Environmental Noise Action Plan

2023–2028

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FOREWORD

Public transport is part of a shared mobility strategy that touches the lives of everyone in Northern Ireland, not just those that use our services. An effective and successful public transport network is vital for the economic, social and environmental well-being of our society.

Translink is Northern Ireland's main public transport provider. We are a public corporation which has a degree of commercial independence yet are governed in policy terms by the Department of Infrastructure. We provide an essential public service to the people of Northern Ireland which impacts on everyone, supporting economic growth, social inclusion and the welfare of the local communities we serve. This supports the growth and prosperity of Northern Ireland. Providing high quality public transport not only enables a region to thrive, it also helps to address the challenge of congestion and air quality, creating healthier towns and cities.

At Translink we are proud of our contribution to Northern Ireland society. However, that sense of pride is paralleled with a sense of responsibility. We are committed to considering the interests of society by taking responsibility for the impact of our own activities on customers, suppliers, employees, stakeholders and communities as well as the environment. We recognise that living next to the railway may have some noise impact. Whilst noise cannot be eliminated the organisation takes action to minimise the impact of this on our local communities.

Our previous Environmental Noise Action Plans have already substantially decreased our noise profile. We have introduced new quieter rolling stock and made improvements to track design and maintenance. However, we are far from complacent and always seek further reasonably practicable opportunities to reduce our noise profile. That is why we have published this updated and extended Translink Environmental Noise Action Plan which contains additional actions to manage noise through until 2030. By publishing this action plan the organisation demonstrates its importance and determination to minimizing the impact where reasonably practicable.

EXECUTIVE SUMMARY

Annex V of the Environmental Noise Directive requires that Action Plans must include the detail under the following headings. This information has been summarised from the main body of the plan for the purpose of complying with the Environmental Noise Regulations (Northern Ireland) 2006 and EU reporting requirements.

This draft of Translink's Noise Action Plan is subject to formal adoption by the Department of Agriculture, Environment and Rural Affairs.

Description of the agglomeration, major railways

The only agglomeration in Northern Ireland considered in Round Four is the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1 and has an approximate area of 208.5km^2. This represents a 0.9 km^2 decrease in comparison to Round Three. The updated Round Four Belfast Agglomeration area continues to accurately represent the densely populated regions surrounding the Belfast urban area, complies with the Regulations, aligns with the population distribution throughout Belfast, and was adopted for Round Four.

Northern Ireland Railways network covers 328 route kilometres of track. The rail network also includes almost 400 railway signals, 205 sets of points and 60 level crossings. Structures on the network include 468 bridges, tunnels and viaducts; 460 culverts; 3 tunnels, 10 miles of sea defences, 434 retaining walls and 139 platforms.

The Authority Responsible

Regulation 10 states the Northern Ireland Transport Holding Company (Translink) is the Competent Authority.

Legislative & Policy Perspective

The Environmental Noise Directive is transposed into legislation by the Environmental Noise Regulations (Northern Ireland) 2006 which came into force on 20th October 2006 and applies to environmental noise levels; in particular, in built-up areas, public parks or other quiet areas in

agglomerations, and other noise-sensitive buildings and areas. The Regulations apply to noise from road, railway and airport sources, as well as industrial noise.

Any Limit Values in Place

There are no relevant formal limit values in force in Northern Ireland with regard to environmental noise from railways.

Summary of the Results of the Noise Mapping

The results are shown in Section 5 for both Agglomeration Rail and Major Railways.

The extent of the Round Four Belfast Agglomeration covers 208.5km^2, with up to:

- 5 km^2 (2.4% of the agglomeration area), 3,313 dwellings and 6,373 persons potentially exposed to railway noise levels greater than 55 dB L_{den}; and
- 1 km^2 (<1% of the agglomeration area), 1,172 dwellings and 2,307 persons potentially exposed to noise levels greater than 50 dB L_{night}.

During the night period, an estimated total of 1,172 dwellings are potentially exposed to noise levels greater than 50 dB L_{night}, which statistically contain an estimated population of 2,307

The total number of school buildings potentially exposed to noise levels greater than 55 dB L_{den} and 50 dB L_{night} from rail sources within the Belfast Agglomeration are 18 and 7, respectively.

The total number of hospital buildings potentially exposed to noise levels greater than 55 dB L_{den} and 50 dB L_{night} from rail sources within the Belfast Agglomeration are 23 and 10, respectively.

The results of the population analysis for railways within the Agglomeration, Table 7.5, shows that only 16 people may be exposed to railway noise levels in excess of 70 dB in relation to the L_{den} scenario.

Identification of potential problems and situations that may need to be improved.

In accordance with the aims and objectives of the Directive, the proposals within this Action Plan are focussed upon:

"preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental noise quality where it is good."

A record of the public consultations organised in accordance with Article 8(7)

A draft Action Plan was made available via a dedicated section on the Translink website with a Public Notice posted in the Belfast Telegraph, and interested stakeholders and local interest groups notified directly by email.

Noise reduction measures already in force

In addition to intrinsic features of the track corridor which attenuate noise experienced by neighbours, Translink have two purpose-built noise barriers. One is located at Central Station, Belfast, and comprises a solid wall and barrier diffuser system. The second is at Adelaide Train Maintenance Facility. Other network features such as the concrete wall at Blythfield Curve exiting Grand Central Station will have noticeable noise reduction benefits. Noise created through damaged wheels and track is minimised by regular maintenance and condition-led monitoring, and use of sensors. Use of disc brakes and composite blocks reduces brake noise levels. This is further reduced through the installation of automatic track lubrication systems on tight curves to reduce friction and hence noise.

Regarding vehicle procurement new trains must have drive-by noise attenuation surpassing EC/ECE70/157, and the specification for the Class 3000 and 4000 rolling stock ensured that they met limits as defined by Council Directive 96/48/EC on the interoperability of the trans-European high speed rail system and conventional rolling stock (2001/16/EC). This specifies maximum noise emission levels from trains. Compliance by NIR with the EU technical Specifications for Interoperability when replacing the fleet has led to an overall reduction in the railway operational noise impact.

We have installed a "wheelset acoustic monitoring" device in the Belfast area that provides early warning of wheel condition/flats that if untreated can give rise to incremental noise increases. Improvements in train preparation systems have eliminated the need for train horn testing prior to trains entering service.

Actions which the Competent Authority intend to take in the next five years

Translink will continue the work progressed through our previous action plan within the 5 major headings to:

- **Demonstrate our continuing commitment to managing noise associated with Translink's operations.**
- **Engage with our neighbours affected by Translink's operations and better understand their concerns and priorities.**
- **Influence planning policy to minimise the number of noise sensitive properties around our network.**
- **Align the organisation to continue to efficiently and effectively manage noise pertaining to our operations**
- **Develop our understanding of noise issues to further inform our priorities, strategies and targets** – with additional actions regarding Round Four as per below:
    - Having identified the worst affected 1% of the population via the modelling, we will carry out field work to ascertain the validity of the noise levels modelled.
    - Analysis of mitigation measures if applicable.

Roles & Responsibilities

The END process within Translink - Northern Ireland Railways is coordinated via the Translink Safety Health & Environment (SH&E) Department, with the ESG Manager the primary contact. The Action Plan has been approved by Chief Operating Officer and his Executives and progress against the actions will be regularly reviewed by the leadership group.

Long-term strategy

Our Translink Corporate Vision is '***to make Translink your first choice for travel, today for tomorrow***' by leading the transformation of transport in Northern Ireland. Our Better Connected strategy, covering the period to 2030, sets out how we will do it and outlines our four strategic objectives of Continuous Improvement, Customer Focus, Climate Action and Connecting

Communities. Elements of this strategy which are directly relevant to this Noise Action Plan include better asset management, action on sustainable rail fleet, and connected network development and services.

Financial information: budgets, cost-effectiveness assessment, cost-benefit analysis

Budgets relating to the development of noise modelling and associated field work is managed via the Translink SH&E Department. Any works required to manage noise on the NI Railways network will reside with the Translink Infrastructure Division and its relevant departments.

Provisions envisaged for evaluating the implementation and the results of the Action Plan

The current NIENDSG (Northern Ireland Environmental Noise Directive Steering Group) system has proved to be effective in developing this draft Noise Action Plan. Consideration will be given to the form in which this plan is progressed (including possible identification of Noise Management Areas), implementation of actions, and the development of future plans following the required five yearly reviews of the noise maps.

Estimates in terms of the reduction of the number of people affected (annoyed, sleep, disturbed, or other).

The Railway is a dynamic entity and there will be variances between the data available to enable modelling and current operational service provision. Translink will work to ensure that the data used to base actions on is updated to reflect the most current operational timetable and fleet usage. This will provide a more accurate assessment of noise relating to the railway and thus improve the identification of consequential management actions for anyone exposed to specific noise categories (noise levels 65dB and above).

Revision of Action Plan

Translink will continue to monitor and review this Railway Noise Action Plan on an on-going basis, as well as when a major development occurs. It should be noted that the major redevelopments of Grand Central and York Street Stations are not reflected in the analysis but have been incorporated into the resulting Action Plan.

1.0 INTRODUCTION

1.1 Purpose

This Noise Action Plan has been prepared to show how the Translink Group intends to manage noise issues and effects arising from the railway operations of Northern Ireland Railways and where necessary, improve the noise climate around the railway network during the period 2025 – 2030. It follows on the work carried out within our previous action plans and reflects our continued commitment to controlling the adverse effects of our operations and minimizing their impact on the local communities in which we operate. In respect of noise this means implementing industry best practice to limit and reduce, where necessary, the number of people affected by noise arising from our operations.

The Noise Action Plan has been prepared in accordance with the European Union Environmental Noise Directive (Directive 2002/49/EC) also known as the 'END', the Environmental Noise Regulations (Northern Ireland) 2006, which transpose the Directive into local legislation, and its supporting guidance.

This is one of a set of five Action Plans for Northern Ireland, namely:

- The Roads Noise Action Plan.
- The Railways Noise Action Plan.
- The Industrial Noise Action Plan.
- The George Best Belfast City Airport Noise Action Plan; and
- The Belfast International Airport Noise Action Plan.

This Railways Action Plan is based on the results of strategic noise mapping produced under the terms of the Regulations and covers noise from railways mapped within the Belfast agglomeration.

