise is a normal part of the event. Night Clubs.	Magnitude and Character of Baseline Noise and period of occupancy
Negligible	Receptors where distraction or disturbance from noise is negligible	All other areas such as those used primarily for industrial or agricultural purposes.	Magnitude and Character of Baseline Noise and period of occupancy

The majority of receptors which have the potential to be affected by noise and vibration effects arising from the Proposed Development are the residents of dwellings in the vicinity of the Proposed Development. Residents, due to the nature and use of residential receptors are deemed to have 'High' sensitivity. Community facilities along with commercial developments are considered 'Medium' sensitivity during daytime periods with the sensitivity reducing to 'Low' during evening for commercial developments. At night-time periods both community facilities and commercial developments are considered low sensitivity as they have reduced occupancy or are unoccupied. Receptors with lower sensitivity to noise include other industrial developments.

13.3.6.3 Determining impact magnitude

13.3.6.3.1 Construction Noise

The TII publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (2004) contains information on the permissible construction noise levels for various hours of operation. The noise level limits are outlined in Table 13-9. Given that this is an infrastructure type project, the TII guidelines' daytime limit of 70 dB $L_{Aeq\ 1hr}$) has been adopted as the appropriate criterion. Table 13-9 below outlined the impact magnitude of construction noise.

Table 13-9 — Construction Noise – Significance of the Impact

Noise Levels	EPA Magnitude of Impact	Significance Rating
≤ Baseline noise level	Negligible	Imperceptible / Not Significant
> Baseline noise level and ≤ TII Guidelines threshold 70 dB ($L_{Aeq\ 1hr}$)	Low	Slight/ Moderate
> BS 5228	Medium	Moderate/

Noise Levels	EPA Magnitude of Impact	Significance Rating
threshold to ≤ TII Guidelines threshold + 5 dB		Significant
> TII Guidelines threshold +5 to + 10 dB	High	Significant/ Very Significant
> + 10 dB		Very Significant / Profound

For assessing the significance of effect, reference has been made to the EPA Guidelines (2022) and specifically the DMRB which states: "*Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding: 1) 10 or more days or nights in any 15 consecutive days or nights; or A total number of days exceeding 40 in any 6 consecutive months*."

13.3.6.3.2 Construction Traffic Noise

Section 13.3.2.1.1 outlined the DMRB magnitude of impact criteria used to determine the construction traffic noise effect. For assessing the significance of effect, reference is made to the EPA Guidelines (2022) and the DMRB with the same criteria used for construction noise and construction traffic noise. Table 13-10 presents the construction traffic noise significance rating. The significance of effect is assessed based on the predicted noise level increase at noise sensitive locations.

Table 13-10 — Construction Traffic Noise – Significance of Effects

Noise Level Increase at NSLs (dB)	DMRB Magnitude	EPA Magnitude of Impact	Significance Rating
Less than 1.0	Negligible	Negligible	Imperceptible / Not Significant
1.0 to 2.9	Minor	Low	Slight/ Moderate
3.0 to 4.9	Moderate	Medium	Moderate/ Significant
Greater than or equal to 5.0	Major	High	Significant/ Very Significant

13.3.6.3.3 Construction Vibration

Section 13.3.2.2 outlined guidance on effects of vibration levels on humans and limits of transient vibration, above which cosmetic damage could occur. For assessing the significance of effect, reference is made to the EPA Guidelines (2022) and specifically the DMRB which states: "*Construction vibration shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding: 1) 10 or more days or nights in any 15 consecutive days or nights; 2) A total number of days exceeding 40 in any 6 consecutive months*." Table 13-11 presents the construction vibration significance rating.

Table 13-11 — Construction Vibration – Significance of Effect

Vibration Level	DMRB Magnitude	EPA Magnitude of Impact	Significance Rating
Less than 0.3 mm/s	Negligible	Negligible	Imperceptible / Not Significant
Greater than or equal to 0.3 mm/s and less than 1.0 mm/s	Minor	Low	Slight/ Moderate

Vibration Level	DMRB Magnitude	EPA Magnitude of Impact	Significance Rating
Greater than or equal to 1.0 mm/s and less than 10 mm/s	Moderate	Medium	Moderate/ Significant
Greater than or equal to 10 mm/s	Major	High	Significant/ Very Significant

13.3.6.3.4 Operational Plant Noise

As outlined in Section 13.3.2.3.1, BS 4142:2014+A1:2019 provides guidance on a method of assessing the effect of a source of industrial or commercial sound. The noise level change criteria associated magnitude of effect and significance rating is summarised in Table 13-12.

Table 13-12 — Operational Plant Noise – Significance of Effect

Predicted Noise Level against Background Noise Level (dB)	BS 4142 Rating	EPA Magnitude of Effect	Initial Significance Rating
Less than background	Low Impact	Negligible	Not Significant
Less than 1.0		Low	Slight/ Moderate
1.0 to 2.9			
3.0 to 4.9		Low/Medium	Moderate/Significant
5.0 to 9.9	Adverse Impact	Medium	Significant/ Very Significant
Greater than or equal to 10.0	Significant Adverse Impact	High	Very Significant /Profound

13.3.6.4 Determining significance of effect

The significance of effect is dependent on both the magnitude of effect and the sensitivity of the receptor in question. The magnitude of the effect is outlined in Section 13.3.6.3 of this Chapter. The sensitivity of receptors is outlined in Table 13-8. A four-point scale of significance of effect is presented in Table 13-13. The final assessment for each effect needs to be based upon expert judgement due to the wide range of the significance of the effect. The EPA Guidelines (2022) uses a seven-point scale and includes factors such as the likelihood, duration and frequency of activities that are considered in this context. For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant. Effects of moderate significance are further assessed using the EPA Guidelines (2022) scale to determine overall significance in EIA terms.

Table 13-13 — Matrix Used for the Assessment of the Significance of the Effect

		Magnitude of Impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**Negligible**	Imperceptible - Not Significant	Imperceptible - Not Significant	Imperceptible - Not Significant	Imperceptible - Slight
	Low	Imperceptible - Not Significant	Not Significant - Slight	Not Significant - Moderate	Slight - Profound
	Medium	Imperceptible - Not Significant	Not Significant - Slight	Slight - Significant	Moderate - Profound
	High	Not Significant - Slight	Slight - Significant	Moderate - Very Significant	Significant - Profound

13.3.7 Mitigation

Primary and secondary mitigation measures are outlined below. Primary mitigation eliminates or reduces noise at its source through design choices, operational controls, and equipment selection. Secondary mitigation controls its transmission of noise along the pathway to the receiver using physical enclosures and attenuation.

13.3.7.1 Primary Mitigation

Primary mitigation is the most effective approach because it prevents noise from being generated in the first place. The following primary mitigation measures will be considered and adopted where possible at design stage of the Proposed Development:

- Equipment Selection: Choosing "low-noise" models of machinery (e.g. using electric-drive compressors instead of diesel, or quiet-blade fans), where possible.
- Any compressors, pumps and associated pipework shall be isolated from the plantroom facings (floor, wall and ceiling) by way of suitably selected vibration isolating measures. These measures should satisfy a natural frequency that is less than 2.5 Hz in the slowest driving frequency (Fn= 2.5/RPM) of each piece of equipment with a minimum isolation efficiency of 90%.
- Plant and equipment should include vibration isolation such that the stated isolation efficiencies are achieved.
- All pump sets should be provided with concrete inertia bases with a weight at least 1.5 times the weight of the pumps they are supporting. Pumps should be mounted in pairs (running and standby) on the same slab-base. The inertia bases should be designed with sufficient strength and rigidity to support the equipment and compensate for dynamic reaction due to the equipment.
- All pump sets should be provided with open-coil spring anti-vibration mountings under the inertia bases. These should be provided with neoprene noise stop pads at least 6mm thick. The effective isolation efficiency of the installed anti-vibration mounts should be as follows:

Table 13-14 — Pump Vibration Isolation Requirements

Details	Suspended Concrete Floor	Solid Floor
Pumps > 5hp	98%	96%
Pumps < 5hp	96%	94%

- With the anti-vibration mountings fully deflected under the weight of the plant, there should be a minimum clearance of 18 mm from the underside of the inertia block to structural floor.
- All smaller in-line type pumps should only be fixed to the structure by isolated fixing bolts.
- All pipe work from pumps should be supported for a distance equivalent to 100 pipe diameters, using neoprene hangers giving a minimum static deflection of 8mm under the imposed load. Pipe work should also include suitable flexible connectors.
- Operational Constraints: Where practicable, the operation of intermittent or noisy plant and equipment should be restricted to less sensitive periods, with heavy haulage and other non-essential noisy activities avoided between 22:00 and 07:00. Where plant and equipment is required to operate continuously, appropriate noise control measures such as acoustic enclosures, hoods or other suitable mitigation should be implemented to minimise noise emissions and ensure compliance with the applicable operational noise criteria.
- During construction works, residents should be informed of any noise works scheduled where there is the potential to generate high levels of construction noise or if specialist works etc need to be conducted out of the working hours.
- Vibration Isolation: Using high-performance rubber mounts or springs on plant machinery to prevent structural vibration from turning into airborne noise.
- Process Changes: Using "press-in" piling methods for construction rather than traditional impact hammering.
- Site Layout: Placing the loudest activities (operating plant and equipment) in the centre of the site, using Proposed Development buildings as a natural buffer for the surrounding environment.
- Noise Control at Source: An acoustic hood, will be installed over the fish return system to mitigate noise during operation.

13.3.7.2 Secondary Mitigation

Secondary mitigation focuses on reducing the noise level as it travels from the source to a noise sensitive receptor. Examples of primary mitigation are as follows;

- Acoustic Enclosures: Installing purpose-built noise enclosures, designed to contain noise generated by plant or equipment and reduce its transmission to the surrounding environment .
- Enclosures: Building an "acoustic enclosure" or a full building envelope around a specific piece of noisy equipment (e.g., an engine room or a pump station).
- Silencers and Attenuators: Fitting "mufflers" to exhaust stacks and ventilation ducts to catch noise before it escapes to the atmosphere.

13.4 Existing Environment

13.4.1 Study Area

The defined Study Area includes the entire Red Line Boundary. Specific attention is directed toward the various treatment and pumping facilities situated along the corridor, where both construction-related and permanent operational effects are most likely to occur.

13.4.1.1 Noise Sensitive Locations (NSLs)

NSLs identified may experience temporary noise and vibration impacts during the construction phase. Furthermore, properties situated in the immediate vicinity of the various water infrastructure facilities are assessed for both transient construction disturbance and long-term operational noise associated with the upgraded infrastructure.

13.4.1.1.1 Construction Noise NSL's

Given the extensive geographical scale of the Proposed Development, representing every individual NSL along the corridor of the water trunk main route is considered impractical. Therefore a distance-contour assessment methodology has been employed to illustrate the potential construction noise effect for any NSL located within 400 m of the water trunk main route. This tiered approach facilitates a systematic categorisation of potential effects, ensuring that the magnitude of effect can be accurately determined for any receptor based on its proximity to the construction corridor. Appendix 13-1 contains the construction noise contour mapping, which illustrates NSLs located within 400 m of the water trunk main route. Individual receptors (typically the closest NSL's) to the proposed fixed infrastructure sites have been assessed for the construction phases.

13.4.1.1.2 Construction & Operational Noise NSL's

All water infrastructure facilities along the trunk main corridor that have the potential to generate noise (RWS, WTPs, BPS, BPT) are situated within rural and agricultural landscapes. Due to their proximity to the site, nearby residential properties are classified as noise-sensitive locations, as they have the potential to be affected by both construction and operational noise. Figure 13-6 to Figure 13-11 below illustrate NSLs in proximity to the numerous water infrastructure facilities.



Figure 13-6 — Wherrew RWI&PS



Figure 13-7 — Lisglennon RWS & PS and Lisglennon WTP

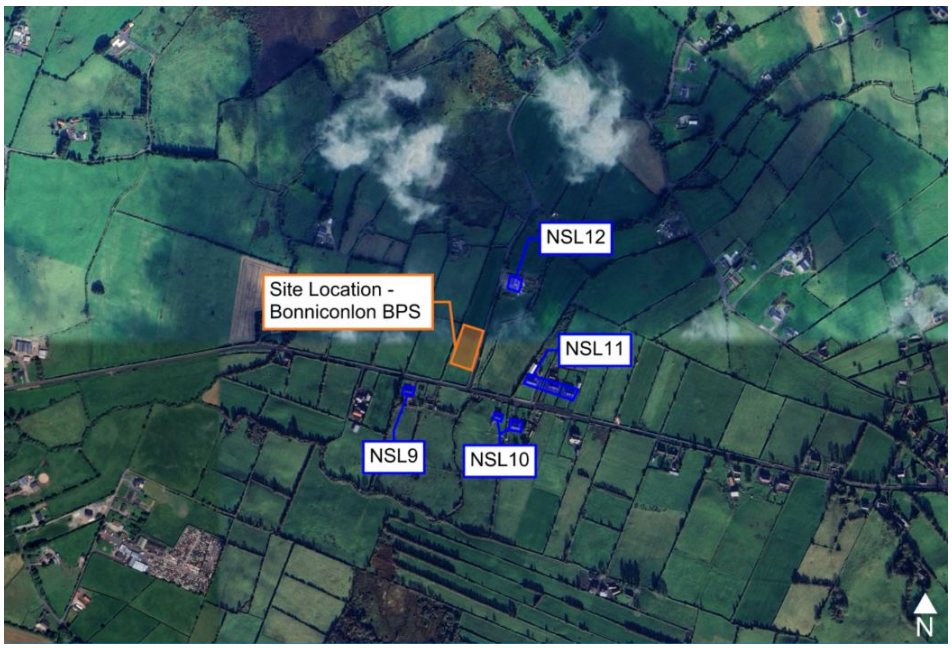


Figure 13-8 — Bonniconlon BPS



Figure 13-9 — Bonniconlon Reservoir



Figure 13-10 — Windy Gap BPT

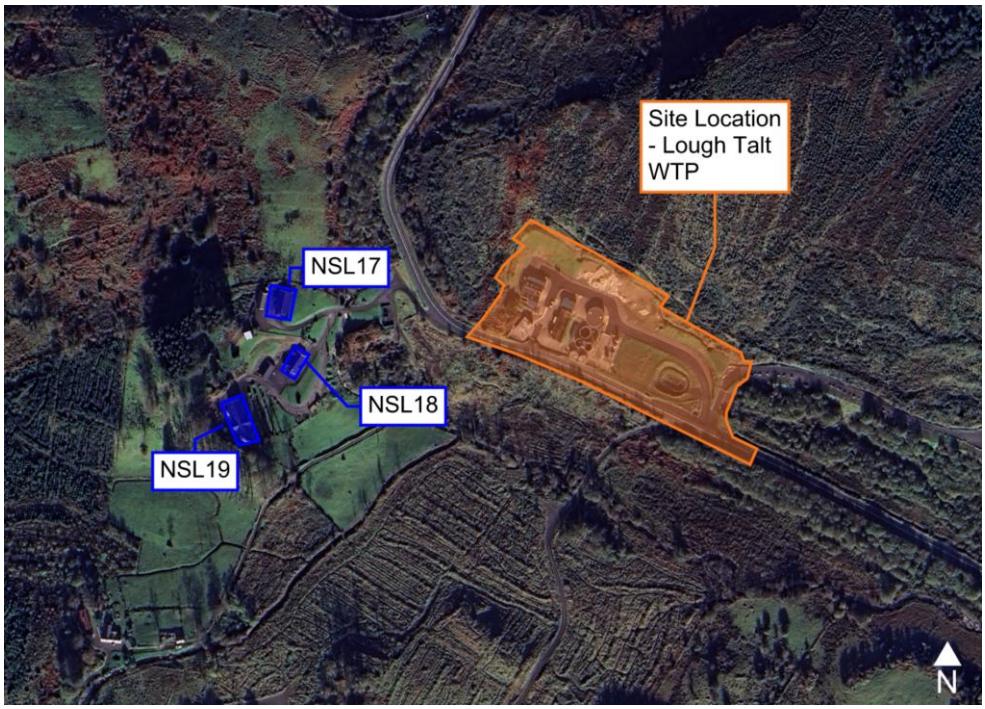


Figure 13-11 — Lough Talt WTP

13.4.1.2 Noise Monitoring Survey Results

This section outlines the results of both the attended and unattended noise monitoring survey.

