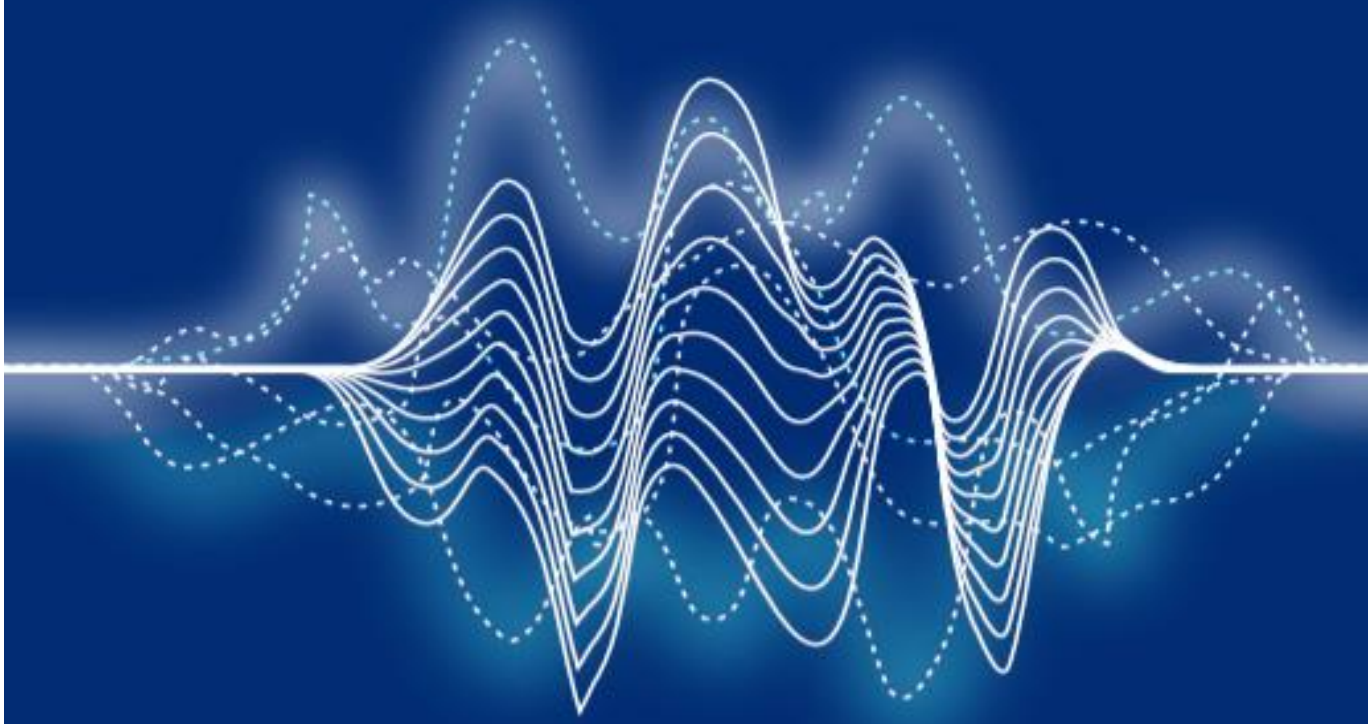
Translink – NIRailways Environmental Noise Directive Round 3 Noise Action Plan 2019 - 2023



Translink NIRailways

CONTENTS

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. It is clearly crucial for our region's future to develop and grow.

Translink is Northern Ireland's main public transport provider. We are a public cooperation 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. Translink is committed to Corporate 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 Environmental Noise Action Plan 2013 – 2018 has already substantially decreased our noise profile. We have introduced new quieter rolling stock and made improvements to track including increased installation of continuously welded rail. However, we are far from complacent and seek to reduce the noise profile further in so far as is reasonably practicable and taking into consideration the greater social good. That is why we have republished this Translink Environmental Noise Action Plan 2019 – 2023 that contains additional actions to manage noise over the next 5 years. 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.

Description of the agglomeration, major railways

The only agglomeration in Northern Ireland considered in Round Three is the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1 and has an approximate area of 209.4km^2. This represents an 11km^2 increase on Round Two and reflects 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 includes all areas modelled at Round 2 plus the new development areas. It should also be noted that the 2015 population for the Belfast agglomeration is 597,419 and exceeds the required END threshold of 100,000.

Northern Ireland Railways network covers 210 route miles of track of which, for Round 1, 55% was continuously welded and 45% flat bottomed jointed track. Recent track relay projects have enhanced the coverage of continuously welded rail (now 98%), particularly in the North West. The rail network also consists of almost 400 railway signals, 205 sets of points and 60 level crossings. Structures on the network include 700 bridges, 290 culverts, 3 tunnels, 10 miles of sea defences, 144 embankments and 124 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 Table 6.2 for the Major Rail and Table 6.3 for the Agglomeration Rail.

Both tables show 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 night-time hours the tables show little noise impact from railways at night.

Table 6.4 shows that for the L_{den} noise scenario 98% of dwellings (256,683) within the Belfast Agglomeration are exposed to railway noise less than 50 dB. No dwellings are exposed to noise levels in excess of 75 dB.

Evaluation of the estimated number of people exposed to noise.

The results of the population analysis for railways within the Agglomeration, Table 6.5, shows that only 41 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 34 separate emails sent to interested stakeholders and local interest groups. The consultation period lasted 10 weeks within which Translink received zero responses.

Noise reduction measures already in force

Translink have two purpose-built noise barriers. One is located at Central Station, Belfast. This barrier is accompanied by a barrier diffuser system at the station end of Platform 3 and 4, at Central Station, Belfast. The second is a recent addition and accompanies the newly developed Adelaide Train Maintenance Facility. Other network features such as the concrete wall at Blythfield Curve will have noticeable noise reduction benefits. Rail operational noise may be created through damaged wheels and track. If both can be kept smooth, noise can be reduced significantly. The move from cast-iron brake-blocks to disc brakes and composite blocks reduces brake noise levels. Regular inspection and maintenance of track and rolling stock help to reduce noise. 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.

Noise related procedures regarding rail operations include Traction Instruction TI05-01-001 ‘Noise Abatement De-Dietrich Head End Power’ which ensures Enterprise locomotives shut down their head-end power unit whilst moving between York Road Depot and Central Station.

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 Three 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 Environmental 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 Translink Corporate Responsibility Steering Group, and the Corporate Responsibility Leadership Group.

Long-term strategy

Our Translink Corporate Vision is '***To be your first choice for travel in Northern Ireland***'.' Our mission is to work innovatively and efficiently taking a collaborative approach with all relevant stakeholders to deliver a transformation in public transport, providing integrated services which connect people, enhance the economy and improve the environment, enabling a thriving Northern Ireland. We aim to achieve this responsibly by placing Translink at the forefront in the journey towards zero emission public transportation, and for all our buses, trains and buildings to be Net Zero Emissions by 2040.