2.0 LEGISLATIVE & POLICY PERSPECTIVE

2.1 Background

The European Parliament and Council Directive for Assessment and Management of Environmental Noise 2002/49/EC, more commonly referred to as the Environmental Noise Directive (END), was published in the Official Journal of the European Union in July 2002. The Directive deals with noise from roads, rail, and air traffic, and from agglomerations.

The aim of the Directive is to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise.

The three main objectives of END are:

- To determine exposure to environmental noise, through noise mapping.
- To ensure information on environmental noise and its effects is made available to the public; and
- Adopt Action Plans based upon the mapping results, to prevent and reduce environmental noise where necessary, where exposure levels can induce harmful effects on human health and to preserve environmental noise quality where it is good.

The END is transposed into legislation by the Environmental Noise Regulations (Northern Ireland) 2006 which came into force on 20th October 2006 and applies to environmental noise levels; in particular, in built-up areas, public parks or other quiet areas in agglomerations, and other noise-sensitive buildings and areas. The Regulations apply to noise from road, railway and airport sources, as well as industrial noise. The Regulations do not apply to noise that is caused by the person exposed to the noise from, domestic activities, noise created by neighbours, noise at workplaces, or noise inside means of transport or due to military activities in military areas. They apply solely to environmental noise to which humans are exposed, in particular in built-up areas, in public parks or other quiet areas in agglomerations, near schools, hospitals and other noise-sensitive buildings and area.

Under the Regulations, noise maps and noise action plans must be prepared over a 5-year rolling cycle. The first round of noise mapping in Northern Ireland was undertaken and completed in 2007 using data representative of 2006. For reporting in 2012, the second round of mapping was undertaken using data representative of 2011, and for reporting in 2017, the third round of mapping was undertaken using data representative of 2016.

The current Round Four maps were created using data representative of 2021.

For the first round of mapping in 2007, the Regulations required the preparation of noise maps for the following:

- All major roads with more than 6 million vehicle passages per year;
- Major railways with more than 60,000 passages per year;
- Major airports; and
- All agglomerations with more than 250,000 inhabitants.

Within agglomerations, the Regulations require the mapping of all roads, railway, industry and airport noise sources regardless of the thresholds outlined above.

For the second and subsequent rounds of mapping, the Regulations reduce the thresholds for which noise mapping and action planning should be prepared and reported for the following:

- All major roads with more than 3 million vehicle passages per year.
- Major railways with more than 30,000 passages per year.
- Major airports comprising “civil airports which have more than 50,000 movements per year (a movement being a take-off or a landing), excluding those purely for training purposes on light aircraft”.
- Industrial noise sources comprising (a) Part A activities (as defined in Schedule 1 of the Pollution Prevention and Control Regulations (Northern Ireland) 2003), within an agglomeration or first round agglomeration; and (b) Ports within an agglomeration or first round agglomeration”; and

- All agglomerations with more than 100,000 inhabitants and population density equal to or greater than 500 people per km^2 and which the Department of the Environment considers to be urbanised.

This action plan relates to Round Four of noise mapping with regard to railways.

It should be noted that noise from domestic activities or noise created by neighbours or construction sites is dealt with under the Pollution Control and Local Government (Northern Ireland) Order 1978. Noise at Work is governed by the Control of Noise at Work Regulations (Northern Ireland) 2006.

If a proposed development is likely to be a source of noise, its location and measures regarding the level or timing of noise emissions may be controlled through the planning system. Existing sources of noise such as road or rail traffic are not subject to planning control but they may be considered in the context of proposed development which may be affected by such sources.

2.2 European Policy

Further to its 1996 Green paper on Future Noise Policy (COM(96)540), the European Commission developed a new framework for noise policy, based on shared responsibility between the EU and national and local levels. The framework included measures to improve the accuracy and standardisation of data which would help improve the coherency of different actions. This document led to a comprehensive set of measures, including:

- The creation of a Noise Expert Network, whose purpose is to assist the Commission in the development of noise policy;
- The END requiring Competent Authority in Member States to produce strategic noise maps based on harmonised indicators, inform the public about noise exposure and its effects, and draw up Action Plans to address noise issues; and
- The follow-up and development of existing EU legislation relating to sources of noise, such as motor vehicles, aircraft and railway rolling stock and the provision of financial support to different noise related studies and research projects; and

- Directive 2002/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to noise emission in the environment by equipment for use outdoors.

2.3 UK Policy

The Department for the Environment, Food and Rural Affairs (Defra) and Devolved Administrations have on-going noise research programmes, which includes surveys of public attitudes to different kinds of noise across the UK and investigations into various technical aspects of noise management. The project outputs inform the government policy in both Westminster and the Devolved Administrations and the governments meet regularly to discuss the outcomes of research and to identify future research priorities.

2.4 Northern Ireland Policy

The English, Scottish and Welsh governments have implemented the END through their own transposing legislation and the END was implemented in Northern Ireland by the Regulations. These Regulations outline a number of stages to manage and, where necessary, reduce environmental noise in line with the requirements of the END. The first stage is strategic noise mapping followed by action planning.

The Regulations specify the general requirements for strategic noise maps. These are:

- Meet the objectives of Article 1(a) of the END;
- Use the supplementary indicators referred to in Schedule 3 of the Regulations;
- Be completed for the L_{den} and L_{night} indicators;
- Include all relevant roads, railways, airports and industrial sites affecting an agglomeration;
- Include all areas affected by designated major roads, railways and airports;
- Be completed using data no more than three years old;
- Satisfy the minimum requirements of schedule 1 of the Regulations which replicates most of Annex IV of the END;
- Present data on an existing or predicted situation in terms of a noise indicator, including breaches of any limit values, the number of people affected in a certain area, or the number of dwellings exposed to certain noise levels in a certain area; and

- Be completed using a method of assessment referred to in Schedule 2 of the Regulations.

The Regulations also specify the requirements for Action Plans, which must:

a) Meet the objectives of:
    i. Preventing and reducing environmental noise where necessary, in particular where exposure levels can induce harmful effects on human health; and
    ii. Preserving environmental noise quality where it is good;
b) Be designed to manage noise issues and effects, including noise reduction if necessary;
c) Aim to protect quiet areas in agglomerations, where appropriate, against an increase in noise;
d) Identify and address priorities for meeting the objectives set out in sub-paragraph (a);
e) Apply in particular to the most important areas as established by strategic noise maps;
f) Meet the requirements in Schedule 4 of the Regulations, which states that an Action Plan shall:
    i. Meet the minimum requirements of Annex V of the Directive;
    ii. Contain a summary covering all the important aspects referred to in Annex V of the Directive, not exceeding 10m pages in length; and
    iii. Be clear and comprehensible: and
g) Be based on Noise Mapping results.

Regulations 34 and 35 place the responsibility for preparing Action Plans on the Northern Ireland Transport Holding Company.

Annex V of the Directive requires that Action Plans must include the detail in Table 1.1 below. Their location in this plan is indicated.

No	Description	Location in this document
1	A description of the agglomerations, the major roads, major railways or major airports and other noise sources taken into account.	Section 3.1
2	The authority responsible.	Section 3.2
3	The legal context.	Section 2
4	Any limit values in place in accordance with Article 5.	Section 3.3
5	A summary of the results of the noise mapping.	Section 6.3
6	An evaluation of the estimated number of people exposed to noise.	Section 6.4
7	Identification of potential problems and situations that may need to be improved.	Section 6
8	A record of the public consultations organised in accordance with Article 8(7).	Section 9.0
9	Any noise-reduction measures already in force and any projects in preparation.	Section 10.1
10	Actions which the competent authorities intend to take in the next five years, including any measures to preserve quiet areas.	Section 8.0
11	Long-term strategy.	Section 10.2
12	Financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment.	Section 10.3
13	Estimates in terms of the reduction of the number of people affected (annoyed, sleep, disturbed, or other).	Section 10.5
14	Provisions envisaged for evaluating the implementation and the results of the action plan.	Section 10.4

Table 1.1 – Annex V Minimum Requirements for Action Plan from Directive

A list of current policy and the framework for the management of environmental noise along with policy and Legislation relating to the control of Noise in Northern Ireland is provided within Appendix C and D.

3.0 CHARACTERISTICS

3.1 Description of the agglomeration, major railways

Translink, on behalf of the Northern Ireland Transport Holding Company, are responsible for identifying and reporting sections of major railway, within the Northern Ireland Railways network, within the thresholds set out in the Regulations.

Under the Regulations, Round Two, and subsequent Rounds (including this Round Four), noise maps in relation to railway noise must encompass:

- Major railways with more than 30,000 passages per year;
- All agglomerations (including road, railways, industrial and airport noise sources) with more than 100,000 inhabitants.

