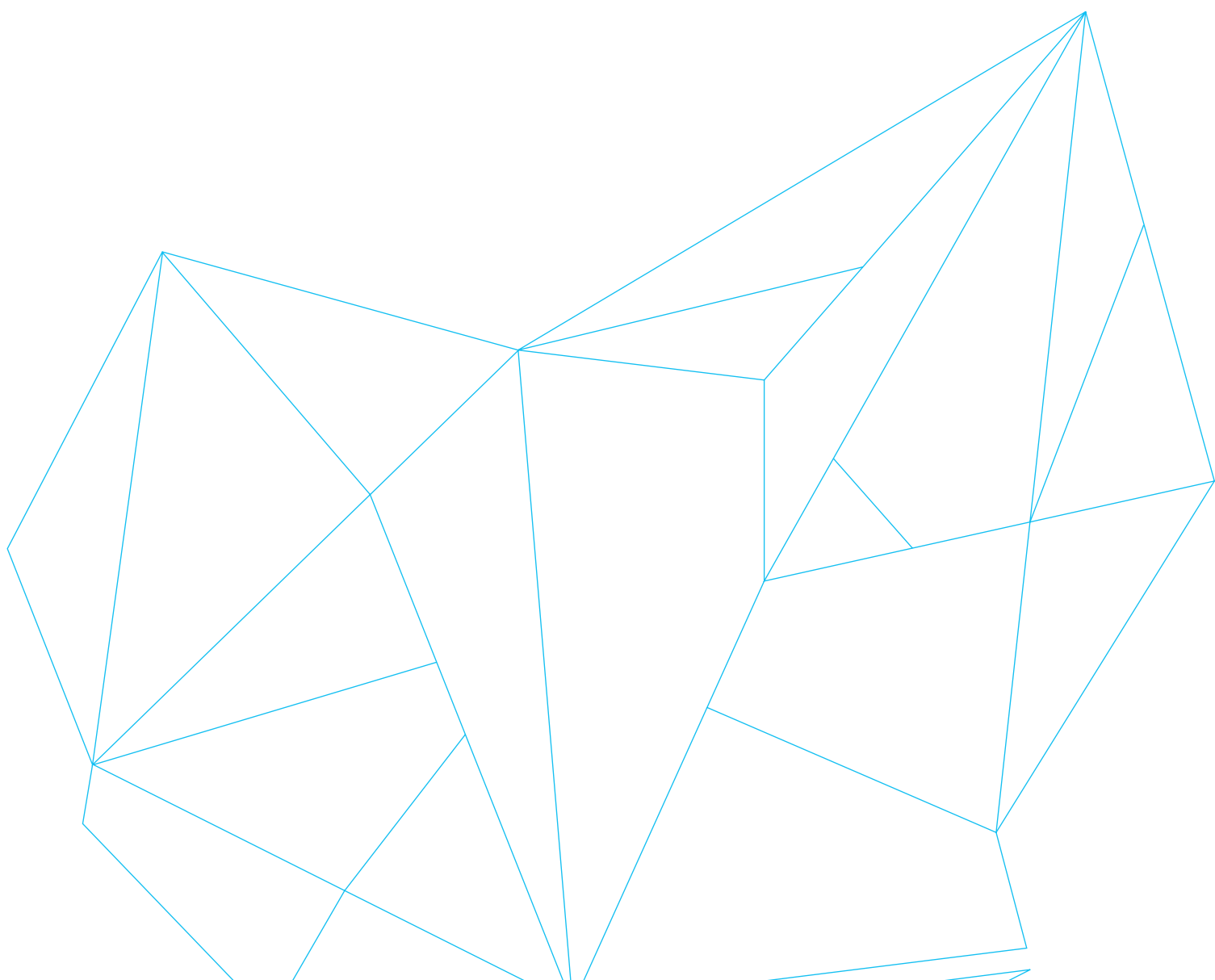


**CITY OF GOTHENBURG**  
**NOISE ACTION PLAN**  
**2014–2018**



City of  
Gothenburg



# WHY A NOISE ACTION PLAN?

Noise is defined as unwanted sound and is one of the environmental disturbances that daily affect a large number of people in Gothenburg. The main source of noise in Gothenburg is traffic noise from state and municipal infrastructure (road and rail) and most of the residents exposed to it live along major trunk roads, on routes used by public transport and in central areas of the city. It is calculated that around 100 000 Gothenburg residents are exposed to traffic noise in their homes that exceeds the national guideline of 55 dBA<sup>1</sup> as a daily equivalent value, of whom around 70 000 are exposed to noise levels of more than 60 dBA. Some 30 percent of Gothenburg's population are troubled by noise at least once a week in or around their homes.

