

**GUIDANCE ON
NOISE ACTION
PLANNING**

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1 Executive Summary

1.1 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 EU in July 2002. This directive deals with noise from road, rail, and air traffic, and from agglomerations. It focuses on the impact of such noise on individuals, complementing existing EU legislation, which sets standards for noise emissions from specific sources.

The three main objectives of the Directive are as follows.

- 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.

The Directive was implemented in Scotland by the Environmental Noise (Scotland) Regulations 2006 and laid down an initial two stage process to manage environmental noise. Thereafter to be repeated every 5 years.

Stage	Detail	Due Completion Date
One	Produce strategic noise maps for major roads, rail, airports, and agglomerations by	June 30 2007
Two	Competent Authorities to draw up Action Plans to manage noise	18 July 2008

Stage One, the creation of strategic noise maps, was the first stage in developing an environmental noise management programme for Scotland.

This guidance, designed to help in the implementation of Stage Two, sets out the proposed mechanisms and arrangements, including the formation of core and working groups, to prepare and draw up Action Plans. This document is provided to inform the public, give guidance to competent authorities, and provide a framework for all organisations involved in the Action Planning process.

The strategic noise maps are the starting point for Action Planning. Their initial analysis, using a prioritisation matrix developed as noted in Section 5 of this document, will provide a focus for deriving actions to reduce noise where it is deemed a problem. Thereafter Candidate Noise Management Areas (CNMA), as described in Section 5.5, will be identified and further scrutinised by the Scottish Environmental Noise Steering Group (SENSG) described in Section 3.3.

Action Plans shall be designed to manage, noise issues and effects, including noise reduction if necessary. Plans for agglomerations shall also aim to protect quiet areas

against an increase in noise. The END lists the minimum requirements for the content of each Action Plan.

2 Introduction

2.1 Scope and Purpose of Guidance

The European Union has estimated that around 20 percent of the EU's population, or close on 80 million people, are subject to noise levels that scientists and health experts consider unacceptable. They are annoyed, their sleep is disturbed, and adverse health effects are expected. An additional 170 million people experience noise levels causing serious annoyance during daytime. With this background, there is clear need to manage environmental noise on a national and local scale.

One of the first steps in embarking on a programme of noise management is to quantify the current noise climate. This provides a solid basis for formulating environmental noise management policy. To ensure parity for this across the European Union the European Parliament and Council adopted Directive 2002/49/EC. This Directive has since been transposed into the Environmental Noise (Scotland) Regulations 2006.¹

The Directive requires competent authorities in Member States to draw up "strategic noise maps" for major roads, railways, airports and agglomerations, using harmonised noise indicators L_{den} (day-evening-night equivalent level) and L_{night} (night equivalent level). These maps are then to be used to assess the number of people potentially annoyed and sleep disturbed.

The Directive requires that the public is informed and consulted about noise exposure, its effects, and the measures considered to address noise. The process of provision of information, consultation, and ultimate decision making on the issues of noise management is known as the Action Planning Process. The final Action Plans will aim to reduce noise where necessary, and maintain environmental noise quality where it is good. It is important to note that the Directive does not set any limit value, nor does it prescribe the measures to be used in the Action Plans, which remain at the discretion of the competent authorities.

This guidance sets out how the noise maps will be presented to the public, it provides advice on understanding the maps, and provides an analysis of the population exposure with respect to noise from both individual and combined noise sources covered by the Directive. To inform the public about the derivation of any "trigger" levels used in Action Planning the existing legislative and guidance framework for noise from transportation and industrial sources is set out in this document.

Finally, a prioritisation matrix will be developed as part of the Action Planning process for use in determining Candidate Noise Management Areas (CNMA). In summary, the purpose of this guidance is to explain to the public the background to the Action Planning process and provide relevant details on the component parts in a manner compliant with the principles of the Aarhus Convention²

¹ <http://www.legislation.gov.uk/ssi/2006/465/contents/made>

² <http://ec.europa.eu/environment/aarhus/>

2.2 Regulatory Framework

The Environmental Noise (Scotland) Regulations 2006 came into force 5 October 2006 and apply to environmental noise to which humans are exposed, in particular in built up areas, public parks or other quiet areas in an agglomeration, near schools, hospitals, 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, 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.

Noise from domestic activities or noise created by neighbours can be dealt with under the Environmental Protection Act 1990 and Antisocial Behaviour etc. (Scotland) Act 2004. Part 5 of the Antisocial Behaviour etc. (Scotland) Act 2004 contains provisions in relation to noise nuisance and in particular gives local authorities additional powers to deal with noise nuisance and tackles the problems of night noise in dwellings. Noise exposure at work is governed by the Control of Noise at Work Regulations 2005 and noise from construction site is controlled by the Control of Pollution Act 1974. Further information on the legislation referred to here can be obtained from; <https://beta.gov.scot/Publications/2004/10/20151/45704>

Details of Draft Noise Management Guide Guidance on the Creation and Maintenance of Effective Noise Management Policies and Practice for Local Authorities and their Officers in Scotland can be obtained from here <https://www.gov.scot/Resource/Doc/77843/0018687.pdf>

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 an issue to be considered in the context of proposed development which may be affected by such sources.