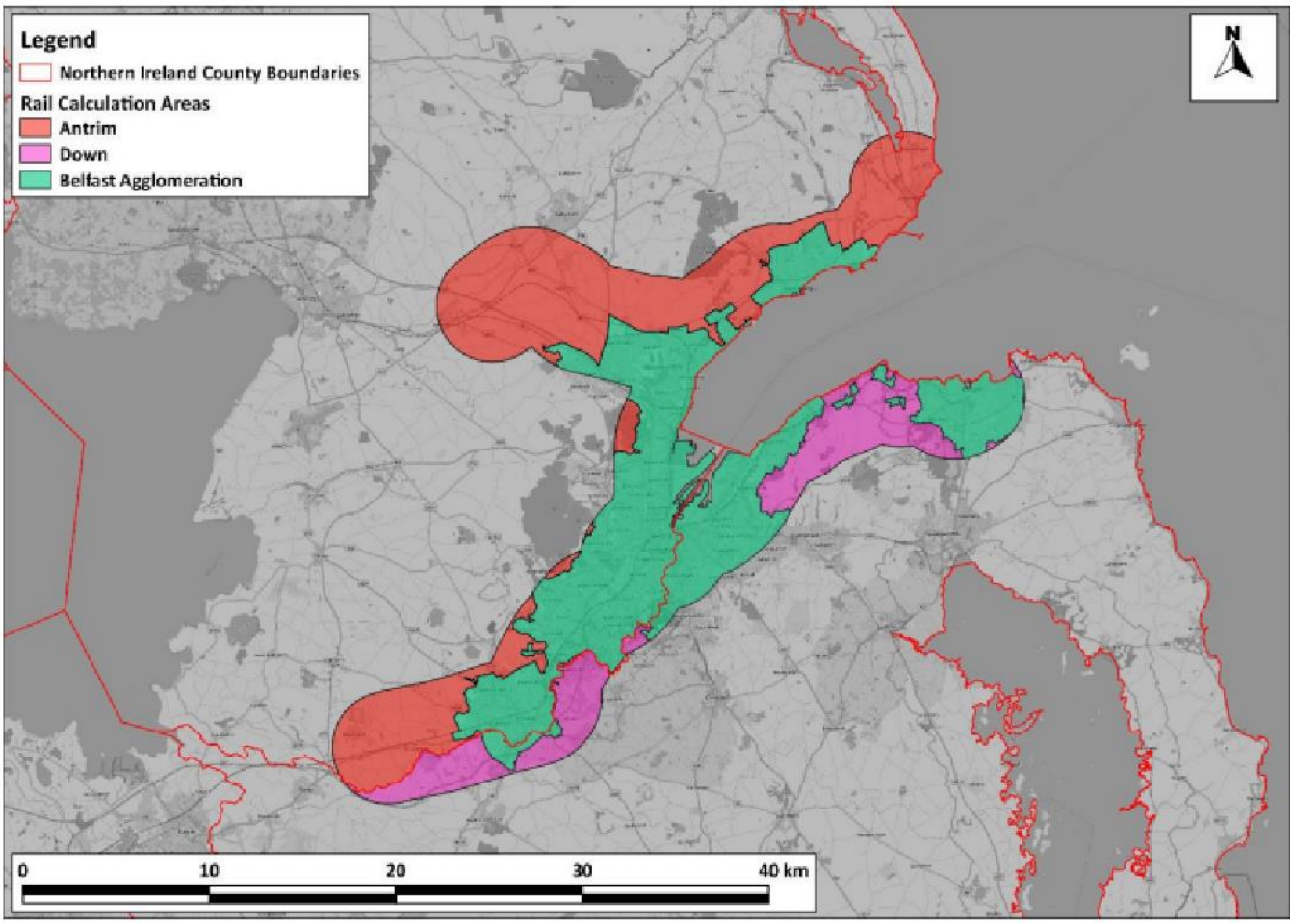
The only agglomeration in Northern Ireland considered in Round Four is the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1 and has an approximate area of 208.5km^2. This represents an 0.9 km^2 decrease in comparison to Round Three. The Belfast Agglomeration boundary for Round Three was developed through merging and dissolving the Northern Ireland Statistics and Research Agency (NISRA) 2005 and 2015 settlement boundaries, then clipping the dissolved boundaries to the OSNI Largescale NI boundary

There have been no major changes to the railway network in Northern Ireland since Round Three and all of Northern Ireland's major rail network falls within the Belfast Agglomeration. As a consequence, the stretches of rail network mapped and considered during the second round were used as the basis for the data capture process. Following a review of railway movement data, it was confirmed that Northern Ireland's major railways are in and around the Belfast Agglomeration.

Using the 2021 data mandated, the Central Line from Great Victoria Street to Lanyon Place comprises the section with the highest number of train passage at almost 65,000 per annum. The line to the north of Belfast (for both Antrim and Carrickfergus) comprises the section of railway with the next highest number of train passages, over 45,000 per annum. Great Victoria Street to Lisburn (36,160 train passages per annum) and Lanyon Place to Bangor (31,319 per

annum) would also be classified as a major railways Train flow information indicating the number of train passages on the NI Railways network is provided in Appendix C.

Plate 3.1 Belfast Agglomeration and Major Railway Calculation Extents, Round Four



Map reproduced from Noise Consultants Ltd for Department of Environment Northern Ireland – Round Four Noise Mapping for Northern Ireland: Railway Modelling Report (21st November 2024)

Railway operational noise originates from a number of sources. These include the engines and cooling fans of locomotives, the under-floor engines of 'diesel multiple units' (self-propelled sets of railway coaches), gears, brakes, aerodynamic effects at higher speeds, and the interaction of wheels and rails. This latter source tends to have an influence on overall noise levels at speeds above 50km/h and is normally predominant at speeds above 100 km/h.

3.2 The Authority Responsible

Regulation 10 states the Competent Authority for drawing up action plans for major railways is the Northern Ireland Transport Holding Company (NITHC). NITHC is a public corporation constituted under the Transport Act (Northern Ireland) 1967. The Translink Group consists of a NITHC which owns and controls seven private limited subsidiary companies (together referred to as the Group or Translink). The relevant contact details for correspondence related to this Noise Action Plan are:

- Email – environment@translink.co.uk
- Post – Environmental Noise Action Plan

  Translink SH&E Dept.

  9TH Floor.

  22 Great Victoria Street

  Belfast

  BT2 7LX

3.3 Any Limit Values in Place

Noise from individual railway vehicles is increasingly being controlled through legislation. The European Commission (EC) introduced a Technical Specification for Interoperability (TSI) to provide limits for noise emission from rail vehicles. Limits from rail plant and equipment are provided by Directive 2000/14/EC, which relates to noise emissions in the environment from equipment used outdoors.

The EC adopted a Technical Specification for Interoperability relating to rolling stock noise for conventional rolling stock in 2006 (Decision 2006/66/EC), and new rolling stock must meet the limits defined in Directive 96/48/EC on the interoperability of the trans-European high-speed rail system. The TSIs (on conventional and high-speed rolling stock) include noise limits for starting noise, noise from stationary vehicles and pass-by noise. The Class 300 and Class 4000 rolling stock used on Northern Ireland's railways meet these limits while the introduction of new rolling

stock for the Enterprise service, planned to occur during this Action Plan, includes this in the technical specification. In addition, preparatory work on electrification of the Northern Ireland Railways network is taking place in line with the organisations target to be Net Zero Emissions by 2040.

When proposing the construction of any new major developments noise is taken into account. Mitigation measures such as optimising the track construction and the use of noise barriers, either through landscaping or purpose-built walls or fences, are included in the design to minimise any adverse noise impact.

The use of continuously welded rail has been found to help reduce operational noise although switch and crossing noise cannot be eliminated by continuous welding. Although not directly related to operational noise, the noise from train horns has been addressed over recent years. The National Railway Group Standard for horns now specifies a maximum noise level (in addition to a minimum level). Furthermore, the Rule Book has been amended to reduce the number of occasions on which the sounding of the horn is mandatory.

There are no relevant formal limit values in force in Northern Ireland with regard to environmental noise from railways. As previously highlighted Technical Specifications for Interoperability (TSIs) include limit values at source for railway vehicles, and occupational noise limits apply through general Health & Safety legislation for workplaces.

4.0 REVIEW OF PREVIOUS NOISE ACTION PLANS

4.1 Summary of the Results of Round One Mapping

During the Round One Mapping, 2007, it was found that the railways had little noise impact within the Belfast Agglomeration. With no major railways being identified and the limited rail network an area of only 1 km^2 was exposed to noise levels within the L_{den} 65-69 contour band, and 189 km^2 (95%) with less than 50dB.

With limited railway operations during night-time hours again little noise impact from railways within the Belfast Agglomeration was attributed during the night.

For the L_{den} noise scenario 98% of dwellings (248,528) within the Belfast Agglomeration were exposed to railway noise less than 50 dB, and no dwellings were exposed to noise levels in excess of 75 dB.

The results of the population analysis for railways showed that only 58 people were exposed to railway noise levels in excess of 70dB within the Belfast Agglomeration in relation to the L_{den} scenario.

4.1.1 Round One Action Plan

The first-round action plan was a high-level strategic plan which outlined the general basis upon which we aimed to tackle environmental noise in line with the requirements of the Directive.

The actions were grouped into 5 major headings:

4.2 Summary of the Results of Round Two Mapping

The only agglomeration in Northern Ireland considered in Round Two was the Belfast agglomeration as defined in the Regulations with an approximate area of 198 km^2. Data used for 2008 showed the Belfast Urban Metropolitan Area had a population of 267,742. The extents of the Agglomeration for Round Two were the same as for Round One.

Using the Belfast agglomeration as a basis, a Round Two data capture extent was created to facilitate the modelling. This was developed by applying a 3km corridor to the boundary of the Belfast agglomeration and subsequently clipped against the Northern Ireland coastline.

There were no major changes to the railway network in Northern Ireland since Round One so Northern Ireland's entire major rail network fell within the Belfast Agglomeration. As a consequence, the stretches of rail network mapped and considered during the first round were used during the data capture process.

The geometric area of the noise bands for each of the required 5dB bands were calculated, and showed that the railways have little noise impact, with less than 1 km^2 exposed to noise levels within the L_{den} 65-69 contour band, and 189 km^2 (95%) with less than 50 dB.

With limited railway operations during nighttime hours the results show little noise impact from railways at night.

4.3 Summary of the Results of Round Three Mapping

The only agglomeration in Northern Ireland considered in Round Three was the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration considered in Round Three had an approximate area of 209.4km^2. This represented an 11 km^2 increase on Round Two and reflected both changes in the definition of the Agglomeration following the 2011 census and creation of new housing developments on the edge of Belfast since 2011. The new agglomeration included all areas modelled at Round Two plus the new development areas. It should also be noted that the 2015 population for the Belfast agglomeration was 597,419 and exceeded the required END threshold of 100,000.

Using the Belfast agglomeration as a basis, the Round Three data capture extent was created. This was developed by applying a 3km corridor around the boundary of the Belfast agglomeration and subsequently clipped against the Northern Ireland coastline.

Round Three Noise Maps and supporting Technical Reports can be found at:

https://www.daera-ni.gov.uk/publications/round-3-noise-maps-and-noise-mapping-technical-reports

4.3.1 Major Railways Extent

There were no major changes to the railway network in Northern Ireland since 2012 and all of Northern Ireland's major rail network falls within the Belfast Agglomeration. As a consequence, the stretches of rail network mapped and considered during the second round were used as the

basis for the data capture process in Round Three. Following a review of railway movement data, it was confirmed that Northern Ireland's major railways were located in and around the Belfast Agglomeration.

Under the Regulations, Round Three noise maps in relation to railway noise encompassed:

- Major railways with more than 30,000 passages per year;
- All agglomerations (including road, railways, industrial and airport noise sources) with more than 100,000 inhabitants.