13.4.1.2.1 Attended Measurement Results

Table 13-15 outlines the results of the attended measurement survey.

Table 13-15 — Attended Noise Measurement Results

Measurement					Measured Noise Levels		
Location	Coordinates	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	15:45	15:00	61	75	42
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	16:01	15:00	62	80	33
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	16:13	15:00	65	83	40
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	16:20	15:00	64	80	33
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	16:29	15:00	65	84	39
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	16:45	15:00	65	84	36
A4 - Wherrew RWI&PS	54.093450,-9.263447	20/11/2025	18:05	15:00	50	70	38
A4 - Wherrew RWI&PS	54.093450,-9.263447	20/11/2025	18:21	15:00	47	76	46
A4 - Wherrew RWI&PS	54.093450,-9.263447	20/11/2025	18:36	15:00	47	65	47
A4 - Wherrew RWI&PS	54.093450,-9.263447	20/11/2025	19:00	15:00	46	59	37
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	22:05	15:00	52	76	29
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	22:39	15:00	53	74	47
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	23:02	15:00	51	78	30
A2 – Bonniconlon Reservoir	54.113237,-9.015005	20/11/2025	23:18	15:00	44	66	29
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	23:40	15:00	51	72	27
A1 - Windy Gap BPT	54.104070,-8.974907	20/11/2025	23:57	15:00	50	73	45
L1 – Lisglennon WTP	54.188816,-9.227886	21/11/2025	08:53	15:00	50	70	42
L1 – Lisglennon WTP	54.188816,-9.227886	21/11/2025	09:08	15:00	50	81	36
L2 – Lough Talt WTP	54.073949,-8.909873	21/11/2025	10:02	15:00	52	71	39
L2 – Lough Talt WTP	54.073949,-8.909873	25/11/2025	12:15	15:00	50	65	39
L1 – Lisglennon WTP	54.188816,-9.227886	25/11/2025	13:13	15:00	50	76	29
A4 - Wherrew RWI&PS	54.093450,-9.263447	25/05/2026	17:36	30:00	45	60	38

Measurement					Measured Noise Levels		
Location	Coordinates	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
A4 - Wherrew RWI&PS	54.093450,-9.263447	26/05/2026	00:56	30:00	50	69	50
A3 - Bonniconlon BPS	54.108535,-9.046049	16/06/2026	18:46	15:00	51	67	40
A3 - Bonniconlon BPS	54.108535,-9.046049	16/06/2026	10:38	15:00	54	66	40

13.4.1.2.2 Unattended Monitoring Results at L1 – Lisglennon WTP

Table 13-16 outlines the results of noise measurements at the unattended monitoring location L1 – Lisglennon WTP.

Table 13-16 — Unattended Measurement Results at L1 – Lisglennon WTP

Start Date	$L_{Aeq,16hour}$ 07:00 - 23:00 dB	$L_{Aeq,8hour}$ 23:00 - 07:00 dB	L_{den} (00:00 - 00:00) dB	10th highest night-time L_{AFmax} dB	L_{AF90} (23:00 - 07:00) dB
21/11/2025	N/A	40	N/A	65[1]	35[1]
22/11/2025	45[1]	N/A	48[1]	N/A	N/A
23/11/2025	46[1]	45	53[1]	63	42
24/11/2025	52	41	53	63	38
25/11/2025	49[1]	N/A	50[1]	N/A	N/A

(1) Shortened measurement duration.

(N/A) Adverse weather conditions.

13.4.1.2.3 Unattended Monitoring Results at L2 – Lough Talt WTP

Table 13-17 outlines the results of noise measurements at the unattended monitoring location L2 – Lough Talt WTP.

Table 13-17 — Unattended Measurement Results at L2 – Lough Talt WTP

Start Date	$L_{Aeq,16hour}$ 07:00 - 23:00 dB	$L_{Aeq,8hour}$ 23:00 - 07:00 dB	L_{den} (00:00 - 00:00) dB	10th highest night-time L_{AFmax} dB	L_{AF90} (23:00 - 07:00) dB
21/11/2025	53	44	54	64	41
22/11/2025	51	50	53	68	44
23/11/2025	49	46	58	66	40
24/11/2025	51	43	53	62	38
25/11/2025	53	N/A	53	N/A	N/A

(N/A) Adverse weather conditions.

13.4.1.2.4 Unattended Monitoring Results at L3 - Bonniconlon BPS

Table 13-18 outlines the results of noise measurements at the unattended monitoring location L3 – Bonniconlon BPS.

Table 13-18 — Unattended Measurement Results at L3 - Bonniconlon BPS

Start Date	$L_{Aeq,16hour}$ 07:00 - 23:00 dB	$L_{Aeq,8hour}$ 23:00 - 07:00 dB	L_{den} (00:00 - 00:00) dB	10th highest night-time L_{AFmax} dB	L_{AF90} (23:00 - 07:00) dB
16/06/2026	52[1]	46	57[1]	65	30
17/06/2026	55[1]	N/A	55[1]	N/A	N/A

(1) Shortened measurement duration.

(N/A) Adverse weather conditions.

13.4.1.2.5 Discussion of Measurement Results

Baseline acoustic monitoring was undertaken across both weekday and weekend periods to quantify the ambient noise climate of the Proposed Development. Road traffic noise from local and regional roads represents the primary noise contributor across all noise monitoring locations, except for Wherrew RWPS, where night-time noise monitoring was dominated by operational plant noise from Wherrew RWPS.

Noise Monitoring Location A1 – Windy Gap BPT
- Main noise source from R294.

Noise Monitoring Location A2 – Bonniconlon Reservoir
- Main noise source from R294 and intermittent noise from L5117.

Noise Monitoring Location A3 & L3 – Bonniconlon BPS
- Main noise source from R294.

Noise Monitoring Location A4 – Wherrew RWI&PS
- Operational plant from the existing Wherrew RWI&PS was clearly audible during the attended night-time survey.
- Occasional road traffic noise.

Noise Monitoring Location L1 – Lisglennon WTP
- Main noise source is from road traffic.
- Wind turbines to the North West of the site.

Noise Monitoring Location L2 – Lough Talt WTP
- Main noise source is from R294.
- Bird song.

13.4.1.2.6 Weather Conditions for Monitoring Period

Good weather conditions were noted in general during the deployment and collection during the attended survey, with winds of less than 5 m/s and no rain for the attended surveys. Where weather conditions during the unattended survey impacted on the results, they were filtered where required.

13.4.1.3 EPA Quiet Area Screening

The EPA Quiet Area Screening methodology requires sites to be screened against specified criteria to determine whether they qualify as a ‘Quiet Area’ or ‘Low Background Noise’ area and, consequently, to establish the appropriate noise limits for the assessment. Table 13-19 presents the screening assessment undertaken for the Proposed Development to determine whether the site meets the criteria for designation as a Quiet Area. In accordance with the EPA methodology, where one or more of the screening criteria is assessed as “No”, the site does not qualify as a Quiet Area.

Table 13-19 — Quiet Area Screening

Quiet Area Screening of the Proposed Development
Screening Question
Is the site > 3 km away from urban areas with a population >1,000 people?
Is the site >10 km away from urban areas with a population >5,000 people?
Is the site > 15 km away from urban areas with a population > 10,000 people?
Is the site > 3 km away from any local industry?
Is the site > 10 km away from any major industry centre
Is the site > 5 km away from any national primary route?
Is the site > 7.5 km away from any motorway or dual carriageway?
Quiet Area?

Table 13-20 below illustrates the EPA Quiet Area Screening across the Proposed Development site.

Table 13-20 — EPA NG4 Quiet Area Screening of Proposed Operational Development Locations

Project Element	>3 km from >1,000 population urban area	>10 km from >5,000 population urban area	>15 km from >10,000 population urban area	>3 km from local industry	>10 km from major industry centre	>5 km from National Primary Route	>7.5 km from motorway / dual carriageway	Quiet Area?
Lisglennon Raw Water Storage & Pumping Station and Lisglennon Water Treatment Plant	Yes	Yes	No	Yes	Yes	Yes	Yes	**No**
Wherrew Raw Water Intake & Pumping Station (RWI&PS)	Yes	Yes	No	Yes	Yes	Yes	Yes	**No**
Bonniconlon Booster Pumping Station (BPS)	Yes	No/Borderline	No	Yes	Yes	No	Yes	**No**
Bonniconlon Reservoir	Yes	Yes	No	Yes	Yes	Yes	Yes	**No**
Windy Gap Break Pressure Tank (BPT)	Yes	Yes	No	Yes	Yes	Yes	Yes	**No**
Lough Talt Water Treatment Plant (WTP)	Yes	Yes	No	Yes	Yes	Yes	Yes	**No**

The Proposed Development comprises a geographically dispersed water supply infrastructure scheme, consisting of a number of discrete operational facilities. In accordance with the EPA's NG4 Quiet Area Screening methodology, the screening has therefore been undertaken with reference to the individual locations of the proposed operational facilities rather than applying the screening criteria to the full extent of the project corridor. The proposed trunk and transfer mains are not considered separately for the purposes of Quiet Area Screening as they do not represent permanent operational noise-generating facilities.

Based on the screening assessment, none of the proposed operational development locations is considered to be located within a Quiet Area as defined by EPA NG4. In particular, the proposed facilities are located within the screening distance of Ballina, which has a 2022 Built Up Area population of 10,556 persons and therefore exceeds the 10,000-person threshold specified in NG4. As a result, the relevant locations do not satisfy the requirement to be greater than 15 km from an urban area with a population greater than 10,000 persons.

13.4.1.3.1 EPA Areas of Low Background Noise

For all areas not identified as Quiet Areas, the existing background noise levels measured during the environmental noise survey should be examined to determine if they are located in an area of low background noise, which would mean satisfying each of the following criteria:

- Average Daytime Background Noise Level ≤40dB L_{AF90}, and;
- Average Evening Background Noise Level ≤35dB L_{AF90}, and;
- Average Night-time Background Noise Level ≤30dB L_{AF90}.

If all three of the above criteria are satisfied for any of the measurement locations, then those locations are deemed to be in areas of low background noise, and reduced noise limit criteria would apply.

Unattended noise monitoring results from locations L1 (Lisglennon WTP), L2 (Lough Talt WTP), and L3 (Bonniconlon BPS) were utilised to assess the baseline environment across the study area against the "Area of Low Background Noise" criteria. Table 13-21 outlines the average daytime, evening, and night-time noise levels recorded at these locations.

Table 13-21 — Average Daytime, Evening and Night-time Noise Levels at Monitoring Locations L1 – Lisglennon WTP, L2 – Lough Talt WTP and L3 - Bonniconlon BPS

Noise Monitoring Location	Average Daytime L_{AF90} (07:00 - 19:00)	Average Evening L_{AF90} (19:00 – 23:00)	Average Night-time L_{AF90} (23:00 - 07:00) dB
L1 – Lisglennon WTP	40	41	38
L2 – Lough Talt WTP	41	40	41
L3 - Bonniconlon BPS	42	34	34

As illustrated in Table 13-21, the L_{A90} measurements recorded at these noise monitoring locations exceed the thresholds defined by EPA NG4 guidance. Consequently, these specific monitoring locations do not qualify for an official "Area of Low Background Noise" designation.

However, given the expansive, linear nature of the Proposed Development, a significant portion of the infrastructure routing traverses highly rural, remote, and inherently quiet terrain situated between the baseline monitoring locations. Therefore, to ensure a robust and conservative "worst-case scenario" assessment, the project has voluntarily adopted the more stringent noise limits associated with an Area of Low Background Noise across the entire development site, with the singular exception of Wherrew RWI&PS.

At Wherrew RWI&PS, night-time attended noise survey results demonstrated that the existing operational plant at this location continuously contributes to the ambient environment. Because these existing baseline sound levels exceed the NG4 night-time threshold, Wherrew RWI&PS does not qualify as an Area of Low Background Noise. Consequently, standard EPA NG4 operational limits are applied at this specific site.

This dual-framework approach ensures maximum protection for all existing and potential future NSLs along the corridor while accurately reflecting the localised baseline environment. The specific operational noise limits applied to the Proposed Development are defined as follows:

The following Area of Low Background Noise limits apply to the General Project Corridor & Facility Sites (Excluding Wherrew):

- Daytime (07:00hrs – 19:00hrs) – 45dB $L_{Ar,T}$
- Evening (19:00hrs – 23:00hrs) – 40dB $L_{Ar,T}$
- Night time (23:00hrs – 07:00hrs) – 35dB $L_{Aeq,T}$.

Standard EPA NG4 noise limits apply Wherrew RWI&PS due to existing operational plant:

- Daytime (07:00hrs – 19:00hrs) – 55dB $L_{Ar,T}$
- Evening (19:00hrs – 23:00hrs) – 50dB $L_{Ar,T}$
- Night time (23:00hrs – 07:00hrs) – 45dB $L_{Aeq,T}$.

13.4.2 Future Baseline

In accordance with EPA EIAR guidelines, a noise impact assessment must outline how the local acoustic environment would evolve if the project were not built. Given its scale, the Proposed Development area encompasses rural, urban, and semi-urban settings where road traffic is the primary noise source. In a "Do Nothing" scenario, the soundscape would remain defined by these traffic trends and the continued operation of existing water infrastructure.

No significant change to the future baseline scenario, in the absence of the Proposed Development, is anticipated other than that which may be caused by cumulative developments (assessed in Section 13.8). There is no evidence to suggest NSLs would be introduced which would be closer than those which have been assessed; therefore, the adopted baseline assumptions are considered representative of the future baseline conditions over the operational life of the Proposed Development.

13.5 Potential effects

The full project description and construction methodology is set out in Chapter 3 – Project Description, however a summary of key parameters with the potential to impact NSLs is provided below.