Noise is also more than an annoyance. Noise can lead to impaired sleep, and reduced ability to rest and to interpret and understand speech, known as speech masking, even without us realizing that we are being disturbed. There is scientific evidence that noise can lead to cardiovascular disorders if we spend long periods in noisy environments.

Gothenburg's high growth target (150 000 increase in population by 2035) and ambition to densify the city means that it cannot be taken for granted that fewer people will be exposed to noise. In order to be able to densify the city, attention has to be paid to ambient noise and its effect on people's health, both in and near their homes, in schools and preschools and in recreational areas. The greatest need for action is in existing environments where the noise situation has deteriorated as a part of the city's growth and increased traffic.

The City of Gothenburg has a duty to have up-to-date noise mapping and an action plan to reduce the negative health effects of ambient noise. This is stipulated by the Environmental Noise Ordinance (SFS 2004:675), which is an implementation in Swedish law of an EC directive on ambient noise.

The action plan should describe activities and areas that need improving, as well as problems that are considered to have priority and the criteria on which these have been selected. The plan should also

include a long-term strategy for handling noise and a description of the noise-reducing measures that are planned to be carried out over the next five years.

Both mapping and the noise action plan are required by the ordinance to be reviewed and redrafted at least every five years and to be reported to the Environmental Protection Agency. The noise action plan for 2014–2018 replaces the previous noise action plan for 2009–2013.

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It is calculated that around 100 000 Gothenburg residents are exposed to traffic noise in their homes that exceeds the national guideline of 55 dBA.

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<sup>1</sup> Decibel A is a unit of sound pressure level that is adapted to resemble the sensitivity of the human ear.



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## BACKGROUND REPORTS

Action plan for noise from buses and trams

Basis for action against traffic noise at preschools and compulsory schools

Basis for noise-control measures in parks and green areas



Photo: Martin Knäuper

# LONG-TERM STRATEGY — GOOD SOUND ENVIRONMENTS IN GOTHENBURG

Gothenburg's high growth target (150 000 more residents by 2035) and its wish to densify the city does not necessarily mean that fewer people will be exposed to noise. In order to increase the density of buildings, great attention must be paid to ambient noise and its effect on human health. The greatest need for measures is in existing environments where the noise situation has deteriorated as a result of the city's growth and the increase in traffic.

In the City of Gothenburg the aim must be to work systematically to take account of good sound environments that either exist or can be created in or near the home, such as in green areas, preschools and compulsory schools, courtyards and urban residential districts. A good urban sound environment is where noise does not disturb sleep and rest in the home or daily activities. There are outdoor spaces for relaxation and recreation in the vicinity of the home, where silence can be felt and the contribution made by

traffic noise is so low that the sound belonging to the location, and that we regard as positive, is able to dominate. In this way the City of Gothenburg can offer an attractive urban environment in which people can live and thrive without any negative effect on their health from noise.

## FOCUS 2014–2018

The aim and purpose of the noise action plan for 2014–2018 is to reduce the negative effect of ambient noise on health by giving the people of Gothenburg access to a good sound environment both indoors and outdoors. The action plan takes a holistic approach to the city's noise problems and strives to create good sound environments in the city, and in addition improve knowledge of noise in the city. The action plan contains the specific measures identified to create a better sound environment in the City of Gothenburg. The action plan will also help to ensure that the sub-goal Good sound environ-

ment in the city's local environmental quality objective Good built environment can be achieved by 2020. The action plan deals with priorities and proposed measures to be taken during 2014–2018. It also proposes how responsibility for implementation should be allocated, when action needs to be taken and also, where possible, the cost of the action.

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The aim and purpose of the noise action plan for 2014–2018 is to reduce the negative effect of ambient noise on health by giving the people of Gothenburg access to a good sound environment both indoors and outdoors.

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Photo: Helena Karlsson



# ROLE OF THE NOISE ACTION PLAN IN THE CITY'S ENVIRONMENTAL WORK

The action plan is intended to serve as an umbrella for measures that are directly intended to reduce noise levels or limit their effect on human health. The action plan is therefore primarily concerned with noise measures in the existing environment, as well as supervisory and coordinating measures regarding noise. See also "Overview of the noise action plan" below.