Table 4.1 provides a summary of the extent of railways and data capture areas for the Round One, Round Two, and Round Three mapping exercise.

Table 4.1 Railway – Length of Railway Mapped and the Extent of the Data Capture Area

Length of Railways Mapped	Round One	Round Two	Round Three
All railways modelled inside the Belfast agglomeration	148km	148km	148km
Major Railways outside the agglomeration	0	0	0
Total	148	148	148
Data Capture Area (km^2)			
Total Area	596	596	618

4.3.2 Summary of the Results of the Noise Mapping

The first post processing step that was undertaken on the raw continuous output noise grids was a reclassification of the grids into 5 dB bands, as per Round Two.

The geometric area of the noise bands for each of the bands was calculated with all individual and total area values summarised to the nearest 0.1 km^2.

The Round Three results are shown in Table 4.2 for the Major Rail and Table 4.3 for the Agglomeration Rail.

In viewing these values, it is important to note that there was an 11km^2 (5.5%) increase in the area of the defined agglomeration area between Round Two and Round Three. This change must be considered fully when trying to make direct comparisons of area extents, dwelling numbers and population estimates produced for Round Two.

Both tables showed that the railways had little noise impact, with less than 0.5 km^2 exposed to noise levels within the L_{den} 65-69 contour band, and 189 km^2 (96%) with less than 50 dB.

With limited railway operations during night-time hours the tables showed little noise impact from railways at night.

Table 4.2 Major Rail – Area of Noise Bands (dB) in km^2

Noise Level (dB)	$L_{Aeq, 16\ hr}$	$L_{Aeq, 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq, 6hr}$
50 – 54	2.2	2.0	2.6	2.3	2.0	**45 – 49**	1.6	1.8
55 – 59	1.3	1.1	1.6	1.3	1.1	**50 – 54**	1.1	0.7
60 – 64	0.8	0.7	1.0	0.8	0.6	**55 – 59**	0.6	0.4
65 – 69	0..1	--	0.4	0.1	0.2	**60 – 64**	0.2	0.1
70 – 74	--	--	0.1	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**70 – 74**	--	--
Total	4.4	3.9	5.6	4.5	3.8	**Total**	3.5	3.1

Table 6.3 Agglomeration Rail – Area of Noise Bands (dB) in km^2

Noise Level (dB)	$L_{Aeq, 16\ hr}$	$L_{Aeq, 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq, 6hr}$
50 – 54	2.7	2.6	3.1	2.7	2.4	**45 – 49**	2.1	2.2
55 – 59	1.7	1.6	2.0	1.7	1.6	**50 – 54**	1.6	0.9
60 – 64	1.0	0.9	1.4	1.1	0.7	**55 – 59**	0.6	0.4
65 – 69	0..1	--	0.4	0.1	0.2	**60 – 64**	0.2	0.1
70 – 74	--	--	0.1	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**>=70**	--	--

Total	5.4	5.1	7.0	5.5	5.0	**Total**	4.4	3.7

4.3.3 Evaluation of the estimated number of people exposed to noise

Tables 4.4 and 4.5 detail the results of the Round Three dwelling and population analysis for railways within the Belfast Agglomeration.

Table 4.4 Agglomeration Railway - Dwellings

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq,\ 6hr}$
50 – 54	1,158	1,063	1,580	1,178	1,048	**45 – 49**	974	1,028
55 – 59	719	741	888	723	789	**50 – 54**	788	394
60 – 64	496	370	653	514	367	**55 – 59**	345	285
65 – 69	19	8	229	14	27	**60 – 64**	56	35
70 – 74	--	--	10	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**>=70**	--	--
Total	2,392	2,182	3,360	2,429	2,231	**Total**	2,163	1,742

Table 4.5 Agglomeration Railways - Population

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq,\ 6hr}$
50 – 54	2,872	2,714	4,014	3,092	2,421	**45 – 49**	2,457	2,571
55 – 59	1,931	1,765	2,203	1,804	2,262	**50 – 54**	2,256	1,722
60 – 64	1,286	1,198	1,682	1,335	965	**55 – 59**	906	654
65 – 69	517	313	1,145	502	532	**60 – 64**	594	281
70 – 74	--	--	41	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**>=70**	--	--
Total	6,607	5,992	9,084	6,733	6,181	**Total**	6,214	5,228

Tables 4.6 & 4.7 detail the results of the Round Three dwelling and population analysis for major railways within the Belfast Agglomeration.

Table 4.6 Major Railways – Population

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq,\ 6hr}$
50 – 54	2,534	2,240	3,538	2,703	2,125	**45 – 49**	2,058	1835
55 – 59	1,556	1,306	1,732	1,481	1,683	**50 – 54**	1,685	1370
60 – 64	899	844	1,372	926	793	**55 – 59**	948	881
65 – 69	510	313	807	499	526	**60 – 64**	569	269
70 – 74	--	--	31	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**>=70**	--	--
Total	5,499	4,704	7,480	5,608	5,128	**Total**	5,260	4,355

Table 4.7 Major Railways – Dwellings

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	$L_{Aeq,\ 6hr}$
50 – 54	914	764	1,194	913	800	**45 – 49**	801	735
55 – 59	574	558	719	590	592	**50 – 54**	629	385
60 – 64	340	219	503	351	278	**55 – 59**	306	254
65 – 69	15	8	190	12	24	**60 – 64**	44	29
70 – 74	--	--	9	--	--	**65 – 69**	--	--
>=75	--	--	--	--	--	**>=70**	--	--
Total	1,843	1,549	2,615	1,866	1,694	**Total**	1,780	1,403

4.4 Review of Previous Actions

The Noise Action Plan template developed during Round One was grouped into five major themes. Progress toward individual action is noted in Table below.

ACTION	Status
Demonstrate our continuing commitment to managing noise associated with Translink's operations.	
We will endeavour to ensure that relevant noise directives, regulations, codes of practice, etc are adhered too when procuring new buses, coaches and rolling stock	**Translink meet and where appropriate exceed relevant requirements in relation to new buses, coaches and rolling stock.**
We will enforce and update noise abatement procedures relating to bus and train operations – including the limiting of vehicle idling.	**A Driver Aid system was developed for Class 3000 and Class 4000 rolling stock. Each system helps reduce vehicle idling, over revving, excessive braking and acceleration. All of these factors have implications on improving noise.**
Engage with our neighbours affected by Translink's operations and better understand their concerns and priorities.	
We will provide a dedicated environmental email address – environment@translink.co.uk for environmental enquiries, including noise, relating to Translink, and utilise the existing customer services / complaints department with respect to our Passenger Charter.	**A dedicated environmental email address has been established and monitored by the Group ESG Manager and Technical Staff.**
Influence planning policy to minimise the number of noise sensitive properties around our network.	
We will endeavour to engage with planners to ensure awareness of Translink's operations is considered in the development of sensitive sites.	**Translink work with planners and large developers in relation to our operations. We have regular interaction with developers through Third-Party Works processes.**
Align the organisation to continue to efficiently and effectively manage noise pertaining to our operations	
Noise complaints will be reported on the Translink TSMIS system and reported to the Translink Senior Management Environmental Committee.	**Any noise issues reported to Translink are recorded on TSMIS and any trends reported at quarterly meetings.**
Noise reduction measures will be incorporated in the planning of engineering and maintenance works, and new capital projects.	**Where appropriate Translink engage with our contractors and support BREEAM assessments. We have organisational targets for achievement of BREEAM categories.**
Develop our understanding of noise issues to further inform our priorities, strategies and targets.	

We will undertake a review of data collected during the noise modelling phase and the feasibility of acquiring detailed information for all routes from Class 3000 vehicles.	**Rolling stock profiles for all routes is readily available for Class 3000 and Class 4000 rolling stock.**
Consider the operation of the newer Class 4000 trains, particularly along the Larne Line.	**No Class 450s are now operating on the Translink network.**
Ensure that current rail types e.g. continuously welded or jointed track have been appropriately applied	**The entire railway network now has Continuously Wedded Rail, with the exception of the Antrim to Knockmore branch line. There are no plans to weld this section as it is currently not open to timetabled passenger services.**
Fieldwork to validate the 1% most affected areas identified in the modelling.	**Fieldwork has been undertaken following each round of modelling.**
Assess the extent to which noise can be reduced and develop a cost / benefit analysis of mitigation measures if applicable.	**AECOM were tasked to conduct an assessment of mitigation methods proposed in the Action Plans, including:** • **A noise barrier between CNMA and the adjacent railway.** • **A noise barrier between the railway and the adjacent motorway.** • **Quieter rolling stock.** • **Continuous welded rail.** **It concluded that a 2 m high railway noise barrier makes no difference to railway noise due to the ineffectiveness of this height of barrier to acoustically screen a receiver located at 4 m (first floor window). A 4 m barrier is more effective, reducing the railway noise by 2 dB. This reduction is reflected in the change in total noise, which is dominated by road noise at each candidate site.** **The noise model predicted a 3 dB reduction from continuously welded rail and a 9 dB reduction in the switch from Class 450s to Class 4000s.**

5.0 ROUND FOUR NOISE MAPPING

5.1 Calculation Methods

For all previous rounds of mapping, Calculation of Railway Noise (CRN, 1995), as adapted, was used for the calculation of railway noise. For Round Four there is a requirement to use the Common Noise Assessment Methods in Europe (CNOSSOS-EU) methodology, which differs from the methodology used in previous rounds.

For railway sources the CNOSSOS-EU:2020 method has three separate modelling parts:

- **Source part:** There are separate noise source emission models for road, rail, industrial and aircraft sources. The noise source emission describes the sound power level emitted by the source as a function of a variety of input factors. For example, in the case of railway traffic, this would include vehicle flow volume and speed, track type, traffic support and location of switches, joints and tight curves.
- **Propagation part:** The propagation part of CNOSSOS-EU:2020 defines how noise levels will attenuate due to aspects such as the distance along a propagation path (source to receiver), air absorption, terrain elevations, screening effects from buildings and barriers, meteorological effects and the influence of ground cover. The CNOSSOS-EU:2020 propagation model is derived from the French NMPB 2008 model and is the same irrespective of the source type being modelled (road/railway/industry).
- **Receiver part:** The receiver part specifies how receiver points should be positioned on dwelling façades, how the number of people and number of dwellings should be attributed to the calculated noise exposure levels at the façade, and how the area exposed to noise should be determined from the calculated noise grids.