13.5.1 Assessment Status of the Proposed Development

Due to the asset distribution and varying infrastructure components across the project footprint, an engineering screening was conducted to identify relevant emission sources. Table 13-22 summarises the assessment status for each facility, detailing the specific internal and external plant items included in the noise and vibrational assessment or the technical rationale for their exclusion.

Table 13-22 — Summary of Operational Noise and Vibration Assessment by Facility

Facility Name	Operational Noise Assessed?	Plant Included in Noise Model	Plant Excluded from Noise Model (Rationale)	Operational Vibration Impact & NSL Separation Distances
Wherrew Raw Water Intake and Pumping Station	**Yes**	Internal operational plant (breakout noise) Fish return system	Standby generator (Emergency use only; operation is infrequent).	**No Adverse Effect** Nearest NSLs (1–4) range from 35m to 175m away. Ground vibration drops 70%–80% within 20m. Residual amplitudes drop completely below human perception (PPV <15mm/s at 4Hz) and BS 6472-1 VDV thresholds.
Lisglennon Raw Water Storage and Pumping Station	**Yes**	Internal operational plant (breakout noise)	None specified.	**No Adverse Effect** Co-located with WTP. Nearest NSLs (5–8) range from 78m to 319m away. Plant is highly attenuated by distance. Vibration levels remain well below cosmetic damage and human comfort thresholds.
Lisglennon Water Treatment Plant	**Yes**	Pump & UV Filtration building (internal breakout) MV Substation (breakout noise) Mixer motors for equalisation & wash water tanks Sludge pumps, dewatering pumps, and compressors	Submersible and underground equipment (Negligible noise impact on NSLs).	**No Adverse Effect** Nearest NSLs (5–8) range from 78m to 319m away. Ground vibration drops 70%–80% within 20m. Residual amplitudes at these distances fall completely below human perception thresholds.
BonniconIon Booster Pumping Station	**Yes**	Pumping station building (internal breakout) MV Substation (breakout noise) External motors and compressors	Standby generator (Emergency use only; operation is infrequent).	**No Adverse Effect** Nearest NSLs (9–12) range from 105m to 159m away. Significant separation distance ensures ground vibration is heavily attenuated.

Facility Name	Operational Noise Assessed?	Plant Included in Noise Model	Plant Excluded from Noise Model (Rationale)	Operational Vibration Impact & NSL Separation Distances
				Safe from structural risk and human discomfort.
BonniconIon Reservoir	**No**	None	Entire site (No major mechanical plant required; emissions negligible and inaudible at boundary).	**No Adverse Effect** Nearest NSLs (13–15) range from 42m to 89m away. No major mechanical or vibrational plant is required at this site. Residual vibration amplitudes are negligible at the boundary.
Windy Gap Break Pressure Tank	**No**	None	Entire site (All infrastructure and plant located below ground level; Negligible impact on NSLs).	**No Adverse Effect** Nearest NSL (16) is highly remote at 442m away. All operational plant and infrastructure are located below ground level. Zero vibration impact on nearby receptors.
Lough Talt Water Treatment Plant	**Yes**	Internal plant within buildings Chemical storage tank pumps (external) Compressor (external) Motor control valves for repurposed chlorine tanks & new reservoir (external)	None specified.	**No Adverse Effect** Nearest NSLs (17–19) range from 169m to 220m away. Ground vibration drops 70%–80% within 20m. Residual amplitudes at these large distances fall entirely below human perception.

13.5.2 Summary of potential effects

The potential effects to NSLs scoped into the assessment are listed below in Table 13-23.

Table 13-23 — Potential effects scoped into the assessment

Impact	Description of effect	Notes
Construction		
Effect 1	Construction related noise & vibration; Site Clearance & Enabling Works; Trenching & Excavation; Pipe Laying & Specialised Crossings; Piling & Compaction	Noise from vegetation removal, topsoil stripping, and the establishment of temporary access tracks or construction compounds. Impacts from heavy machinery used for rock breaking, crushing and screening. Noise from side-booms, welding equipment, and specialised techniques like Horizontal Directional Drilling (HDD) used to cross roads or rivers.

Impact	Description of effect	Notes
Effect 2	Construction Vibration	Potential vibration from specialised techniques like Horizontal Directional Drilling (HDD) and heavy vibrating compaction machinery used during backfilling.
Effect 3	Construction Traffic	The potential noise impacts of construction-related traffic.
Operation and Maintenance (O&M)		
Effect 4	Operational Plant and Equipment	Fixed plant noise from external pumps and motors. Assessments often require these to be 5 dB(A) below existing background levels at the nearest receptor.
Effect 5	Operational Activities	Operational traffic noise from delivery of chemicals and removal of sludge.
Effect 6	Operational Vibration	The potential vibration impacts of operational plant i.e. pumps, on NSLs.

In addition, a number of potential impacts were scoped out of further assessment. These are set out in Table 13-24.

Table 13-24 — Potential effects scoped out of the assessment

Impact	Description of effect	Rationale for scoping out
Operation and Maintenance (O&M)		
Effect A	O&M Traffic	Operational and maintenance traffic has been scoped out of the assessment due to its infrequency and negligible potential for noise impact.
Effect B	Maintenance Works	Routine maintenance works are scoped out of this assessment, as their temporary acoustic impact is negligible relative to the existing baseline noise environment

13.5.3 Assessment Parameters

The parameters relevant to this chapter upon which this assessment is based are set out in Table 13-25.

Table 13-25 — Parameters of the Noise & Vibration Assessment

Effect	Details	Value	Notes / Assumptions
Construction			
Construction related noise effects on NSLs	Construction works; Installation of Water Trunk Mains and water infrastructure facility upgrades.	Given that this is an infrastructure type project the TII guidelines' daytime limit of 70 dB (LAeq 1hr) has been adopted as the appropriate criterion.	Construction noise will be restricted to standard daytime hours (typically 07:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays), with the noise profile being characterised as intermittent.
Construction related vibration effects on NSLs	Potential vibration from specialised techniques like rock breaking, Horizontal Directional Drilling (HDD) and heavy vibrating compaction machinery used during backfilling.	According to this British Standard, residential structures in good repair can typically withstand Peak Particle Velocities (PPV) of 15 mm/s at 4Hz up to 50 mm/s at 40 Hz+ before risking minor cosmetic damage.	Given the distance between the development site and the nearest noise sensitive locations, vibration levels from construction operations are expected to remain below criteria thresholds.
Construction Traffic	The potential noise impacts of construction-related traffic due to increase in vehicle movements.	Given that this is an infrastructure type project the TII guidelines' daytime limit of 70 dB ($L_{Aeq\ 1hr}$) has been adopted as the appropriate criterion	Construction traffic impacts are expected to be short-term and intermittent, occurring only during specific phases of the build. Given the predicted vehicle movements, these works are not anticipated to result in a significant acoustic impact on the existing road network or nearby NSLs.
Operation and Maintenance			
Operational Plant and Equipment	The introduction of Operational Plant and Equipment will create new noise sources, which may adversely affect the acoustic environment of nearby NSLs.	EPA NG4 outlines that noise attributable solely to onsite activities from a licenced premises should not exceed areas of low background noise limits: Daytime (07:00hrs – 19:00hrs) – 45dB $L_{Ar,T}$ Evening (19:00hrs – 23:00hrs) – 40dB $L_{Ar,T}$ Night time (23:00hrs – 07:00hrs) – 35dB $L_{Aeq,T,}$	As a worst-case scenario, all operational plant and equipment have been modelled as functioning continuously over a 24-hour period.

Effect	Details	Value	Notes / Assumptions
		and in the case of Wherrew RWI&PS: Daytime (07:00 hrs – 19:00 hrs) – 55 dB $L_{Ar,T}$ Evening (19:00 hrs – 23:00 hrs) – 50 dB $L_{Ar,T}$ Night time (23:00 hrs – 07:00 hrs) – 45 dB $L_{Aeq,T,.}$ BS 4142:2014+A1:2019 considers the likelihood of complaints by considering the margin by which the noise in source exceeds the background noise level.	
Operational vibration effects on NSLs	The introduction of Operational Plant and Equipment will generate vibration, which may adversely affect nearby NSLs	Table 13-5 outlines Vibration Dose Value ranges which might result in various probabilities of adverse comment within residential buildings	Mitigation measures for operational vibration, which are to be incorporated at detail design stage have been included in Section 13.7.

13.6 Potential Effects of the Proposed Development

13.6.1 Baseline

Summary of NSLs from the receiving environment are outlined below.

13.6.1.1 NSLs Associated with the Installation of Water Trunk Main

Due to the project's vast geographic scale, mapping every individual Noise Sensitive Location (NSL) along the water trunk main is impractical. Instead, a distance-contour methodology was used to assess construction noise for any NSL within 400 m of the route. This tiered approach allows for a systematic impact analysis based on a receptor's proximity to the corridor.

13.6.1.2 NSLs Associated with the Various Water Infrastructure Facilities

The water trunk main corridor encompasses various water infrastructure facilities. Nearby residential properties to the various facilities are classified as NSLs due to their potential exposure to construction and operational noise. These NSLs are illustrated in Figure 13-6 to Figure 13-11 and detailed in Table 13-26 .

Table 13-26 — Noise Sensitive Locations

NSL	Location	Eircode	Justification
1	Wherrew RWPS	F26 CAE3	Residential Property
2	Wherrew RWPS	F26 X9D7	Residential Property
3	Wherrew RWPS	F26 Y0C6	Residential Property
4	Wherrew RWPS	F26 Y9F8	Residential Property
5	Lisglennon RWPS & WTP	F26 K8PR	Residential Property
6	Lisglennon RWPS & WTP	F26 DK57	Residential Property
7	Lisglennon RWPS & WTP	F26 EF2D	Residential Property
8	Lisglennon RWPS & WTP	F26 XN97	Residential Property
9	Bonniconlon BPS	F26 E436	Residential Property
10	Bonniconlon BPS	F26 C2R6	Residential Property
11	Bonniconlon BPS	F26 P02D	Residential Property
12	Bonniconlon BPS	F26 E3F2	Residential Property
13	Bonniconlon Reservoir	F26 F6C4	Residential Property
14	Bonniconlon Reservoir	F26 N6K6	Residential Property
15	Bonniconlon Reservoir	F26 VX92	Residential Property
16	Windy Gap BPT	F26 D6P9	Residential Property
17	Lough Talt WTP	F91 VP62	Residential Property
18	Lough Talt WTP	F91 EY75	Residential Property
19	Lough Talt WTP	F91 R9C3	Residential Property

13.6.2 Construction

Construction phase effects have been identified as construction noise and vibration from the installation of the water trunk mains, upgrades to water infrastructure facilities, and construction traffic noise.

13.6.2.1 Effect 1: Construction Noise

Construction noise for both the installation of the water trunk mains and construction works at various water infrastructure facilities has been predicted based on the information provided in Chapter 3 - Project Description. A summary of the expected equipment, durations and operating times are provided for each stage of construction works. The assessment has taken into consideration that the works are dynamic and will be conducted at different locations across the water trunk main corridor as well as more concentrated works at the water infrastructure facilities, particularly Lisglennon WTP as this site more so than others, will undergo expansion to increase treatment capacity. This will include upgrades to process infrastructure and the construction of a new storage reservoir at the WTP site.

The prediction methodology in BS 5228 has been used to calculate the noise level over a typical day for each of the main construction stages. The assessment was conducted using a distance-contour methodology, which assess construction noise for any NSL within 400m of the water trunk mains route. This tiered approach allows for a systematic impact analysis based on a receptor's proximity to the corridor.

Construction noise predictions are undertaken following the following methodology:

$$SPL_2 = SPL_1 - 20\log(R_2/R_1)$$

Where:

SPL2 is the sound pressure level at the receptor.

SPL1 is the sound pressure level at the measurement location (10m for construction noise predictions).

R2 is the distance from the noise source to the receptor.

R1 is the distance from the noise source to the measurement location (10m).

13.6.2.1.1 Construction Activity Plant Reference Data

Table 13-27 details the standard database plant items compiled from BS 5228-1 used to estimate construction noise predications. To prevent over-prediction, specific heavy equipment groups are bounded strictly to their relevant engineering assets. For example, material processing (crushers) is restricted to facility demolition zones, while sheet piling and heavy breakers are restricted to deep substructure engineering phases.

Table 13-27 — BS 5228 Measured Noise Levels for Typical Construction Noise Sources

Construction Reference Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref)	Noise Level (L_{Aeq} at 10 m dB(A))	On Time of 10 hr day
Installation of Water Trunk Mains	Excavators	77	3 Hours
	Road Lorry	76	1 Hour
	Dumper	81	1 Hour
	Cement Mixer (Discharging)	75	1 Hour
	Poker Vibrator	78	1 Hour

Construction Reference Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref)	Noise Level (L_{Aeq} at 10 m dB(A))	On Time of 10 hr day
	Power tools	70	2 Hours
	Directional Drilling (generator)	77	4 Hours
	Directional Drilling (mounting supports)	87	3 Hours
	Large Excavator with Hydraulic Breaker	93	4 Hours
Site Set Up (Facility Upgrade Works)	Diggers	77	4 Hours
	carpentry tools	78	4 Hours
	Skill saw	84	3 Hours
Demolition Facility Upgrade Works (Only applicable to Wherrew RWI&PS and Lough Talt WTP)	Excavators	77	2 Hours
	Concrete breaker	92	2 Hours
	Pulveriser mounted on excavator	80	2 Hours
	Hand held pneumatic breaker	83	2 Hours
	Drills (into concrete)	89	2 Hours
	Dumper 7t	81	5 Hours
	Lorry Idling	80	3 Hours
	Telescopic Handler	71	5 Hours
	Screen Stockpiler	81	5 Hours
	Tracked Crusher	82	5 Hours
Substructure Facility Upgrade Works (Impact Sheet Piling only applicable to Wherrew RWI&PS)	Excavators	77	4 Hours
	Con saws	84	3 Hours
	Rail saw	85	2 Hours
	Drills (into concrete)	89	3 Hours
	Dumper 7t	81	4 Hours
	Cement Mixer (Discharging	75	4 Hours
	Lorry Idling	80	2 Hours
	Telescopic Handler	71	4 Hours
	Concrete Pump	78	3 Hours
	Impact Sheet Piling	94	3 Hours
Superstructure Facility Upgrade Works	Drills (into concrete)	89	2 Hours
	Power tools	70	3 Hours
	Impact steel	69	2 Hours
	Hammer	69	4 Hours
	Dumper 7t	81	3 Hours
	Cement Mixer (Discharging	75	2 Hours
	Lorry Idiling	80	2 Hours
	Telescopic Handler	71	5 Hours
External Finishes Facility Upgrade Works	Hand Tools	70	5 Hours
	Power tools	70	2 Hours

13.6.2.1.2 Predicted Construction Noise at NSLs

A distance-contour analysis was used to predict noise levels at receptors within various distances of the proposed construction works (see Table 13-28). This method provides a clear, proximity-based impact assessment. The full extent of the construction noise assessment along the proposed water trunk main corridor is illustrated in Appendix 13-1, Volume 3 of this EIAR. The figures present the construction noise assessment distance bands of 25 m, 50 m, 100 m, 150 m, 200 m, 250 m, 300 m, 350 m and 400 m from the construction works, consistent with the assessment distances presented in Table 13-28. The calculations set out below are based on assumed site construction works and a combination of the plant outlined in Table 13-27. This includes the use of a rock breaker during water trunk main installation, a crusher and screener during demolition works at Wherrew RWI&PS and Lough Talt WTP and impact sheet piling during substructure construction works at Wherrew RWI&PS. The construction noise levels predicted below represent a worst-case scenario, as they assume all machinery operates simultaneously. In reality, these activities will not occur at the same time.