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 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.

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. We believe this will significantly reduce the number of dwellings and population exposed to specific noise categories (noise levels 65-69 dB and above).

Revision of Action Plan

Translink will continue to monitor and review this Railway Noise Action Plan via the Translink Corporate Responsibility Leadership Group, and its supporting Steering Group, on an on-going basis, as well as when a major development occurs.

1.0 INTRODUCTION

1.1 Purpose

This Noise Action Plan has been prepared to show how Translink, on behalf of the Northern Ireland Transport Holding Company, intends to manage noise issues and effects arising from the railway operations of Northern Ireland Railway's and where necessary, improve the noise climate around the railway network during the period 2018 – 2023. It follows on the work carried out within our previous 2013 – 2018 action plan 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.

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 road, 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; and
- All agglomerations with more than 100,000 inhabitants.

This action plan relates to the third round of noise mapping.

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 measure 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	Section 8.0

	the next five years, including any measures to preserve quiet areas.	
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 Round's, 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.

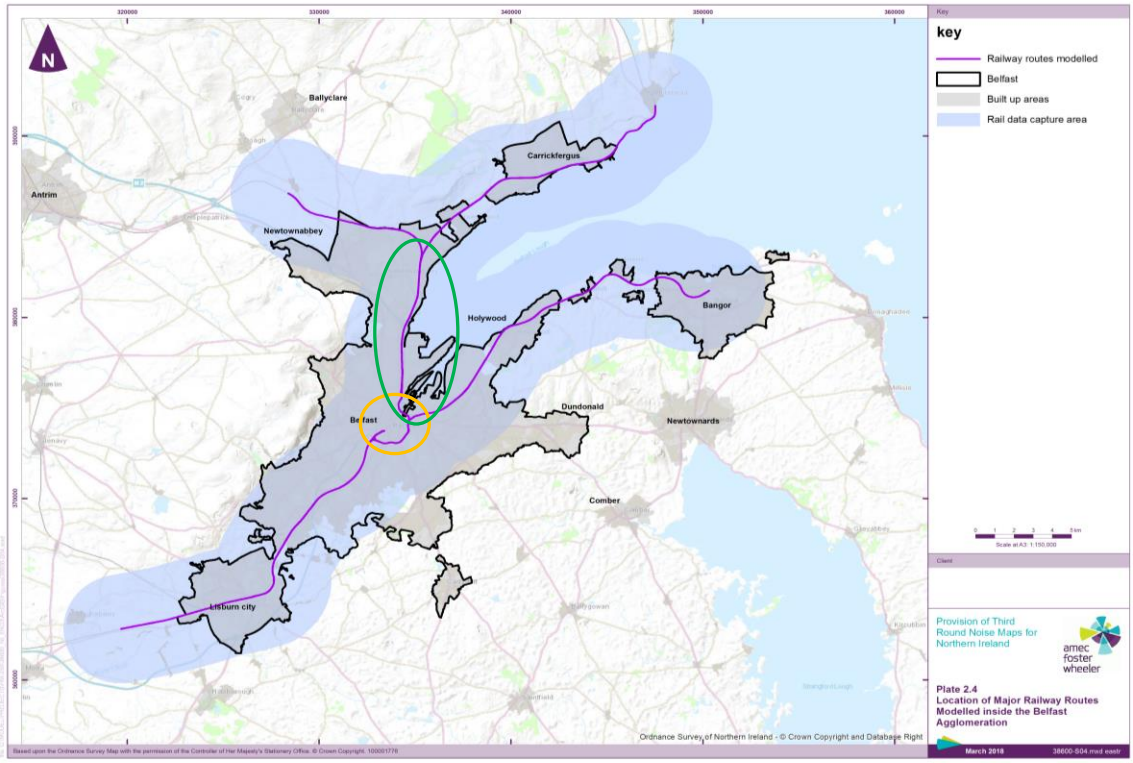
The only agglomeration in Northern Ireland considered in Round Three is the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1 and has an approximate area of 209.4km^2. This represents an 11 km^2 increase on Round Two and reflects both changes in 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 includes all areas modelled at Round 2 plus the new development areas. It should also be noted that the 2015 population for the Belfast agglomeration is 597,419 and exceeds the required END threshold of 100,000. A review of potential agglomerations qualifying for Round Three was also undertaken for completeness. Data obtained from the Northern Ireland Statistics and Research Agency (NISRA) for 2015 shows that the second largest urban area in Northern Ireland is the Derry Urban Area. The Derry Urban Area has a population of 91,602 and therefore falls below the 100,000 threshold. The Derry Urban Area has therefore not been mapped in Round Three. 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. The resulting data capture area is shown in Plate 3.1.

There have been 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. Following a review of railway movement data, it has been confirmed that Northern Ireland's major railways are in and around the Belfast Agglomeration.

The railway from Great Victoria Street to Lanyon Place (formerly Central Station), highlighted by the orange circle within Plate 3.1 comprises the section with the highest number of train passages (over 60,000 per annum). The area highlighted in green, to the north of Belfast, comprises the section of railway with the next highest number of train passages (35, 984 per annum). Belfast to Lisburn City would also be classified as a major railway with 31, 312 train passages per annum, whilst Belfast to Bangor is just slightly below (29, 806 per annum). Train flow information indicating the number of train passages on the NI Railways network is provided in Appendix E.

Plate 3.1 Belfast Agglomeration showing location of the major and minor railway routes modelled during Round Three.



Map reproduced from Department of Environment Northern Ireland – Provision of Third Round Noise Maps for Northern Ireland Railway Noise Mapping Final Report.

Northern Ireland Railways network covers 210 route miles of track of which, for Round 1, 55% was continuously welded and 45% flat bottomed jointed track. Recent track relay projects have enhanced the coverage of continuously welded rail (now 98%), particularly in the North West. The rail network also consists of almost 400 railway signals, 205 sets of points and 60 level crossings. Structures on the network include 700 bridges, 290 culverts, 3 tunnels, 10 miles of sea defences, 144 embankments and 124 platforms.

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 around 100 km/h.

END Round 3 reports are available online at:

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

3.2 The Authority Responsible

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

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 majority of the Northern Ireland Railways rolling stock, 23 x Class 3000 and 20 x Class 4000, has been introduced that meet these limits. It is planned that the Enterprise will be replaced 2026/27 and technical studies are being developed regards the feasibility of electrifying the Northern Ireland Railways network 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.

Within Northern Ireland Railways, noise related procedures regarding rail operations include Traction Instruction TI05-01-001 ‘Noise Abatement De-Dietrich Head End Power’ which ensures Enterprise locomotives shut down their head-end power unit whilst moving between York Road Depot and Central Station.

4.0 REVIEW OF ROUND ONE NOISE ACTION PLAN

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.