## THE ENVIRONMENTAL QUALITY OBJECTIVE – GOOD BUILT ENVIRONMENT

The expression of intent that most clearly indicates the preconditions for work on noise in the existing environment is the environmental quality objective Good built environment, which lays down that the built environment has to contribute to a good living environment where resources are used in a sustainable manner. From a Gothenburg perspective it is a matter of creating a city with a good and healthy living environment. Part of the objective of a good built environment is the sub-goal Good sound environment. The overall goal formulation is that the residents should have access to a good sound environment both indoors and outdoors. In addition the sub-goal has been expressed in concrete objectives for homes, preschools and schools and also parks and green areas.

Two of the concrete targets concern noise levels in specific and relatively limited areas: preschools and compulsory schools, and also parks and green areas. The action plan contains two areas for action that are intended to attain the environmental goals.

The concrete target that concerns exposure to noise in homes relates to the

## SPECIFIC OBJECTIVES FOR GOOD SOUND ENVIRONMENT

<b>Residential environment</b>	At least 90 percent of Gothenburg's population have by 2020 at the latest an outdoor noise level at home lower than 60 dBA daily equivalent level at the exposed facade.
<b>Schools including preschools</b>	At least 95 percent of the city's schools, including preschools have by 2020 at the latest access to playgrounds with a maximum 55 dBA daily equivalent level.
<b>Parks and green areas</b>	All city parks have by 2020 at the latest levels below 50 dBA daily equivalent level in the greater part of the park area.

noise level at the facade and requires that we reduce the noise level to below 60 dBA for a further 18 000 people in Gothenburg by 2020. To achieve this target measures have to be taken that reduce the total noise generated by traffic by one or two decibels (when the homes that have a noise level just above 60 dBA will experience lower levels). This work will represent a major challenge to the city and will, for example, necessitate speed reductions, traffic-regulating measures and behaviour-changing measures. This type of action is not included in a general plan in the noise action plan, see section "Delimitations".

The plan contains an area for action to

prevent noise in residential areas that is intended to create a clearer prioritization and to intensify the tempo of the work in the homes most exposed to noise. The area of action will be able to contribute to the achievement of the target for noise exposure in homes.

## CONFLICTING OBJECTIVES

The ambition to densify the city by building homes centrally and close to public transport, plus extending public transport to attain the goal of sustainable travel, represents a conflict of goals with the sub-goal Good sound environment. New homes will, for example, be built

where the noise level outdoors exceeds 60 dBA equivalent levels at the facade. Public transport should run close to homes and workplaces in order to be a real alternative to the car, which increases the amount of noise around homes. To alleviate the conflict of goals there is a need for traffic-regulating measures that reduce noise generation and measures that reduce the noise from public transport. The action plan therefore proposes steps to reduce the noise from buses and trams. Moreover, when planning new housing the city needs to deal with the noise question from a holistic perspective in order to create good sound environments both indoors and outdoors, for example by adaptation of building design and compensatory measures, which is the focus in the production of the city's new noise policy.

## OTHER STRATEGIES AFFECTING THE SOUND ENVIRONMENT

A number of strategic documents also affect and touch upon targets and measures regarding ambient noise. Several strategic projects are in progress in the city which focus on long-term development of the city and which will affect the noise situation in Gothenburg.

Three of these projects are Strategi för utbyggnadsplanering (Strategy for development planning)<sup>1</sup>, Trafikstrategi för en nära storstad (Transport Strategy)<sup>2</sup> and Grönstrategi för en tät och grön stad (Green Strategy for a dense and green city)<sup>3</sup>, all of which concentrate on how Gothenburg is to develop over the next 20 years. The aims are to find the measures in the future that are most conducive to the development of the city for residents, business life and visitors. The environmental effect of traffic must be reduced, with car traffic giving way to pedestrianism, cycling and public transport. Gothenburg is to remain and become even more of a city of green qualities while at the same time we build more densely.

The city's environmental programme proposes measures in those areas that require additional efforts in order to attain the city's environmental objectives. The programme proposes measures contributing to a reduction in noise generation, thus improving the possibility of reducing the effect of noise on human health. These measures are summarized in the environmental programme, see description of sub-goal 33 Good sound environment. Measures that have the greatest significance in lowering noise emissions

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Several strategic projects are in progress in the city which focus on long-term development of the city and which will affect the noise situation in Gothenburg.

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are those intended to increase sustainable travel, including speed-reducing measures and measures designed to reduce car and lorry traffic in favour of cycling, pedestrians and public transport. Implementation of the measures in the noise action plan is also a measure in the environmental programme.

With the aid of the city's noise policy the city can ensure that the question of noise is dealt with, not only in and adjacent to individual homes, but also in the sound environments close to the home. The holistic perspective of sound environments becomes an important component in a city striving to create a mixed building structure and a rich urban life.