Table 13-28 — Predicted Noise Levels Without Mitigation for Each Stage of Construction Works

NSL Distance from Works	Noise Limit L_{Aeq}, dB	Predicted noise level (construction noise impact only) with no mitigation L_{Aeq}, dB					
		Installation of Water Trunk Mains	Site Set Up	Demolition	Substructure	Superstructure	External Finishes
25 m	70	82	73	81	83	76	61
50 m	70	76	67	75	77	70	56
100 m	70	70	61	69	71	64	52
150 m	70	66	58	65	68	61	51
200 m	70	64	56	63	65	58	51
250 m	70	62	55	61	63	57	50
300 m	70	60	54	60	62	56	50
350 m	70	59	53	59	61	55	50
400 m	70	58	52	58	60	54	50

The unmitigated construction noise level results indicate that for any NSL located at a distance greater than 100 m from an active work zone, construction noise will inherently comply with standard TII guidelines and BS 5228-1 assessment limits without further noise controls. Potentially significant unmitigated exceedances are strictly confined to a close-range threshold envelope within 25 m to 75 m of the boundary. The peak worst-case exposure is driven by Substructure heavy civils (up to 83 dB at 25 m) and Demolition site processing (up to 81 dB at 25 m). Crucially, these peak worst-case columns do not apply uniformly to all locations across the project footprint:

- The +13 dB exceedance caused by impact sheet piling within the Substructure phase is explicitly restricted to Wherrew RWI&PS, as this is the only site where sheet piling may occur.
- The +11 dB exceedance caused by the Demolition phase is restricted solely to Wherrew RWI&PS and Lough Talt WTP, as these are the only two facilities undergoing structural demolition and material crushing.

Pipeline trunk main laying is linear and moving, therefore the 82 dB L_{Aeq} peak at 25 m is temporary, acting as a transient passing wave rather than a sustained noise footprint. Because activities at the permanent water infrastructure facilities are stationary and longer in duration, their potential noise effects on nearby NSLs have been

analysed using SoundPLAN 9.1 software. Figure 13-12 to Figure 13-17 illustrate the resulting construction noise contours calculated for each facility within the Proposed Development.



Figure 13-12 — Wherrew RWI&PS Construction Noise Contour



Figure 13-13 — Lisglennon RWS & PS Construction Noise Contour

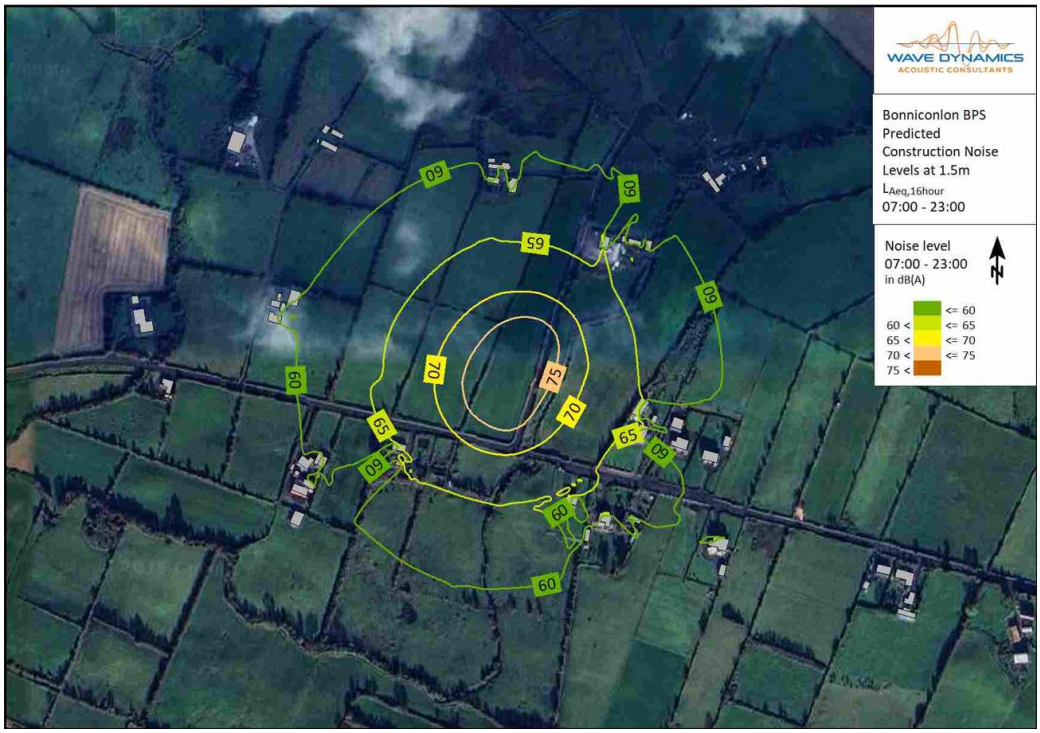


Figure 13-14 — Bonniconlon BPS Construction Noise Contour

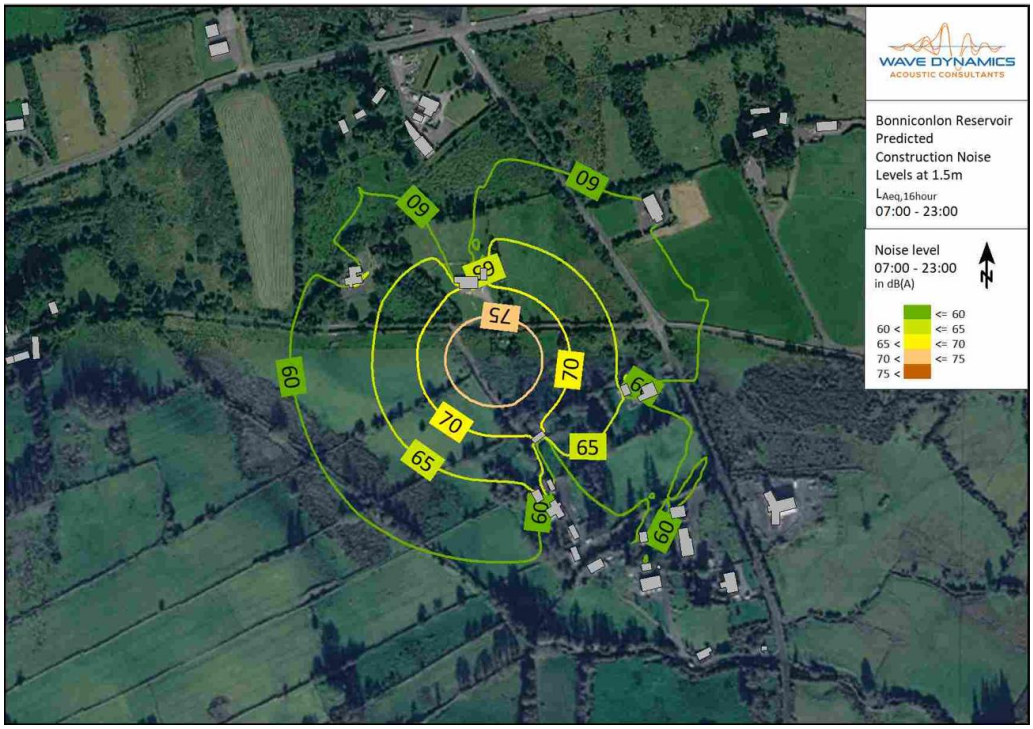


Figure 13-15 — Bonniconlon Reservoir Construction Noise Contour

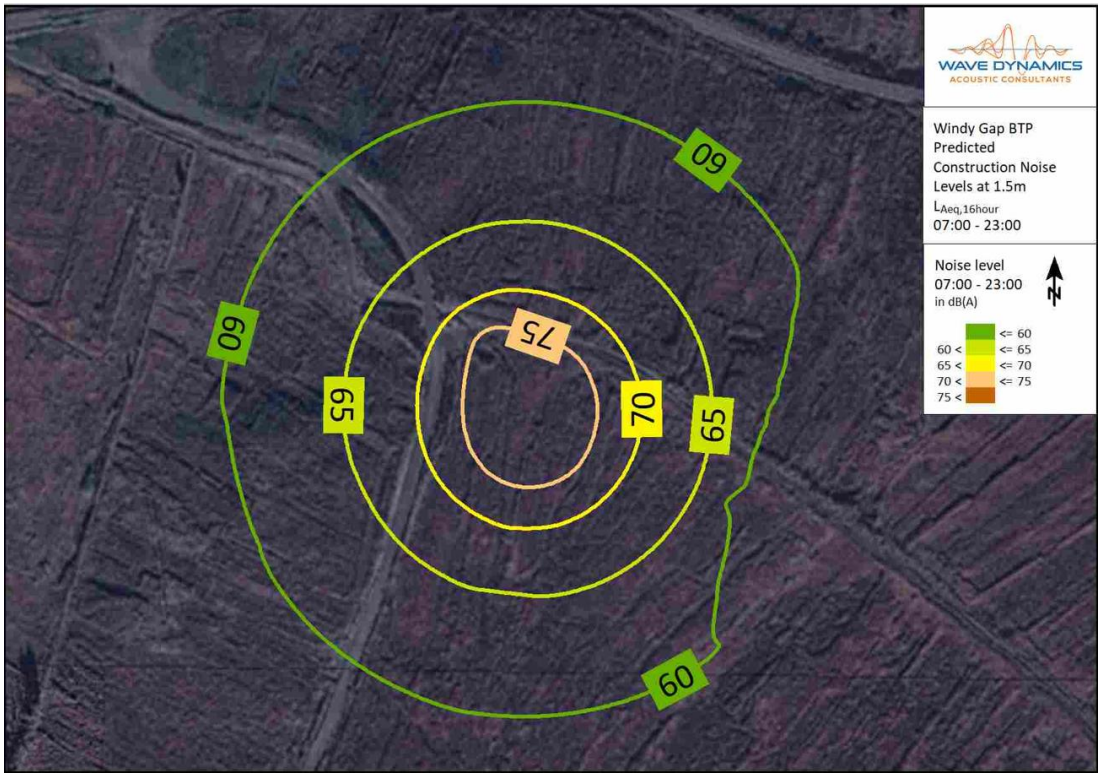


Figure 13-16 — Windy Gap BPT Construction Noise Contour

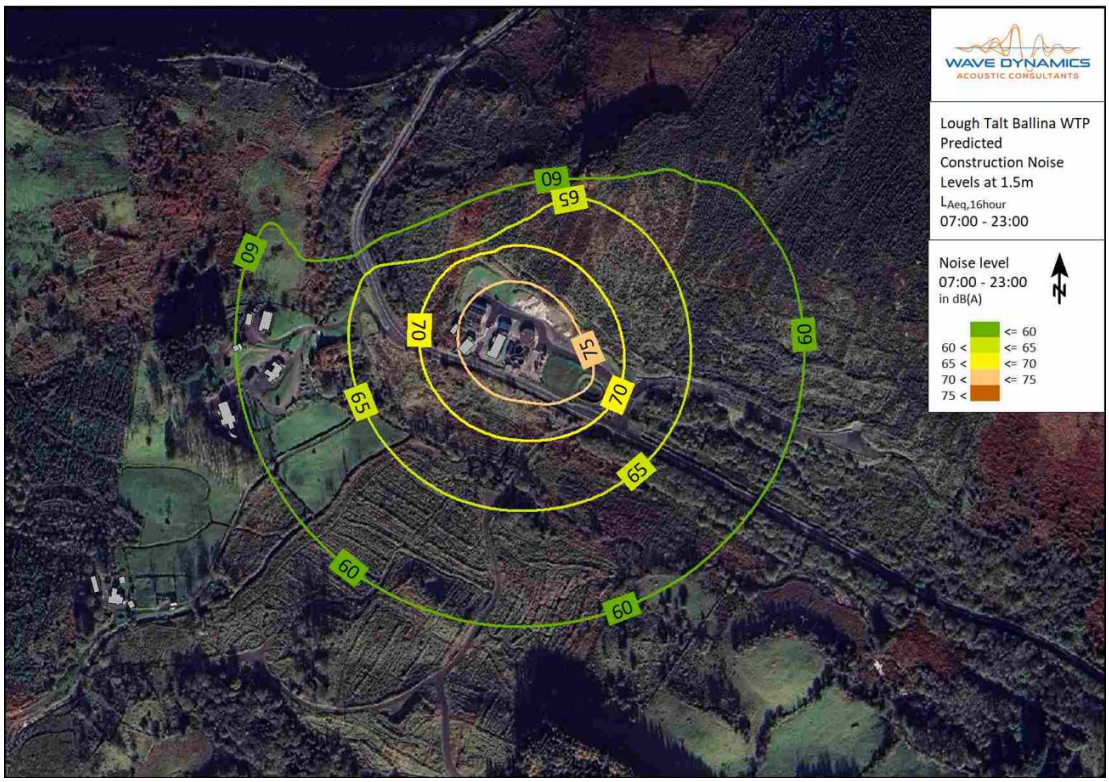


Figure 13-17 — Lough Talt WTP Construction Noise Contour

As illustrated in Figure 13-12 to Figure 13-17, construction noise effects from fixed-location works at the water infrastructure facilities will comply with Transport Infrastructure Ireland (TII) limits at all NSLs, with the exception of NSL 1 at Wherrew RWI&PS. At this location, unmitigated construction noise levels are predicted to exceed the TII daytime limit of 70 dB ($L_{Aeq\ 1hr}$).

Without mitigation, construction noise from the Proposed Development is predicted to comply with BS 5228-1 and TII limits at all NSLs 100 metres or more from the site. These assessments represent a worst-case scenario, as they assume multiple pieces of machinery operate simultaneously. In practice, actual noise levels will be lower because equipment will operate intermittently and move across varying locations.

Under worst-case conditions, unmitigated construction noise levels across the Proposed Development site are predicted to exceed BS 5228-1 and TII limits for any NSLs located within <50m to the construction noise source. To address this, Table 13-29 specifies the required attenuation levels necessary to ensure compliance and prevent adverse impacts on these nearby receptors.

Table 13-29 — Attenuation Required Based on the Construction Noise Predictions

NSL Distance M	Noise Limit L_{Aeq}, dB	Noise reduction required at each stage of works to meet criteria (L_{Aeq}, dB)					
		Installation of Water Trunk Mains	Site Set (Upgrade Works)	Demolition	Substructure (Upgrade Works)	Superstructure (Upgrade Works)	External Finishes (Upgrade Works)
25	70	12	3	11	9	6	0
50	70	6	0	5	7	0	0
100	70	0	0	0	1	0	0

13.6.2.1.3 Value and sensitivity

The vast number of NSLs within the Study Area are residential properties. In accordance with standard EIA acoustic criteria, residential receptors are assigned a High sensitivity. This classification reflects their high susceptibility to noise disturbance, particularly during evening and night-time hours when residents have a reasonable expectation of a quiet environment.