4.2 Round One Action Planning

Our long-term strategy is to – promote the use of the best practicable means to minimizing noise impacts whilst providing a transformed network of coordinated bus and rail services which attracts a growing number of passengers, enjoys public confidence and is recognised for its quality and innovation.

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

The actions were grouped into 5 major headings, as highlighted in the following table:

ACTION	PERFORMANCE INDICATOR
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	Report on vehicle standards through Fleet Profile reporting. **Status: Translink meet and where appropriate exceed relevant requirements in relation to new buses, coaches and rolling stock. We now operate one of the youngest fleets in the UK.**
We will enforce and update noise abatement procedures relating to bus and train operations – including the limiting of vehicle idling.	Procedures are monitored through divisional safety management systems. **Status: an Eco-Driving Programme is being rolled out across the Translink Bus Services Division; a Vehicle Management System has been rolled out for support vehicles, vans etc; and a Driver Aid system is being 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.	Number of contacts recorded. **Status – a dedicated environmental email address has been established and monitored by the Group Environmental 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.	Number of interactions with local planning department. **Status – Translink work with planners and large developers in relation to our operations**
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.	Noise complaint trends. **Status – any noise issues reported to Translink are recorded on TSMIS and any trends reported a weekly, monthly and quarterly meetings**
Noise reduction measures will be incorporated in the planning of engineering and maintenance works, and new capital projects.	CEEQUAL and BREEAM assessments. **Status – where appropriate Translink engage with our contractors and support CEEQUAL and BREEAM assessments. For example the recent construction of Adelaide Train Maintenance Facility includes the construction of a noise barrier, as well as the installation of rolling stock shore-supply and changes to train horn testing.**
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.	**Status – rolling stock profiles for all routes is readily available for Class 3000 and Class 4000 rolling stock.**

Through our Translink Corporate Responsibility Strategy sustainability and environmental aspects including environmental noise are at the core of the Group's values. The strategy sets

the businesses in Translink significant outcomes and process challenges. The focus is in delivering the improved performance on the ground with common standards across the businesses. A specialist safety, health and environmental risk management function provides support across the Group. The function also monitors performance against the strategy.

5.0 ROUND TWO NOISE MAPPING

5.1 Agglomeration Modelling Extent

The only agglomeration in Northern Ireland considered in Round Two was the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1, 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 Agglomeration was considered in Round One due to its population exceeding the Round One threshold of 250,000. 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. The resulting data capture area of 596 km^2 is shown in Plate 3.1

5.2 Major Railways Extent

There have been no major changes to the railway network in Northern Ireland 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.

Under the Regulations, Round Two 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.

Table 5.1 provides a summary of the extent of railways and data capture areas for the Round One and Round Two mapping exercise.

Table 5.1 Railway – Length of Railway Mapped and the Extent of the Data Capture Area

Length of Railways Mapped (km)	Round One	Round Two
Minor Railways	148.4	59.2
Major Railways	0	89.2
Total	148.4	148.4
Date Capture Area (km^2)	Round One	Round two
Total Area	No information available	455.4

5.3 Summary of the Results of the Noise Mapping

The approach set out in the Directive is to first undertake strategic noise mapping within agglomerations, and for major sources outside agglomerations, and assess the numbers of people exposed to noise within 5 dB bands.

It should be noted that the noise mapping process produces maps which are to be used on a strategic level. There are limitations to the maps and it is accepted that noise levels represented by the maps do not necessarily reflect noise level which would be experienced at any given point.

The results of the strategic noise mapping process help to gain an understanding of:

- Where environmental noise is located;
- The approximate magnitude of noise levels with the assessment area; and
- Approximately how many people are exposed to differing levels of environmental noise.

The geometric area of the noise bands for each of the 5 dB bands were calculated based on the outputs. The results are shown in Table 5.2 for the Major Rail and Table 5.3 for the Agglomeration Rail.

Both tables show 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 night time hours the Tables show little noise impact from railways at night.

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

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	128.42	128.54	134.36	127.87	128.16	129.27	**< 45**	131.31
50 – 54	2.74	2.70	0.35	2.86	2.82	2.46	**45 – 49**	1.87
55 – 59	1.83	1.81	0.11	1.96	1.89	1.72	**50 – 54**	1.20
60 – 64	1.45	1.41	0.00	1.55	1.52	1.07	**55 – 59**	0.39
65 – 69	0.36	0.34	0.00	0.52	0.42	0.28	**60 – 64**	0.04
70 – 74	0.01	0.01	0.00	0.05	0.02	0.01	**65 – 69**	0.00
>=75	0.00	0.00	0.00	0.00	0.00	0.00	**70 – 74**	0.00
< 50	128.42	128.54	134.35	127.87	128.16	129.27	**< 45**	131.31
>= 50	6.39	6.27	0.46	6.94	6.67	5.54	**<= 45**	3.5
Total	134.81	134.81	134.81	134.81	134.81	134.81	**Total**	134.81

Table 5.3 Agglomeration Rail – Area of Noise Bands (dB) in km^2

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	190.08	190.21	197.23	189.37	189.79	190.95	**< 45**	193.43
50 – 54	3.23	3.2	0.75	3.38	3.3	3.01	**45 – 49**	2.36
55 – 59	2.32	2.3	0.12	2.5	2.39	2.2	**50 – 54**	1.57
60 – 64	1.79	1.74	<0.01	1.89	1.86	1.39	**55 – 59**	0.7
65 – 69	0.67	0.64	0.00	0.9	0.74	0.54	**60 – 64**	0.04
70 – 74	0.01	0.01	0.00	0.06	0.02	0.01	**65 – 69**	<0.01
>=75	<0.01	<0.01	0.00	<0.01	<0.01	<0.01	**70 – 74**	<0.01
< 50	190.09	190.21	197.23	189.37	189.79	190.95	**< 45**	193.43
>= 50	8.02	7.89	0.87	8.73	8.31	7.15	**<= 45**	4.67
Total	198.1	198.1	198.1	198.1	198.1	198.1	**Total**	198.1

5.4 Evaluation of the estimated number of people exposed to noise.

Tables 5.4 and 5.5 detail the results of the Round Two dwelling and population analysis for railways with the Belfast Agglomeration.