Noise from lawful use of existing roads and railways cannot be construed as a noise nuisance in terms of the Environmental Protection Act. Noise from new roads and new railways may also be controlled by conditions attached as part of the Parliamentary Bill process.

At present where noise from a new or altered road exceeds a certain trigger level, and meets other qualifying criteria, the Land Compensation (Scotland) Act 1973 provides for insulation work to be carried out or a grant to be made in respect of that insulation work. "Altered" road is defined within the Noise Insulation (Scotland) Regulations 1975 (NISR). Under the NISR, the Land Compensation (Scotland) Act 1973 also confers a right to compensation for depreciation in the value of land caused by public works. Public works do not include aerodromes.

The railway equivalent of the NISR is the Noise Insulation (Railways and other Guided Transport Systems) Regulations 1996. However, the provisions of the 1996 Regulations, which came into force under the Land Compensation Act 1973, do not extend to Scotland.

Noise from aircraft in flight is not treated as nuisance. Ground noise at the airport is treated as industrial noise and is controlled by the local authority. Most airports operate a sound insulation grant scheme for people living nearby airports, and information on the insulation scheme can be obtained from the relevant airport.

The Scottish Government also issues planning guidance in respect of various noise related issues in the form of planning advice notes such as Planning Advice Note 2/2011 “Planning and Noise”³ and the associated Technical Advice Note (TAN)⁴. Planning Advice Note 50 “Controlling the Environmental Effects of Surface Mineral Working, Annex A: The Control of Noise at Surface Mineral Working”⁵. In more general terms Planning Advice Note 51: Planning, Environmental Protection and Regulation⁶ supports the existing policy on the role of the planning system in relation to the environmental protection regimes.

An environmental impact assessment is required for a large range of projects which are likely to have significant environmental effects. Noise emissions are one of the impacts which has to be considered and, if relevant, measures to mitigate the effects should be proposed. The implementation of the mitigation measures are a matter for the consenting procedure and the responsible authority.

Industrial noise for Part A and Part B process (as defined within the Pollution Prevention and Control (Scotland) Regulations 2012) is controlled through The Pollution Prevention and Control (Scotland) Regulations 2012 (the PPC Regulations). These regulations designate the Scottish Environment Protection Agency (SEPA) as the 'Regulator' responsible for enforcing the regime.⁷

As part of its role as regulator, SEPA produces guidance for use in enforcing the PPC Regulations. SEPA has produced guidance on the control of noise at PPC installations, which will be used when considering applications for, and inspections of PPC installations. For non Part A and B process the control of noise is exercised by the relevant local authority.

From the above it is clear that there are existing controls in respect of operational industrial sources, but at present there are no further controls over operational transportation sources and the preparation of noise mapping and action plans affords an opportunity to inform policy on such matters.

It is important that the Action Planning process takes into account the existing legislative and guidance framework that exists within Scotland.

3 Objectives of the END

3.1 Purpose and Scope

In 2002, the European Union (EU) adopted a Directive relating to the Assessment and Management of Environmental Noise. It represented the first significant attempt at establishing a common approach to deal with the harmful effects of environmental noise.

³ <https://www.gov.scot/Publications/2011/02/28153945/0>

⁴ <https://www.gov.scot/Publications/2011/03/02104659/12>

⁵ <https://www.gov.scot/Publications/1996/10/17728/23419>

⁶ <https://www.gov.scot/Publications/2006/10/20095106/0>

⁷ <http://www.legislation.gov.uk/ssi/2012/360/contents/made>

The main objectives of the Directive are set out in Section 1.1. For the first round of mapping the objectives were as follows;

To monitor environmental noise by requiring competent authorities in Member States to prepare 'strategic noise maps' for the following:-

- all major roads with more than 6 million vehicle passages per year.
- railways with more than 60,000 passages per year.
- Airports with more than 50,000 air traffic movements per year and airports within agglomerations.
- All agglomerations with more than 250,000 inhabitants

For the second and subsequent rounds of mapping the objectives are as follows:-

- all major roads with more than 3 million vehicle passages per year.
- railways with more than 30,000 passages per year.
- Airports with more than 50,000 air traffic movements per year and airports within agglomerations.
- All agglomerations with more than 100,000 inhabitants

As stated in Section 2.2 of this document the END relates only to noise sources arising from, road, rail, air transportation, and ports and industry, within agglomerations. In Scotland, neighbourhood noise is dealt with in other legislation (see Section 2.2 above).

The END is a complex Directive relying heavily on the collection of data and computer modelling technology to support the development of noise maps and Action Plans. It is important to acknowledge that as computer processing power develops, the manner in which data is collected and managed by different organisations will also evolve. This development is likely to continue for some time. This means that an approach appropriate today, for preparing noise maps and Action Plans, may not be so in the future, when more powerful processing may be available.

