TRANSPORT SCOTLAND
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Transportation Noise Action Plan (TNAP)

2019-2023

Contents

1 Foreword

Transport is an essential part of Scotland's economic activity. Our infrastructure, roads, rail, airports and ports – and the businesses that use these assets - are all vital components of our economy. Transport has a significant and positive contribution to make to Scotland's economic growth, and to the prosperity and quality of life of the people of Scotland.

Our key challenge is to develop Scotland's transport infrastructure and services in innovative ways that anticipate future needs and challenges, while recognising at the outset there is an environmental impact from traffic noise. The shared purpose of the Scottish Government and its partners is to make Scotland a more successful country, with opportunities for all to flourish, through increasing sustainable economic growth, by investing in our people and our infrastructure in a sustainable way.

This purpose is translated into one of our five National Transport Strategy Objectives, "to protect our environment and improve health by building and investing in public transport and other types of efficient and sustainable transport which minimise emissions and consumption of resources and energy".

Our transport vision is therefore of a transport system that meets everyone's needs, respects our environment, and contributes to health, wellbeing and sustainable economic growth. Prioritising the management of transport noise is a key component in protecting our environment.

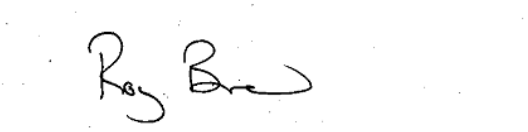
With these principles at the forefront, this Transportation Noise Action describes the range of, direct and indirect, actions Transport Scotland will take during 2019 to 2023, with respect to road and rail related noise. This will build on the work we have taken forward in our previous action plan from 2014 to 2018.

Our overall aim is twofold.

Firstly, we will continue to ensure noise management is incorporated into all transport-related activities, across the spectrum of design, construction, maintenance, policy, and point-to-point transportation activities.

Secondly, we will further seek to manage noise levels where necessary and practicable at Noise Management Areas (NMAs), and aim to preserve environmental noise quality where it is good.

Our approach in delivery will be to work collaboratively in partnership with others. To begin this we will engage directly on this consultation and we welcome comments and suggestions for improvement and involvement.



Roy Brannen
Transport Scotland
Chief Executive

2 Introduction

2.1. What is Noise

Environmental noise has been defined as “unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity”[1, 2].

Placed in context, transportation noise is the biggest source of environmental noise in Scotland.

Noise may negatively impact on speech, sleep, music or sounds of nature. These impacts contribute, in various degrees, to most people’s quality of life but disturbance, masking or detraction of these positive elements can lead to annoyance. Noise can also have economic impacts by potentially affecting tourism, learning/studying and workplace productivity.

2.2. Noise and Health

The Scottish Government is committed to understanding and managing the environmental impact of our transport network. We acknowledge that noise can be distressing, affects our quality of life, and can impact on our health[3] and environment. Attitudes to noise are changing and it has been suggested that people are becoming less tolerant with their noise environment.

The assessment of noise and noise annoyance is a complex process and different [transport] noise sources affect people in different ways. Whilst WHO (2011) suggest that there is sufficient evidence from large-scale epidemiological studies linking the population’s exposure to environmental noise with adverse health effects, others suggest some effects may occur only in a susceptible minority of the population[4]. This issue is an ongoing area of research. Recent research suggests that annoyance and sleep disturbance may be the most significant impacts of noise.

2.3. Scope of the Transportation Noise Action Plan

The Scottish Noise Action Plans are a requirement of European Parliament and Council Directive for Assessment and Management of Environmental Noise 2002/49/EC, as discussed further in Section 3.1. They describe how the Scottish Government has worked with stakeholders in identifying options for noise management, and provide detail on how those actions will be delivered. This Transportation Noise Action Plan is one of the set of eight Scottish Noise Action Plans as follows.

- Aberdeen Agglomeration Noise Action Plan
- Dundee Agglomeration Noise Action Plan

- Edinburgh Agglomeration Noise Action Plan
- Glasgow Agglomeration Noise Action Plan

- Transportation Noise Action Plan

- Aberdeen Airport Noise Action Plan

- Edinburgh Airport Noise Action Plan

- Glasgow Airport Noise Action Plan

2.4. Strategic Noise Mapping and Action Planning

Strategic noise maps[5] for END Round 3 (for 2017) were produced on behalf of the Scottish Government by Jacobs consultants. These were produced using a computer based prediction methodology, and the outputs can be found on the Scottish Noise Mapping website at https://noise.environment.gov.scot/.

Utilising the latest available data, population exposure levels derived from the maps were submitted by the Scottish Government to Europe in December 2017. Noise maps were produced by a computer based prediction methodology and can be found on the Scottish Noise Mapping website at https://noise.environment.gov.scot/

As outlined in Table 1 below, Round 3 of END requires “places near”[6] major roads with more than three million vehicle passages a year, and places near major railways which have more than thirty thousand train passages per year, to be included in the mapping and action planning. This criteria defines the scope of this transportation noise action plan, and road and rail routes with movements below these limits have not been included. Key differences in scope between Round 1 and Round 2 of END are also outlined in Table 1 below.

END movement limits	Round 1	Round 2	Round 3
Major roads - vehicle passages per year	> 6,000,000	> 3,000,000	> 3,000,000
Railways - train passages per year	> 60,000	> 30,000	> 30,000
Agglomerations - Population	> 250,000	> 100,000	> 100,000
Airports - air traffic movements per year and airports within agglomerations	> 50,000	> 50,000	> 50,000
Airport transportation noise is covered in a specific Airports Noise Action Plan. Round 3 will cover corridors across the Scottish Trunk Road Network[7], Rail Network[8], and local authority networks[9].			

Table 1 – Movement limits for Rounds 1, 2, and 3 of the END.

2.5. Population Exposure

The noise mapping process identified sections across a number of transport corridors that fall within the Round Three Transportation Action Planning Process. These corridors are shown in Appendix 1.

Following the result of the noise mapping, Tables 2 and 3 show the estimated number of people exposed to noise during each round.

	Lden (dB)			Lnight (dB)		
	> = 55	> = 65	> = 75	> = 50	> = 60	> = 70
END Round 1	191,000	44,600	1,600	115,900	20,200	100
END Round 2	201,200	60,300	600	153,200	15,600	0
End Round 3	260,700	68,400	300	182,200	16,800	0

Table 2 – Population exposure from major roads outwith the agglomerations.

	Lden (dB)			Lnight (dB)		
	> = 55	> = 65	> = 75	> = 50	> = 60	> = 70
END Round 1	20,500	5,700	100	14,300	3,300	0
END Round 2	37,700	13,500	2,800	32,100	12,500	1,200
END Round 3	39,200	9,300	300	29,900	5,200	200

Table 3 – Population exposure from rail outwith the agglomerations.

Noise from roads within the agglomerations of Aberdeen, Dundee, Edinburgh, and Glasgow is covered within the respective action plans noted earlier in Section 2.3.

Although preliminary analysis has taken place, the drivers for change in the number of people exposed to noise over each round, shown in Table 3 above,

are as yet unconfirmed. Further analysis of these figures will be undertaken to evaluate these changes and to establish meaningful conclusions to support policy development.