Table 5.4 Agglomeration Railway - Dwellings

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	257192	257264	261593	256683	256981	257813	**< 45**	259401
50 – 54	2100	2092	360	2321	2188	1868	**45 – 49**	1374
55 – 59	1395	1373	22	1396	1411	1378	**50 – 54**	878
60 – 64	997	971	0	1178	1092	717	**55 – 59**	316
65 – 69	291	275	0	383	321	199	**60 – 64**	6
70 – 74	0	0	0	14	2	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	257192	257264	261593	256683	256981	257813	**< 45**	259401
>= 50	4783	4711	382	5292	5014	4162	**<= 45**	2574
Total	261975	261975	261975	261975	261975	261975	**Total**	261975

Table 5.5 Agglomeration Rail – Population

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	564125	564256	572419	563124	563684	565357	**< 45**	568483
50 – 54	4131	4124	612	4518	4311	3645	**45 – 49**	2473
55 – 59	2580	2523	32	2672	2617	2462	**50 – 54**	1540
60 – 64	1739	1694	0	2060	1912	1266	**55 – 59**	555
65 – 69	490	466	0	669	537	333	**60 – 64**	13
70 – 74	0	0	0	21	3	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	564125	564256	572419	563124	563684	565357	**< 45**	588483
>= 50	8940	8807	644	9940	9380	7706	**<= 45**	4581
Total	573065	573065	573065	573065	573065	573065	**Total**	573065

Table 5.4 shows that for the L_{den} noise scenario 98% of dwellings (256,683) within the Belfast Agglomeration are exposed to railway noise less than 50 dB. No dwellings are exposed to noise levels in excess of 75 dB.

The results of the population analysis for railways within the Agglomeration, Table 5.5., shows that only 21 people may be exposed to railway noise levels in excess of 70 dB in relation to the L_{den} scenario.

Tables 5.6 - 5.11 detail the results of the Round Two dwelling and population analysis for major railways, within the Belfast Agglomeration, outside the Belfast Agglomeration and across the whole of Northern Ireland.

Table 5.6 Major Railway – Dwellings (Belfast Agglomeration)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	258738	258799	261810	258404	258565	259218	**< 45**	260263
50 – 54	1442	1420	143	1579	1514	1231	**45 – 49**	968
55 – 59	957	950	22	944	959	988	**50 – 54**	610
60 – 64	734	710		876	814	467	**55 – 59**	128
65 – 69	104	96		160	121	71	**60 – 64**	6
70 – 74				12	2		**65 – 69**	
>=75							**70 – 74**	
< 50	258738	258799	261810	258404	258565	259218	**< 45**	260263
>= 50	3237	3176	165	3571	3410	2757	**<= 45**	1712
Total	261975	261975	261975	261975	261975	261975	**Total**	261975

Table 5.7 Major Railway – Population (Belfast Agglomeration)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	567009	567121	572822	566325	566676	567972	**< 45**	570058
50 – 54	2881	2845	211	3129	3038	2431	**45 – 49**	1719
55 – 59	1753	1732	32	1810	1756	1739	**50 – 54**	1056
60 – 64	1265	1223		1512	1411	816	**55 – 59**	220
65 – 69	157	144		271	182	106	**60 – 64**	12
70 – 74				18	3		**65 – 69**	
>=75							**70 – 74**	
< 50	567009	567121	572822	566325	566676	567972	**< 45**	570058
>= 50	6056	5944	243	6740	6389	5093	**<= 45**	3007
Total	573065	573065	573065	573065	573065	573065	**Total**	573-065

Table 5.8 Major Railway – Dwellings (Outside Agglomeration)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	491887	491888	491908	491885	491885	491892	**< 45**	491896
50 – 54	8	8	0	10	10	4	**45 – 49**	5
55 – 59	4	3	0	3	3	7	**50 – 54**	7
60 – 64	9	9	0	10	10	5	**55 – 59**	0
65 – 69	0	0	0	0	0	0	**60 – 64**	0
70 – 74	0	0	0	0	0	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	491887	491888	491908	491885	491885	491892	**< 45**	491896
>= 50	21	20	0	23	23	16	**<= 45**	12
Total	491908	491908	491908	491908	491908	491908	**Total**	491908

Table 5.9 Major Railway – Population (Outside Agglomeration)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	1,200,474	1,200,476	1,200,506	1,200,471	1,200,471	1,200,481	**< 45**	1,200,488
50 – 54	13	12	0	16	16	7	**45 – 49**	8
55 – 59	7	5	0	5	5	11	**50 – 54**	10
60 – 64	13	13	0	15	15	7	**55 – 59**	0
65 – 69	0	0	0	0	0	0	**60 – 64**	0
70 – 74	0	0	0	0	0	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	1,200,474	1,200,476	1,200,506	1,200,471	1,200,471	1,200,481	**< 45**	1,200,488
>= 50	32	30	0	35	35	25	**<= 45**	18
Total	1,200,506	1,200,506	1,200,506	1,200,506	1,200,506	1,200,506	**Total**	1,200,506

Table 5.10 Major Railway – Dwellings (Northern Ireland)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	750,625	750,687	753,718	750,289	750,450	751,110	**< 45**	752,159
50 – 54	1450	1428	143	1589	1524	1235	**45 – 49**	973
55 – 59	961	953	22	947	962	995	**50 – 54**	617
60 – 64	743	719	0	886	824	472	**55 – 59**	128
65 – 69	104	96	0	160	121	71	**60 – 64**	6
70 – 74	0	0	0	12	2	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	750625	750687	753,718	750,289	750,450	751,110	**< 45**	752,159
>= 50	3258	3196	165	3594	3433	2773	**<= 45**	1724
Total	753,883	753,883	753,883	753883	753,883	753,883	**Total**	753,883

Table 5.11 Major Railway – Population (Northern Ireland)

Noise Level	LA_{eq}, 16 hr	LA_{eq}, 18 hr	LA_{eq}, 6 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}
< 50	1,767,483	1,767,597	1,773,328	1,766,796	1,767,147	1,768.454	**< 45**	1,770,546
50 – 54	2894	2858	211	3144	3053	2438	**45 – 49**	1727
55 – 59	1760	1737	32	1815	1761	1750	**50 – 54**	1066
60 – 64	1278	1236	0	1527	1425	823	**55 – 59**	220
65 – 69	157	144	0	271	182	106	**60 – 64**	12
70 – 74			0	18	3	0	**65 – 69**	0
>=75	0	0	0	0	0	0	**70 – 74**	0
< 50	1,767,483	1,767,597	1,773,328	1,766,796	1,767,147	1,768,454	**< 45**	1,770,546
>= 50	6088	5974	243	6775	6424	5117	**<= 45**	3025
Total	1,773,571	1,773,571	1,773,571	1,773,571	1,773,571	1,773,571	**Total**	1,773,571

5.5 Comparison between Round One and Round Two

For the railways in Northern Ireland, the main change in the data inputs between Round One and Round Two, in terms of noise emissions is the change in the rolling stock and a change in the number of movements. Class 450 were operating a reduced number in 2011 in comparison to 2006 as these units were replaced by Class 4000.

In addition to changes in emissions, changes in the 3D modelling of the Belfast Agglomeration, notable changes in topography and changes to the modelling of ground cover also contributed to changes in the population exposed to railway noise.

The results of the population analysis for railways in Round One 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, within Round Two the number had reduced to 21.