<sup>1</sup> Strategi för utbyggnadsplanering: Adopted by the Building Committee on January 14th, 2014

<sup>2</sup> Trafikstrategi för en nära storstad: Adopted by the Urban Transport Committee on February 16th, 2014

<sup>3</sup> Grönstrategi för en tät och grön stad: Adopted by the Parks and Landscape Committee on February 10th, 2014

## GENERAL PLAN FOR THE CITY OF GOTHENBURG

- Strategy for development planning
- Transport Strategy for a close-knit city
- Green Strategy for a dense and green city

## CITY OF GOTHENBURG ENVIRONMENT PROGRAMME

## CLIMATE STRATEGIC PROGRAMME FOR THE CITY OF GOTHENBURG

## ENVIRONMENTAL PROGRAMME FOR TRAFFIC

## OVERVIEW OF THE NOISE ACTION PLAN

CITY OF GOTHENBURG LOCAL ENVIRONMENTAL QUALITY OBJECTIVE GOOD BUILT ENVIRONMENT Good sound environment				
NOISE ACTION PLAN				
PLANNING	NOISE MONITORING	EXISTING ENVIRONMENTS		
Building Committee	Environmental and Climate Committee	Environmental and Climate Committee	Parks and Landscape Committee	Urban Transport Committee
Noise policy	Mapping and Calculations	Supervision	Parks and green areas	Bus and tram
	GIS-tool analyses			Residential areas
	Measurements			Barriers and berms
	Coordination			Preschools

*The measures proposed in the action plan are based on the sub-goal Good sound environment in the city's environmental quality objective Good built environment and deals primarily with noise action in existing environments and environmental monitoring, but in part also noise aspects in new planning. The action plan also deals with different types of supervisory, collaboration and investigative work that need to be implemented for the city to have a structured approach to the noise issue.*

*The schedule also sets out a selection of other programmes and strategic documents that may affect noise propagation. Although these documents don't have improving the sound environment as their primary aim they nevertheless include measures which may lead to this happening.*

# DELIMITATION

The framework for the noise action plan is to reduce the harmful effects of ambient noise on human health. The plan aims to reduce the effects of traffic noise from road and tramway as this is undoubtedly the dominating source of ambient noise. It focuses on a number of areas for action intended to facilitate good sound environments in the city, to contribute to attaining the sub-goal of Good sound environment in the city's environmental quality objective Good built environment and to improve knowledge of noise within the city.

Measures that reduce the effect of traffic noise at the source in a general way, such as reducing speed limits and other traffic-regulating and behaviour-modifying measures, are necessary in order to attain the target for noise exposure at the facade. These measures are proposed in the environmental programme as contributing to the attainment not only of the noise target, but also other environmental goals, and to meeting Gothenburg's long-term challenge to develop into an attractive and sustainable city. To avoid parallel processes these measures are not therefore being dealt with on a general level within the framework of the noise action plan, but will always be considered when deciding upon measures in

specific locations. The action plan needs to be updated on the basis of which measures will be included in the environmental programme and which will not.

The development of quieter vehicle tyres and of quieter vehicles are examples of measures that also affect the occurrence of noise, but over which the City of Gothenburg has no control and therefore are not included in the action plan.

The focus of the noise action plan 2014–2018 means that there are a number of sources of noise that are not addressed in the plan, for example:

- noise from motor racing tracks and building sites
- noise at places of work and health care institutions
- high noise levels at special events
- aircraft noise
- general industrial noise
- the indoor environment of preschools and compulsory schools

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The framework for the action plan is to reduce the harmful effects of ambient noise on human health. The plan aims to reduce the effects of traffic noise from road and tramway as this is undoubtedly the dominating source of ambient noise.

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# MONITORING

The monitoring of the plan ought to be coordinated with the monitoring of the environmental programme as the implementation of the noise action plan is one of the measures in the environmental programme. The Environmental and Climate Committee is therefore responsible for monitoring.



Photo: Helena Karlsson





Photo: Helena Karlsson

# MEASURES 2014–2018

The following pages set out how the city is to work with measures that ensure good sound environments for its residents. The measures are of varying character and cover everything from improving knowledge to proposals for measures in the physical environment.

The action plan is divided between a main document describing the measures and a number of background reports on which these are based. These consist of the action plans and underlying information that have been prepared for buses and trams, schools including preschools and parks and green areas, and are to form a basis for the implementation of the measures.

The main documents contain measures or working methods for each area of action and, as far as possible, the resources required, in the form of staff and capital, in order to implement the measures. The proposed measures and the resource requirements are estimates of the noise-control measures needed in order to assist in attaining the local environmental quality objective and are each summarized in their own information panel.