The Directive requires a strategic approach for noise mapping and defines the data requirements that should be used to derive noise maps. This means that the results from the mapping phase of END should be viewed as a good starting point for those bodies involved in noise regulation and control of environmental noise.

At a European level, there will also be developments over the longer term. The Commission has established common assessment methods and although not available for the first three rounds of noise mapping a common method of assessment will be used from Round 4 onwards. The common assessment method is known as Common Noise Assessment Methods in Europe (CNOSSOS-EU). In accordance with Art. 6.2 of the Environmental Noise Directive 2002/49/EC (END), the European Commission developed Common NOise aSSessment methOdS (CNOSSOS-EU) for road, railway, aircraft and industrial noise and is to be used after adoption by the Member States for the purpose of strategic noise mapping as required by Article 7 of the END. It aims at improving the consistency and comparability of noise assessment results across the EU Member States which are performed on the basis of the data becoming available through the consecutive rounds of strategic noise mapping in Europe.

3.2 Competent Authorities and Key Partners

The Scottish Government is the Competent Authority for END and is responsible for drawing up noise Action Plans. While for Airports it is the Airport operator who is the Competent Authority. To develop and prepare noise Action Plans, the Scottish Government will work with key partners involved in END. Partnership working is explained in section 3.3.

In drawing up the Action Plans, the Scottish Government will seek input from key stakeholders or partners, in particular those likely to have the power to implement the plans. The airport operators already have noise management schemes that will provide a good starting point in the drawing up of noise Action Plans required by the END.

The airport operators in Scotland have worked very closely with the Scottish Government's consultants to produce the required noise maps and have indicated that they would like to be similarly fully involved in the Action Plan process in terms of both producing Action Plans for individual Airports and Action Plans for the agglomerations.

The following list shows the organisations and key partners who were involved in round one Action Planning:

- The Scottish Environment Protection Agency (SEPA)
- Local Authorities within agglomerations
 - Glasgow agglomeration
 - East Dunbartonshire Council
 - East Renfrewshire Council
 - Glasgow City Council
 - North Lanarkshire Council
 - Renfrewshire Council
 - South Lanarkshire Council
 - West Dunbartonshire Council
 - Edinburgh agglomeration
 - City of Edinburgh Council
 - East Lothian Council
 - Midlothian Council
 - West Lothian Council
- Local Authorities not in agglomerations for local road issues
- Regional Transport Partnerships
- BAA Glasgow, Edinburgh and Aberdeen
- Transport Scotland
- Network Rail

For the second and third rounds the above list was extended to include the Aberdeen and Dundee agglomerations:

- Aberdeen agglomeration
 - Aberdeenshire Council
 - Aberdeen City Council
- Dundee agglomeration
 - Dundee City Council
 - Angus Council
 - Perth and Kinross Council
 - Fife Council

For qualifying Airports, the airport operators are responsible for drawing up their own noise Action Plans.

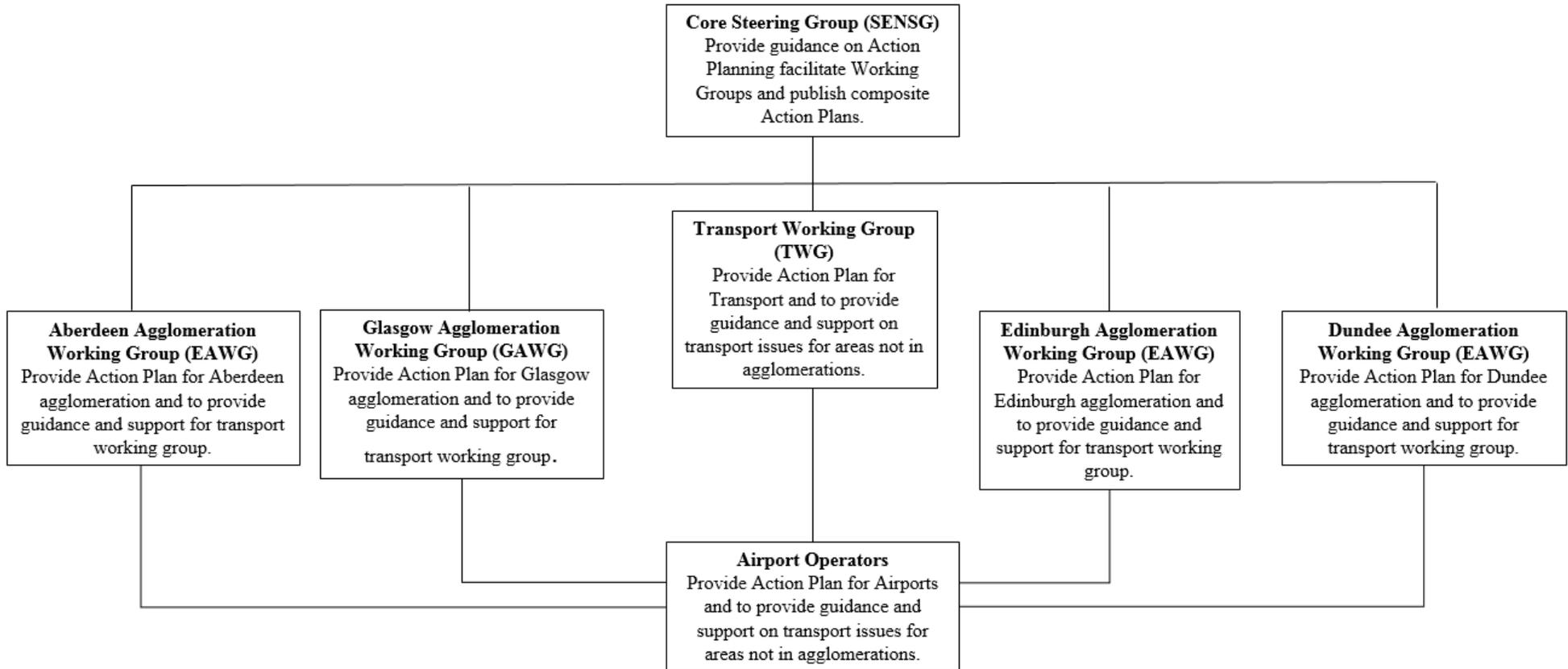
3.3 Steering and Working Groups for Action Planning