13.6.2.1.4 Magnitude

Due to the linear nature of the water trunk main installation, the magnitude of construction noise will be temporary and transient. Receptors located within the immediate vicinity of the pipe-laying works and upgrade works are likely to experience a moderate magnitude of change for a short duration.

13.6.2.1.5 Significance of effect

Construction Phase: While the sensitivity is High, the transient nature of the works means that for the majority of the route, the significance of effect will be Slight to Moderate. Where NSLs are in proximity to construction works (<100 m) a temporary Significant effect may occur in the absence of mitigation.

13.6.2.1.6 Residual significance of effect

While the sensitivity of the residential receptors remains High, the application of mitigation measures outlined in Section 13.7 of this Chapter, will effectively reduce the noise at the source. Consequently, the residual effect for the majority of residential properties along the corridor is considered Slight. These effects will be temporary and short-term, ceasing immediately upon the completion of the pipe-laying works and upgrade works in each specific area.

13.6.2.2 Effect 2: Construction Vibration

During the installation of water trunk mains, specifically during rock breaking and HDD, the project will generate some vibration. According to this British Standard, residential structures in good repair can typically withstand Peak Particle Velocities (PPV) of 15 mm/s at 4 Hz up to 50 mm/s at 40 Hz+ before risking minor cosmetic damage. Given the distance between the development site and the nearest noise sensitive locations, vibration levels from both construction and future operations are expected to remain well below these thresholds; consequently, no adverse effects are anticipated.

Prediction of vibration levels at receptors is complex and dependent on several variables including the nature of the used equipment, the properties of the subsoil, the heterogeneity of the soil deposit, the distance to the receptor and the dynamic characteristic of the adjacent structures. Therefore, limits or threshold criteria as set out in BS 5228-2 are applied for buildings and humans.

Given the separation distances to local receptors, construction-related vibrations are not anticipated to cause any adverse impacts. However, as a precautionary measure, it is recommended to implement vibration monitoring at the closest sensitive receptors during high-impact activities such as rock breaking and sheet piling. This will proactively track and mitigate any potential disturbances to nearby NSLs.

13.6.2.2.1 Value and sensitivity

All identified receptors are residential properties, which are classified as having a High sensitivity to vibration. This classification considers both the potential for cosmetic building damage and, more critically, the human perception of vibration. Residential occupants are particularly sensitive to vibration during evening and night-time hours; however, their sensitivity is also high during the day regarding activities that require comfort and quiet enjoyment of their property.

13.6.2.2.2 Magnitude

The magnitude of vibration impact is assessed based on the Peak Particle Velocity (PPV) generated by construction activities. Given the nature of the water trunk main installation and upgrade works, the primary sources of vibration are limited to localised excavation and limited HDD.

Due to the significant distance separation between the construction corridor and the nearest NSLs, the magnitude of vibration reaching these receptors is predicted to be Negligible. Vibration levels at the NSLs are expected to remain well below the threshold of human perception and significantly below the criteria for any structural or cosmetic damage to buildings.

13.6.2.2.3 Significance of effect

By combining the High sensitivity of the residents with the Negligible magnitude of the vibration levels, the resulting significance of effect is determined to be Not Significant. While residents may be aware of construction activity visually or acoustically, there is no anticipated impact from ground-borne vibration. The effect is considered to be neutral and imperceptible for the duration of the project.

13.6.2.2.4 Residual significance of effect

Following the implementation of the precautionary mitigation measures and considering the inherent protection provided by the distance between the works and the residential properties, the residual significance of effect remains Not Significant. There are no long-term or permanent residual vibration impacts associated with either the construction or operational phases of the water trunk main or upgrade works.

13.6.2.3 Effect 3: Construction Traffic

Additional traffic noise from the construction works is not expected to increase the traffic noise from the roads to any significant impact. The Design Manual for Roads and Bridges (DMRB) states that a 25% increase in traffic flows leads to a 1dB(A) increase in traffic noise levels. Construction traffic flow increases associated with the Proposed Development will be significantly less than 25% (Please refer to Chapter 15 Roads, Traffic & Transportation) and therefore the noise levels from construction traffic will not increase the existing noise levels at the noise sensitive locations by more than 1 dB(A).

13.6.2.3.1 Value and sensitivity

NSLs located along the proposed haulage routes and the water trunk main corridor are classified as having a High sensitivity to traffic-related noise. This reflects the high importance of maintaining a suitable acoustic environment for residents, particularly along rural roads where existing traffic volumes may currently be low.

It is generally accepted that it takes an approximate 3 dB(A) increase in noise levels to be perceptible to the average person (Ref: Planning Policy Guidance Note 24 [PPG24 - Planning & Noise). Construction traffic noise levels associated with the Proposed Development are not expected to increase the traffic noise by 3 dB(A), therefore will not have a negative impact on nearby NSLs.

13.6.2.3.2 Magnitude

Given that the volume of construction traffic will be below the threshold required to create a perceptible shift in noise levels (typically a 3 dB(A) increase), the magnitude of the impact is assessed as Negligible.

13.6.2.3.3 Significance of effect

Combining the High sensitivity of NSLs with the Negligible magnitude of change, the significance of effect from construction traffic is determined to be Not Significant. The additional vehicle movements will be transient and limited to the construction phase, resulting in a neutral impact on the long-term acoustic character of the area.

13.6.2.3.4 Residual significance of effect

With the implementation of a Construction Traffic Management Plan and the adherence to restricted delivery hours, the residual significance of effect is rated as Not Significant. The impact will be temporary and short-term, restricted solely to the construction period, with no permanent residual noise effects arising from traffic.

13.6.3 Operation and Maintenance

Following the noise survey, the operational plant associated with the water infrastructure facilities was modelled using SoundPlan 9.1. This approach established noise levels under worst-case operating conditions. The model implements the ISO 9613-1 and ISO 9613-2 algorithms, accounting for:

- Distance attenuation;
- Source and receptor locations;
- Barrier effects (buildings, walls etc.);
- Topographical elevations;
- Ground effects and absorption;
- Source sound power levels;
- Directivity and orientation of the source; and
- Atmospheric attenuation and meteorological effects.

Consultation with the design team identified various pumps and motors as the primary mechanical plant with operational noise potential. Operational noise levels were modelled using a combination of manufacturer technical data and the Wave Dynamics database for comparable installations. Equal or approved plant is suitable for the

Proposed Development and these predictions represent a worst-case scenario to ensure a conservative assessment of potential impacts at the nearest NSLs.

Noise levels at the NSLs were assessed to the height of the worst-case façades (4 m for all NSLs), to predict the noise levels at the first-floor bedrooms of the nearest NSLs. Noise levels at the NSLs were assessed at 1.5 m to assess the external amenity noise levels on the NSLs, and grid noise contours have been provided in Figure 13-18 to Figure 13-21 for daytime noise impact and Figure 13-22 to Figure 13-25 for nighttime noise impact.

13.6.3.1 Plant and Equipment

The Proposed Development comprises several water infrastructure facilities featuring various noise-emitting components. This assessment focuses on internal and external plant items. Submerged or below-ground plant, are excluded from the model as they are unlikely to cause adverse impacts at any NSL.

A summary of external plant located at each water infrastructure facility is outlined below.

13.6.3.1.1 Wherrew Raw Water Intake and Pumping Station

The project scope includes necessary upgrades to the Wherrew RWI&PS. To assess acoustic impact, the model accounts internal plant noise from pumps and key external noise sources, specifically the fish return system. The proposed enclosure will comprise a NOISEBLOCK™ STL-2 acoustic panel system, or equivalent, incorporating a solid outer skin, perforated inner skin and acoustic infill. The proposed STL-2 panel system has a manufacturer-rated Sound Transmission Class (STC) of 37, with frequency-dependent sound transmission loss values ranging from 17 dB at 125 Hz to 57 dB at 4 kHz. A conservative STL-2 enclosure specification, based on the manufacturer's stated acoustic performance, has been incorporated into the operational noise model to account for the attenuation provided by the enclosure.

13.6.3.1.2 Lisglennon Raw Water Storage and Pumping Station

Breakout noise from internal operational plant at the Lisglennon Raw Water Storage and Pumping Station has been assessed in the model.

13.6.3.1.3 Lisglennon Water Treatment Plant

The majority of plant and equipment at Lisglennon Water Treatment Plant & Treated Water Storage is submersible or underground, such plant has been excluded from the assessment due to the negligible noise impact on NSLs. Breakout noise from internal operational plant at the proposed Pump & UV Filtration building has been assessed in the model, as well as breakout noise form the MV Substation. External plant included in the model included mixer motors for equalisation tanks and used wash water settlement tanks, sludge pumps, dewatering pumps and compressors.

13.6.3.1.4 Bonniconlon Booster Pumping Station

A new BPS near Bonniconlon will be constructed as part of the development. Breakout noise from internal operational plant at the pumping station building has been assessed in the model, as well as breakout noise from the MV Substation. External noise sources, such as motors and compressor have also been included in the acoustic model. The following blockwork used in the model was approximately 415 mm thick external wall construction, consisting of 215 mm external blockwork, a 100 mm cavity and 100 mm internal wall.

13.6.3.1.5 Bonniconlon Reservoir

The proposed service reservoir near Bonniconlon will house treated water. As the site will not require any major mechanical plant, operational noise emissions are anticipated to be negligible and inaudible at the site boundary.

13.6.3.1.6 Windy Gap Break Pressure Tank

All site infrastructure and operational plant will be located below ground level. Consequently, the facility is expected to have no adverse impact on nearby NSLs.

13.6.3.1.7 Lough Talt Water Treatment Plant

The majority of plant will be located internally within buildings. As a worst case scenario external plant such as chemical storage tank pumps, motor control valve for repurposed chlorine tanks, compressor and motor control valve for new reservoir have been modelled.

Table 13-30 outlines the internal and external plant items integrated into the SoundPLAN 9.1 operational noise model, including the sound power levels and octave-band centre frequencies for each asset. Note that due to proximity, operational plant from Lisglennon RWS&PS and Lisglennon WTP have been assessed together within the one acoustic model.

Table 13-30 — Plant and Equipment Incorporated into the SoundPlan 9.1 Noise Model

Site	Plant Location	Plant	Source Sound Power Level L_w (dB) at Octave Band Centre Frequency, Hz								L_{wA} (dBA)
			63	125	250	500	1000	2000	4000	8000	
Source Database											
Wherrew RWI&PS	External	Fish Return System (x2)	44	65	77	84	89	87	86	73	93
Wherrew RWI&PS	Internal	Pumps (x2)	35	56	68	75	80	78	77	65	84
Lisglennon WTP	External	Mixer Motors (x4)	15	36	49	55	60	58	57	44	64
Lisglennon WTP	External	Dewatering pump	35	56	68	75	80	78	77	65	84
Lisglennon WTP	External	Sludge Pump	15	36	48	55	60	58	57	45	64
Lisglennon WTP	External	Compressor	21	42	54	61	66	64	63	51	70
Lisglennon WTP	Internal	Pumps (x4)	35	56	68	75	80	78	77	65	84
Lisglennon WTP	Internal	MV Substation	106	101	96	86	86	76	66	56	92
Lisglennon RWS&PS	Internal	Pumps (x3)	35	56	68	75	80	78	77	65	84
Bonniconlon BPS	External	Motor for Control Valves (x2)	15	36	48	55	60	58	57	45	64
Bonniconlon BPS	External	Compressor	21	42	54	61	66	64	63	51	70
Bonniconlon BPS	Internal	Pumps (x4)	35	56	68	75	80	78	77	65	84
Bonniconlon BPS	Internal	MV Substation	106	101	96	86	86	76	66	56	92
Lough Talt WTP	External	Chemical Storage Tank Pumps (x3)	35	56	68	75	80	78	77	65	84

Site	Plant Location	Plant	Source Sound Power Level L_w (dB) at Octave Band Centre Frequency, Hz								L_{wA} (dBA)
			63	125	250	500	1000	2000	4000	8000	
Source Database											
Lough Talt WTP	External	Motor Control Valve for Repurposed Chlorine Tank	15	36	48	55	60	58	57	45	64
Lough Talt WTP	External	Compressor	21	42	54	61	66	64	63	51	70
Lough Talt WTP	External	Motor Control Valve for New Reservoir	15	36	48	55	60	58	57	45	64

13.6.3.2 Effect 4: Operational Plant & Equipment

This section outlines the predicted operational noise effect from plant and equipment on the closest NSLs outlined in Table 13-26. As a worst-case scenario, it has been assumed that operational plant and equipment at all water infrastructure facilities is operating 24hrs. The nearest NSLs relevant to each water infrastructure facility were taken as part of the assessment as identified in Figure 13-6 to Figure 13-11 and outlined in Table 13-26. This allows for a worst-case scenario assessment, NSLs located further away from each water infrastructure facility are expected to experience lower noise levels with typical conditions due to distance attenuation.

13.6.3.2.1 Daytime Operations

The more stringent EPA NG4 daytime noise criterion of (07:00hrs – 19:00hrs) 45dB $L_{Ar,T}$ for Areas of Low Background Noise has been applied to all operational plant across the Proposed Development, with the sole exception of the Wherrew RWI&PS facility. At Wherrew, the standard EPA NG4 daytime noise limit of (07:00hrs – 19:00hrs) 55dB $L_{Ar,T}$ has been adopted due to existing baseline conditions. Table 13-31 presents the predicted unmitigated daytime noise emissions from the operational plant at each facility at the nearest NSLs. These daytime emissions are calculated at a standard receiver height of 1.5 m and represent free-field façade noise levels.

Table 13-31 — Noise Model Results from Operational Plant and Equipment for Daytime at 4m Height

NSL	Location	Criteria dB L_{ArT}	Daytime Predicted Noise dB L_{ArT} (07:00hrs to 19:00hrs)	Compliant/Non-Compliant
1	Wherrew RWI&PS	55	29	Compliant
2	Wherrew RWI&PS	55	18	Compliant
3	Wherrew RWI&PS	55	17	Compliant
4	Wherrew RWI&PS	55	8	Compliant
5	Lisglennon RWS&PS and Lisglennon WTP	45	18	Compliant

NSL	Location	Criteria dB L_{ArT}	Daytime Predicted Noise dB L_{ArT} (07:00hrs to 19:00hrs)	Compliant/Non-Compliant
6	Lisglennon RWS&PS and Lisglennon WTP	45	16	Compliant
7	Lisglennon RWS&PS and Lisglennon WTP	45	25	Compliant
8	Lisglennon RWS&PS and Lisglennon WTP	45	26	Compliant
9	Bonniconlon BPS	45	22	Compliant
10	Bonniconlon BPS	45	27	Compliant
11	Bonniconlon BPS	45	27	Compliant
12	Bonniconlon BPS	45	26	Compliant
13	Bonniconlon Reservoir	45	No Internal/External Operational Noise Sources	Compliant
14	Bonniconlon Reservoir	45	No Internal/External Operational Noise Sources	Compliant
15	Bonniconlon Reservoir	45	No Internal/External Operational Noise Sources	Compliant
16	Windy Gap BPT	45	No Internal/External Operational Noise Sources	Compliant
17	Lough Talt WTP	45	23	Compliant
18	Lough Talt WTP	45	29	Compliant
19	Lough Talt WTP	45	31	Compliant

As shown in Table 13-31, predicted daytime noise emissions from operational plant and equipment at all water infrastructure facilities are compliant with the relevant NG4 daytime noise criteria at the nearest NSLs. Figure 13-18 to Figure 13-21 present the predicted daytime noise contours at a receptor height of 1.5 m for NSLs surrounding the water infrastructure facilities. The figures also include an indicative red-line boundary for each facility, provided for context to illustrate the location and extent of the Proposed Development relative to the predicted operational noise propagation. The red-line boundary is indicative only and does not represent a noise contour or the extent of predicted noise impact. As illustrated, all identified NSLs are located outside the 45 dB contour. Accordingly, the predicted operational noise levels are confirmed to comply with the applicable NG4 daytime noise criteria.