Since the published noise contours provide a strategic level representation of the modelled noise climate for the areas mapped in Scotland, the resulting Action Plans must also be strategic in nature, whilst complying with the minimum requirement of the Environmental Noise Directive Annex 5. The noise maps cannot therefore be used to determine the noise level at any specific property. With this strategic approach in mind, it is essential to note the following points.

- A noise map is analogous to a weather map in that it maps strategic noise levels in terms of coloured contour bands at 5dB noise contour intervals. Strategic noise levels show annual average noise levels.
- The noise contours are not receptor-specific levels experienced on the ground. Rather, the noise levels are calculated on the basis of a 10m grid at a height of 4m above ground level. They do not represent levels at ground - or typical human ear - level[10].

Initial analysis of the noise map, using the Prioritisation Matrix (see Section 5.1 following), provides a focus for deriving actions to manage noise by identifying Candidate Noise Management Area (CNMA) (as described in Section 5.2). The CNMAs may subsequently progress into a Noise Management Area (NMA) status as described in Section 5.3). Between 2019 and 2023, the NMAs[11] will be the primary consideration when formulating environmental noise management actions/policy following the actions listed in this Transportation Noise Action Plan (in line with PAN 1 (2011)).
The process listed above follows the Technical Guidance[12] published by the Scottish Government during END Round 1.

3 Noise Legislation and Policy Background

3.1. The European Directive on Environmental Noise

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 July 2002 and adopted in 2004. END required Member States to bring about measures "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". END objectives[13] are:

- To determine the noise exposure of the population through noise mapping
- To make information available on environmental noise to the public
- To establish Action Plans, based on the mapping results, to reduce noise levels where necessary, and to preserve environmental noise quality where it is good

END does not set limit values, nor does it prescribe Action Plans measures; these remain at the discretion of the competent authority.

3.2. Legal Context in Scotland

The END was transposed into the Environmental Noise (Scotland) Regulations 2006; END definitions are evident in the Scottish regulations. A useful summary of the regulatory framework is available in the Scottish Governments Draft Guidance on Noise Action Planning[14]. This guidance highlights a number of legal issues with respect to transportation:

- Noise from lawful use of existing roads[15] and railways cannot be construed as noise nuisance, under the terms of the Environmental Protection Act.

If noise from a new or "altered" road exceeds a certain trigger level[16], and meets other qualifying criteria, the Noise Insulation (Scotland) Regulations 1975 (NISR) states that insulation work can be carried out, or a grant offered in respect of the insulation work. Compensation for depreciation in land value caused by public works may be due under the Land Compensation (Scotland) Act 1973.

- The railway equivalent of the NISR is the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996. Whilst the 1996 Regulations do not apply to Scotland, they have been adopted on certain new rail corridor projects in Scotland on a case by case basis.

4 Governance of Noise Action Planning

4.1. Competent Authority

The Scottish Government is the Competent Authority for END in Scotland.

4.2. Scottish Environmental Noise Steering Group

The Scottish Environmental Noise Steering Group (SENSG) comprises representation from organisations with varying responsibility for environmental noise, namely the Scottish Government, AECOM, Local Authorities, SEPA, Transport Scotland, airport operators and the Society for Chief Officers for Transportation in Scotland. SENSG provided a forum for discuss on the Noise Action Planning progression, with the governance arrangement noted in Figure 1 below. SENSG will host meetings twice yearly during the lifetime of the Noise Action Plans to review progress on the actions.

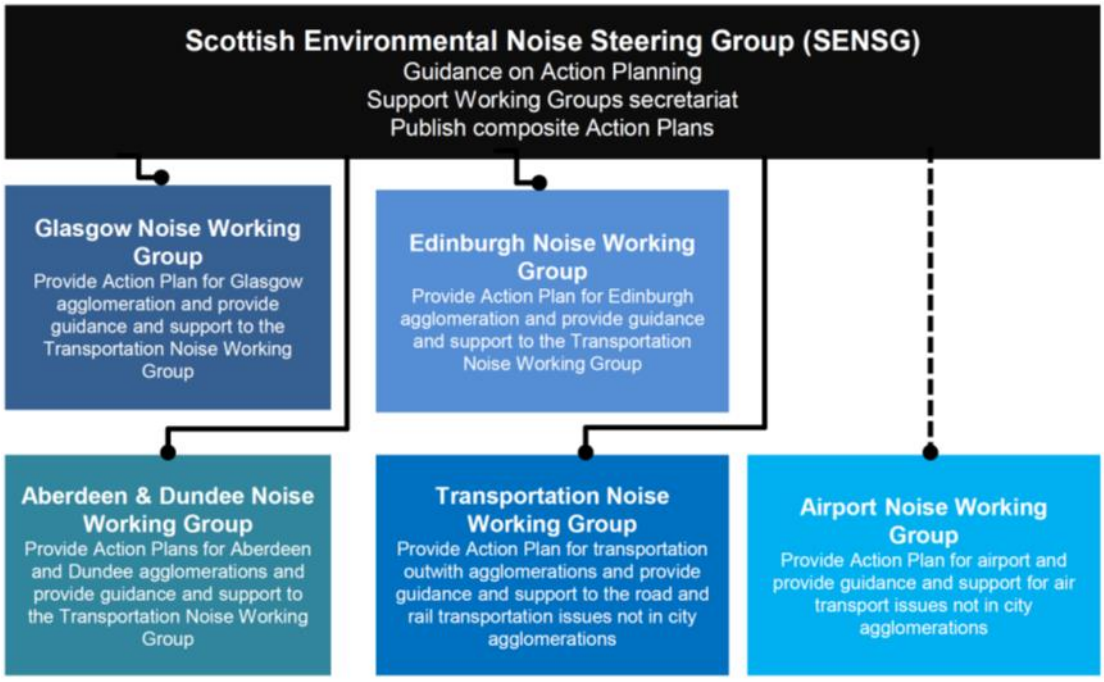


Figure 1 – Noise Action Planning governance via SENSG and associated Working Groups

4.3. Transportation Noise Working Group

Authoring of the Transportation Noise Action Plan 2014 was overseen by the Transportation Noise Working Group (under the auspice of SENSG) and comprised Transport Scotland (chair), Society for Chief Officers for Transportation in Scotland, Network Rail, First ScotRail, Road Haulage Association, the Scottish Hydrogen and Fuel Cell Association (representing the 2020 Climate Group) and AECOM. The principle objective of the Transportation Noise Working Group was to comply with END, and the Scottish Regulations, to produce a Transportation Noise Action Plan containing clear tangible actions through collaboration and partnering.

5 Identification of Noise Management Areas

5.1. Prioritisation Matrix – BPS and SPS

From analysis of the END noise maps, the prioritisation process is a method of determining [the provisional assignment of] “Candidate Noise Management Areas” (CNMAs) and thereafter “Noise Management Areas” (NMAs). Figure 2 below outlines the step-by-step journey of the prioritisation process. As noted earlier in Section 2.2, the noise contour maps alone are not sufficient to determine where noise management is required.