Each area of action has a target date for its implementation. Those areas in-

tended to attain the environmental quality objective have the same year as the environmental quality objective, 2020. Other areas of the plan have the target year 2018.

The text of each area of action provides a more detailed description of what the measures involve, with a background description and methods of working for 2014–2018.

For specific measures it is important to make a holistic assessment at each individual location in order to find the best solution for the place concerned. It is important to take into account every possible solution and to assess positive and negative effects of each measure. Firstly to review measures that eliminate or reduce the source of noise, secondly to reduce the noise near the source and thirdly to look at measures that protect the recipient from noise.

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It is important to take into account every possible solution and to assess positive and negative effects of each measure.

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## OVERVIEW OF MEASURES

Area of action	Measures	Target year	Responsible committee Implementer/ Convener	Others participating Committees/ authorities / External	Required resources Staff/capital	Policy goal
<b>Sound environment in parks and green areas</b>	Create a task force to work specially on sound and noise in parks and green areas. Initiate external monitoring and study good examples of suitable noise-control solutions in park settings. Produce action plans including prioritization, cost estimates and schedules for measures. Take action in the priority parks so that at least the environmental target is achieved.	2020	Parks and Landscape Committee	Urban Transport Committee , Swedish Transport Administration Environmental and Climate Committee	Need for staff resources to lead and take part in project group and possibly external consultants.  Investment cost for implementation of noise-control measures is estimated to amount to millions, depending on the measures required.	All city parks have by 2020 at the latest levels below 50 dBA daily equivalent level in the greater part of the park area.
<b>Outdoor environments at preschools</b>	Produce prioritization and schedules for identified preschools. Implement action at the preschools with priority for noise-control measures so that the environmental quality objective can be achieved. Supplement investigations already carried out with the aid of the new noise map.	2020	Urban Transport Committee	City Premises Committee Environmental and Climate Committee District Committees Preschool organizations Swedish Transport Administration	Need for staff resources to manage and lead the action.  Capital cost is estimated at SEK 10 million for dealing with 17 preschools.	At least 95 percent of the city's schools, including preschools have by 2020 at the latest access to playgrounds with a maximum 55 dBA daily equivalent level.
<b>Noise-control measures in residential areas</b>	Produce an action plan including priorities, possible measures and, if possible, cost. Informational activities concerning noise-control grant to the property owners where noise-control measures have priority. Inform property owners of the possibility of combining noise-control measures with maintenance and renovation plans.	2020	Urban Transport Committee	Swedish Transport Administration Environment and climate committee	Producing action plan and informational activities implies need for staff resources.  Investment is required in order to be able to implement noise-control measures more rapidly, estimated at SEK 250 million.	The population should have access to a good sound environment outdoors and indoors.
<b>Noise from buses and trams</b>	Implement the measures described in the action plan produced for noise from buses and trams.	2018	Urban Transport Committee	Göteborgs Spår- vägar Västtrafik Environmental and Climate Committee Building Committee	To implement proposed measures implies a need for staff resources. Work on the measures is to some extent in progress. Implementation of measures proposed in the action plan requires capital investment estimated at SEK 125 million.	The population should have access to a good sound environment outdoors and indoors.



Area of action	Measures	Target year	Responsible committee Implementer/ Convener	Others participating Committees/ authorities / External	Required resources Staff/capital	Policy goal
<b>Quiet side</b>	Monitor properties with noise levels above 55 dBA in courtyards and high noise levels from traffic to ensure that the aggregate noise level from installations does not exceed the Environmental Protection Agency guidelines.	2018	Environmental and Climate Committee		Supervision as indicated as a measure requires increased staff resources.	The population should have access to a good sound environment outdoors and indoors.
<b>Barriers and berms</b>	Produce a plan and procedures for maintenance of existing barriers and berms. Create a routine for maintenance contracts for barriers when planning new housing where action on noise is required. Produce a plan for places suitable for berms and for quick handling of filling material for noise control. Compile informational literature on noise barriers addressed to property owners.	2018	Urban Transport Committee	Building Committee (planning permission) Swedish Transport Administration Environmental and Climate Committee	Producing plan, routine and informational material requires increased staff resources.	The population should have access to a good sound environment outdoors and indoors.
<b>Noise policy</b>	Apply current noise policy. Evaluate the noise policy adopted in 2013.	-	Building Committee	Environmental and Climate Committee Urban Transport Committee Real Estate Committee	No resources are expected to be required. On the contrary, application of the policy should lead to a more efficient handling of matters concerning planning and planning permission.	The population should have access to a good sound environment outdoors and indoors.
<b>Noise map</b>	Inform relevant departments of the value and application of the noise map. Make the noise map available on the City of Gothenburg website. Update the noise map regularly.	-	Environmental and Climate Committee	Building Committee (Geo-data)	Within existing budget.	The population should have access to a good sound environment outdoors and indoors.
<b>Areas proposed for investigation before next action programme (2019–2023)</b>	Areas for investigation vary in extent and orientation but are generally intended to: - make use of the opportunities offered by better noise mapping in the city's planning work and action, - coordinate efforts and investigations in existing environments, - create a forum for cooperation both within the city and with other cities, universities, organizations and research institutes.	2018	Environmental and Climate Committee	Urban Transport Committee Building Committee Parks and Landscape Committee Swedish Transport Administration VMC Chalmers Gothenburg University etc.	Staff resources required for managing and coordinating the noise issue and monitoring action taken 2014–2018.	The population should have access to a good sound environment outdoors and indoors.