The CNOSSOS-EU:2020 railway source emission model requires information on aspects such as 3D railway centreline geometry, rail vehicle flows and speeds for each rail vehicle type, and parameters describing each railway vehicle, railway track and support structures present within the rail network.

The Environmental Noise Regulations (Northern Ireland) 2006 (Regulations15), as amended by the Environmental Noise (Amendment) (NI) Regulations 201816, transposed European Commission Directive 2002/49/EC17, known as the Environmental Noise Directive (END), into

Northern Irish law. The Regulations make reference to Annex VI of the END, which sets out the exposure statistics that are required to be reported. The END state that the following exposure statistics are required:

For Agglomerations:

- "The estimated number of people (in hundreds) living in dwellings that are exposed to each of the following bands of values of Lden in dB 4 m above the ground on the most exposed façade: 55-59, 60-64, 65-69, 70-74, > 75, separately for noise from road, rail and air traffic, and from industrial sources. The figures must be rounded to the nearest hundred (e.g. 200 = between 150 and 249; 100 = between 50 and 149; 0 = less than 50)."

And:

- "The estimated total number of people (in hundreds) living in dwellings that are exposed to each of the following bands of values of Lnight in dB 4 m above the ground on the most exposed façade: 50-54, 55-59, 60-64, 65-69, > 70, separately for road, rail and air traffic and for industrial sources."

For major roads, major railways and major airports:

- "The estimated total number of people (in hundreds) living outside agglomerations in dwellings that are exposed to each of the following bands of values of Lden in dB 4 m above the ground and on the most exposed façade: 55-59, 60-64, 65-69, 70-74, > 75."

And:

- "The estimated total number of people (in hundreds) living outside agglomerations in dwellings that are exposed to each of the following bands of values of Lnight in dB 4 m above the ground and on the most exposed façade: 50-54, 55-59, 60-64, 65-69, > 70."

And:

- "The total area (in km2) exposed to values of Lden higher than 55, 65 and 75 dB respectively. The estimated total number of dwellings (in hundreds) and the estimated

total number of people (in hundreds) living in each of these areas must also be given. Those figures must include agglomerations."

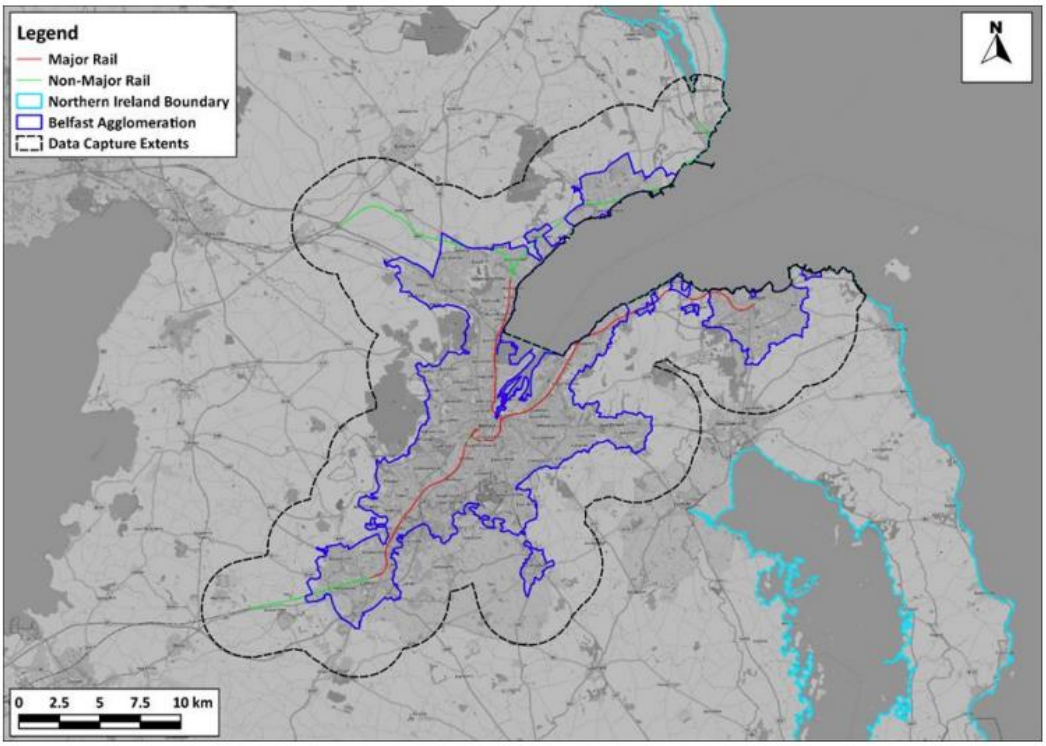
5.2 Agglomeration Modelling Extent

The Belfast urban area remains the only agglomeration area in Northern Ireland for the Round Four noise mapping. In Round Four, the Belfast Agglomeration area from Round Three was re-evaluated and redefined using Census 2021 data at the data zone level, as well as 1km and 100m grid areas. The updated Round Four Belfast Agglomeration area continues to accurately represent the densely populated regions surrounding the Belfast urban area, complies with the Regulations, aligns with the population distribution throughout Belfast, and has been adopted for Round Four.

The Round Four Belfast Agglomeration has a total area of 208.5 km2, representing a 0.9 km^2 decrease on the Round Three Belfast Agglomeration boundary.

The Round Four Belfast Agglomeration data capture extent was developed though buffering the agglomeration boundary by 3km and clipping to the OSNI Largescale NI boundary. The resulting data capture area is shown in Plate 5.1.

Plate 5.1 Rail Model Data Capture Extents, Round Four



Round Four Noise Maps and supporting Technical Reports can be found at:

https://www.daera-ni.gov.uk/publications/round-4-noise-maps-and-noise-mapping-technical-reports

To improve accessibility and usability of the maps for all stakeholders and Competent Authorities, the Department has published noise maps on an interactive noise map viewer. These can be accessed at:

https://gis.daera-ni.gov.uk/arcgis/apps/storymaps/collections/4965ad9d9ec042049fd206001ee63b02?item=4

5.3 Major Railways Extent

For the Round Four 2021 assessment year, it was confirmed that there have been no changes to the network that would alter the extents of the major railways since Round Four (see table 4.1).

All of Northern Ireland's major railway network lies within the Belfast Agglomeration, or extends to Bangor. Therefore, only rail sections within 3 km of the agglomeration were considered in the Round Four data capture. Translink data subsequently confirmed that Northern Ireland's major railways are situated in and around the Belfast Agglomeration.

5.4 Summary of the Results of the Noise Mapping

The Round Four results are shown in Table 5.1 for the Major Rail and Table 5.2 for the Agglomeration Rail. In viewing these values, it is should be noted that there was an 0.9km^2 (0.4%) decrease in the area of the defined agglomeration area between Round Three and Round Four.

With limited railway operations during night-time hours the tables showed little noise impact from railways at night.

Table 5.1 Major Rail – Area of Noise Bands (dB) in km^2

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	1	0
55 – 59	3	2	2	2	2	0	0
60 – 64	2	1	1	1	1	0	0
65 – 69	0	0	0	0	0	0	0
70 – 74*	0	0	0	0	0	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

Table 5.2 Agglomeration Rail – Area of Noise Bands (dB) in km^2

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	2	0
55 – 59	3	3	3	3	3	0	0
60 – 64	2	1	1	1	1	0	0

65 – 69	0	0	0	0	0	0	0
70 – 74*	0	0	0	0	0	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

5.4 Evaluation of the estimated number of people exposed to noise

Tables 5.3 and 5.4 detail the results of the Round Three dwelling and population analysis for railways within the Belfast Agglomeration.

Table 5.3 Agglomeration Railway - Dwellings

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	844	0
55 – 59	2591	2260	1675	2139	2023	316	0
60 – 64	977	791	587	722	699	12	0
65 – 69	265	116	76	106	89	0	0
70 – 74*	10	2	2	2	2	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

Table 5.4 Agglomeration Railways - Population

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	1733	105
55 – 59	5228	4455	3280	4180	3951	554	0
60 – 64	1807	1430	1031	1304	1265	20	0
65 – 69	474	215	136	196	163	0	0
70 – 74*	16	3	3	3	3	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

Tables 5.5 & 5.6 detail the results of the Round Four dwelling and population analysis for major railways within the Belfast Agglomeration.

Table 5.5 Major Railways – Population

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	0	0
55 – 59	12	12	9	12	12	0	0
60 – 64	2	2	0	2	2	0	0
65 – 69	0	0	0	0	0	0	0
70 – 74*	0	0	0	0	0	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

Table 5.6 Major Railways – Dwellings

Noise Level (dB)	L_{den}	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,18hr}$	L_{night}	$L_{Aeq,16hr}$
50 – 54	N/A	N/A	N/A	N/A	N/A	0	0
55 – 59	5	5	4	5	5	0	0
60 – 64	1	1	0	1	1	0	0
65 – 69	0	0	0	0	0	0	0
70 – 74*	0	0	0	0	0	0	0
>=75	0	0	0	0	0	N/A	N/A
* represents >= 70 dB for L_{night}							

5.5 Comparison between Round Three and Round Four

Analysis of the Round Four agglomeration and major railway maps highlighted the following key observations, which apply to both agglomeration and major rail given their very similar geographical extents.

The first three rounds of strategic noise maps have been developed using computation methods set out in Environmental Noise Regulations 2006 (S.I. 140/2006) (ECAC Doc 29 2nd Edition), however Round Four requires the use of the Common Noise Assessment Methods for Europe (CNOSSOS-EU) method (ECAC Doc 29 4th Edition). It is therefore not appropriate to make direct comparisons between the exposure statistics derived for Round Four with those derived for earlier rounds due to the changes both in the calculation and exposure assessment methodologies.

5.5.1 Belfast Agglomeration

The extent of the Round Four Belfast Agglomeration covers 208.5km^2, with up to 5 km^2 (2.4% of the agglomeration area) exposed to railway noise levels greater than 55 dB L_{den} (compared to 3.9km^2 in Round Three) and 1 km^2 (<1% of the agglomeration area) is exposed to noise levels greater than 50 dB L_{night} (compared to 2.4km^2 in Round Three).