6.0 ROUND THREE NOISE MAPPING

6.1 Agglomeration Modelling Extent

The only agglomeration in Northern Ireland considered in Round Three is the Belfast agglomeration as defined in the Regulations. The Belfast agglomeration is presented in Plate 3.1 and has an approximate area of 209.4km^2. This represents an 11 km^2 increase on Round Two and reflects 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 includes all areas modelled at Round 2 plus the new development areas. It should also be noted that the 2015 population for the Belfast agglomeration is 597,419 and exceeds 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. The resulting data capture area is shown in Plate 3.1.

Round 3 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

6.2 Major Railways Extent

There have been 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. Following a review of railway movement data, it has been confirmed that Northern Ireland's major railways are located in and around the Belfast Agglomeration.

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

Table 6.1 provides a summary of the extent of railways and data capture areas for the Round One, Round Two, and Round Three mapping exercise.

Table 6.1 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
Date Capture Area (km^2)			
Total Area	596	596	618

6.3 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 results are shown in Table 6.2 for the Major Rail and Table 6.3 for the Agglomeration Rail.

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

Both tables show that the railways have 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 show little noise impact from railways at night.

Table 6.2 Major Rail – Area of Noise Bands (dB) in km^2

Noise Level (dB)	LA_{eq}, 16 hr	LA_{eq}, 18 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	LAeq, 6 hr
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)	LA_{eq}, 16 hr	LA_{eq}, 18 hr	L_{den}	L_{day}	L_{eve}	Noise Level	L_{night}	LAeq, 6 hr
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

6.4 Evaluation of the estimated number of people exposed to noise

Tables 6.4 and 6.5 detail the results of the Round Three dwelling and population analysis for railways within the Belfast Agglomeration.

Table 6.4 Agglomeration Railway - Dwellings

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level (dB)	L_{night}	LAeq, 6 hr
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 6.5 Agglomeration Railways - Population

Noise Level (dB)	$L_{Aeq,\ 16\ hr}$	$L_{Aeq,\ 18\ hr}$	L_{den}	L_{day}	L_{eve}	Noise Level (dB)	L_{night}	LAeq, 6 hr
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 6.6 & 6.7 detail the results of the Round Three dwelling and population analysis for major railways within the Belfast Agglomeration.

Table 6.6 Major Railways – Population

Noise Level (dB)	LA_{eq}, 16 hr	LA_{eq}, 18 hr	L_{den}	L_{day}	L_{eve}	Noise Level (dB)	L_{night}	LAeq, 6 hr
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 6.7 Major Railways – Dwellings

Noise Level (dB)	LA_{eq}, 16 hr	LA_{eq}, 18 hr	L_{den}	L_{day}	L_{eve}	Noise Level (dB)	L_{night}	LAeq, 6 hr
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

6.5 Comparison between Round Two and Round Three

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

In global terms, the geographical extent of areas mapped above 55dB has reduced significantly for the Lday, Leve, Lden and LAeq, 16-hour indicators between Round Two and Three. These changes are evident across the network but particularly noticeable across the Belfast – Carrickfergus line. This reflects both changes in train stock (i.e. removal of 450 classes and replacement with the quieter 4000 class trains) across the network and changes in movement profiles

The total geographical extent of areas mapped above 50dB has remained largely unchanged for the Lnight indicators between Round Two and Round Three. These are some differences in total areas assigned to individual 5dB upper bands, but these changes are relatively small.

There has been a similar level of reduction in the estimated number of dwellings above 55dB for each of day related noise indicators and a small increase in the number of dwellings identified in the 45-49 and 50-54 noise bands for Lnight.

The amount of population estimated to be living in areas exceeding 55dB for rail noise remains relatively low when compared to other noise sources (road and aircraft). This reflects the relatively small geographical footprint of the noise contours for agglomeration and major railways.

For most of the indicators (LAeq, 16-hour, Lden, Lday and Leve), the level of population living in areas exceeding 60dB remains relatively low (<2000) with both small and negative changes when compared to Round 2 estimates. These changes reflect both changes in the noise maps and also the enhanced method for the allocation of population to individual building objects in Round 3;

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

7.1 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."

7.2 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.

7.3 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.

7.4 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 2025 & Regional Development Strategy 2035;
- Local Area Development Plans;
- Planning Policy Statements and Planning Supplementary Guidance;
- A Planning Strategy for Rural Northern Ireland;
- Ensuring a Sustainable Transport Future: a New Approach to Regional Transportation;
- Sustainable development 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; and
- Noise Insulation Regulations (Northern Ireland) 1995.

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.

7.5 Review of Translink Noise Action Plan 2012 – 2018

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.	The EU Council Directive 96/48/EC on the interoperability of rolling stock applies to all new rolling stock and contains limits on external noise. Thus the introduction of the Class 4000s has led to a reduction in noise compared to the older, pre interoperability directive, Class 450s. The Class 4000 DMUs compared to the Class 450 DMUs equates to an 8.5 dB difference due to the wheel roughness/braking type (disc brakes on the Class 4000 compared to tread brakes on the Class 450). 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	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.
Having identified the worst affected 1% of the population. We will carry out field work to ascertain the validity of the noise levels modelled.	Translink appointed external consultants AECOM to carry out the following works: Noise monitoring at a Candidate Noise Management Area (CNMA) to compare with: • The second round of noise mapping • A rail noise model developed to assess proposed Action Plans. Noise monitoring at a second location where rail noise was the dominant source. The measurements showed that the noise near to the CNMA from both rail and road sources is broadly in line with that produced by the second round of mapping and influencing factors have been given that would produce variations between the two. Measurements at a second location (railway source only) also compare favourably with those predicted (within 2 dB)
Identify if noise sensitive rooms are on the most exposed façade of the building or if noise mitigation	In the CNMA, the nearest residential dwellings are located on the east side of Arosa Park/Glasgow Street and the relevant distances were identified. These dwellings are separated from the railway by walls on the boundary. However, the effectiveness of these walls as noise barriers is not known and it is unlikely that