# SOUND ENVIRONMENTS IN PARKS AND GREEN AREAS

Responsible: Parks and Landscape Committee

To create good sound environments in the city's parks a multi-departmental task force has been instructed to study in detail noise-control measures with a view to finding creative solutions that may be appropriate in a public park setting. The aim does not have to be to create totally silent environments but there should be an attempt to go as far in this direction as possible. There may therefore be reason to protect parts of parks, for example where there are sociotopic values for rest or where there are green oases. The task force should be led by the Parks and Landscape Administration and also include representatives of the Urban Transport Administration and the Environmental Administration. The project leader convenes the force and decides on the skills to which it needs to have access and also allocates the work involved.

The documentation that has been compiled and that forms a supplement to the noise action plan will be used by the task force to produce an action plan with a list of priorities, estimates of costs and a schedule for carrying out the measures. The method of working proposed is intended to attain the local environmental quality objective, i.e. that not later than 2020 all city parks should have noise levels below 50 dBA in the greater part of the park area, and that the remainder of the 10 priority parks will have a good sound environment. The aim is therefore to lead the development of sound environment solutions in parks and green areas in the future.

## Documentation

Representatives of the Environmental Administration, the Parks and Landscape Administration and the Urban Transport Administration have produced documentation that highlights the ten parks where the need for noise control is greatest. Places that have been given priority have high noise levels from traffic and lie in areas where there are generally few quiet spots. An important factor in the work on parks and green areas is that the place must have the potential for becoming a green, quiet oasis with the possibility of recreation in an otherwise noise-exposed area.

The documentation was produced with the aid of the city's noise and sociotopic mapping, which gives an overall picture of the use of the outdoor environment. The analyses of the places have taken into account the sociotopic class and sociotopic values in park environments and green areas that in some way acquire an added value from noise attenuation. Those places that contained such sociotopic values were then examined for noise propagation. The concretization of the environmental quality objective Good built environment identifies all city parks as priority environments for

noise protection before 2020. According to the noise map four of nine city parks have noise levels exceeding the recommended noise guidelines, which mean that the target for noise has not been reached.

## ACTION

- Create a task force to work specially on sound and noise in parks and green areas
- Initiate external monitoring and study good examples of suitable noise-control solutions in park settings
- Produce action plans including prioritization, cost estimates and schedules for measures
- Take action in the priority parks so that at least the environmental objective is achieved

## REQUIRED RESOURCES

- Need for staff resources to lead and take part in project group: Parks and Landscape Committee, Urban Transport Committee, Environmental and Climate Committee and possibly external consultants
- Investment cost for implementation of noise-control measures is estimated to amount to millions: Parks and Landscape Committee



Photo: Helena Karlsson

# OUTDOOR ENVIRONMENTS AT PRESCHOOLS

**Responsible:** Urban Transport Committee

To achieve the environmental quality target at least 17 preschools have to be dealt with before 2020. The erection of noise barriers requires an increased investment of some SEK 10 million. If the preschools are to be dealt with within the implementation period of the action plan this would add around SEK 2 million per year to the cost. However, it is desirable to consider whether the measures can be implemented at a quicker pace in view of the activity. The reason why barriers have been chosen as a measure for noise and cost calculations is to show that it is possible to take action that will meet the 55 dBA requirement and also to obtain an estimated cost that can serve as a basis for budgeting.

Ten of the 18 preschools identified (17 playgrounds) ought to be given high priority for action because they have such high noise levels that they exceed the environmental quality objective by a wide margin. The remaining eight schools have somewhat lower priority but probably exceed the target levels. As new work on noise mapping began in 2013 there ought to be a new analysis of preschools based on this. Action concerning the eight preschools given lower priority ought to await this analysis in case preschools with higher priority appear.