The Scottish Environmental Noise Steering Group (SENSG) is a group with representation from all parties involved in environmental noise. The group comprises representatives from the Scottish Government, local authorities, SEPA, BAA, Transport Scotland and Network Rail. The primary aim of SENSG is to provide a forum for all key partners to review the development and progress of Action Plans and to determine the prioritisation of control measures.

SENSG acts as the core group to oversee the consistent development and implementation of all Action Plans. SENSG will establish three working groups to assist in the preparation of Action Plans and these groups will feedback to the core group. There will be a Glasgow agglomeration working group, an Edinburgh agglomeration working group and a Transportation Action Planning working group. All three groups will have representation on the core steering group.

Airport operators have a key role to play in Action Planning and will be able to input to all working groups. The airport operators will also be represented on the Transportation working group. The Scottish Government's nominated noise mapping consultants, Hamilton McGregor for Round 1, AECOM for Round 2 and Jacobs for Round 3, assisted in the development of noise maps for the major airports in Scotland. Noise data was prepared by the Civil Aviation Authority (CAA) and Bikerdyke Allan (for Round 1) noise consultants.

The diagram below illustrates the reporting structure for Action Planning.



3.4 Programme and Key Dates

The Regulations required strategic noise maps to be drawn up by 30 June 2007. Round One was 2007 to 2012 and required that strategic noise maps be drawn up for:-

- major agglomerations over 250,000 inhabitants (including industry and ports within them) ;
- major roads carrying more than 6 million vehicles a year;
- major railways with over 60,000 rail passages a year; and
- major airports with over 50,000 movements per year.

Round Two ran from 2012 to 2017 and Phase 3 from 2017 when urban areas with over 100,000 inhabitants, all major roads carrying more than 3 million vehicles, and railways with over 30,000 rail passages a year are included.

4 Policy Perspective

4.1 European Directive on Noise

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

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

4.2 The Environmental Noise (Scotland) Regulations 2006

The Environmental Noise (Scotland) Regulations 2006, which transposed the EU Directive, specify the general requirements for Action Plans. They are required to:-

- (a) meet the objectives of—
 - (i) preventing and reducing environmental noise where necessary and in particular where exposure levels can induce harmful effects on human health; and
 - (ii) reserving 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 first round agglomerations and agglomerations, as appropriate, against an increase in noise;
- (d) identify and address priorities for meeting the objectives set out in subparagraph (a);
- (e) apply in particular to the most important areas as established by strategic noise maps: and
- (f) meet the requirements in Schedule 4.

Schedule 4 states that an Action Plan shall

- (a) meet the minimum requirements of Annex V to the Directive;

- (b) contain a summary covering all the important aspects referred to in Annex V to the Directive, not exceeding 10 pages in length; and
- (c) be clear and comprehensible.

4.3 Local Considerations

When considering results from the noise maps, the appropriate working group will produce a draft list of priority locations called “Candidate Noise Management Areas (CNMA)”.

Before determining a CNMA, the appropriate working group should consider all relevant information including;

- (a) local circumstances;
- (b) sensitivity of receptors;
- (c) the nature, extent and duration of noise sources

These locations will then be further assessed to determine whether or not they should be presented to the core steering group as a Noise Management Area (NMA). The appropriate working group will prepare a report on the CNMA detailing the reasons for their selection of the location.