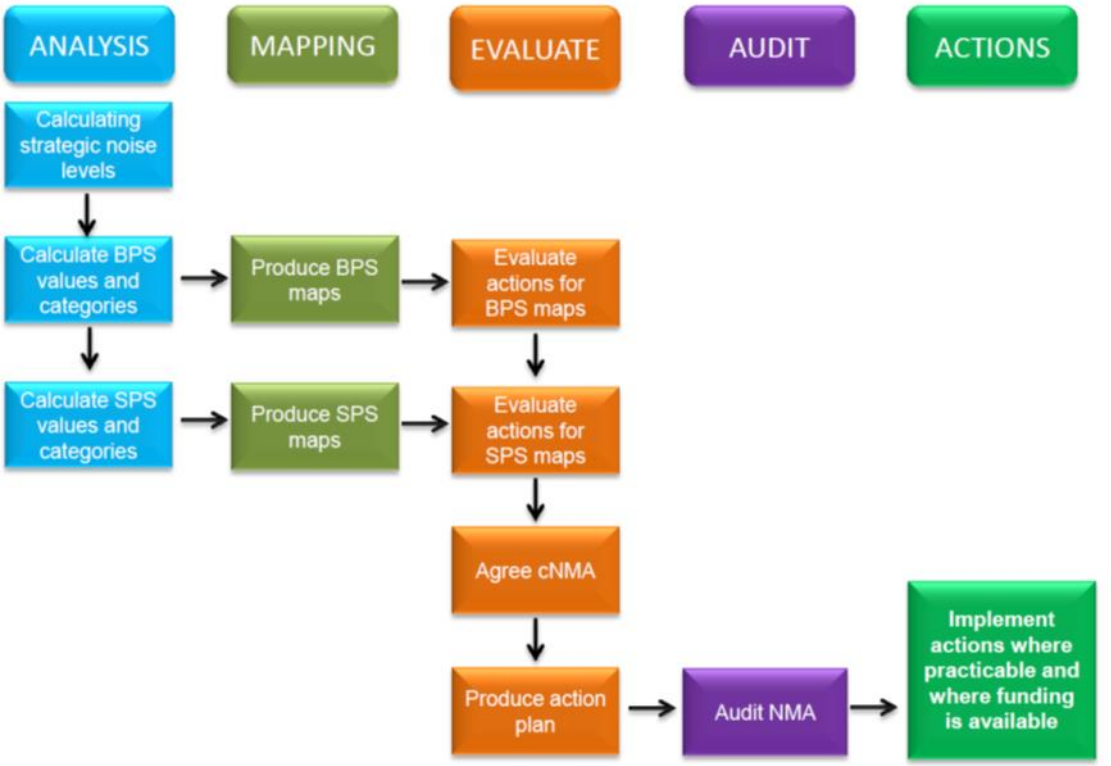


Figure 2 – Step by step stages of the Prioritisation Process. BPS = Building Prioritisation Score; SPS = Source Prioritisation Score (see below for more detail).

A prioritisation matrix is generated from a computer based model, where each building is assigned a Building Prioritisation Score (BPS), which takes into account the predicted road and rail noise levels, in conjunction with the number of people potentially affected and the annoyance response of that exposed population relative to the transportation noise source in question. A Source Prioritisation Score (SPS) is then determined by first segmenting the road or rail corridors into 100m sections. Each road/rail segment is then given a unique ID and for each building with a noise level greater than or equal to Lden 55dB the ID of the road/rail segment that is closest to it is assigned to that building. The logarithmic sum of BPS values for all buildings with the same nearest road/rail segment ID is then assigned to the relevant road segment to give the Source Prioritisation Score for that road/rail segment.

All SPS values are prioritised, where the top 1% of SPSs (normally distributed) corresponded to the mean SPS plus two standard deviations to identify the highest three 1% bands of the SPS scores across the road and railway network. These are subsequently referred to as Candidate Noise Management Areas (CNMAs). Determination of a CNMA is simply a means of highlighting that a geographical area should be considered further in terms of a potential need for noise management. It may be that following further analysis, the area will be disregarded entirely or extended or reduced.

Ultimately, the decision about whether or not a CNMA is eventually assigned full Noise Management Area (NMA) status is dependent on a series of steps during which various assessments and considerations are taken into account. These are outlined in separate Technical Guidance[17].

5.2. Noise Management Area Identification (CNMA to NMA)

The areas with CNMA status are shown in Appendix 2. A comparison of CNMA areas for Round 1 and Round 2 of END are shown in Appendix 1.

Each CNMA will be reviewed to determine if it should become a Noise Management Area (NMA). The CNMA determination process and the CNMA to NMA review process is outlined in a technical note on the Scottish Noise Mapping website[18].

The CNMA to NMA review process will, amongst other steps, verify the noise model findings[19] and assumptions in comparison to physical features which are evident on the transport network[20]. The assigning of Noise Management Areas and subsequent appraisal, planning, and prioritisation of potential management measures in the NMAs form a core part of the Action Planning Process.

It should be noted that NMAs from Round 1 will continue to be NMAs during the END Round 2 period.

The total number of people exposed to road and rail noise during the day and night at Candidate Noise Management Areas has been outlined in Table 2 and Table 3 earlier.

5.3. Determining Noise Management Measures at NMAs

A transparent cost-benefit analysis will be required to determine practical, cost effective and noise management measures at NMAs. Criteria used to develop the prioritisation of actions in NMAs will cover the following:

- Identifying where most people are most likely to be annoyed by noise; this will be achieved via the prioritisation matrix (noted in Section 5)

- The options for managing noise for the affected population

- Adoption of a whole life cost approach
- Reviewing existing maintenance and improvement programmes to identify when and how interventions can be implemented

- If noise management measures are needed, these will be subject to the appropriate funding being available

5.4. Identification of Quiet Areas (QAs)

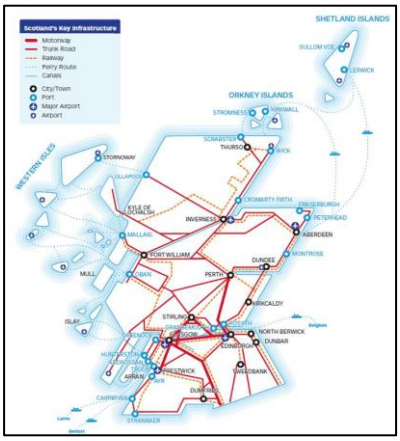
END is also clear that Member States should aim to identify and preserve its Quiet Areas[21]. Preserving existing quiet areas is of equal importance to managing high noise levels in noisy areas where people are most likely to be affected by noise. Noise mapping has been used to identify Candidate Quiet Areas in Scotland with a subsequent process leading to agreement of designating actual Quiet Areas[22].

5.5. Quiet Noise Identification (CQA to QA)

There are no Candidate Quiet Areas (CQA) on the major road or rail networks mapped during END Round 3.

6 Description of Transportation in Scotland

6.1. Transport in Scotland



Transport Scotland is the national transport agency for Scotland. We seek to deliver a safe, efficient, cost-effective transport system for the benefit of the people of, and visitors to, Scotland. Our work plays a key role in helping to achieve the Scottish Government's Purpose of creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth.