Before a final decision is taken on the measures for each individual location all possible measures should be considered. This means considering not only the erection of noise barriers but also traffic regulation measures and relocation. The location may also be unsuita-

ble from an air quality aspect and every individual preschool should therefore be examined before noise-control measures are planned.

Within the city there is a coordinating group to prevent new schools, including preschools, being located where the children are exposed to high noise levels or harmful air pollution, and so we don't build in future environmental and health problems.

It is recommended that a multi-departmental task force plans and manages the programme of measures. It should also decide on final priorities, a schedule for completion and choice of measures taken. It is proposed that the task force consist of representatives from the Urban Transport Administration, the City Premises Administration and the Environmental Administration. It may also be necessary to bring in representatives from the Swedish Transport Administration, the city district Committees, the property owners and the preschool organizations.

As the body ultimately responsible for upkeep of the roads the Urban Transport Administration ought to be the project leader and coordinate the action taken.

## Documentation

Representatives of the Urban Transport Administration, the City Premises Administration and the Environmental Administration have compiled documentation on traffic noise at preschools and compulsory schools in the City of

Gothenburg that identifies and prioritizes the need for noise-protection measures. The work has been concentrated on preschool playgrounds since the environmental objective for schools has already been met. From a first selection of 58 preschools more detailed reports are presented for 36. For 18 of these there are proposed measures (barriers) and the cost of the measures are given. The documentation forms an appendix to the noise action plan.

## ACTION

- Produce prioritization and schedules for identified preschools
- Implement action at the preschools with priority for noise-control measures so that the environmental quality objective can be achieved
- Supplement investigations already carried out with the aid of the new noise map

## REQUIRED RESOURCES

- Need for staff resources to manage and lead the action. Urban Transport Committee, City Premises Committee, Environmental and Climate Committee
- Capital cost estimated at SEK 10 million: Urban Transport Committee

# NOISE-CONTROL MEASURES IN RESIDENTIAL AREAS

## Responsible: Urban Transport Committee

In order to clarify which properties are to be prioritized for action and to be able to speed up the work, a plan of action has to be produced. Property for prioritization facilitates both the implementation of the measures and the processing of complaints about noise. The documentation also helps to make noise-control efforts more cost-effective if the investment is directed towards dealing with the properties with the highest noise level or which have been given priority for other reasons. The grounds for priority are prepared by the task force for the sub-project, which has representatives of different departments at the Urban Transport Administration, and the Environmental Administration. Factors which should affect prioritization have been identified as follows:

- **noise level at facade** – equivalent level and maximum level.
- **disturbing noise from several kinds of traffic** – places with more than one form of traffic, such as buses, trams and road traffic, also produce different kinds of noise and frequencies and therefore a different form of noise pollution.
- **number of people** – value to the community, greatest effect per invested krona.
- **facades exposed to traffic from several directions** – if the property is exposed to noise from more than one street/track.
- **access to side with lower noise level** – if for example the property has a common courtyard which is protected from noise; if there is no such access the property should have higher priority.

First and foremost the mapping carried out in 2013 will form the basis for a new

and improved analysis of which properties, and parts of properties, are exposed to noise levels where action should have priority.

The action plan will also state which types of measures are feasible and should be given priority at the places that have been identified, such as speed limits in combination with physical speed-reducing measures, quiet asphalt surfacing, barriers, berms or action regarding windows, as well as when measures are planned to be implemented. As barriers are not always suitable in an urban environment, as they need space and often only have a beneficial effect on the lowest storeys of buildings, such solutions will not always be possible. In confined areas modification of the windows may be the only solution.

The action plan will also help the Urban Transport Administration to make a targeted approach where those property owners who have the highest priority will be informed of the possibilities and responsibilities that exist for traffic noise inside dwellings. There may be deviation from the order of priority in cases where building of new housing or roads in the immediate vicinity leads to the erection of a noise barrier. For reasons of cost-effectiveness a screening measure should for example be extended to cover adjacent noise exposed areas to protect existing buildings, even if the existing properties are not of such high priority as determined above. The same applies if there is access to filling material which may mean that places where it is possible to build or reinforce a noise berm have greater priority.