The report is likely to include:

- (a) a detailed map of the area;
- (b) a description, including any measurements of noise source levels
- (c) the reasons why the area was determined as a CNMA;
- (d) a detailed list of proposed interventions;

To ensure that all factors have been consistently and fairly assessed, the core steering group will review the CNMA reports and provide feedback if required. The final decision rests with the core steering group following discussions with the appropriate working groups. Once an area has been classified as an NMA, the Scottish Government will carry out a consultation with stakeholders and the public to inform them of the decision and the rationale for the determination.

Further information on determination of CNMA's is provided in section 5.5

5 Strategic Noise Maps

5.1 Introduction to Noise Mapping

A noise map is analogous to a weather map, but instead of showing a temperature or percentage cloud cover it shows noise levels in terms of coloured contour bands. Also the noise levels represent the noise to be experienced within a certain area over a given period of time. Therefore, the level may vary throughout the day or even on a daily basis as the noise map will display levels based on annual averages.

The maps produced in response to the END are strategic maps, i.e. the noise levels are predicted using a 10m grid spacing at a receptor height of 4m above ground level, and consequently it will not be possible to use the maps to determine the noise level outside any given property. It is important to remember that the noise maps are strategic and they will be used accordingly.

Noise maps are produced by specialised computer software that calculate the noise level at a specific point as it spreads out from the sources of noise that have been included. The software can take account of features which affect the spread of noise such as buildings and the shape of the ground (e.g. cuttings and embankments), and whether the ground is acoustically absorbent (e.g. fields) or reflective (concrete or water).

The data used in the mapping process can be regarded as follows:

- Map data (topological and topographic)
- Attribute data

Map data is essential to identify the geographical location of objects and features to be included in the modelling assessment. Attribute data are data such as road and rail traffic flows etc.

A lot of this work is done using GIS techniques (Geographical Information Systems). A GIS may be described as a system of computer software, hardware and data, and personnel to manipulate, analyse and present information that is geo-referenced (i.e. tied to a spatial location). Once the actual three dimensional model is created using these techniques the attribute data is added and the model processed using the specialised computer software.

The completed map can then be interrogated to determine the number of people or properties within each noise band, the number of people/properties exposed to noise above any given level etc. The noise maps can also be used to consider the effect of certain actions such as resurfacing a road or introducing noise barriers.

5.2 Limitations of Strategic Mapping

As was stated above the noise maps are based on predicted noise levels using a 10m grid spacing at a receptor height of 4m above ground level. The value of the “grid” is determined by the centre point of the grid and therefore in reality there may be some variation within the grid. Also, with a receptor point at 4m above ground level and the average “ear” at about 1.2-1.5m above ground level it should be clear that the

strategic maps cannot be used to determine the level for any specific property. Once again it is important to remember that the noise maps are strategic and they will be used accordingly.

5.3 Data Sources for Mapping

It was explained in Section 5.1 above that two types of data are used in the creation of the noise maps; namely map data and attribute data. The following data was used

The map data sources were as follows:

- Ordnance Survey (OS):
 - MasterMap,
 - AddressBase Plus,
 - Integrated Transport Network (ITN)
 - OS Terrain 5.
- The OS data was supplemented with additional data provided by Transport Scotland and Network Rail which included:
 - Video data of the trunk network,
 - SRTDb (Scottish Roads Traffic Database) [now NTDS – National Transport Database]
 - Lidar
 - Station Locations
 - Bridge Locations
 - Rail network
 - Tiplocs (Timing Point Locations)
 - Building heights were determined using Lidar Digital Surface Model (DSM) and Digital Terrain Model (DTM) where the data existing.
- Additional sources included:
 - PointX,
 - Nextmap data,
 - Agglomeration Polygon Layer (from the Scottish Government and Land Use Constraints polygons).

The attribute data sources were as follows:

- Road Traffic Data:
 - Transport Model for Scotland (TMfS);
 - ASAM4B (Aberdeen Agglomeration)
 - CSTM23 (Dundee Agglomeration)
 - SRM23 (Edinburgh Agglomeration)
 - SRTM14 (Glasgow Agglomeration)
- Rail Traffic Data:

- Actraff data
- Railsys 6
- Geogis and Engineering Network Model (ENM) model from Network Rail
- Air Traffic Data:
 - .csv result files from the airport authorities.

5.4 Consolidated Maps

The term ‘consolidated’ in this context means a map showing the total noise level at a location from the various sources being mapped. The consolidated maps, as required by the Regulations is the combination of the noise maps for each of the road, rail, industrial and aircraft maps within the agglomerations. The consolidated maps are produced simply as a logarithmic sum of the separate source sound levels and are not subject to response or effects based corrections in any shape or form. It is important therefore to remember that any differences in community response between the different noise sources present at the same sound should only be interpreted in that light.