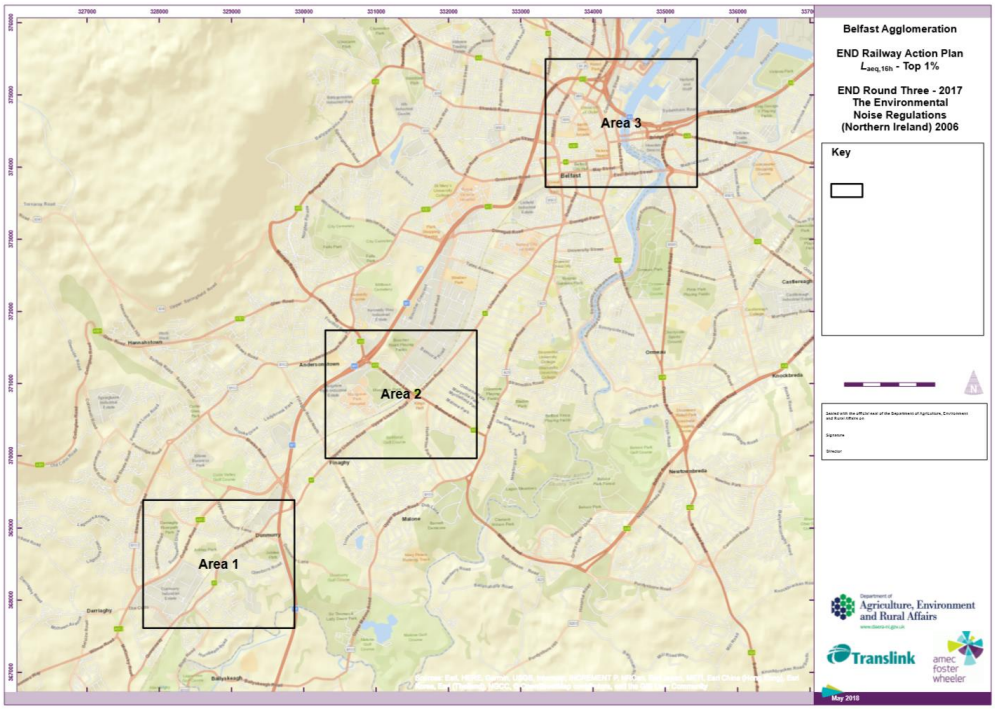
measures are already in place.	these walls provide acoustic screening for the rooms located on the second story or above. Therefore, these boundary walls have not been included in the noise prediction model. This matches the noise mapping in which such walls would not have been included. Predictions were made at two heights, for comparison with the measurement data (1.5 m above the ground) and at first floor window on a dwelling (4.0 m) as per the END mapping.
Assess the extent to which noise can be reduced and develop a cost / benefit analysis of mitigation measures if applicable.	AECOM were also tasked to conduct an assessment of mitigation methods proposed in the Action Plans, including: A noise barrier between the CNMA and the adjacent railway A noise barrier between the railway and the adjacent motorway Quieter rolling stock Continuous welded rail. The noise model was used to predict the impact of introducing mitigation in the form of a noise barrier between the railway line and the CNMA where residential properties are adjacent to the railway line. The noise barrier was located on the boundary of the railway and the properties where the existing walls are positioned. A 2 m high railway noise barrier makes no difference to either the railway or road 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 and the road traffic noise by 3 dB. This reduction is reflected in the change in total noise, which is dominated by the road noise. The same procedure was carried out for a road noise barrier located between the M2 and the railway. The location of this barrier between the road and the railway means that the noise from the railway is not screened. A 2 m road noise barrier reduces the total noise level by 2 dB and a 4 m barrier by 6 dB. The noise model predicted a -3 dB change from continuously welded rail and a -9 dB change in the switch from Class 450s to Class 4000s.

7.6 Identification of areas to be subjected to noise management activities

Within the population analysis for Round Two, approximately 8900 of the population within the Belfast Agglomeration were subject to environmental noise above 50 LA_{eq18h} and LA_{eq16h} from railways. For Round Three the number has fallen to 6,607 of the population within the Belfast Agglomeration subject to environmental noise above 50 LAeq18h and 5,992 LAeq16h from railways.

A population exposure assessment was undertaken at 1dB levels, with the assistance of external environmental noise consultants. This enabled 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.

Plate 7.1 Belfast Agglomeration L_{AEQ} 16hr highlighting the general areas of the worst 1% of the population affected by the highest noise levels.



Map reproduced from Department of Environment Northern Ireland – Provision of Third Round Noise Maps for Northern Ireland Railway Noise Mapping Final Report.

With the lowering in Translink's overall noise levels the worst 1% is now mainly located to the south of the city and can be grouped together into 3 main areas, as per Plate 7.1. The most concentrated locations are within Area 1 and Area 2. Therefore, these areas will be concentrated on first, and thus designated as a Candidate Noise Management Area. Due to the spread of locations, general areas are highlighted in Plate 7.1 and specific locations will be identified to allow for the field work stage. The only property identified within Area 3 is the Obel Tower, which was completed in 2011 and therefore constructed to modern building standards.

The next stage is 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.

We will also carry out field work in Area 3 to check against the previous field work with the aim of revoking this Candidate Noise Management Area.

7.7 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 include:

- Carriage noise emissions and rail noise regulations set at EU level;
- Noise regulations which would be set at national level;
- Transport policy objectives set at regional level;
- Local council and government departments' powers;
- 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;
- Replacement of tread brakes with disc brakes;

- 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.

8.0 TRANSLINK NOISE ACTION PLAN 2019 - 2023

Translink will continue the work progressed through our Round One and Round Two Action Plans 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 Three 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.
    - Assess the extent to which noise can be reduced and develop a cost / benefit analysis of mitigation measures if applicable.

    (Precise actions will be confirmed following the award of a new Independent Environmental Advisor Framework (Spring / Summer 2021) and finalisation of budgets).

Roles & Responsibilities

The END process within Translink - Northern Ireland Railways is coordinated via the Translink Safety Health & Environment (SH&E) Department, with the Environmental 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 Translink Corporate Responsibility Steering Group, and the Corporate Responsibility Leadership Group.

Any new or major railways would require planning permission as per The Planning (General Development) (Amendment) Order (Northern Ireland) 2013 which makes amendments to Part 13 of Schedule 1 to The Planning (General Development) Order (Northern Ireland) 1993.