An estimated total of 3,313 dwellings are potentially exposed to noise levels greater than 55 dB L_{den} from railway sources within the Belfast Agglomeration, which statistically contain an estimated population of 6,373 (compared to 1,780 dwellings/ 5,071 persons in Round Three).

During the night period, an estimated total of 1,172 dwellings are potentially exposed to noise levels greater than 50 dB L_{night}, which statistically contain an estimated population of 2,307 (compared to 1,189 dwellings/ 3,756 persons in Round Three).

The total number of school buildings potentially exposed to noise levels greater than 55 dB L_{den} and 50 dB L_{night} from rail sources within the Belfast Agglomeration are 18 and 7, respectively.

The total number of hospital buildings potentially exposed to noise levels greater than 55 dB L_{den} and 50 dB L_{night} from rail sources within the Belfast Agglomeration are 23 and 10, respectively.

5.5.2 Major Railways outside the Belfast Agglomeration

Less than 1km^2 is potentially exposed to railway noise levels greater than 55 dB L_{den} (compared to 3.1m^2 in Round Three) and less than 1km^2 is potentially exposed to noise levels greater than 50 dB Ln_{ight} (compared to 3.5km^2 in Round Three).

An estimated total of 6 dwellings are potentially exposed to noise levels greater than 55 dB L_{den} from major railway sources, which statistically contain an estimated population of 14 (compared to 1,421 dwellings/ 3,942 persons in Round Three).

During the night period, it is estimated that no dwellings are potentially exposed to noise levels greater than 50 dB L_{night} (compared to 979 dwellings/ 3,202 persons in Round Three).

No school buildings are potentially exposed to noise levels greater than 55 dB L_{den} or 50 dB L_{night} from major railway sources.

No hospital buildings are potentially exposed to noise levels greater than 55 dB L_{den} or 50 dB L_{night} from major railway sources.

6.0 Identification of potential problems and situations that may need to be improved.

6.1 Aim of Action Plans

In accordance with the aims and objectives of the Directive, the proposals within this Action Plan are focussed upon:

"preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental noise quality where it is good."

6.2 Effects of Noise

There are many different effects of noise, and individuals experience each of them to different degrees. It is known that noise can disturb human activity, by causing distraction or by physically interfering with it. These effects can include:

- general detection/distraction;
- speech interference;
- disruption of work/mental activity; and
- sleep disturbance.

Any of these can lead to annoyance and possibly more overt reactions, including complaints.

In addition, there are physiological effects that can occur including stress and other health effects. The nature of these effects is much less certain, although it is known that noise can cause a variety of biological reflexes and responses referred to as stress reactions. Whether, over a period of time, these reactions could lead to clinically recognisable disease is unclear. The possibility that severe annoyance might itself induce stress cannot be ignored.

Noise is an inevitable consequence of a mature and vibrant society. People enjoy a benefit from road, rail and air transport and industrial processes, and these benefits manifests themselves in terms of business, leisure, the movement of goods and employment. When managing the environmental noise that arises from transportation noise sources, we have to strike a balance.

6.3 The Action Planning Process

In developing this, and previous, action plans we have taken into account the guidance issued to Competent Authorities within Northern Ireland. This states that the LA_{eq18h} and LA_{eq16h} indicators should be used for prioritization and that as a first priority the Competent Authority should identify the total population affected by noise levels of more than 50 LA_{eq18h} and LA_{eq16h} from railways. From this information the Competent Authority should then identify where the 1% of the population that are affected by the highest noise levels from railways are located according to the results of the strategic noise mapping ("Important Areas") and target these areas for investigation with a view of becoming a Candidate Noise Management Areas.

As required by END, Competent Authorities must work to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise. To achieve this, Competent Authorities should consider investigating beyond the top 1% of the population affected in situations where this could be advantageous in reducing noise exposure and the effects of noise. Competent Authorities can also examine the L_{day}, L_{eve} and L_{night} results to consider whether or not there are any additional features of the noise impact from railways that could be managed further, in an effort to reduce population exposure and improve the noise situation for those most affected by railway noise.

6.4 Wider Considerations

When considering any new noise management measure within the Action Plan, Translink must bear in mind the legislation and guidance referred to in Appendices C and D together with the following;

- Regional Development Strategy 2035;
- Local Area Development Plans;
- Planning Policy Statements and Planning Supplementary Guidance;
- A Planning Strategy for Rural Northern Ireland;
- The Eastern Transport Plan (ETP) 2035;
- All-Island Strategic Rail Review;
- Green Growth Strategy and related objectives, plans and policies;
- Planning Agreements;
- Air Quality Regulations and Action Plans;

- Renewable Energy Action Plans;
- Local Authority Open Space policies;
- Mosaic GI strategy for Northern Ireland;
- Emerging Climate change initiatives;
- Spatial Data Strategy;
- Urban Regeneration Strategies;
- Noise Abatement Policies.

Translink will also consider the guideline noise levels as outlined with the Department of the Environment "Noise Mapping and Action Planning Technical Guidance – Noise from Railways" document. These values are appropriate when considering the impact of any future development and the 1% approach outlined in the Department of the Environment Noise Mapping and Action Planning Technical Guidance is considered to be the best means of assessing priority areas.

6.5 Review of Translink Noise Action Plan 2019 – 2023

ACTION	PERFORMANCE INDICATOR
Develop our understanding of noise issues to further inform our priorities, strategies and targets.	
Consider the operation of the newer Class 4000 trains, particularly along the Larne Line.	**Status: No Class 450s are now operating on the Translink network**.
Ensure that current rail types eg continuously–welded or jointed track have been appropriately applied	**Status: The entire railway network now has Continuously Welded Rail, with the exception of the Antrim to Knockmore branch line. There are no plans to weld this section as it is currently not open to timetabled passenger services.**
Having identified the worst affected 1% of the population, we will carry out field work to ascertain the validity of the noise levels modelled.	**Status: Translink appointed external consultants to carry out the following works:** • **Noise monitoring at identified Candidate Noise Management Areas (CNMA) to compare with:** • **The third round of noise mapping**

	• **A rail noise model developed to assess proposed Action Plans.** **CNMAs were located at Derriaghy, Finaghy, Fortwilliam / Yorkgate.** **The survey measurements showed that noise levels in the three CNMA were typically dominated by road noise, in particular during the night-time at the CNMA measurement locations selected in this report.** **The survey measurements showed that the noise levels at Derriaghy and Finaghy, were typically below the contour band values produced by the Round Three strategic rail noise maps. This was considered to be an indication that the Round Three rail noise maps are overestimating rail noise at these locations.**
Actions added during the development of the Plan	
Translink to actively consult with Daera to ensure the Round Four rail noise model is accurate and takes into account the current operational timetable, passenger numbers, fleet usage and track type classification to ensure a more accurate assessment of rail noise relating to the Round Four rail noise maps.	**Status: Consultations were held during the development of the current round, with additional detail provided to support mapping.**
A Noise Specification Document for any noise survey work should be developed to enable compliance with the requirements of the Noise Action Plan (NAP) and Environmental Noise Regulations. The Noise Specification Document would inform the appointed contractor and provide the required: • Noise Indicators; • time durations; • methodologies; and guidance	**Status: The need for such a specification document to be added to the project management process is to be established.**

6.6 Identification of areas to be subjected to noise management activities

Within the population analysis for Round Three, approximately 6,607 of the population within the Belfast Agglomeration were subject to environmental noise above 50 LA_{eq18h} and 5,992 above LA_{eq16h} from railways.

For Round Four the number has reduced to 5,382 of the population within the Belfast Agglomeration subject to environmental noise above 50 LA_{eq18}h and 5,683 above LA_{eq16h} from railways.

A population exposure assessment will be undertaken at 1dB levels, with the assistance of external environmental noise consultants. This will enable the organisation to identify where the top 1% of the population affected by the highest noise levels from railways is located, according to the results of the noise mapping.

Once determined, the next stage will be to carry out a degree of field work to ascertain that the noise levels indicated by the strategic noise maps are actually experienced in the area identified. This field work will also identify if noise sensitive rooms are on the most exposed façade of the building or if noise mitigation measures are already in place.

Following this fieldwork Translink will be better placed to assess the extent to which noise needs to be reduced. Whilst considering the potential measures to be adopted Translink will assess their effectiveness and cost in the wider context. This will include, for example, positive impacts on health or quality of life, a potential benefit for the local economy or whether the potential measure may have adverse environmental impacts on air quality.

6.7 Possible Prevention and Mitigation Measures.

There are a wide range of potential direct and indirect noise mitigation measures. Some act at a national or regional level, others may be localised, some relate to vehicle manufacture, whilst some directly mitigate noise and others act to avoid noise. However, not all measures are available to Translink and thus they may not be implemented following assessment of the potential measures. Potential options, including those already implemented, include:

- Railhead grinding;
- Fleet renewal;
- Carriage manufacture/design controlling noise at source and reducing engine noise;
- Electrification of lines;
- Altering the type of rolling stock using a particular rail corridor;
- Managing traffic, for example to reduce start up, acceleration and braking noise;

- Greasing rails on tight corners;
- Reducing the number of wheel profiles in use to improve contact at the wheel/rail interface;
- Congestion management schemes to divert railways from sensitive premises; and
- Design and layout of developments or urban landscape to ensure that noise insensitive buildings are used as barriers to protect sensitive structures.

7.0 TRANSLINK NOISE ACTION PLAN 2025 - 2030

Translink will continue the work progressed through our previous Action Plans within 5 major headings. This consistency of approach will allow for good governance and clear identification of cost-effective opportunities.

ACTION	EXPECTED BENEFIT	METRIC / ASSURANCE
Demonstrate our continuing commitment to managing noise associated with Translink's operations.		
Develop noise complaint metric in quarterly ESG reporting.	Better management awareness of potential noise issues.	Number of complaints per 100,000km.
Contribute to RSSB Sustainable design standards for rail.	Standardised approach to noise management across UK rail industry.	New standards produced.
Engage with our neighbours affected by Translink's operations and better understand their concerns and priorities.		
Periodic review of morning and evening timetables includes stakeholders.	Improved understanding and awareness of opportunities to prevent nuisance.	Stakeholder engagement metrics.
Ongoing formal and informal Stakeholder engagement.	Improved understanding and awareness of opportunities to prevent nuisance.	Stakeholder engagement metrics.
Influence planning policy to minimise the number of noise sensitive properties around our network.		
Respond to any planning applications for development within the higher noise exposure zone.	Limit the exposure of additional residents to higher noise levels.	N/A
Align the organisation to continue to efficiently and effectively manage noise pertaining to our operations		
Periodic review of capital projects.	Identify potential to affect noise profile, and opportunities to incorporate noise management with other objectives.	Evidence of reviews.
Develop our understanding of noise issues to further inform our priorities, strategies and targets.		