5.5 Identification of Candidate Noise Management Areas (CNMA)

A prioritisation matrix has been developed to determine the Candidate Noise Management Areas (CNMA).⁸ This matrix takes into account many factors some of which are as follows; the level of noise, the relevant contributions from each of the different noise sources, the relative effects of different noise sources present, insofar as they are known or might be known to be different at similar sound levels, the number of people and properties exposed, population density, type of area, landuse, any trigger or target levels contained with existing legislation/guidance, distance of properties from main transportation links and recommended target levels contained within existing legislation guidance. Once a CNMA is identified further action will be considered as appropriate.

5.6 Analysis of Maps

Maps will be analysed using GIS tools and this will facilitate an understanding of the number of people exposed to different noise levels, the number of buildings affected, and the number of properties within agglomerations that have a quiet facade. From this analysis it should be possible to define relative quiet areas within agglomerations and areas where there are excessive noise levels. For technical reasons, it is easier to identify areas of high noise level than quieter or tranquil areas. However, areas of relative quiet within agglomerations can in principle be shown on noise maps.

⁸ https://noise.environment.gov.scot/pdf/Technical_Guidance_CNMA2NMA.pdf

6 Action Plans

6.1 Introduction to Action Planning

Action Planning is the process whereby environmental noise, as described in the Regulations, will be managed.

6.2 Extent of Action Plans

The agglomeration Action Plans must cover the area of the agglomeration. Outside agglomerations Action Plans must be developed for places 'near' the designated major sources. The Scottish Government intends to define the term "places near" in terms of levels of exposure that need to be reported to the Commission: *i.e.* out to the L_{den} 55dB and L_{night} 50dB contour bands in a noise map (see [Annex VI](#) of the END). The distance noise propagates from linear sources such as major roads and railways depends on the surrounding features. To take account of this a buffer area of 2km has been created around the agglomerations and main transport sources in the mapping process. However, in the case of relevant airports the distance to the L_{den} 55 dB and L_{night} 50 dB contours may be greater and the mapped area extended to cover this as required.

6.3 Competent Authority for Developing Action Plans

The END requires the designation of a competent authority to be responsible for the development of Action Plans. The competent authority is responsible for ensuring that an Action Plan is developed but it may well be the case that the necessary powers to implement the actions that might be contained in the plan rest with other bodies. Where this is the case the Scottish Government intends that the powers for taking action to manage the noise climate will remain with the bodies that already hold them. These powers to take action lie with a wide number of organisations. It is not the Scottish Government's intention to alter such arrangements.

The Scottish Government expects that any bodies/authorities named in the finalised Action Plans, including those with the power to take action, should take the necessary steps to treat the Action Plans as policy. They should, therefore, take the plans into account as a 'relevant' or 'material' consideration when making a policy decision

6.4 How, Why, and When to Prepare an Action Plan

The Action Plan should contain the following four key stages:

1. Analysis of the strategic noise maps. This should include population exposure information that requires to be sent to the commission by the relevant date for that Round of mapping.. This will assist in identification of candidate areas for noise management areas.

2. Further investigation and analysis of the candidate areas that could include noise measurements but will involve checks on the ground to ensure that the assumptions underlying the strategic maps are reflected at the local level. (For example the strategic maps may show high exposure levels but there may have been physical

changes on the ground since the data was collected). More simply there may also be some inaccuracies in the maps as they are strategic maps after all.

3. An evaluation of existing UK, Scottish and Local policies, plans and programmes that may have an impact on the strategic environmental noise climate for the areas identified as potential noise management areas. (e.g. transport plans and programmes, local plans, air quality management plans)

4. An evaluation of potential mitigation measures to manage noise, with options subject to a cost benefit analysis. This could include identifying gaps in existing policies and plans with recommendations to fill those gaps as appropriate.

6.5 Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) is a systematic process for identifying, predicting and where possible avoiding significant adverse environmental impacts of implementing public strategies, plans and programmes. In Scotland, the Environmental Assessment (Scotland) Act 2005 ensures that all public strategies, plans and programmes that are likely to result in significant environmental effects, adverse or positive, are assessed.

Individual draft END Action Plans may fall within the scope of the Environmental Assessment (Scotland) Act 2005 given their potential for significant environmental effects and may therefore require an SEA. For END Action Planning, it is considered advisable that the SEA should not be undertaken within a separate work-stream from the plan-making one, but viewed as a creative decision aiding tool that may be used in the design cycle of END Action Plans.

The process of such assessment involves:

- creating a summary and scoping out the likely effects on the environment of implementing a proposed strategy, plan or programme.
- outlining those effects in an Environmental Report
- undertaking a formal public consultation exercise on the strategy, plan or programme along with the Environmental Report
- taking into account the comments and views expressed during the consultation and the contents of the report in the final decision making process.
- informing stakeholders of the decisions taken through a post- adoption statement.

Strategic Environmental Assessment applies to public strategies, plans and programmes that are likely to have significant environmental effects if implemented and allows the identification, comparison, and adoption of reasonable alternatives (to avoid potential significant adverse environmental impacts or to enhance beneficial ones).