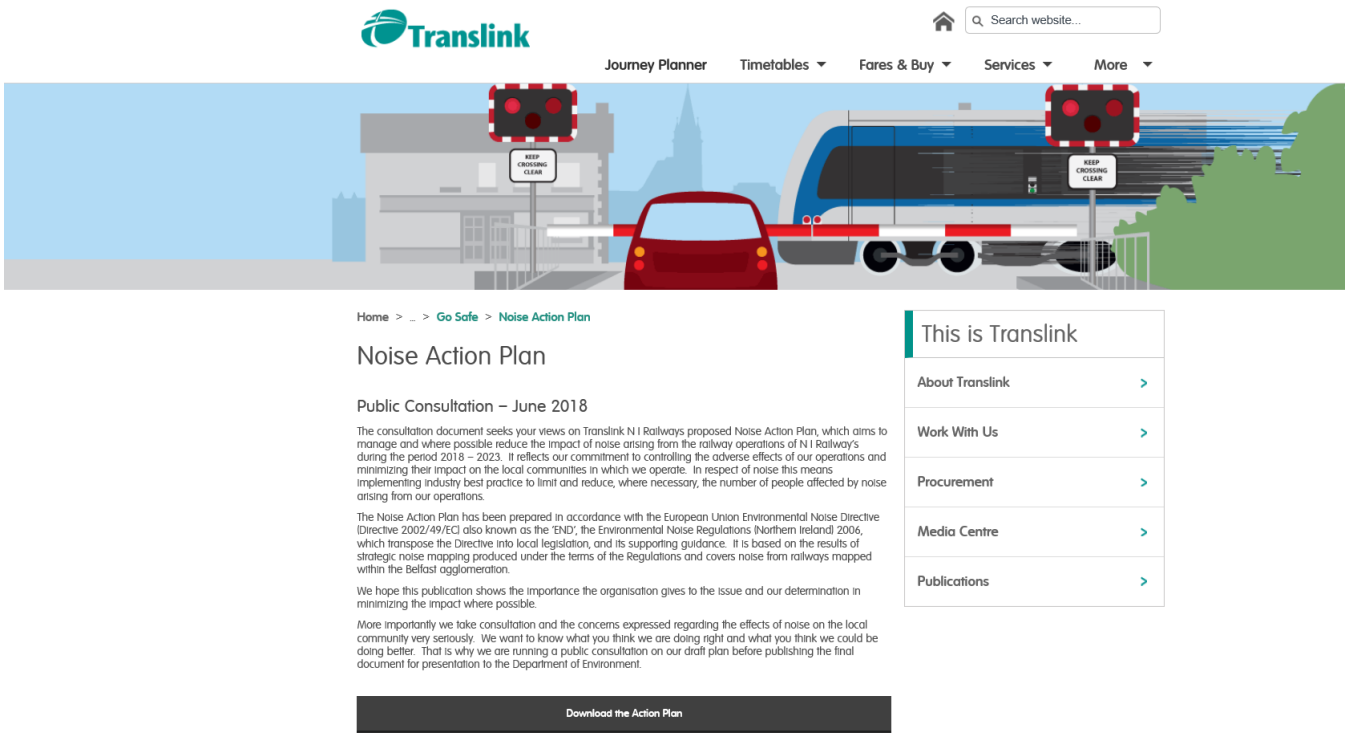
Planning permission is not required for track maintenance and relay projects or for the installation, alteration or replacement of signalling equipment but is required for the development of new lines, railway stations and bridges.

9.0 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 ran 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 was made available via a dedicated section on the Translink website with a Public Notice posted in the Belfast Telegraph, and 34 separate emails sent to interested stakeholders and local interest groups. The consultation period lasted 10 weeks within which Translink received zero responses. We will review our approach to the consultation process and consider how we can improve stakeholder engagement in the future.

Plate 9.1 Screenshot of the Noise Action Plan section of the Translink website



10.0 NOISE MANAGEMENT

10.1 Noise Reduction Measures Already in Force

Translink have two purpose-built noise barriers. One is located at Central Station, Belfast. This barrier is accompanied by a barrier diffuser system at the station end of Platform 3 and 4, at Central Station, Belfast. The second is a recent addition and accompanies the newly developed Adelaide Train Maintenance Facility. Other network features such as the concrete wall at Blythfield Curve will have noticeable noise reduction benefits. Rail operational noise may be created through damaged wheels and track. If both can be kept smooth, noise can be reduced significantly. The move from cast-iron brake-blocks to disc brakes and composite blocks reduces brake noise levels. Regular inspection and maintenance of track and rolling stock help to reduce noise. 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.

Noise related procedures regarding rail operations include Traction Instruction TI05-01-001 ‘Noise Abatement De-Dietrich Head End Power’ which ensures Enterprise locomotives shut down their head-end power unit whilst moving between York Road Depot and Central Station.

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.

10.2 Long-term strategy

Our Translink Corporate Vision is '***To be your first choice for travel in Northern Ireland***'.' Our mission is to work innovatively and efficiently taking a collaborative approach with all relevant stakeholders to deliver a transformation in public transport, providing integrated services which connect people, enhance the economy and improve the environment, enabling a thriving Northern Ireland. We aim to achieve this responsibly by placing Translink at the forefront in the journey towards zero emission public transportation, and for all our buses, trains and buildings to be Net Zero Emissions by 2040.

10.3 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.

10.4 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.

10.5 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. We believe this will significantly reduce the number of dwellings and population exposed to specific noise categories (noise levels 65-69 dB and above).

10.6 Revision of Action Plan

Translink will continue to monitor and review this Railway Noise Action Plan via the Translink Corporate Responsibility Leadership Group, and its supporting Steering Group, on an on-going basis, as well as when a major development occurs.

Appendix A

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 100,000,000 micropascals) corresponds to around 130-140 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.
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

Definition of Railways for which Noise Maps must be produced

B1 Under the Regulations Noise Maps must be made if:

1. It is a railway with more than 30,000 train passages per year (approximately 80 train passages per day).

2. Railways near to agglomerations must also be mapped regardless of the level of traffic where the level of activity means that railway noise causes

   (a) an Lden value of 55 dB(A) or greater; or
   (b) an Lnight value of 50 dB(A) or greater;
   anywhere within the agglomeration.

B2 An agglomeration is defined as an area having a population in excess of 100,000 persons and a population density equal to or greater than 500 people per km^2; and which is considered urbanised.

For the first round of mapping, reported in 2007, the population threshold is 250,000 and in the Regulations these agglomerations are described as ‘first round agglomerations’.

Appendix C

List of Current Policy and the framework for the Management of Environmental Noise

BS 5228 Noise & Vibration Control on Construction and Open Sites

- Part 1 1997 - Code of Practice for basic info and procedures for noise & vibration control
- Part 2 1997 - Guide to noise & vibration control legislation for construction and demolition including road construction and maintenance
- Part 4 1992 - 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 1999 - Sound Insulation and noise reduction for buildings – Code of Practice

Calculation of Railway Noise 1995 Department of Transport

Control of Noise (Code of Practice for Construction and Open Sites) Order (NI) 2002

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

Relevant Policy and Guidance Publications.

The Civil Aviation Act 2006

The Environmental Assessment of Plans and Programmes Regulations (NI) 2004

The Noise Insulation (Railways and other Guided Transport Systems) Regulations 1996

Transport Assessment; Guidelines for Development Proposals in N. Ireland Nov 06 DRD/DOE

Appendix D

Policy and Legislation relating to the control of Noise in Northern Ireland

Noise Act 1996

Councils in Northern Ireland have discretion whether or not to adopt the Noise Act 2006 which provides them with additional powers to deal with noise at night from domestic premises. Such powers include issuing warning and fixed penalty notices and, in certain circumstances, seizing noise making equipment.

Regional Transportation Strategy for Northern Ireland 2002 – 2012

This requires the environmental impact including noise to be assessed for noise improvement schemes and the effects of any noise to be considered when determining the feasibility of any such scheme.

Pollution Control and Local Government (Northern Ireland) Order 1978

Article 38 of this Order gives district councils power to deal with noise from premises (including land) which they consider amounts to a statutory nuisance. The powers apply to the control of existing noise and where a noise is expected to occur or reoccur. Where a council is satisfied a nuisance exists, it is required to serve a legal notice requiring the abatement of that noise nuisance.