We manage a comprehensive, multi-modal transport network that helps keep Scotland connected. This includes managing the environmental noise impact of Scotland's trunk road and rail network, the main arteries of commerce, work, learning, leisure and tourism for the country. As part of ensuring this, we will ensure the actions in the Transportation Noise Action Plan are aligned to our work in developing and applying the policies discussed in Section 6.2 below.

6.2. Policy Approach

The Scottish Government's Programme for Scotland 2018 - 2019, Delivering for Today, Investing for Tomorrow, set out an ambitious plan, and a series of measures with the following particularly relevant to Transport Scotland, the Transportation Noise Action Plan, and the management of transport noise.

- Rolling out the electrification of Scotland's roads with 1500 new charge points, and £20 million, to help people and businesses switch to electric vehicles.

- Reducing our carbon footprint with 500 new ultra low emission vehicles in the public sector including over 100 new green buses, and more than doubling the funding available (to £20 million) to enable more people and businesses to make the switch to electric, and establishing a 'Switched on Taxis' initiative.

- Working across all levels of government, and with our NHS, businesses and communities, to realise the potential of a shift to active travel including as a prescription for better health.

- Building on our plans to electrify the A9 by expanding the scope of our Switched on Towns and Cities initiatives to create at least 20 Electric Towns across Scotland by 2025.

- Introducing Europe's most comprehensive network of cutting-edge remote sensing air quality monitors on local and trunk roads.

- A commitment to introduce low emission zones in our four biggest cities by 2020, this will make our cities cleaner, healthier places to work, study and live.

- To help those who will have the most difficulty in making the transition we will create a Low Emission Zone Support Fund that will target specific cohorts of both commercial and private vehicle owners affected by the introduction of low emission zones in Scottish cities.

The National Transport Strategy (NTS) sets the long term vision for our transport policies. It was first published in 2006 after the Scottish Government consulted the public, interested individuals and a wide range of organisations on their views for the future of transport in Scotland. A refresh in 2016 recommended that a full and collaborative review of the NTS should take place during the fifth session of the Scottish Parliament (from May 2016).

The purpose of this Review, now well underway, is to develop a successor strategy (the NTS2) that sets out a compelling vision for Scotland's transport system over the next 20 years. The approach to the review is built around three core strands as follows.

- Collaborative working with partners

- Developing a robust evidence base
- Engaging with stakeholders and citizens across Scotland

The Review will also inform the Strategic Transport Projects Review (STPR), helping to identify future spending priorities on infrastructure, and will set a strategic direction for policy and possible spending priorities in other, non-infrastructure, areas of importance. It will also align with National Planning Framework (NPF). The NTS will include reference to this Transportation Noise Action Plan.

Transport Scotland is committed to the 2030 vision for Active Travel which is that Scotland's communities are shaped around people, with walking and cycling the most popular choice for shorter everyday journeys and active travel placed at the heart of our transport planning.

The Government is committed to building an Active Nation, and to achieve this has doubled the already record level of investment in walking and cycling from £39.2 million in 2017-18 to £80 million per year in 2018-19 and 2019-20. Transport Scotland invests over £1 billion per year in active and sustainable transport – 43% of the total Transport Budget.

The Cycling Action Plan for Scotland 10% vision was intended to be bold, aspirational and challenging. While it will be challenging to meet the vision of 10% of everyday journeys by 2020, doubling the active travel budget to £80 million this year will help mitigate the barriers to delivering better infrastructure to enable more walking and cycling journeys.
We have advertised to appoint, in Autumn 2018, an Active Nation Commissioner to ensure we deliver world class infrastructure across Scotland, with advocacy and behavioral change projects to increase physical activity levels through walking and cycling.

The Scottish Government is committed to building an 'Active Nation' by making our towns and cities friendlier, safer and more accessible. Our funding of active travel projects aims to significantly improve our public realm, creating segregated cycle lanes in our towns and cities, supporting behavior change and educational projects and making walking and cycling the natural and easy choice for everyday short journeys. All of these measures will have a significant impact in reducing noise levels in our towns and cities.

We have progressively reduced air pollution in Scotland over recent years, but poor air quality – predominantly caused by road transport – remains an issue at a number of hotspots in our towns and cities. In the Cleaner Air for Scotland: The Road to a Healthier Future (CAFS) strategy, published in November 2015, the Scottish Government therefore committed to ensuring that Scotland's air quality will be the best in Europe.

Improving air quality must be at the centre of the Scottish Government's transport and placemaking decision making, to ensure we maximise the real and tangible health benefits associated with cleaner air. To support this, the Scottish Government has committed to the following.

- With local authorities, introduce Low Emission Zones (LEZs) into our four biggest cities between 2018 and 2020 and into all other Air Quality Management Areas by 2023 where the National Low Emission Framework (NLEF) appraisals advocate such mitigation

- Introduce an Air Quality Fund to support local authorities with Air Quality Management Areas to deliver transport based mitigation as identified by the NLEF.

However, we also recognise there must be collaboration and partnerships between Government, its agencies, local authorities, regional transport partnerships, business and industry, non-governmental organisations and the general public to successfully deliver LEZs.

Air quality is a major issue and managing the adverse effects of traffic on the population is seen as a key area for attention.

There are also changes in the type of vehicles being used, with plug-in hybrid and fully electric vehicles expected to become much more commonplace.

Scotland has a roadmap for the widespread adoption of plug-in vehicles with an ambitious vision of freeing towns, cities and communities from the damaging emissions of petrol and diesel fueled vehicles by 2050.

The infrastructure for this changeover presents a great opportunity for ITS services to utilize Tools and techniques are enabling completely new services to be created. One such concept is ‘Mobility as a Service’ or MaaS9, where various forms of transport services are integrated into a single mobility service accessible by users on demand.

All of these measures will support the management of noise from vehicles and contribute to the work of this Transportation Noise Action Plan.

Scotland has been at the forefront of the use of Intelligent Transport Systems (ITS) and related services as they have developed over the last 30 years. Our Traffic Scotland service contributes positively to the safe and efficient movement of people, goods and services across the country and supports key industries such as tourism and the food and drink sector.

This Strategy sets out the broad principles of our intended approach and will be supported by the development of six thematic Action Plans and costed delivery programmes. This affords the flexibility to align our specific initiatives as novel techniques and approaches and changing customer needs emerge. One of the thematic action plans relates to Environment and Sustainability. Our focus here will be on using ITS to contribute to improved air quality, lower noise levels and reducing the adverse effects of heavy traffic and to determining how best to support a low carbon economy through the selection and use of ITS technology and greener travel choices, including low carbon vehicles. Within each of the themes we will keep and periodically update a technology prediction map for that theme. Each will be used to relate business objectives, with key decision points and development or activities that will enable something to be implemented. They will be used to give foresight of approaching maturity or adoption of technology, standards and directives. In this way we will keep abreast of wider innovation and implementation of technology in the ITS domain.

7 Transportation Noise Actions

7.1. Transportation Noise Actions from 2014 to 2018

A number of direct and indirect [23] transportation noise management measures and outcomes have been achieved in Scotland since the first TNAP was published, as detailed in Table 4 below.