Maintain optimum rail profile	Rail profile maintenance reduces noise generation and improves efficiency.	Programme-specific metrics
Validation of modelling outputs	Provides assurance as to accuracy of noise bands and identifies need for any further actions. Establishes the effect of existing noise attenuation measures. Supports cost/benefit analysis for potential projects.	Completed report with comparative assessment
Introduce new Enterprise rolling stock 2028/29	Specification EU Council Directive 96/48/EC on the interoperability of rolling stock applies to all new rolling stock and contains limits on external noise. The new rolling stock is expected to use hybrid traction be significantly quieter in urban areas.	Project completion Comparison of noise profiles?
Sensor-led maintenance of powerpacks	Earlier identification and intervention on units improves performance and controls noise.	Programme-specific metrics

7.1 Roles & Responsibilities

The END process within Translink / Northern Ireland Railways is coordinated via the Safety Health & Environment (SH&E) Department, with the ESG Manager the primary contact. The Action Plan has been approved by Chief Operating Officer and their Executives and progress against the actions will be regularly reviewed by the Translink Senior Leadership Team.

Any significant new opportunity to mitigate environmental noise will be subject to Translink's standard project selection and management processes, including the development of a business case. If approved, works would be managed by a qualified project manager with appropriate oversight and scheduled to best advantage with other projects.

8.0 PUBLIC CONSULTATION

Translink take consultation and the concerns expressed regarding the effects of noise on the local community very seriously. We want to know what we are doing right and what people think we could be doing better. Therefore, we will complete a public consultation on our draft plan before publishing the final document for presentation to the Department of Agriculture, Environment and Rural Affairs (DAERA).

A draft Action Plan will be made available via a dedicated section on the Translink website with a Public Notice posted in the Belfast Telegraph. The consultation period will last eight weeks.

9.0 NOISE MANAGEMENT

9.1 Noise Reduction Measures Already in Force

In addition to intrinsic features of the track corridor which attenuate noise experienced by neighbours, Translink have two purpose-built noise barriers. One is located at Central Station, Belfast, and comprises a solid wall and barrier diffuser system. The second is at Adelaide Train Maintenance Facility. Other network features such as the concrete wall at Blythfield Curve exiting Grand Central Station will have noticeable noise reduction benefits. Noise created through damaged wheels and track is minimised by regular maintenance and condition-led monitoring, and use of sensors. Use of disc brakes and composite blocks reduces brake noise levels. This is further reduced through the installation of automatic track lubrication systems on tight curves to reduce friction and hence noise.

Regarding vehicle procurement, new trains must have drive-by noise attenuation surpassing EC/ECE70/157. The specification for the Class 3000 and 4000 rolling stock entering service during the last Action Plan ensured that they met limits as defined by Council Directive 96/48/EC on the Technical Specification for Interoperability (TSI) of the trans-European high speed rail system and conventional rolling stock (2001/16/EC). The TSIs include noise limits for starting noise, noise from stationary vehicles and pass-by noise. The Class 300 and Class 4000 rolling stock used on Northern Ireland's railways meet these limits while the introduction of new rolling stock for the Enterprise service, planned to occur during this Action Plan, includes this in the technical specification.

We have a "wheelset acoustic monitoring" device in the Belfast area that provides early warning of wheel condition/flats that if untreated can give rise to incremental noise increases.

Improvements in train preparation systems have eliminated the need for train horn testing prior to trains entering service.

9.2 Long-term strategy

Our Translink Corporate Vision is '***to make Translink your first choice for travel, today for tomorrow***' by leading the transformation of transport in Northern Ireland. Our Better Connected strategy, covering the period to 2030, sets out how we will do it and outlines our four strategic objectives of Continuous Improvement, Customer Focus, Climate Action and Connecting

Communities. Elements of this strategy which are directly relevant to this Noise Action Plan include better asset management, action on sustainable rail fleet, and connected network development and services. Underpinning this, our journey to Net Zero emissions from trains involves the electrification of our rolling stock which will eliminate diesel engine noise. Our Fleet Renewal Strategy describes the technologies, timelines and benefits of this transition.

9.3 Financial information: budgets, cost-effectiveness assessment, cost-benefit analysis

Budgets relating to the development of noise modelling and associated field work is managed via the Translink SH&E Department. Any works required to manage noise on the NI Railways network will reside with the Translink Infrastructure Division and its relevant departments.

9.4 Provisions envisaged for evaluating the implementation and the results of the Action Plan

The current NIENDSG system has proved to be effective in developing this draft Noise Action Plan. Consideration will be given to the form in which the group will continue in order to facilitate on-going planning work (including identification of Noise Management Areas), implementation of actions, and the development of future plans following the required five yearly reviews of the noise maps.

9.5 Estimates in terms of the reduction of the number of people affected (annoyed, sleep, disturbed, or other).

The Railway is a dynamic entity and there will be variances between the data available to enable modelling and current operational service provision. Translink will work to ensure that the data used to base actions on is updated to reflect the most current operational timetable and fleet usage. This will provide a more accurate assessment of noise relating to the railway and thus improve the identification of consequential management actions for anyone exposed to specific noise categories (noise levels 65dB and above).

9.6 Revision of Action Plan

Translink will continue to monitor and review this Railway Noise Action Plan, with individual actions embedded in Divisional plans. Governance will be via the Translink ESG Manager and the Senior Leadership Team.

Appendix A - Glossary

Action Plan	Plans designed to manage noise issues and effects, including noise reduction if necessary. An Action Plan must include: • A description of the agglomeration, major roads, major railways and major airports and other noise sources taken into account; • The authority responsible; • The legal context; • Any limit values in place in accordance with Article 5 of the END; • A summary of the results of the noise mapping; • An evaluation of the estimated number of people exposed to noise, identification of problems and situations to be improved; • A record of the public consultations organised in accordance with Article 8(7) of the END; • Any noise-reduction measures already in force and any projects in preparation; • Actions which the Competent Authorities intend to take in the next five years, including any measures to preserve Quiet Areas; • Long-term strategy; • Financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment; and • Provisions envisaged for evaluating the implementation and the results of the Action Plan. The actions which the Competent Authorities intend to take in the fields within their competence may include: • Traffic planning; • Land-use planning; • Technical measures at noise sources; • Selection of quieter sources; • Reduction of sound transmission; and • Regulatory or economic measures or incentives. Each Action Plan should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other)
Agglomeration (first round)	A part of a territory, delimited by the Member State, having a population in excess of 250,000 persons and a population density such that the Member State considers it to be an urbanised area. The population density must exceed 500 persons per square kilometre.
Agglomeration (subsequent rounds)	A part of a territory, delimited by the Member State, having a population in excess of 100 000 persons and a population density such that the Member State considers it to be an urbanised area. The population density must exceed 500 persons per square kilometre.
Attributable Area	A trait, quality, or property describing a geographical feature, e.g. vehicle flow or building height

Attributing (Data)	The linking of attribute data to spatial geometric data
ASL	Above Sea Level
Competent Authority	The Competent Authorities will be responsible for aspects such as making and where relevant, approving noise maps and Action Plans for agglomerations, major roads, major railways and major airports. They will also be responsible for delimiting Quiet Areas within agglomerations and open countryside, and collecting noise maps and Action Plans. The Competent Authorities are as follows: • Agglomerations – Department of the Environment • Major roads – Department for Regional Development • Major railways – Northern Ireland Transport Holding Company • Major airports – Airport Operator
Data	Data comprises information required to generate the outputs specified, and the results specified.
Decibel (dB)	The human ear can detect sound waves exerting pressures ranging from 20 micropascals up to 100,000,000 micropascals. Because these numbers are so unwieldy a logarithmic scale (the decibel scale) is used. The typical threshold of human hearing, 20 micropascals, is set as 0 decibels. It follows from this that the loudest sounds we can hear before suffering immediate hearing damage (aRound One00,000,000 micropascals) corresponds to aRound One30-140 decibels. Typically, an increase/decrease of ten decibels is perceived by listeners as a doubling/halving in loudness (Doubling/halving the sound power of the source, however, only results in an increase/decrease of three decibels. The response of the human ear is non-linear in energy terms.)
dB(A)	The human ear is most sensitive to sound waves with frequencies of a few thousand Hz. A sound wave with the same sound pressure amplitude outside this range will sound noticeably quieter than one in this range. Describing the loudness of a sound purely in terms of decibels based on sound pressure can therefore be misleading. When measuring sound, it is therefore standard practice to break it down into frequency bands and apply a correction to each band depending on the sensitivity of the typical human ear to the frequencies in that band, before combining them into an overall 'A-weighted' sound pressure level. A-weighted decibels are a good indication of perceived loudness for broadband noise (noise covering a broad range of frequencies), but they sometimes underestimate the effect of low-frequency noise.
END	Directive 2002/49/EC of the European Parliament and Council relating to the assessment and management of environmental noise, otherwise known as the Environmental Noise Directive.
GIS	Geographical Information System
ISO	International Standards Organisation
LAeq,T	The A-weighted equivalent continuous sound pressure level which is a notional continuous level that, at a given position and over the defined time period, T,