Figure 13-18 — Wherrew RWPS Operational Noise Contours for the Daytime Noise Impact at 1.5m L_{Aeq} dB



Figure 13-19 — Lisglennon RWPS & WTP Operational Noise Contours for Daytime Noise Impact at 1.5 m L_{Aeq} dB



Figure 13-20 — Bonniconlon BPS Operational Noise Contours for the Daytime Noise Impact at 1.5 m L_{Aeq} dB



Figure 13-21 — Lough Talt WTP Operational Noise Contours for the Daytime Noise Impact at 1.5 m L_{Aeq} dB

13.6.3.2.2 Evening Operations

Predicted operational noise levels are consistent across daytime and evening periods. The EPA NG4 evening noise criterion of 40 dB $L_{Ar,T}$ (19:00hrs – 23:00hrs) has been applied to operational plant and equipment at all water infrastructure facilities, with the exception of the Wherrew RWI&PS. At Wherrew RWI&PS, the standard EPA NG4 evening criterion of 50 dB $L_{Ar,T}$ has been applied, reflecting the existing operational plant and associated baseline noise conditions at the facility.

As demonstrated in Table 13-31, the predicted evening operational noise levels are compliant with the applicable EPA NG4 evening noise criteria.

13.6.3.2.3 Night-time Operations

The EPA NG4 recommended night-time noise criterion of 35 dB $L_{Ar,T}$ (23:00hrs – 07:00hrs) has been applied to operational plant and equipment at all water infrastructure facilities, with the exception of the Wherrew RWI&PS. At Wherrew RWI&PS, the standard EPA NG4 night-time criterion of 45 dB $L_{Ar,T}$ has been applied, reflecting the existing operational plant and associated baseline noise conditions at the facility.

The predicted night-time noise emissions from operational plant and equipment at each water infrastructure facility have been assessed under a worst-case scenario. The predicted night-time noise levels at the nearest relevant NSLs are presented in Table 13-32. Noise emissions have been calculated at a receptor height of 4 m, representing a worst-case assessment height for first-floor bedrooms. All values refer to free-field façade noise levels.

Table 13-32 — Predicted Night-time Operational Noise Levels at 4 m Height – Unmitigated Scenario

NSL	Location	Criteria dB L_{ArT}	Night-time Predicted Noise dB $L_{Aeq,T}$ (23:00hrs to 07:00hrs)	Compliant/Non-Compliant
1	Wherrew RWPS	45	29	Compliant
2	Wherrew RWPS	45	18	Compliant
3	Wherrew RWPS	45	17	Compliant
4	Wherrew RWPS	45	8	Compliant
5	Lisglennon RWPS & WTP	35	18	Compliant
6	Lisglennon RWPS & WTP	35	16	Compliant
7	Lisglennon RWPS & WTP	35	25	Compliant
8	Lisglennon RWPS & WTP	35	26	Compliant
9	Bonniconlon BPS	35	22	Compliant
10	Bonniconlon BPS	35	27	Compliant

NSL	Location	Criteria dB L_{ArT}	Night-time Predicted Noise dB $L_{Aeq,T}$ (23:00hrs to 07:00hrs)	Compliant/Non-Compliant
11	Bonniconlon BPS	35	27	Compliant
12	Bonniconlon BPS	35	26	Compliant
13	Bonniconlon Reservoir	35	No Internal/External Operational Noise Sources	Compliant
14	Bonniconlon Reservoir	35	No Internal/External Operational Noise Sources	Compliant
15	Bonniconlon Reservoir	35	No Internal/External Operational Noise Sources	Compliant
16	Windy Gap BPT	35	No Internal/External Operational Noise Sources	Compliant
17	Lough Talt WTP	35	23	Compliant
18	Lough Talt WTP	35	29	Compliant
19	Lough Talt WTP	35	31	Compliant

As demonstrated in Table 13-32, the predicted night-time noise emissions from operational plant and equipment have been assessed under a worst-case scenario. The results indicate that predicted night-time noise levels comply with the applicable NG4 criteria at all of the assessed NSLs.

Figure 13-22 through Figure 13-25 present the predicted night-time (23:00–07:00) noise emission contour maps at a receptor height of 4 m, representative of first-floor bedroom window height. The applicable night-time noise criterion is 35 dB $L_{Ar,T}$ for all water infrastructure facilities, with the exception of Wherrew RWI&PS, where a criterion of 45 dB $L_{Ar,T}$ applies due to the existing operational plant and baseline noise conditions. The modelling demonstrates that the predicted night-time operational noise levels comply with the applicable NG4 night-time criteria at all identified NSLs.



Figure 13-22 — Wherrew RWI&PS Noise Contours for the Night-time Noise Impact at 4m L_{Aeq} dB



Figure 13-23 — Lisglennon RWS&PS & WTP Noise Contours for Night-time Noise Impact at 4m L_{Aeq} dB



Figure 13-24 — Bonniconlon BPS Noise Contours for the Night-time Noise Impact at 4m L_{Aeq} dB

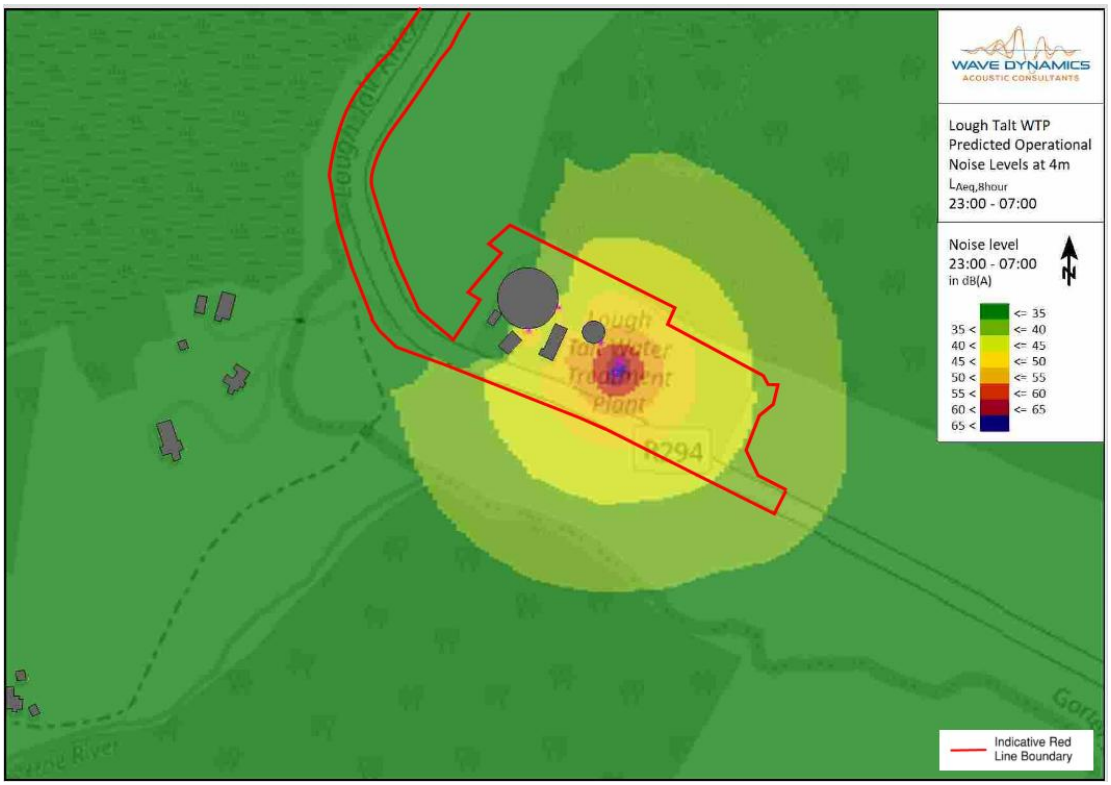


Figure 13-25 — Lough Talt WTP Noise Contours for the Night-time Noise Impact at 4m L_{Aeq} dB

13.6.3.2.4 Value and sensitivity

NSLs located in the vicinity of the proposed water infrastructure facilities are classified as having High sensitivity to operational noise. This reflects the importance of maintaining a suitable acoustic environment for residents, particularly in rural areas where existing background noise levels are low and permanent stationary noise sources (such as pumps and motors) are more readily perceptible.

While a change of 3 dB is generally required for a noise level increase to be perceptible to the human ear (Ref: PPG24), operational noise from plant and equipment is assessed against absolute limit values (e.g. NG4 criteria). Where predicted noise emissions from the infrastructure remain below these established thresholds or do not significantly exceed the prevailing background noise, the impact on nearby NSLs is minimised.

13.6.3.2.5 Magnitude

The magnitude of the noise impact is assessed based on the degree to which predicted noise levels exceed the established NG4 criteria or the existing background noise environment.

For the majority of water infrastructure facilities where plant is housed internally or underground, noise emissions at the nearest NSLs are predicted to be negligible, resulting in a Negligible magnitude of impact.

13.6.3.2.6 Significance of effect

The significance of effect is determined by combining the High sensitivity of the receptors with the predicted magnitude of change. For all operations the effect is determined to be Not Significant, as all facilities will operate within daytime, evening and night-time limits.

13.6.3.2.7 Residual significance of effect

For all of the proposed water infrastructure, the residual significance of effect is classified as Not Significant. This is achieved by housing equipment internally or below ground, ensuring operational noise levels remain well within the NG4 daytime, evening, and night-time criteria.

As this is a preliminary planning stage operational noise assessment, it is recommended that this assessment is updated at detailed design stage when final plant and equipment selections are available to ensure that the noise criteria are achieved.

13.6.3.3 Operational Vibration

During the operational phase of the Proposed Development, the introduction of new plant and equipment will generate some vibration. According to this British Standard, residential structures in good repair can typically withstand Peak Particle Velocities (PPV) of 15 mm/s at 4Hz up to 50 mm/s at 40Hz+ before risking minor cosmetic damage. Given the distance between the development site and the nearest noise sensitive locations, vibration levels from future operations are expected to remain well below these thresholds; consequently, no adverse effects are anticipated.

Operational vibration impacts on human comfort within residential buildings are assessed using the Vibration Dose Value (VDV) in $m \cdot s^{-1.75}$, in accordance with BS 6472-1:2008. The standard defines criteria for adverse comment probability, with ranges of 0.2 to 0.4 $m \cdot s^{-1.75}$ (low probability) for daytime (16-hour) and 0.1 to 0.2 $m \cdot s^{-1.75}$ for night-time (8-hour) periods. Given the distance to the nearest NSLs and the mitigation measures outlined in Section 13.7, operational vibration levels from the Proposed Development are not expected to adversely affect nearby NSLs. Levels are anticipated to remain well below the BS 6472-1:2008 VDV thresholds for adverse comment.

Prediction of vibration levels at receptors is complex and dependent on several variables including the nature of the used equipment, the properties of the subsoil, the heterogeneity of the soil deposit, the distance to the receptor and the dynamic characteristic of the adjacent structures. For a typical localised industrial source (such as a pump or booster station), ground vibration primarily propagates as surface Rayleigh waves. As a practical example, when

using math from the Bornitz Attenuation Equation (1931), combined with standard point-source parameters (where (n=1.0) at a 1-metre reference distance) a baseline vibration velocity measured at 1 m from the source will drop by approximately 70%-80% by the time it travels just 20m away, even in firm or rocky soil conditions. Over the much larger separation distances typical of the nearest NSLs outlined in Table 13-34, the residual vibration amplitudes are projected to fall completely below the threshold of human perception (PPV) of 15 mm/s at 4Hz.

Table 13-33 below illustrates the approximate distances from the nearest NSLs to the nearest plant (vibrational source) associated with each water infrastructure station.

Table 13-33 — NSL Distance to Nearest Vibration Source

NSL	Location	Eircode	Approx. Distance to Nearest Vibration Source
1	Wherrew RWI&PS	F26 CAE3	35 m
2	Wherrew RWI&PS	F26 X9D7	108 m
3	Wherrew RWI&PS	F26 Y0C6	120 m
4	Wherrew RWI&PS	F26 Y9F8	175 m
5	Lisglennon RWPS & WTP	F26 K8PR	78 m
6	Lisglennon RWPS & WTP	F26 DK57	319m
7	Lisglennon RWPS & WTP	F26 EF2D	224 m
8	Lisglennon RWPS & WTP	F26 XN97	317 m
9	Bonniconlon BPS	F26 E436	105 m
10	Bonniconlon BPS	F26 C2R6	121 m
11	Bonniconlon BPS	F26 P02D	122 m
12	Bonniconlon BPS	F26 E3F2	159 m
13	Bonniconlon Reservoir	F26 F6C4	42 m
14	Bonniconlon Reservoir	F26 N6K6	89 m
15	Bonniconlon Reservoir	F26 VX92	68 m
16	Windy Gap BPT	F26 D6P9	442 m
17	Lough Talt WTP	F91 VP62	176 m
18	Lough Talt WTP	F91 EY75	169 m
19	Lough Talt WTP	F91 R9C3	220 m

13.6.3.3.1 Value and sensitivity

All identified receptors are residential properties, which are classified as having a High sensitivity to vibration. This classification considers both the potential for cosmetic building damage and, more critically, the human perception of vibration. Residential occupants are particularly sensitive to vibration during evening and night-time hours; however, their sensitivity is also high during the day regarding activities that require comfort and quiet enjoyment of their property.

13.6.3.3.2 Magnitude

The magnitude of vibration impact is assessed based on the Peak Particle Velocity (PPV) and Vibration Dose Value (VDV) in $m \cdot s^{-1.75}$, generated by operational plant. Given the nature of the operational activities associated with the Proposed Development, the primary sources of vibration are limited to vibration-generating plant and equipment, such as pumps.

Due to the significant distance separation between the operational plant and equipment associated with the Proposed Development and the nearest NSLs, the magnitude of vibration reaching these receptors is predicted to be Negligible. Vibration levels at the NSLs are expected to remain well below the threshold of human perception and significantly below the criteria for any structural or cosmetic damage to buildings.