#	Action	Progress
Objective 1 - On a prioritised basis, by 2018 we aim to manage the exposure to environmental noise in NMAs		
1a	Develop and apply appropriate Appraisal and Test of Reasonableness tools to rank effective NMA interventions.	These have been developed and will be applied to the CNMA noted in Appendix 2.
1b	Where appropriate, apply noise management interventions on a prioritised basis during existing maintenance and improvement programmes where reasonably practicable.	We have considered and applied quieter road surfacing material in the CNMA locations during routine maintenance.
1c	Engage with Aberdeen, Dundee, Edinburgh and Glasgow to assess major road NMAs within agglomerations.	We have worked collaboratively with Local Authorities in assessing trunk road CNMAs.
Objective 2 - By 2018, we will incorporate environmental noise management within all stages of transportation planning, design, construction and maintenance activities as appropriate		
2a	Incorporate a commitment to mitigate environmental emissions (such as noise) into future corporate and/or annual business plans.	Our Transport Scotland Corporate Plan 2017– 2020 included a commitment to ensure our policies, projects, and interventions manage noise emissions.
2b	Incorporate consideration of noise issues into future construction or maintenance contracts, franchise agreements and specifications.	Appropriate noise mitigation is included as part of all Transport Scotland transport projects. This is also review as part of our before and after monitoring process.
2c	Championing the consideration of noise mitigation into local authority development control (planning) process and periodically review transportation appraisal process.	We have worked closely with Local Authorities, and others, in relation to noise complaints where development control has a part to play in improving outcomes.
2d	Develop a process for approval of noise barriers near the Trunk Road network.	This process has been developed and will be applied to the CNMA noted in Appendix 2.

#	Action	Progress
2e	Conduct before-and-after sample noise measurement to (i) determine measured baseline at selected NMAs prior to mitigation construction and (ii) appraise noise mitigation approaches in terms of cost benefit and delivery of effective noise management.	As part of a recent research project we have conducted before and after monitoring at select locations on the network. Case Study 1 provides further background.
Objective 3 - By 2018, we will demonstrate a practical contribution to noise management via existing and future proposals and policies		
3a	Transport and travel policies and proposals to both take into account and facilitate noise management.	We have held a series of internal seminars on noise management, and included a commitment to undertake all of noise management actions in this table, within our Annual Business Plan 2014-15.
3b	Promote Intelligent Transport Systems to better manage trunk road flows.	Our Future Intelligent Transport Systems Strategy 2017 included a commitment to applying ITS to contribute to improved air quality, lower noise levels and reduce the adverse effects of heavy traffic. Further details are provided in Section 6.2.
3c	Promote uptake of low noise tyres.	We have contributed to noise action week and have raised awareness of low noise tyres on Transport Scotland media outlets.
3d	Consider update to Noise Insulation Scotland Regulations (NISR) legislation.	Scoping, consultation, and legislative preparation has been completed. The update background is well progressed and will be further progressed in the next TNAP.
Objective 4 - By 2018, we will promote channels of communication to stakeholders that encourage a learning environment		
4a	Provide guidance, information and progress updates on the TNAP actions to the Scottish Noise Mapping Website via links to the Transport Scotland/SCOTS website and social media platforms.	Regular updates have been provided.
4b	Conduct review of noise complaints on trunk road and rail network over the last 5 years in order to better understand their nature.	This review has been completed and the findings are being assessed.

#	Action	Progress
4c	Incorporate noise maps into transportation GIS.	The location of the CNMA have been added to our in house asset management system.
4d	Undertake research to better understand and quantify the effects of END-related noise.	Through our links to PIARC, and working with the Scottish Roads Research Board we have progressed significant research.

Table 4 – Progress on TNAP 2014 to 2018 actions

In addition to the progress noted in Table 4 above we have also been working collaboratively with a range of partners on applied research. Some key examples of our progress are shown in Case Studies 1 and 2 below.

Case Study 1: New Noise Assessment Method

In 2018 Scotland TranServ, funded from Transport Scotland's Innovation Fund, began a project to assess and quantify the noise attenuation properties of TS2010 road surfacing. The project used an innovative new method to measure traffic noise levels before and after resurfacing works were carried out. The first year of the project focussed on four resurfacing schemes located across Scotland's south west trunk road network. Progress to date is as follows.

- TS2010 surface course in its first four weeks is, on average, achieving a higher level of noise attenuation, than was previously assessed during the trial phase of the surfacing specification.
- The findings have been presented to a meeting of the Transport Scotland Pavement forum for consideration.

The next year of this study will monitor noise levels at 6 months then annually in subsequent years. Ongoing measurement will provide valuable insight into the noise attenuation properties of the final design of TS2010 and as the surfacing ages.

7.2. Transportation Noise Actions between 2019 to 2023

The options for managing noise were developed using the source, pathway, receptor model. Appraisal began with assessing the source (where the noise originated), the pathway (how the noise travels through the environment), and the receptor of the noise pollution (who or what could be affected). Using this model, and an understanding of the type of measures we could take to develop our noise management actions, the optioneering fell into five types, as described in Table 5 below.

Options 1 and 3 will endeavour to manage noise at the pathway whereas Options 2, 3 and 5 will aim to manage noise at source and receptor.

Type	Description	Source	Pathway	Receptor
1	Hard and soft engineering solutions		•	
2	Network operational management of roads and rail	•		
3	Proposals and Policies	•		•
4	Desktop: Research, appraisal and tool development	•	•	•
5	Communication and stakeholder engagement	•		•
Network operational management refers to the application of products and systems that facilitate more efficient use of our networks (and as a result may facilitate noise management), such as Intelligent Transport Systems (ITS) on Scotland's trunk roads which aim to manage our roads more efficiently and keep traffic moving.				

Table 5 – Noise action optioneering approach.

TNAP objectives, actions (falling within the above categories), timescales and cross-linkages to other Noise Action Plans in Scotland are outlined in Table 6 below.

In terms of evaluating the implementation of these actions, the results will be evaluated during the next round of mapping. Evidence will be sourced to demonstrate progress, on an annual basis, against the objectives outlined in Table 6 below, with an annual update provided on the Transport Scotland website and Scottish Noise Mapping website.