	contains the same sound energy as the actual fluctuating sound that occurred at the given position over the same time period, T.
Lday	The LAeq over the period 0700 – 1900, local time (for strategic noise mapping this is an annual average).
Levening	The LAeq over the period 1900 – 2300, local time (for strategic noise mapping this is an annual average).
Lnight	The LAeq over the period 2300 – 0700, local time (for strategic noise mapping this is an annual average).
LAeq,16h	The LAeq over the period 0700 – 2300, local time (for strategic noise mapping this is an annual average).
Lden	The LAeq over the period 0000 – 2400, but with the evening values (1900 – 2300) weighted by the addition of 5 dB(A), and the night values (2300 – 0700) weighted by the addition of 10 dB(A).
Limit Values	Member States are required to inform the Commission of existing limit values or limit values in preparation (Article 5, paragraph 4 of the END). These must be expressed in terms of the noise indicators L_{den} and L_{night}.
Major Airport	The END defines a major airport as: a civil airport, designated by the Member State, which has more than 50,000 movements per year (a movement being a take-off or landing), excluding those purely for training purposes on light aircraft (Article 3(p)). In the UK a light aircraft is generally considered to be one with a maximum take-off weight authorised (MTWA) of less than 5,700 kilogrammes. In the UK a civil airport is one operated by civil authorities and so excludes those operated by the military. In any event, military activity in a military area is excluded from the END (Article 2, paragraph 2).
Major Railway	The END defines a major railway as: a railway designated by the Member State which has more than 30,000 train passages per year' (approximately 80 train passages per day) (Article 3(o)). However, for the first round of mapping in 2007 the qualifying figure is 60,000 train passages per annum (Article 7, paragraph 1).
Major Road	The END defines a major road as: a regional, national or international road, designated by the Member State, which has more than 3 million vehicle passages per annum' (approximately 8,200 vehicles per day) (Article 3(n)).
Noise Bands required by the END	Areas lying between contours of the following levels (dB): Lden <55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, ≥75 Ld <55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, ≥75 Le <55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, ≥75 Ln <45, 45-49, 50 – 54, 55 – 59, 60 – 64, 65 – 69, ≥70 Notes: 1) It is recommended that class boundaries be at .00, e.g. 55 to 59 is actually 55.00 to 59.99. 2) The assessment and reporting of the 45 – 49 dB band for L_{night} is optional under the Regulations.
Noise Mapping	The presentation of data on an existing or predicted noise situation in terms of a noise indicator.
Noise Mapping (Input) Data	Two broad categories: (1) Spatial (e.g. road centre lines, building outlines); and (2) Attribute (e.g. vehicle flow, building height – assigned to specific spatial data).
Noise Mapping Software	Computer program that calculates required noise levels based on relevant input data
Noise Model	All the input data collated and held within a computer program to enable noise levels to be calculated.

Noise Model File	The (proprietary software specific) project file(s) comprising the noise model
Output Data	The noise outputs generated by the noise model
Processing data	Any form of manipulation, correction, adjustment factoring, correcting, or other adjustment of data to make it fit for purpose (includes operations sometimes referred to as 'cleaning' of data).
Quiet Area	Article 3(l) and 3(m) of the END define a 'quiet area in an agglomeration' as an area, delimited by the Competent Authority, for instance which is not exposed to a value of L_{den} or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source.
Round One	The noise mapping and action planning process is to be taken forward on a five-year rolling programme. The first round of mapping and action planning applies to the largest of the agglomerations (including the industries and ports within them), the busiest major roads and railways and all major airports. The thresholds determining which agglomerations, major roads, major railways and major airports should be mapped during the first round are set out in Article 7 paragraph 1 and are as follows: • Agglomerations - only those which have a population in excess of 250,000 persons; • Major roads - only those which more than 6 million vehicle passages a year; • Major railways - only those that have more than 60,000 train passages per year; • All airports within round one agglomerations and major airports.
Round Two and Round Three	• Agglomerations - only those which have a population in excess of 100,000 persons; • Major roads - only those which more than 3 million vehicle passages a year; • Major railways - only those that have more than 30,000 train passages per year; • All Airports within round one and any which have since expanded and meet the criteria of the END.

Round Four	• Agglomerations, as defined in the Regulations as an area identified by the Department of the Environment as: "(a) having a population in excess of 100,000 persons and a population density equal to or greater than 500 people per km2 ; and (b) which it considers to be urbanised."
	• Major roads, which are roads that "(a)are—
	  • (i)trunk roads;
	  • (ii)motorways; or
	  • (iii)classified roads; and
	• (b)have more than three million vehicle passages a year."
	• Major railways, "which have more than 30,000 train passages per year."

	• Major airports, which are “civil airports which have more than 50,000 movements per year (a movement being a take-off or a landing), excluding those purely for training purposes on light aircraft.”
	
	• Industrial noise sources, which are defined as:
	  • “(a)Part A activities, as defined in Schedule 1 of the Pollution Prevention and Control Regulations (Northern Ireland) 20034 , within an agglomeration or first round agglomeration; and
	  • (b)Ports within an agglomeration or first round agglomeration”.

Spatial (input) Data	Information about the location, shape, and relationships among geographic features, for example road centre lines and buildings.
WG - AEN	Working Group – Assessment of Exposure to Noise

Appendix B - List of Current Policy, Legislation and Gudiance for the Management of Environmental Noise in Northern Ireland

- BS 5228 Noise & Vibration Control on Construction and Open Sites
    - Part 1:2009+A1:2014 - Code of Practice for basic info and procedures for noise & vibration control
    - Part 2 :2009+A1:2014 - Guide to noise & vibration control legislation for construction and demolition including road construction and maintenance
    - Part 4 :2009+A1:2014 - Code of Practice for noise and vibration from piling operations
- BS 6472 1992 - Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80 Hz)
- BS 7385 Part 1 1990 – Evaluation and Measurement for Vibration in Buildings – Guide for measurement and evaluation of their effects on buildings
- BS 7385 Part 2 1993 - Evaluation and Measurement for Vibration in buildings - Guide to damage levels from ground borne vibration
- BS 7445 Part 1: 1999 - Description and measurement of environmental noise
- BS 7445 Part 2: 1999 - Guide to the acquisition of data pertinent to land use
- BS 7445 Part 3: 1999 - Guide to the application of noise limits
- BS 8233 2014 - Sound Insulation and noise reduction for buildings – Code of Practice
- Calculation of Railway Noise 1995 Department of Transport (provides the official methodology to be used for assessing noise level, or changes in noise levels, resulting from new or changed railway networks and the rail traffic which use them)
- Control of Noise (Code of Practice for Construction and Open Sites) Order (NI) 2002
- Common Noise Assessment Methods in Europe (CNOSSOS-EU:2020)
- DEFRA – A Review of Published Research on High Freq. Noise and It Effects – May 2003 Development Control Advice Note 10 (Revised) Environmental Impact Assessment (August 1999)
- DEFRA - Low Frequency Noise 2002

- Delivering the goods – a toolkit for improving night-time deliveries Freight Transport Association in consultation with Department for Transport
- Environmental Noise Regulations (Northern Ireland) 2006.
- Land Acquisition and Compensation (Northern Ireland) Order 1973
- Land Compensation - Your Rights Explained DOE (NI)
- ODPM - PPG24: Planning and Noise (1994)
- Noise Insulation Regulations (NI) 1995
- Pollution Control and Local Government (NI) Order 1978
- Transport Analysis Guidance provided by the Department for Transport[1].
- Design Standards for Highway Structures and Bridges[2]
- The Environmental Assessment of Plans and Programmes Regulations (NI) 2004
- Environmental Impact Assessment (NI) Regulations 1999
- The Clean Neighbourhoods and Environment Act 2011
- The Noise Insulation (Railways and other Guided Transport Systems) Regulations 1996
- Transport Assessment; Guidelines for Development Proposals in N. Ireland Nov 06 DRD/DOE
- Regional Development Strategy 2035
- Ensuring a Sustainable Transport Future: A New Approach to Regional Transportation (draft version, subject to formal adoption)
- Draft Belfast Metropolitan Area Plan 2015
- Regional Transportation Strategy for Northern Ireland 2002-2012
- Belfast Metropolitan Transport Plan 2015

[1] https://www.gov.uk/guidance/transport-analysis-guidance-tag
[2] https://www.standardsforhighways.co.uk/search?discipline=HIGHWAY_STRUCTURES_AND_BRIDGES&suite=DMRB

Appendix C – NI Railways Train Passages Information 2021

Lanyon Place to Bangor

Bangor – Lanyon Place				
	Total	**Day**	**Evening**	**Night**
Stopper	12569	9735	2009	825
Flyer	1803	1545	258	0
Stopper (Bangor, Bangor West, Holywood, Titanic Quarter, Belfast Central)	1288	1288	0	0
Lanyon Place – Bangor				
	Total	**Day**	**Evening**	**Night**
Stopper	11796	8601	2370	825
Flyer – Central; Titanic Quarter; Sydenham; Holywood; Bangor West; Bangor	1030	1030	0	0
Flyer – Central; Titanic Quarter; Holywood; Bangor West; Bangor	2833	2575	0	258

GVS – Lisburn

Lisburn – GVS				
	Total	**Day**	**Evening**	**Night**
Stopper – all stops	11743	8755	2215	773
Flyer – Lisburn – GVS	5048	4790	258	0
Lisburn, Dunmurry, Finaghy, Balmoral, Adelaide	413	413	0	0
GVS – Lisburn				
	Total	**Day**	**Evening**	**Night**
Stopper	13804	8087	2060	3657
Flyer	4121	3966	103	52
One Stop – Dunmurry	773	773	0	0
Fly/Stop – GVS, Adelaide, Balmoral. Finaghy, Dunmurry – Lisburn	258	258	0	0

Lanyon Place – Carrickfergus

Lanyon Place – Carrickfergus				
	Total	**Day**	**Evening**	**Night**
Stopper	10714	8241	1391	1082
Flyer	1288	1030	0	258
Carrickfergus – Lanyon Place				
	Total	**Day**	**Evening**	**Night**
Stopper	11280	8653	2060	567
Flyer	773	773	0	0

Lanyon Place – Antrim

Lanyon Place – Antrim				
	Total	**Day**	**Evening**	**Night**
All Stopper	9735	7211	1391	1133
Doesn't Stop at Whiteabbey	1030	1030	0	0
Antrim – Lanyon Place				
	Total	**Day**	**Evening**	**Night**
Stopper	9685	7160	1958	567
Doesn't Stop at Whiteabbey	773	515	0	258

Lanyon – Dublin (Enterprise loco plus carriages)

Lanyon Place – Dublin				
	Total	**Day**	**Evening**	**Night**
Stopper	2732	2060	362	310
Dublin – Lanyon Place				
	Total	**Day**	**Evening**	**Night**
Stopper	2730	2060	670	0

Lanyon Place – GVS (Total for the 3 Routes)

Lanyon Place – GVS				
	Total	**Day**	**Evening**	**Night**
Stopper	32963	25082	6748	1133
GVS – Lanyon Place				
	Total	**Day**	**Evening**	**Night**
Stopper	31932	23691	6593	1648