Guidance on how to undertake an SEA is outlined in the SEA Tool Kit available on the Scottish Governments publications website, and which may be accessed via the following link - <https://www.gov.scot/resource/doc/148434/0039453.pdf>

7 Quiet Areas

7.1 Introduction to Quiet Areas and Criteria for Their Designation

The regulations require that Quiet Areas within agglomerations are identified. What does quiet mean? The Transport Research Laboratories (TRL) undertook research for Defra on the subject of Quiet Areas.⁹ The research reported that defining, identifying and appreciating the benefits of preserving quiet or relatively Quiet Areas in urban conurbations cuts across many different fields including health, physical and psycho-acoustics, and environmental psychology. An important aspect of the research carried out into Quiet Areas has been to establish the positive effect natural sounds have on health and well-being.

7.2 Current Research Into Quiet Areas

Research carried out in Sweden (Berglund et al., 2004)¹⁰ has examined how adverse health effects of noise are related to individual exposure and perceived soundscapes in residential areas with and without access to Quiet Areas. Their results show that access to a quiet façade of a dwelling reduces annoyance to noise by 10-20%, depending on the sound level from road traffic at the most exposed side. Results suggest (Nilsson and Berglund, 2006)¹¹ that a good urban outdoor soundscape should (a) be dominated by positive sounds from nature, and (b) have an overall equivalent sound level below 50dB (A) during the daytime.

Research carried out in Norway has examined the relationship between localised areas of noise and quiet within a neighbourhood on residential noise annoyance in Oslo (Klæboe et al, 2005)¹². Results indicate that noisy neighbourhoods have the potential to increase residential noise annoyance primarily for apartments exposed to low residential noise levels whereas quiet neighbourhood areas have the potential to reduce residential noise annoyance the most at intermediate and high residential noise levels.

In the Netherlands, reviews of current research has concluded that the percentage of time during which a disturbance is present (or the length of time during which a 'level of quiet' is regarded as acceptable) is generally more important than the actual noise level (van den Berg and van den Berg, 2006)¹³. Alongside these acoustic criteria additional criteria about the sounds heard which convey positive or negative feelings, with regard to appropriateness for a given context, are also important.

Research carried out in Italy to identify indicators to describe perceived soundscapes is following a similar approach to that found in the Netherlands in that it is related to temporal variations in noise although the method is more complex (Licitra and Memoli, 2006).¹⁴

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<http://webarchive.nationalarchives.gov.uk/20091118124941/http://www.defra.gov.uk/environment/quality/noise/research/documents/quiet-areas.pdf>

¹⁰ Berglund B, Kihlman T, Kropp W and Öhrström E (2004). Soundscape support to health. Final Report Phase 1, Chalmers University, Gothenburg, Sweden.

¹¹ Nilsson M E and Berglund B (2006). Soundscapes in city parks and suburban green parks. Proceedings of Euronoise 2006, Tampere, Finland.

¹² Klæboe R, Kolbenstvedt, M and Fyhri, A, (2005). The Impact of an Adverse Neighbourhood Soundscape on Road Traffic Noise Annoyance, Acta Acustica United with Acustica, Vol 91, pp. 1039-1050

¹³ van den Berg M M H E and van den Berg G P (2006). Quiet areas: health issues and criteria. Proceedings of Euronoise 2006, Tampere, Finland.

¹⁴ Licitra G and Memoli G (2006). Testing new solutions for action plans in quiet areas. Proceedings of Euronoise 2006,

Research in the UK into Quiet Areas has primarily been carried out to assist in the implementation of END (Symonds Group Ltd, 2003).¹⁵

The TRL research recommended that public and open spaces in the UK, should fall within the noise band $< 55 \text{ dB } L_{\text{day}}$, as determined from the first round of noise mapping) and a minimum area (the candidate area must be at least 9 hectares). The specifications for the filter definitions and the candidate list of Quiet Areas should be reviewed and, where necessary, revised by the relevant authorities before the list is finalised.

The following filter specifications which may require revising include:

- Noise Level filter: The specification of a $55 \text{ dB } L_{\text{day}}$ limit is seen as an appropriate compromise, based on the mapping requirements of the END and definitions for Quiet Areas used elsewhere in Europe;
- Minimum Area filter: The specification of a minimum area of 9 hectares is based upon consideration of both the minimum area that should lie within the defined noise limit to warrant preservation (50%) and the minimum area required to achieve $55 \text{ dB } L_{\text{day}}$, based on the presence of at least one major road at the boundary.
- Minimum Area 'of Quiet' filter: The specification that a minimum area of 4.5 hectares must fall within the noise band $< 55 \text{ dB } L_{\text{day}}$ is to allow areas significantly larger than 9 hectares to qualify as candidate Quiet Areas when less than 50% of the area falls within the specified noise band.