No	Source		Action	Action	Year					
	Road	Rail			2019	2020	2021	2022	2023	2024
Objective 1 - On a prioritised basis, by 2023 we will continue to manage the exposure to environmental noise in NMAs.										
1a	•	•	Update and apply appropriate Appraisal and Test of Reasonableness tools to rank effective NMA interventions.	4	•	•				
1b	•	•	Apply noise management interventions on a prioritised basis during existing maintenance and improvement programmes, where reasonably practicable.	1		•	•	•	•	•
1c	•	•	Engage with Aberdeen, Dundee, Edinburgh and Glasgow to assess all major road and rail NMAs within agglomerations.	4	•	•	•	•	•	•
1d	•	•	Establish and operate a Noise Inspection Panel (NISP) to assess issues on Transport Noise from a source, transmission, receptor perspective to support delivery of the TNAP, and report yearly on progress.	3		•	•	•	•	•
Objective 2 - By 2023, we will further incorporate environmental noise management within all stages of transportation planning, design, construction and maintenance activities as appropriate										
2a	•	•	Incorporate a commitment to mitigate environmental emissions, such as noise, into all future Transport Scotland Corporate and Annual Business Plans.	3	•	•	•	•	•	
2b	•	•	Ensure consideration of noise issues into the statutory process, and contract documents for new construction or maintenance contracts, franchise agreements, and specifications.	3	•	•	•	•	•	•
2c	•	•	Champion the consideration of noise mitigation into development control process and periodically review transportation appraisal process.	3	•	•	•	•	•	•

No	Source		Action	Action	Year					
	Road	Rail			2019	2020	2021	2022	2023	2024
2d	•	•	Conduct before-and-after sample noise measurement to determine measured baseline at selected NMAs prior to construction, and appraise noise mitigation approaches in terms of cost benefit and delivery of effective noise management.	4		•	•	•	•	•
Objective 3 - By 2023, we will demonstrate a further contribution to noise management through existing and future proposals and policies.										
3a	•		Ensure all Transport Scotland policies and proposals, consider and facilitate noise management.	3	•	•	•	•	•	•
3b	•		Promote Intelligent Transport Systems to better manage trunk road flows to reduce noise.	2	•	•	•	•	•	•
3c	•		Continue to promote targeted measures to reduce noise, such as an increased awareness of construction noise, understanding of noise nuisance, and feedback form the annual road user survey.	3	•	•	•	•	•	•
3d	•		Update Noise Insulation Scotland Regulations (NISR) 1975 legislation.	4		•	•			
Objective 4 - By 2023, we will promote new channels of communication to stakeholders that encourage a learning environment										
4a	•	•	Provide guidance, information, and progress updates on the TNAP actions to the Scottish Noise Mapping Website, through links to the Transport Scotland and SCOTS websites.	5	•	•	•	•	•	•
4b	•	•	Review noise complaints on trunk road and rail network over the last 5 years, to better understand their nature.	4		•				
4c	•		Incorporate round three noise maps into Transport Scotland asset management systems.	2		•				

No	Source		Action	Action	Year					
	Road	Rail			2019	2020	2021	2022	2023	2024
Objective 5 - By 2023, we will work with others to improve the tools available for Noise Assessment,										
5a	•	•	Jointly develop analytical tools for detailed assessment of CNMA and appropriate interventions.	4		•	•			
5b	•	•	Develop a clearer understanding of noise annoyance to support decision making.	4				•	•	
5c	•	•	Publish a short series of investigate case studies on the planning, design, construction and maintenance aspects of transport noise.	4			•			
5d			Support the development of a UK wide approach to Noise modelling and data collection.							

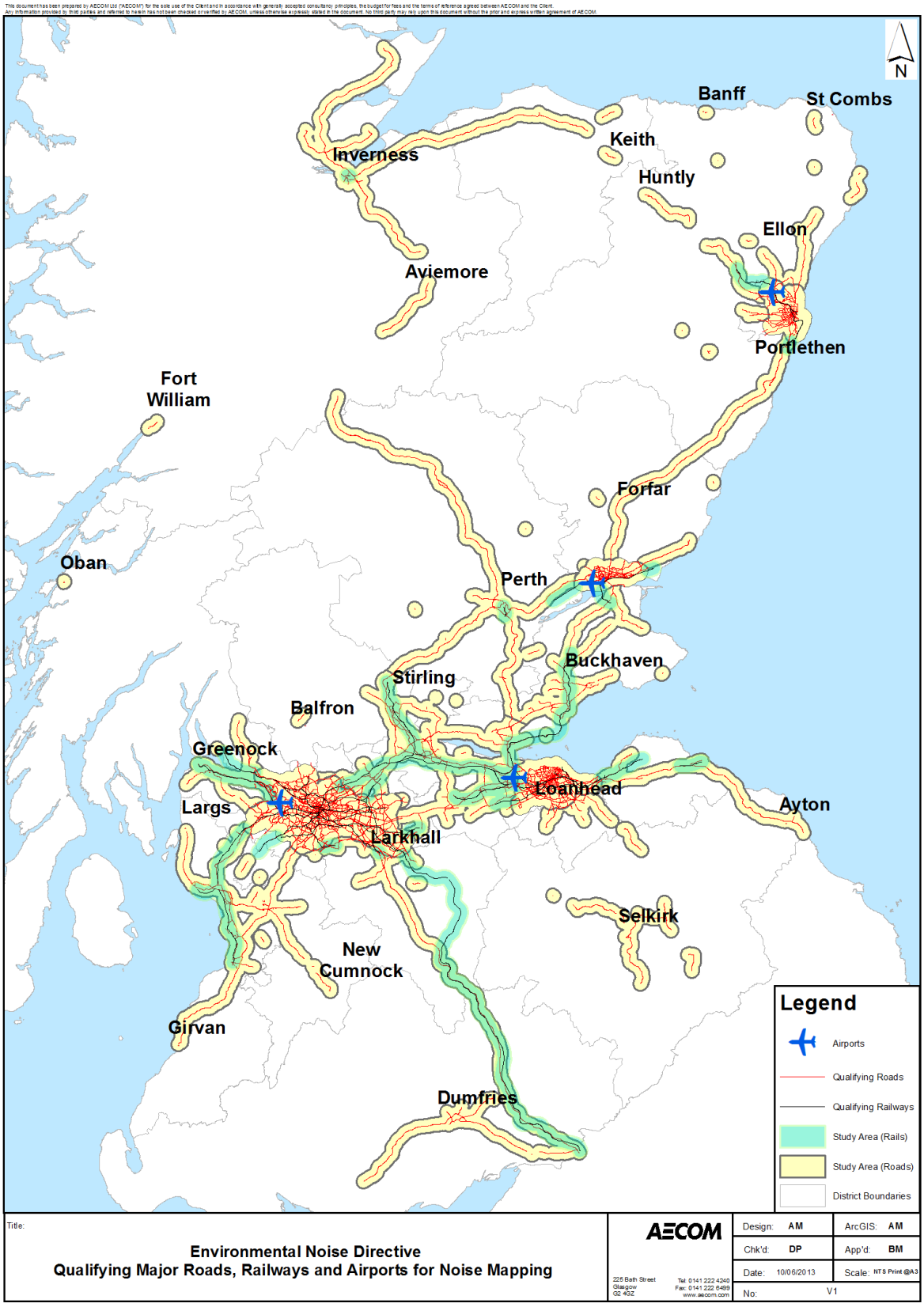
Action Code

1 Hard and soft engineering solutions.
2 Network operational management of roads and rail.
3 Proposals and Policies.
4 Research, appraisal and tool development.
5 Communications and stakeholder engagement.