13.6.3.3.3 Significance of effect

By combining the High sensitivity of the residents with the Negligible magnitude of the operational vibration levels, the resulting significance of effect is determined to be Not Significant. The effect is considered to be neutral and imperceptible for the operational phase of the Proposed Development.

13.6.3.3.4 Residual significance of effect

Following the implementation mitigation measures at detailed design stage and considering the inherent protection provided by the distance between operational plant and the residential properties, the residual significance of effect remains Not Significant. There are no long-term or permanent residual vibration impacts associated with the operational phases of the water trunk main or upgrade works.

13.7 Mitigation Measures

13.7.1 Construction Phase

Best practice control measures for noise from construction sites are found within BS 5228 (2009 +A1 2014) Part 1. Construction noise impacts are expected to vary during the construction phase of the project, this impact will depend on the distance between the construction activities and noise sensitive receptor. The contractor will ensure that all best practice noise and control methods will be used, to ensure any negative noise impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228 (2009) Part 1 includes guidance on several aspects of construction site mitigation measures, this includes the:

- Selection of quiet plant and equipment;
- Noise control at source of the noise;
- Screening, and;
- Public liaison and communication plan.

13.7.1.1 Construction Phase Noise

This section sets out general recommendations for the control of noise from construction works. As stated in Section 13.6.2.1.2, construction mitigation is required across the Proposed Development site during construction works as predicted construction noise levels exceed the criteria set out by BS 5228-1 and TII guidelines for NSLs located within 50m of construction works. Notwithstanding, the following standard noise commitments will be adhered to.

Selection of Plant and Equipment

The noise impact of all plant and equipment should be assessed prior to selection of the plant for the Proposed Development. Where an item of plant is identified as noisy with the potential to cause a negative noise impact it will be reviewed to check if there is an alternative quieter version of the same plant to undertake the same construction task.

Noise Control at Source

Where replacing a noisy item of plant is not viable or practical, consideration should be given to control that noise at source. This includes modifying the piece of plant or equipment to generate less noise, using dampening to control vibration induced noise or rattling. Example best practice mitigation measures to be considered are as follows:

- All plant and equipment to be switched off when idling.
- The use of white noise reversing alarms.
- Restriction on the dropping and loading of materials to less sensitive hours.
- The use of local screening for noisy activities or works with hand tools.
- Not dropping materials onto hard surfaces and using rubber mats etc for the dropping of materials.
- Ensure all plant and equipment is well maintained and cleaned, all lubrication should be in line with manufacturers guidelines.

Screening

Screening when used correctly can be an effective method of reducing the construction noise impact on the NSL's. The use of site hoarding and careful selection of areas for noise works, using buildings on the site, site offices and

the building being constructed to screen noise from the works. Local screening of noisy works with the use of temporary acoustic barriers, examples are provided below (see also Figure 13-26).

- https://ventac.com/acoustic-products/noisebreak-acoustic-barrier/
- https://echobarrier.com/



Figure 13-26 — Temporary Construction Noise Barrier © Ventac

13.7.1.2 Construction Phase Vibration

This section sets out general recommendations for the control of vibration during the construction phase. Although no significant impacts are predicted due to distance separation, the following 'Best Practicable Means' (BPM) will be implemented as a precautionary approach:

- Selection of Plant: Use of low-vibration equipment and techniques where possible (e.g., vibratory rollers will be restricted or managed when operating at their closest point to a dwelling).
- Plant Placement: Stationary vibration-generating equipment will be located as far as possible from the nearest NSLs.
- Monitoring: In the event of specific resident concerns, vibration monitoring may be conducted to ensure levels remain within the limits specified in BS 5228-2:2009+A1:2014.
- Communication: It is recommended that a public liaison officer should be put forward by the contractor to liaise with the local residents on matters relating to noise and vibration. Residents should be informed of any noise works scheduled where there is the potential to generate high levels of construction noise or if specialist works etc need to be conducted out of the working hours.

13.7.1.3 Construction Phase Traffic

This section sets out general recommendations for the control of construction traffic noise. Although no significant impacts are predicted, the following management measures will be implemented to minimise any potential disturbance:

- Construction Works Traffic Management Plan (CWTMP): A formal CWTMP will be implemented to manage the flow of HGVs and avoid convoys of vehicles.
- Restricted Hours: Deliveries and site traffic will be restricted to standard daytime working hours to avoid sensitive evening and night-time periods. There may be a need on specific occasions for deliveries to arrive outside of normal hours. In all such cases the applicant will liaise and agree any necessary derogations with local residents.
- Driver Conduct: Drivers will be briefed on minimising noise when approaching NSLs (e.g., avoiding unnecessary idling or heavy braking).

- Vehicle Maintenance: All construction vehicles will be regularly maintained to ensure they operate within legal noise limits.

13.7.2 Operational Phase

13.7.2.1 Operational Phase Noise

To ensure compliance with the operational noise targets at NSLs, fixed mechanical assets—such as pumps and compressors—will be housed within dedicated, plant buildings. The structural, mechanical and architectural design of these facilities will incorporate the following building mitigation measures to maximise source attenuation and eliminate potential acoustic leakage.

13.7.2.1.1 Wherrew Raw Water Intake & Pumping Station (RWI&PS)

Operational phase noise associated with the proposed upgrades to the existing Wherrew RWI&PS will comprise the proposed fish return system, which will incorporate acoustic hoods, in addition to the existing plant and equipment on site, most notably the pumps associated with the existing pumping station. To ensure compliance with the operational noise criteria at the nearest Noise Sensitive Locations (NSLs), the fish return system will be housed within a fully enclosed, acoustically treated enclosure.

The enclosure will be designed as a complete acoustic system, with appropriate treatment of access points, joints and any necessary ventilation openings, to minimise sound breakout from the enclosed fish return system. The enclosure specification will be confirmed during detailed design and shall provide acoustic performance at least equivalent to that assumed within the noise assessment.

13.7.2.1.2 Lisglennon Raw Water Storage & Pumping Station (RWS&PS)

Upgrade works at the Lisglennon Raw Water Storage & Pumping Station (RWS&PS) will include the replacement of the existing decommissioned pumps with two new pump sets within the existing pumping station building. As the new pumps will be fully enclosed within the existing building, operational noise impacts at nearby NSLs **are expected to be negligible.**

Notwithstanding this, the following mitigation measures should be considered at the detailed design stage and incorporated into the existing pumping station building, where practicable, to further minimise potential noise breakout from the new pumping equipment:

- Building Envelope
  - Specify acoustically rated doors with suitable perimeter seals and drop seals.
  - Use acoustic glazing where windows are required for operational or health and safety purposes.
  - Ensure all windows and doors are fitted with effective compression seals to prevent noise leakage.
- Ventilation Openings and Louvres
  - Fit acoustic louvres to all ventilation openings to maintain airflow while reducing noise breakout.
  - Use acoustic attenuators or splitter silencers on mechanical supply and extract ventilation systems.
  - Design ventilation routes with bends or lined plenums to increase insertion loss.
  - Avoid direct line-of-sight paths between noisy equipment and external openings
- Internal Acoustic Treatments
  - Reducing reverberation can lower the internal sound pressure level and, consequently, reduce building breakout noise.
  - Install sound-absorbing wall and/or ceiling panels to reduce reverberant noise build-up within the pump house.
- Plant and Equipment Controls

- Select low-noise pumps, motors and associated mechanical equipment where feasible.
- General Design Considerations
  - Locate the noisiest equipment as far as practicable from noise-sensitive façades and ventilation openings.
  - Orient acoustic louvres and doors away from nearby noise-sensitive receptors where possible.
  - Eliminate gaps and weak points within the building envelope, as small openings can significantly reduce the overall acoustic performance of the structure.

13.7.2.1.3 Lisglennon Water Treatment Plant (WTP)

The majority of plant and equipment associated with the Lisglennon Water Treatment Plant (WTP) and Treated Water Storage facilities is either submersible or located underground and, therefore, has been excluded from the assessment on the basis that it will have a negligible noise impact at nearby NSLs. Potential noise breakout from internal operational plant within the proposed Pump & UV Filtration Building has been included in the noise model, along with noise breakout from the MV Substation. External plant and equipment included in the assessment comprises mixer motors serving the equalisation tanks and used wash water settlement tanks, sludge pumps, dewatering pumps and compressors.

The following mitigation measures should be considered at the detailed design stage and, where practicable, incorporated into the upgrade works at the Lisglennon WTP to further minimise potential noise breakout:

- Building Envelope
  - Provide dense masonry walls and an acoustically rated roof construction, with acoustic doors/windows where required. All service penetrations, joints and other potential gaps should be suitably sealed to minimise noise leakage.
- Ventilation
  - Provide acoustic louvres and/or attenuators to ventilation openings and mechanical ventilation systems, where required, to minimise noise breakout while maintaining adequate ventilation.
- Internal Acoustic Treatment
  - Provide sound-absorbing wall and/or ceiling treatments within plant areas, where required, to reduce reverberant noise levels and associated breakout.
- Plant and Equipment
  - Where practicable, select low-noise pumps, motors and compressors and provide local acoustic enclosures for particularly noisy equipment where required.
- Equipment Location
  - Locate the noisiest plant as far as practicable from noise-sensitive façades and orient doors, louvres and other openings away from nearby NSLs.

13.7.2.1.4 Bonniconlon Booster Pumping Station (BPS)

The proposed Bonniconlon Booster Pumping Station (BPS) will comprise a new 320 kW booster pumping station incorporating a pumping area, control room and welfare facilities. An ESB medium-voltage (MV) substation and 400 kVA transformer will also be provided to supply the required electrical capacity. The proposed pumping equipment will be housed within the BPS building and, accordingly, operational noise effects at nearby NSLs are **anticipated to be negligible.**

Notwithstanding this, the following mitigation measures should be considered during detailed design and incorporated into the proposed BPS, where practicable, to minimise potential noise breakout from the pumping equipment;

- Building Envelope
  - The proposed BPS building should comprise standard blockwork construction with appropriate acoustic criteria.

- Acoustically rated doors should be provided with suitable perimeter and drop seals, and acoustic glazing should be used where windows are required for operational or health and safety purposes.
- All windows, doors, service penetrations and other potential gaps should be effectively sealed to minimise noise leakage.

- Ventilation
  - Acoustic louvres should be provided to ventilation openings, with acoustic attenuators or splitter silencers incorporated into mechanical ventilation systems where required.
  - Ventilation routes should incorporate bends or acoustically lined plenums where practicable, while avoiding direct line-of-sight between noisy equipment and external openings.
- Internal Acoustic Treatment
  - Sound-absorbing wall and/or ceiling treatments should be provided where required to reduce reverberant noise levels and associated noise breakout from the pump house.
- Plant and Equipment
  - Low-noise pumps, motors and associated mechanical equipment should be selected where practicable.
- General Design Considerations
  - Noisy equipment should be located as far as practicable from noise-sensitive façades and ventilation openings, with doors and acoustic louvres oriented away from nearby NSLs where possible.
  - The building envelope should be designed and constructed to minimise gaps and weak points that could compromise its overall acoustic performance.

13.7.2.1.5 Bonniconlon Reservoir

The proposed service reservoir near Bonniconlon will house treated water. As the site will not require any major mechanical plant, operational noise emissions are **anticipated to be negligible** and inaudible at the site boundary. Therefore no operational noise mitigation measures are required.

13.7.2.1.6 Windy Gap Break Pressure Tank (BPT)

All site infrastructure and operational plant will be located below ground level. Consequently, the facility is expected to have **no adverse impact on nearby NSLs,** therefore no operational noise mitigation measures are required.

13.7.2.1.7 Lough Talt Water Treatment Plant (WTP)

The existing Lough Talt site will be repurposed as part of the Proposed Development, with the majority of new and retained plant and equipment located internally within existing or proposed buildings. Based on the predicted operational noise levels, noise from the Lough Talt Water Treatment Plant (WTP) **is not anticipated to result in a significant adverse effect at nearby NSLs**.

Notwithstanding this, the following mitigation measures should be considered at the detailed design stage, where practicable, to further minimise potential operational noise emissions:

- Building Envelope
  - Acoustically rated doors should be provided with suitable perimeter and drop seals, and acoustic glazing should be used where windows are required for operational or health and safety purposes.
  - All windows, doors, service penetrations and other potential gaps should be effectively sealed to minimise noise leakage.
- Ventilation
  - Acoustic louvres should be provided to ventilation openings, with acoustic attenuators or splitter silencers incorporated into mechanical ventilation systems where required.
  - Ventilation routes should incorporate bends or acoustically lined plenums where practicable, while avoiding direct line-of-sight between noisy equipment and external openings.
- Internal Acoustic Treatment

- Sound-absorbing wall and/or ceiling treatments should be provided where required to reduce reverberant noise levels and associated noise breakout from enclosed plant areas.

- Plant and Equipment
  - Low-noise pumps, motors, compressors and associated mechanical equipment should be selected where practicable.
- General Design Considerations
  - Noisy equipment should be located as far as practicable from noise-sensitive façades and ventilation openings, with doors and acoustic louvres oriented away from nearby NSLs where possible.

13.7.2.2 Operational Phase Vibration

This section sets out mitigation measures for the control of vibration during the operational phase of the Proposed Development. Although no significant impacts are predicted due to distance separation, the following mitigation measures will be implemented at detailed design stage across.

- Plant Placement: Stationary vibration-generating equipment will be located as far as possible from the nearest NSLs.
- Any compressors, pumps and associated pipework shall be isolated from the plantroom facings (floor, wall and ceiling) by way of suitably selected vibration isolating measures. These measures should satisfy a natural frequency that is less than 2.5Hz in the slowest driving frequency (Fn= 2.5/RPM) of each piece of equipment with a minimum isolation efficiency of 90%.
- Plant and equipment should include vibration isolation such that the stated isolation efficiencies are achieved.
- All pump sets should be provided with concrete inertia bases with a weight at least 1.5 times the weight of the pumps they are supporting. Pumps should be mounted in pairs (running and standby) on the same slab-base. The inertia bases should be designed with sufficient strength and rigidity to support the equipment and compensate for dynamic reaction due to the equipment.
- All pump sets should be provided with open-coil spring anti-vibration mountings under the inertia bases. These should be provided with neoprene noise stop pads at least 6mm thick. The effective isolation efficiency of the installed anti-vibration mounts should be as shown in Table 13-34.

Table 13-34 — Pump Vibration Isolation Requirements

Details	Suspended Concrete Floor	Solid Floor
Pumps > 5hp	98%	96%
Pumps < 5hp	96%	94%

- With the anti-vibration mountings fully deflected under the weight of the plant, there should be a minimum clearance of 18 mm from the underside of the inertia block to structural floor.
- All smaller in-line type pumps should only be fixed to the structure by isolated fixing bolts.
- All pipe work from pumps should be supported for a distance equivalent to 100 pipe diameters, using neoprene hangers giving a minimum static deflection of 8mm under the imposed load. Pipe work should also include suitable flexible connectors.

13.8 Cumulative and Interactive Effects

13.8.1 Cumulative Impact Assessment

The potential for cumulative noise and vibration effects has been assessed having regard to other existing, permitted and proposed developments within the 400 m zone of influence established for the Proposed Development.