For the second and subsequent rounds of mapping SENSG decided that any local authority within an agglomeration boundary can, with good and justifiable reasons, request that an area be classified as a Quiet Area. Otherwise technical guidance on identification of Candidate Quiet Areas can be found here.¹⁶

¹⁵ Symonds Group Ltd. (2003). Report on the definition, identification and preservation of urban and rural quiet areas. Final Report 4E 59492. Symonds Group Ltd, East Grinstead, UK.

¹⁶ https://noise.environment.gov.scot/pdf/Technical_Guidance_for_Quiet_Areas.pdf

8 Financial Considerations

8.1 Cost Benefit Analysis

The financial impact of noise on society has been estimated at between 0.2% to 2% of GDP. In addition the European Commission Green Paper (1996) noted noise contributes greatly to reducing city dwellers quality of life and can cause severe health problems. There is a clear benefit to society to reducing environmental noise. At the same time however, reducing noise levels will often involve interventions requiring significant expenditure and cost. Competent Authorities and their Key Partners within the working groups will therefore be required to develop sift criteria, , for identifying areas within Noise Management Areas to determine whether practical and cost effective noise mitigation measures can be taken. In this way the budget can be allocated to permit such measures to be implemented where benefit is justified.

It is likely that it will be appropriate to develop a five year plan of appropriate interventions to achieve the desired target levels of improvement.

Useful criteria for consideration in developing any cost benefit analysis may include the following.

- Minimising whole life cost.
- Including interventions within existing maintenance and improvement programmes
- Minimising disruption.

A timetable and programme for a series of interventions can then be agreed and included in the composite Action Plan. The interventions should identify the number of properties and people that would benefit, and the cost of the intervention.

8.2 Possible Intervention Measures

- Speed reduction measures where practicable.
- Traffic flow relocation measures.
- Consideration of all reasonably practicable mitigation measures.
- Traffic volume optimisation measures.
- Improvements to running surface where practicable
- Environmental barriers where practicable

Annexe A Glossary and List of Acronyms

Action Plan

Plans designed to manage noise issues and effects, including noise reduction if necessary. An Action Plan must at least include the following elements:

- a description of the agglomeration, the major roads, the major railways or 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 that need 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,
- 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 for example include:

- traffic planning,
- land-use planning,
- technical measures at noise sources,
- selection of quieter sources,
- reduction of sound transmission,
- 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

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 boundary of an agglomeration was drawn using the 'urban

settlement approach' set out in 'Identifying the Options Available for Determining Population Data and Identifying Agglomerations in Connection with EU Proposals Regarding Environmental Noise. The population density exceeds 500 persons per km².

Airport (this is covered under major airport – see below)

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; delimiting quiet areas within agglomerations and open countryside and collecting noise maps and Action Plans. See Section 3.2.

Consolidated Map

A map showing the noise level from airport, road rail, ports and industrial noise combined for the agglomeration areas.

END

European Noise Directive

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). They must be expressed in terms of the noise indicators L_{den} and L_{night} . Limit values are defined as meaning 'a value of L_{den} or L_{night} , and where appropriate L_{day} and $L_{evening}$, as determined by the Competent authority for developing Action Plans Member State, the exceeding of which causes competent authorities to consider or enforce mitigation measures' (Article 3 (s) of the END).

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 kg. 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 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)). However, for the first round of mapping the qualifying threshold is 6 million vehicle passages per annum (Article 7, paragraph 1).

Major Railways

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). The END requires that, no later than 30 June 2005 (and thereafter every five years), Member States shall

inform the Commission of the major railways that have more than 60,000 train passages per year (Article 7, paragraph 1).

Noise Mapping

The presentation of data on an existing or predicted noise situation in terms of a noise indicator, indicating breaches of any relevant limit value in force, the number of people affected in a certain area, or the number of dwellings exposed to certain values of a noise indicator in a certain area.

Quiet Area

Article 3(l) and 3(m) of the END defines 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 yearly 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 qualifying which agglomerations, major roads, and major railways 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; and
- 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 onwards

- 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; and
- Major railways – only those that have more than 30 000 train passages per year.
- All Airports within round one and two agglomerations and major airports

Annexe B Regulations on Action Planning from the Directive

ANNEX V of the END states the following minimum requirements for Action Plans referred to in Article 8

1. An Action Plan must at least include the following elements.
 - A description of the agglomeration, the major roads, the major railways or 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.
 - 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 that need to be improved.
 - A record of the public consultations organised in accordance with Article 8(7).
 - 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.
 - Provisions envisaged for evaluating the implementation and the results of the Action Plan.
2. The actions which the competent authorities intend to take in the fields within their competence may for example include the following.
 - Traffic planning
 - Land-use planning,
 - Technical measures at noise sources,
 - Selection of quieter sources,
 - Reduction of sound transmission,
 - Regulatory or economic measures or incentives.
3. Each Action Plan should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other).
4. The Commission may develop guidelines providing further guidance on the Action Plans in accordance with Article 13(2). 18.7.2002 EN Official Journal of the European Communities L 189/23