Table 6 – Transportation noise management between 2019 and 2024

8 Appendices

8.1. Appendix 1 – Transport Corridors for END Round 3 Mapping.



8.2. Appendix 2 – Major Road and Rail CNMAs for END Round 3

#	Road	Nearest Street	Nearest Town or Area	Responsible Authority
1	A74 (M)	Castle Break	Ecclefechan	Transport Scotland
2	M74	Priory Crescent	Blackwood	Transport Scotland
3	M74	Donaldson Road	Larkhall	Transport Scotland
4	A711	Dalbeattie Road	Dumfries	Dumfries and Galloway Council
5	A780	Laurieknowe	Dumfries	Dumfries and Galloway Council
6	A780	Annan Road	Dumfries	Dumfries and Galloway Council
7	A780	Annan Road	Dumfries	Dumfries and Galloway Council
8	A780	St Marys Street	Dumfries	Dumfries and Galloway Council
9	A781	Shakespeare Street	Dumfries	Dumfries and Galloway Council
10	A756	Brooms Road	Dumfries	Dumfries and Galloway Council
11	A77	Old Street	Girvan	Transport Scotland
12	A77	High Street	Maybole	Transport Scotland
13	A79	Main Street	Prestwick	South Ayrshire Council
14	A79	Main Street	Prestwick	South Ayrshire Council
15	A79	Ayr Road	Ayr, Heathfield	South Ayrshire Council
16	B749	Portland Street	Troon	South Ayrshire Council
17	B746	Barassie Street	Troon	South Ayrshire Council
18	A71	Main Street	Greenholm	North Ayrshire Council
19	A737	Dalry Road	Kilwinning	Transport Scotland
20	A735	Witch Road	Kilmarnock	North Ayrshire Council
21	A71	Kirk Street	Strathaven	South Lanarkshire Council
22	A737	New Street	Dalry	Transport Scotland
23	A723	Portland Place	Hamilton	South Lanarkshire Council

#	Road	Nearest Street	Nearest Town or Area	Responsible Authority
24	A723	Low Waters Road	Hamilton	South Lanarkshire Council
25	B761	West Mains Road	East Kilbride	South Lanarkshire Council
26	A725	East Mains Road	Calderwood	Transport Scotland
27	A725	Hamilton Road	Calderwood	Transport Scotland
28	A724	Union Street	Hamilton	South Lanarkshire Council
29	A724	Burnbank Road	Hamilton	South Lanarkshire Council
30	A724	Glasgow Road	Blantyre	South Lanarkshire Council
31	M8	Forest Road	Kirk of Shotts	Transport Scotland
32	A706	Manse Road	Whitburn	West Lothian Council
33	A89	South Bridge Street	Bathgate	West Lothian Council
34	M8	Bathgate Road	Bathgate	Transport Scotland
35	A705	East Main Street	Whitburn	West Lothian Council
36	A989	Tay Street	Perth	Perth and Kinross Council
37	A989	Atholl Street	Perth	Perth and Kinross Council
38	A989	Caledonian Road	Perth	Perth and Kinross Council
39	M9	St Thomas's Well	Stirling, Cambusbarron	Transport Scotland
40	M9	Stewart Street	Stirling, Cambusbarron	Transport Scotland
41	M9	Bo'Ness Road	Polmont, Centre	Transport Scotland
42	A8	Station Road	Ratho	Edinburgh City Council
43	A899	West Main Street	Broxburn	West Lothian Council
44	A899	West Main Street	Broxburn	West Lothian Council
45	A99	East Main Street	Uphall	West Lothian Council
46	A6094	High Street	Dalkeith	Midlothian Council
47	A89	North Bridge Street	Bathgate	West Lothian Council
48	A899	Edinburgh Road	Bathgate	West Lothian Council
49	B804	Dunbeath Road	Coatbridge, Central	North Lanarkshire Council

#	Road	Nearest Street	Nearest Town or Area	Responsible Authority
50	B804	Dunbeath Road	Coatbridge, Central	North Lanarkshire Council
51	M80	Deerdykes Road	Cumbernauld	Transport Scotland
52	M80	Craigelvan Drive	Cumbernauld	Transport Scotland
53	M80	Kirk Place	Cumbernauld	Transport Scotland
54	A89	East Main Street	Armadale	West Lothian Council
55	A8	Dalrymple Street	Greenock	Transport Scotland
56	A770	Dalrymple Street	Greenock	Inverclyde Council
57	A770	Brougham Street	Greenock	Inverclyde Council
58	A771	Chapel Street	Greenock	Inverclyde Council
59	A770	Kempock Street	Greenock	Inverclyde Council
60	B8046	Pumpherston Road	Uphall Station	West Lothian Council
61	M9	King Edwards Way	Kirkliston	Transport Scotland
62	A199	Bridge Street	Tranent	East Lothian Council
63	A78	High Street	Greenock	Transport Scotland
64	B800	Station Road	Kirkliston	Edinburgh City Council
65	M80	Carrick Road	Cumbernauld, Village	Transport Scotland
66	M80	Roadside	Cumbernauld, Village	Transport Scotland
67	M876	Bankhead Crescent	Bonnybridge	Transport Scotland
68	M876	Balfour Street	Bonnybridge	Transport Scotland
69	A814	Glasgow Road	Dumbarton	West Dunbartonshire Council
70	A814	Glasgow Road	Dumbarton	West Dunbartonshire Council
71	A8	East Hamilton Street	Greenock	Transport Scotland
72	A8	Greenock Road	Port Glasgow	Transport Scotland
73	A8011	Central Way	Cumbernauld	North Lanarkshire Council
74	M9	KIrklands Park Street	Kirkliston	Transport Scotland
75	A803	High Street (Preston Road)	Linlithgow	West Lothian Council
76	A803	High Street (Whiten Loan)	Linlithgow	West Lothian Council

#	Road	Nearest Street	Nearest Town or Area	Responsible Authority
77	A1087	West Port	Dunbar	East Lothian Council
78	B803	Cow Wynd	Falkirk, Centre	Falkirk Council
79	B902	Grahams Road	Falkirk, Bankside	Falkirk Council
80	A803	Mary Street	Falkirk, Laurieston	Falkirk Council
81	B902	Beamont Drive	Falkirk, Carron	Falkirk Council
82	A803	Cockburn Street	Falkirk, Centre	Falkirk Council
83	B857	Main Street	Renton	West Dunbartonshire Council
84	A803	Camelon Road	Falkirk, Centre	Falkirk Council
85	A9	Glasgow Road	Falkirk, Camelon	Falkirk Council
86	A872, A883	Broad Street	Denny, Dunipace	Falkirk Council
87	M80	-	Denny, Head of Muir	Transport Scotland
88	M80	Wallace Crescent	Denny, Stoneywood	Transport Scotland
89	A9	Stirling Road	Larbert, Centre	Falkirk Council
90	M90	-	Glenfarg	Transport Scotland
91	A823	St Leonards Street	Dunfermline	Fife Council
92	A823	Aberdour Road	Dunfermline	Fife Council
93	A907	Appin Crescent	Dunfermline	Fife Council
94	A907	Maitland Street	Dunfermline	Fife Council
95	A907	William Street	Dunfermline	Fife Council
96	A9	New Road	Stirling, Bannockburn	Stirling Council
97	A9	New Road	Stirling, Bannockburn	Stirling Council
98	A9	-	Central Belt	Stirling Council
99	A811	St Ninians Road	Stirling, Centre	Stirling Council
100	B8051	Victoria Place	Stirling, Centre	Stirling Council
101	A921	Flesh Wynd	Kirkcaldy	Fife Council
102	A921	Lord Gambier Wharf	Kirkcaldy	Fife Council
103	B925	Nicol Street	Kirkcaldy	Fife Council
104	A9	Burghmuir Road	Stirling, Centre	Transport Scotland
105	A811	Randolph Terrace	Stirling, Centre	Stirling Council
106	A9	Henderson Street	Stirling, Bridge of Allan	Stirling Council
107	B8033	Stirling Road	Dunblane	Stirling Council