The identified projects were reviewed with regard to their proximity, nature and potential to generate noise or vibration during construction or operation. Particular consideration was given to developments located along or in close proximity to the proposed treated water trunk main, where construction activities could potentially overlap.

The majority of identified projects are not anticipated to result in a material cumulative noise or vibration interaction due to their scale, nature, separation from sensitive receptors or limited operational noise potential. The potential for cumulative effects is therefore primarily associated with temporary construction activities occurring concurrently with the Proposed Development and, to a lesser extent, the operation of existing or permitted noise-generating facilities.

Table 13-35 — Topic-Specific zone of influence applied to the Stage 1 Long List of the Cumulative Impact Assessment

Technical Chapter	Zone of Influence[1]	Rationale
13. Noise and Vibration	400 m	▪ Industry standard ▪ Guidance ▪ Impact zone of most sensitive receptors

13.8.2 Anticipated Effects

The principal potential cumulative and interactive effects are associated with:

- Construction noise from activities occurring concurrently with other permitted developments;
- Construction traffic noise associated with simultaneous construction activities; and
- Potential interaction between operational noise from the Proposed Development and existing or permitted fixed noise sources.

No material cumulative vibration effects are anticipated.

13.8.3 Construction

13.8.3.1 Effect 1: Cumulative Construction Noise

13.8.3.1.1 Value and sensitivity

Noise-sensitive locations are predominantly residential properties and are therefore considered to have High sensitivity to construction noise.

[1] Distance calculated from the red line boundary.

13.8.3.1.2 Magnitude

The potential for cumulative construction noise is greatest where works associated with the Proposed Development occur concurrently with other construction activities in close proximity to the same NSLs. Table 13-28 demonstrates that, under worst-case unmitigated conditions, construction noise levels generally reduce with increasing distance from the works, with the greatest potential for exceedance occurring at receptors located close to the active construction area.

Given the temporary and localised nature of the works and the uncertainty regarding the timing of other permitted developments, the magnitude of cumulative construction noise is considered Low to Moderate.

13.8.3.1.3 Significance of effect

Taking account of the High sensitivity of the receptors and the temporary nature of the construction activities, the significance of cumulative construction noise is considered Slight to Moderate, where concurrent works occur in close proximity to the same receptors.

13.8.3.1.4 Mitigation

The construction noise mitigation measures set out in Section 13.7 will be implemented, including control of noise at source, appropriate selection and management of plant, screening where practicable and adherence to appropriate working practices.

13.8.3.1.5 Residual significance of effect

Following implementation of the proposed mitigation measures, the residual cumulative construction noise effect is considered Not Significant.

13.8.4 Operational Effects

Operational cumulative noise has been considered in relation to existing and permitted developments within the 400 m zone that have the potential to generate ongoing noise emissions.

The majority of identified developments do not contain significant fixed operational noise sources. Greater potential for interaction is associated with existing or permitted facilities incorporating operational plant, including the Mullafarry limestone quarry (Planning Ref. 21708), the Lisglennon anaerobic digestion/biogas facility (Planning Ref. 2193) and the Tawnaghmore energy infrastructure developments (Planning Refs. 18358 and 2560108).

The operational assessment in Section 13.6.3 demonstrates compliance with the applicable noise criteria. Having regard to the predicted operational noise levels, separation distances and nature of the identified developments, no significant cumulative operational noise effect is anticipated.

The residual cumulative operational noise effect is therefore considered Not Significant.

13.8.5 Interactions

The potential for interactions between noise and vibration effects and other environmental aspects of the Proposed Development has been considered for both the construction and operational phases. Such interactions may arise where noise or vibration effects occur concurrently with, or contribute to, effects identified within other environmental topics, particularly in relation to population and human health, biodiversity, and roads, traffic and transportation.

The assessment has considered the nature, duration and extent of the predicted noise and vibration effects, together with the findings of the assessments presented in the relevant technical chapters. The principal interactions identified in relation to noise and vibration are summarised in Table 13-36.

Table 13-36 — Interactions between Environmental Aspects of the Proposed Development

Interaction	Description
Chapter 6 - Population and Human Health;	Noise and vibration have the potential to interact with effects on population and human health during both the construction and operational phases. During construction, temporary noise effects may arise from activities including water trunk main installation, site set-up, demolition, substructure and superstructure works. As demonstrated in Table 13-28, the highest construction noise levels occur at receptors located closest to the active works, with the potential for exceedances of the applicable construction noise criterion under worst-case conditions. Construction-related vibration is predicted to be negligible at nearby receptors due to the separation distances between the works and noise-sensitive locations. During operation, noise from fixed plant and equipment has been assessed at the nearest NSLs. Predicted operational noise levels are within the applicable EPA NG4 criteria.
Chapter 7 - Biodiversity	Noise and vibration have the potential to interact with effects on biodiversity during the construction phase through temporary disturbance associated with construction activities. The potential for interaction is greatest where construction works occur in proximity to sensitive ecological receptors. During operation, noise and vibration associated with fixed water infrastructure plant are expected to be substantially more localised, with the majority of operational plant located internally, underground or otherwise screened. The potential for noise and vibration to interact with effects on sensitive ecological receptors is therefore expected to be greatest during the temporary construction phase.
Chapter 15 - Roads, Traffic & Transportation	An interaction exists between noise and traffic during both construction and operation. During construction, additional vehicle movements associated with the delivery of materials, plant and equipment have the potential to generate temporary increases in traffic noise. The construction traffic noise assessment identifies a Negligible magnitude of impact, with the additional traffic movements not expected to result in a perceptible change in noise levels. During operation, traffic associated with the Proposed Development is expected to be limited and is not anticipated to result in a significant increase in road traffic noise. Accordingly, no significant interaction between traffic and noise is anticipated during either phase.

13.9 Residual Effects

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

13.9.1 Construction Phase

As the construction phase is temporary, there will be no long-term/permanent noise impacts on the surrounding area from construction noise. Section 13.7 above outlines mitigation measures which if used in full will reduce the construction noise impact on the surrounding NSLs.

13.9.2 Operational Phase

Operational noise sources include plant and equipment associated with the various water infrastructure facilities across the Proposed Development site. Based on the noise impact assessment, with the implementation of mitigation measures outlined Sections 13.6.3 and 13.7, it is not likely that these sources will have a negative noise impact on the surrounding NSLs.

13.10 Monitoring Requirements

13.10.1 Construction Phase

To ensure continuous compliance, noise and vibration monitoring will be carried out throughout the construction phase:

- Noise Monitoring: monitoring will be conducted at noise sensitive receptor locations to ensure construction site activities remain within the established TII Guidance limits.
- Vibration Monitoring: Monitoring will be undertaken to ensure vibration levels, measured in Peak Particle Velocity (PPV), do not exceed thresholds for cosmetic or structural protection of neighbouring buildings.

13.10.2 Operational Phase

Following completion of the construction works and commencement of operations at the various water infrastructure sites, a compliance noise survey should be undertaken at the nearest NSLs during the night-time period (23:00–07:00). The survey will verify that operational noise levels from the water infrastructure sites comply with the relevant EPA NG4 night-time noise criteria.

13.11 Do Nothing Scenario

Under the ‘Do Nothing’ scenario, the existing noise climate at the nearest NSLs would persist in its current state. No significant alterations to the future baseline are anticipated, notwithstanding the potential impacts of cumulative developments discussed in Section 13.8. The baseline data presented in this chapter is therefore considered representative of the long-term future noise environment in the absence of the Proposed Development.

13.12 Conclusion and Summary tables

This chapter outlines the project criteria, survey results, assessment, and general guidance recommendations for:

- Construction related noise and vibration from the construction of the proposed project.
- Operational noise from operational external plant and equipment associated with the proposed project.

Based on the operational hours of the Proposed Development there is potential for noise effect in both the day and night-time, therefore an assessment for both has been conducted. The noise impact assessment included attended and unattended noise measurements across the proposed project site. This included measurements of background noise at the noise sensitive locations.

13.12.1 Construction Noise and Vibration

The construction noise and vibration assessment indicates that, following implementation of the mitigation measures identified in Section 13.7, construction noise and vibration effects will be controlled in accordance with the applicable criteria and recognised best-practice standards. Any elevated noise levels are expected to be temporary and localised to the active construction works.

13.12.2 Operational Noise

Operational noise emissions from the Proposed Development have been assessed against the relevant criteria set out in EPA NG4. The assessment considered the potential noise effects associated with daytime, evening and night-time operation at the nearest NSLs. Predicted operational noise levels from all water infrastructure sites are compliant with the applicable EPA NG4 criteria. Accordingly, operational noise from the Proposed Development is not anticipated to result in significant negative effects at nearby NSLs during daytime, evening or night-time periods.

13.12.3 Construction Phase Cumulative Effects

The potential for cumulative construction noise and vibration effects was assessed having regard to other existing, permitted and proposed developments within the 400 m zone of influence. While a number of developments are located in close proximity to the proposed treated water trunk main, the potential for cumulative effects is dependent on the timing and location of construction activities. The majority of identified developments are limited in scale or are not anticipated to generate significant noise or vibration at common NSLs. Where construction activities associated with other developments occur concurrently with the Proposed Development, the potential for temporary cumulative noise effects exists, particularly where works are located close to the same NSLs. Following implementation of the construction mitigation measures set out in Section 13.7, the residual cumulative construction noise and vibration effect is considered Not Significant.

13.12.4 Operational Phase Cumulative Effects

Operational cumulative noise effects have been considered in relation to existing and permitted developments within the 400 m zone of influence. The majority of identified developments do not contain significant fixed operational noise sources capable of materially interacting with the Proposed Development.

The operational noise assessment demonstrates compliance with the applicable EPA NG4 criteria. Having regard to the predicted operational noise levels, separation distances and nature of the identified developments, no significant cumulative operational noise effect is anticipated.

Table 13-37 — Summary of impact assessment – Construction

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
Construction Noise	High	Residential NSLs are highly sensitive to noise disturbance.	Moderate	Construction noise is temporary and transient, with the greatest effects occurring at NSLs in close proximity to the active construction works.	Slight to Moderate	Implementation of construction noise controls in accordance with BS 5228, including selection of quiet plant, noise control at source, screening where practicable and appropriate working practices	Low	Slight
Construction vibration	High	Residential properties are sensitive to vibration, particularly where construction activities are undertaken in close proximity.	Negligible	Given the separation distances between the construction works and the nearest NSLs, vibration levels are predicted to remain below thresholds for	Not Significant	Precautionary vibration monitoring at the closest sensitive receptors during high-impact activities such as rock breaking and sheet piling	Negligible	Not Significant

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
				human perception and structural or cosmetic damage.				
Construction traffic noise	High	Residential NSLs along the proposed haulage routes and water trunk main corridor are sensitive to traffic-related noise	Negligible	Additional construction traffic is temporary and is not expected to result in a perceptible increase in road traffic noise levels.	Not Significant	Construction Traffic Management Plan and adherence to restricted delivery and construction traffic hours.	Negligible	Not Significant

Table 13-38 — Summary of impact assessment – Operation and maintenance

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
Operational plant and equipment	High	Residential NSLs are sensitive to operational noise, particularly during evening and night-time periods.	Low	Predicted operational noise levels are within the applicable EPA NG4 criteria.	Slight	Acoustic enclosure for the fish return system at Wherrew RWI&PS.	Negligible	Not Significant

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
Operational vibration	High	Residential properties are sensitive to vibration and associated effects on human comfort.	Negligible	Operational vibration levels are predicted to remain well below thresholds for human perception and structural or cosmetic damage due to the separation between operational plant and nearby NSLs.	Not Significant	No specific operational vibration mitigation is required.	Negligible	Not Significant

Table 13-39 — Summary of cumulative impact assessment

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
Cumulative construction noise and vibration	High	Residential NSLs are sensitive to construction noise and vibration.	Low	Potential for temporary cumulative noise where construction activities overlap with other developments.	Slight	Construction noise and vibration mitigation measures outlined in Section 13.7.	Negligible	Not Significant

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
				Construction vibration is predicted to be negligible.				
Cumulative operational noise	High	Residential NSLs are sensitive to operational noise, particularly during evening and night-time periods.	Low	The majority of identified developments have limited operational noise potential. Operational noise from the Proposed Development complies with the applicable criteria.	Slight	Acoustic enclosure for the fish return system at Wherrew RWI&PS and operational noise mitigation measures outlined in Section 13.7.	Negligible	Not Significant

Table 13-40 — Summary of interactions

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
Chapter 6 – Population and Human Health	High	Residential receptors are sensitive to noise disturbance during construction and operation.	Low	Noise effects are localised and temporary during construction. Operational noise is controlled through the proposed	Slight	Construction and operational noise mitigation measures outlined in Section 13.7.	Negligible	Not Significant

Feature	Importance		Magnitude		Significance	Mitigation measures	Residual impact	Residual significance
				mitigation measures.				
Chapter 7 – Biodiversity	High	Noise and vibration have the potential to interact with effects on sensitive ecological receptors, particularly during construction.	Low	Construction noise and vibration effects are temporary and localised. Operational plant is predominantly internal, underground or screened.	Slight	Construction noise and vibration controls outlined in Section 13.7.	Negligible	Not Significant
Chapter 15 – Roads, Traffic & Transportation	High	Construction traffic has the potential to interact with noise through additional vehicle movements on the local road network.	Low	Construction traffic is temporary and is not expected to result in a perceptible increase in traffic noise levels.	Slight	Construction Traffic Management Plan and controls on construction traffic and delivery movements.	Negligible	Not Significant

13.13 Difficulties encountered during preparation of this chapter

Given the large-scale, linear nature of the project corridor and the inclusion of various water infrastructure facilities, certain standard engineering variables had to be managed using a conservative approach:

- Equipment Specifications: Because the final purchasing of mechanical equipment occurs after planning approval is granted, exact manufacturer noise data for every individual pump, mixer, motor, and compressor was not yet available. To ensure a protective assessment, conservative maximum noise levels based on source levels provided by the client, plant manufacturer and measurement data on similar types of equipment from the Wave Dynamics (WD) database were built into the SoundPLAN 9.1 predictive software. Additionally, a commitment has been made to verify the final equipment choices against these noise limits before construction begins.

- Varied Local Environments: The Red Line Boundary spans a diverse geographical area, ranging from busier transport routes near Ballina town to highly rural, remote terrain. To ensure comprehensive protection for all residents, baseline noise monitoring was concentrated around the primary facilities, and a conservative "low background noise" target was applied to safeguard the quiet rural gaps between the noise monitoring locations.

- Construction Noise**:** The exact day-to-day sequencing of machinery — such as when a contractor will deploy a rock breaker along the pipeline, a concrete crusher or sheet piling — cannot be finalised at this stage. To account for this, calculations were based on a "worst-case scenario" under BS 5228-1 guidelines. This assumes that all equipment assigned to a specific construction phase operates simultaneously at the closest property boundary, providing a significant safety margin.

None of these standard engineering factors have limited the reliability of the assessment, and the protective assumptions used ensure that potential impacts have been fully accounted for and mitigated.

13.14 References

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Central Statistics Office: https://www.cso.ie/en/statistics/population/

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