Transport Planning

When proposing the construction of a new road or additional carriageway, a noise impact assessment must be carried out as part of the Environmental Statement, which is issued in accordance with EC Directive 85/337 EEC (as amended). The potential noise impact should be assessed for all properties within 300m of each new road or proposed alteration or carriageway.

Current policy also requires an impact assessment to be carried out if there is an expected increase of 1dB LA10,18h from the existing road when alterations are carried out (Design

Manual for Roads and Bridges, Vol 11, Section 3, Part 7, (HA 213/08 (August 2008)). The process which tends to be followed is set out in the Design Manual for Roads and Bridges (Design Manual for Roads and Bridges, Vol 11, Section 3, (HA 213/08, August 2008). Mitigation such as optimising the route alignment and the use of noise barriers, either through landscaping or purpose-built walls or fences, should be included in the road design to minimise any adverse noise impact. The impact assessment process also has regard to the protection of tranquil areas in general, through consideration of the impact on landscape.

Whilst conditions relating to noise can be set as part of a planning permission, there is currently no specific policy or guidance which addresses the issue of noise at the planning stage. However, noise is referred to in several other Planning Policy Statements and noise is a material consideration which is taken into account in the making of planning decisions.

Land Use Planning

In dealing with planning applications involving noise that would be generated by the proposed development or existing noise to which the development would be subjected, the Planning Authority consults the appropriate Environmental Health Department and relevant Competent Authority.

It is not the purpose of the planning system to intervene in existing noise problems arising from lawful land use activity and the planning system should not be used to achieve objectives relating to other legislation. Whilst there is no specific policy guidance which addresses the issue of noise in the Northern Ireland planning regime, noise is referred to in several Planning Policy Statements and it is recognised that where relevant, noise is a material consideration in the determination of planning applications. Therefore, the Northern Ireland planning system has a role to play in preventing and minimising the impact of noise through its influence in the layout and design of new developments and consideration of the resulting amenity impacts which is a fundamental part of the development management process. The key question is whether a proposed development would unacceptably affect the amenity of the surrounding neighbours/properties or likewise whether a noise-sensitive development would be incompatible with existing noisy activities in the area. However, the Planning Authority will

base its decisions on planning applications on planning grounds alone. It will not use its planning powers to secure objectives achievable under non-planning legislation.

Transport Analysis Guidance

This is published by the Department for Transport (available at www.webtag.org.uk). The guidance assists in setting objectives, identifying problems, developing solutions, creating a transport model to appraise solutions, and providing general advice on the appraisal of major transport schemes.

Design Manual for Roads and Bridges Volume 11 (Environmental Assessment) (Highways Agency, 1994). Please see above for more information.

Noise Insulation Regulations (Northern Ireland) 1995

These Regulations apply to all Department of Regional Development proposals and enable a resident, subject to increased noise from a new or altered road, to benefit from a reduction in noise level inside their homes by means of double windows, supplementary ventilation and where appropriate venetian blinds and double doors.

Land Compensation Act 1973

This provides for monetary compensation to those homeowners affected by the new or improved highway to account for any loss in value of the property that has occurred as a result of the road. The assessment, which is carried out by surveyors, is purely subjective and claims for compensation must be made within a certain period of time.

Building Regulations

The Buildings Regulations, which are administered by District Councils in Northern Ireland, ensure the safety, health and welfare of people working in and around buildings. The Department of Finance and Personnel has prepared technical guidance on their implementation.

For buildings constructed in the vicinity of noise sources such as roads, it would be appropriate for specific façade noise insulation to be a requirement of the construction, potentially with a

pre-completion sound insulation test required prior to habitation. This would help to ensure that the design targets of the construction are met in practice.

British Standard 8233:199 (BS8233:1999, Sound Insulation and Noise Reduction in Buildings – Code of Practice) provides design advice for various buildings, including dwellings and offices in order to mitigate the effects of noise from road traffic. Advice is provided on what constitutes reasonable or good standard in terms of internal noise levels and on what mitigation might be used to achieve those levels.

Building Bulletin 93 (BB93 Acoustics Design of Schools, A Design Guide, 2003) provides guidance on acoustics in schools including target noise levels for the indoor and outdoor environment in order to secure an appropriate acoustic environment for teaching. Following the guidelines in BB93 is one way of ensuring that new schools comply with the requirements of the Building Regulations (Northern Ireland) 2000.

Appendix E

NI Railways Train Passages Information 2016

Bangor – Belfast Central (2016)					
		Total	Day	Evening	Night
Stopper		11588	8689	2333	566
Flyer		1530	1530	0	0
Stopper (Bangor, Bangor West, Hollywood, Titanic Quarter, Belfast Central		1785	1785	0	0

Belfast Central - Bangor (2016)					
		Total	Day	Evening	Night
Stopper		12098	8784	2385	929
Flyer – Central; Titanic Quarter; Sydenham; Holywood; Bangor West, Bangor)		1020	1020	0	0
Flyer – Central; Titanic Quarter; Holywood; Bangor West, Bangor)		1785	1785	0	0

Lisburn – GVS (2016)					
		Total	Day	Evening	Night
Stopper – all stops		11445	9253	2074	678
Flyer – Lisburn - GVS		4267	4267	0	0
Lisburn, Dunmurry, Finaghy, Balmoral, Adelaide.		311	311	0	0

GVS - Lisburn (2016)					
		Total	Day	Evening	Night
Stopper		11022	8127	2074	821
Flyer		2295	2295	0	0
One Stop - Dunmurry		1972	1972	0	0
Fly/Stop – GVS, Adelaide, Balmoral, Finaghy, Dunmurry – Lisburn)		311	311	0	0

Central - Carrickfergus (2016)					
		Total	Day	Evening	Night
Stopper		11363	8773	1456	1134

Carrickfergus – Central (2016)					
		Total	Day	Evening	Night
Stopper		11022	8326	2074	622
Flyer		765	765	0	0

Central – Antrim (2016)					
		Total	Day	Evening	Night
All Stopper		510	510	0	0
No Whiteabbey		5907	4200	1237	510

Antrim - Central (LY) (2016)					
		Total	Day	Evening	Night
Stopper		5907	4200	1707	0
Doesn't Stop at Whiteabbey		510	255	255	0

Central - Dublin (2016) (Enterprise loco plus carriages)					
		Total	Day	Evening	Night
Stopper		2748	2074	363	311

Dublin - Central (2016) (Enterprise loco plus carriages)					
		Total	Day	Evening	Night
Stopper		2748	1733	674	311

Belfast Central – GVS (Total for the 3 Routes) (2016)					
		Total	Day	Evening	Night
Stopper		30134	23883	6050	363

GVS – Central (Total for the 3 Routes) (2016)					
		Total	Day	Evening	Night
Stopper		30159	23531	5297	1499

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