#	Road	Nearest Street	Nearest Town or Area	Responsible Authority
108	A92	-	Glenrothes	Transport Scotland
109	A914	South Road	Cupar	Fife Council
110	A912	Crieff Road	Perth	Perth and Kinross Council
111	A912	Barrack Street	Perth	Perth and Kinross Council
112	A918	South Street	St Andrews	Fife Council
113	B993	Elphinstone Road	Port Elphinstone	Aberdeenshire Council
114	A82	Kenneth Street	Inverness	Transport Scotland
115	A862	Telford Street	Inverness	Highland Council
116	A82	Longman Road	Inverness	Transport Scotland
117	A96	High Street	Elgin	Transport Scotland
118	A940	Market Street	Forres	Moray Council
119	A719	New Bridge Street	Ayr, Centre	South Ayrshire Council
120	A89	Main Street	Coatbridge, Central	North Lanarkshire Council
121	A725	Whifflet Street	Coatbridge, Whiflett	North Lanarkshire Council
122	A89	Graham Street	Airdrie	North Lanarkshire Council
123	A89	Deedes Street	Coatbridge, Central	North Lanarkshire Council
124	A89	Alexander Street	Airdrie	North Lanarkshire Council
125	A8010	High Street	Airdrie	North Lanarkshire Council
126	A989	Leonard Street	Perth	Perth and Kinross Council
127	A85	West Bridge Street	Perth	Perth and Kinross Council

Rail CNMA		
#	**Nearest Street or Road**	**Nearest Community**
1	Glenboig New Road	Coatbridge
2	B7076	Behind the Mill Forge, Gretna Green

Rail CNMA		
#	Nearest Street or Road	Nearest Community
3	B7076	Greenfield Park Homes, Kirkpatrick Fleming
4	Edengrove	Kirkpatrick Fleming
5	Bridge Road	Kirtlebridge
6	Mill Street	Castle milk estates , S of Lockerbie
7	Mains Meadow	Lockerbie
8	Dryfesdale Court	Lockerbie
9	Dryfe Park	Lockerbie
10	Dinwood	Dinwoodie Mains, S of Abingdon services
11	Newton Meadows	Newton Wamphray , Moffat
12	Younger Place	Beattock
13	B7076	Auchen Castle , Beattock
14	Watling Street	Crawford
15	A702	Roberton, A702
16	B7055	near Lamington Biggar
17	Carding Street	Symington, Biggar
18	Sherifflats Road	Thankerton
19	North Shore Road	Troon
20	Montgomerie Road/Queens Terrace	Prestwick
21	Ardrossan Road	Saltcoats
22	Lanark Road	Braidwood, Carluke
23	St Luke's Avenue	Carluke
24	Halidon Avenue	Cumbernauld
25	West Port Place	Union Road /Preston Road junction, Linlithgow
26	Strawberry Bank	Linlithgow
27	Mill Street	Kirkcaldy
28	Adamson Place	Stirling
29	Hartfield Court	Dumbarton

8.3. Appendix 3 - Notes

1 The environmental noise definition is based on Environmental Noise Directive (END) Annex I to Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

2 END does not apply to noise caused by the person exposed to the noise, noise from domestic activities, noise created by neighbours, noise at work places, or noise inside means of transport or due to military activities in military areas. It should be noted that whilst transport noise is the most common form of noise (from road transport, aircraft and railways with road responsible for ~90% of transportation noise), noise can also occur from industrial or workplace processes, wind turbines, pubs, clubs, next door neighbours and people in the street.

3 WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. See WHO (2011) Burden of disease from environmental noise: Quantification of healthy life years lost in Europe. http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf

4 Maynard (2010) Environmental Noise and Health in the UK: A report by the Ad Hoc Expert Group on Noise and Health. Health Protection Agency. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747.

5 END required competent authorities to draw up “strategic noise maps” for major roads, railways, airports and agglomerations, using harmonised noise indicators Lden (day-evening-night equivalent level) and Lnight (night equivalent level).

6 The Scottish Government has defined “places near"as areas where the noise mapping indicates the Lden exceeds the 55 dB(A) noise contour and the Lnight exceeds the 50 dB(A) noise contour.

7 The trunk road and motorway network connects Scotland's major cities, towns, airports and ports enabling the movement of people, goods and services. It is Scottish Ministers’ single biggest asset. The network is hugely diverse, ranging from the ten-lane M8 in the centre of Glasgow to single carriageway sections in the west Highlands. The trunk road and motorway network is 3,507 km (2,179 miles) long, including slip roads and roundabouts and represents 6% of the total Scottish road network. It includes 1,900 bridges and 3,700 other structures, and has a gross asset value of over £20.8 billion. It carries 35% of all traffic and 60% of heavy goods vehicles. with 1,900 bridges and 3,700 other structures.

8 Scotland’s rail network comprises 2,819 kilometres of railway - 28% electrified - with 348 stations leased to First ScotRail and 3 others operated by Network Rail (Glasgow Central and Edinburgh Waverley) and a private company (Prestwick International Airport). The addition of three new electrified rail routes operating in Scotland during 2018-19 means that an estimated 75% of all rail

passenger journeys in Scotland will be by fast, reliable and low carbon electric trains.

9 Local authorities manage and maintain local roads, which comprise approximately 94% of Scotland's roads (around 56,000km).

10 Strategic maps cannot be used to determine the noise level for any specific property particularly in the presence/absence of local features e.g. walls which may influence actual noise levels.

11 Noise complaints will occur outwith NMAs. As such, consideration of actions/policy will also be given to areas outwith the NMAs, given the strategic nature of the Transportation Noise Action Plan.

12 http://www.scottishnoisemapping.org/public/action-planning.aspx

13 Objectives sought Round 1 mapping completion and reporting in 2009 and revision by early 2014

14 http://www.scotland.gov.uk/Publications/2007/08/24141743/0

15 Noise from new roads can be managed via the planning process, as detailed in Planning Advice Note 1/2011 and PAN 51.

16 The Trigger level is 68dB LA10, 18hrs.

17 http://www.scottishnoisemapping.org/downloads/guidance/Technical_Guidance_CNMA2NMA.pdf

18 http://www.scottishnoisemapping.org/default.aspx

19 Such as traffic flow, composition, speed, surface type, gradient and topography.

20 Such as existing sound insulation, existing noise barriers or building orientation.

21 Although “Quiet Areas” are not specifically defined in the Directive, a study by the Transport and Research Laboratory (TRL) recommended that UK “Quiet Areas” should be defined as areas ≥9 hectares and in which at least 75% of the area is subject to noise levels not exceeding < 55 dB Lday.

22 This is covered in separate Technical Guidance on the Scottish Noise Mapping website.

23 Noise management may not have been the principle driver, but such actions nevertheless have contributed towards noise abatement in Scotland.

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