### ACTION

- Produce an action plan including priorities, possible measures and, if possible, cost.
- Informational activities concerning noise-control grant to the property owners where noise-control measures have priority
- Inform property owners of the possibility of combining noise-control measures with maintenance and renovation plans

### REQUIRED RESOURCES

- Producing action plan and informational activities implies need for staff resources: Urban Transport Committee
- Investment is required in order to be able to implement noise-control measures more rapidly, estimated at SEK 250 million, SEK 36 million per year: Urban Transport Committee

## Documentation

The Urban Transport Committee has set a target to prioritise by 2015 measures to deal with noise problems for all those who have an equivalent noise level of at least 65 dBA at the facade of the building, of which half of these will be dealt with by 2010. In 2006 there were 11 000 people in Gothenburg with a level of 65 dBA or more in the home. By 2012 action had been taken with regard to just over 3 000 of these, with the noise level being reduced either at the facade or indoors by modifications to the windows.



# NOISE FROM BUSES AND TRAMS

Responsible: Urban Transport Committee

The action plan for noise from buses and trams has been produced by the Urban Transport Administration to bring up to date proposals for noise-attenuating measures and strategies for public transport. The action plan suggests strategies and specific measures for each type of transport to enable the city to deal with this kind of noise in the future. The actions proposed concern physical measures in an urban environment and on vehicles but also consideration of noise when planning new public transport.

The strategies in the action plan are intended for implementation in between one and three years. Those strategies, over which the Urban Transport Administration and the public transport providers have control, ought therefore to be in place by 2018 at the latest.

Work on some of the proposed measures has already begun. Several of the measures proposed therefore depend on how projects already in progress and tests work out. Certain measures may there-

fore be replaced by others. The objective of the action strategy remains that of dealing with noise from public transport whatever the solution chosen. The action plan is available in its entirety as an appendix to the noise action plan.

## Documentation

As the densification of Gothenburg proceeds, the city aims to increase the number of journeys made by public transport. This will partly be achieved by improving accessibility to public transport and running more frequent services. Densification of the city in combination with the planned extension of public transport imply in the short term conflicting goals that have to be reconciled. One of these is noise. Keeping noise from buses and trams to a minimum is essential if Gothenburg is to be a pleasant city for residents and visitors.

An action plan for noise from buses and trams has therefore been produced as part of the noise action plan.

## ACTIONS

- Implement the measures described in the action plan produced for noise from buses and trams

## REQUIRED RESOURCES

- To implement proposed measures implies a need for staff resources. Urban Transport Committee
- Work on the measures is to some extent in progress. Implementation of measures proposed in the action plan requires capital investment estimated at SEK 125 million, 25 million per year: Urban Transport Committee



Photo: Helena Karlsson

# QUIET SIDE

Responsible: Environmental and Climate Committee

The city's work on quiet sides in existing environments will be directed towards improving the noise environment in homes that are exposed to high noise levels on the traffic side of the building. The aim of the measures is to tackle noise problems in courtyards, i.e. the side of the home that is meant to be the quiet or noise-attenuated side. This will be done by reducing the noise level in courtyards and also by supervision to ensure that the property owners themselves take steps to prevent high noise levels from other installations.

The Environmental Administration will therefore prioritize supervision activities to properties around courtyards that have high noise levels from installations and are at the same time exposed to high levels of traffic noise. The baseline is the Environmental Protection Agency's guidelines for external industrial noise.

The Environmental Administration will require action plans, demand measures where applicable and carry out follow-up inspections of the properties concerned.

## Documentation

The quiet side in a residential building ought to be a side with a noise level of under 45 dBA (Leq free-field value) as a total level from traffic, fans and similar installations. The Environmental Administration has previously made indicative measurements of the noise level of some 700 courtyards in the city. Around 400 of these courtyards had noise levels of over 45 dBA and about 70 of them over 55 dBA. A comparison of exposure calculations for traffic noise confirmed that 60 % of the persons exposed to more than 65 dBA have a noise level on the courtyard side of under 50 dBA. 20 % have less than 45 dBA.

## ACTIONS

- Monitor properties with noise levels above 55 dBA in courtyards and high noise levels from traffic to ensure that the aggregate noise level from installations does not exceed the Environmental Protection Agency guidelines.

## REQUIRED RESOURCES

- Supervision as indicated as a measure requires increased staff resources. Environmental and Climate Committee



Photo: Martin Knappe



# BARRIERS AND BERMS

## Responsible: Urban Transport Committee

The aim of the measure is to identify places for new berms if there is a surplus of filling material (new barriers are assumed to come into other projects concerning housing, parks and school environments) and ensure maintenance of existing noise control.

The action taken should therefore include an inventory of and reporting on the need for supplementation and renovation of existing barriers and berms and an inventory of areas where barriers can and should be built. The point of designating suitable places for berms is to facilitate quick handling of excess excavated material. The action is also indicated in the City of Gothenburg's environmental programme.

There is a problem in dealing with the maintenance question with regard to new noise barriers erected by building contractors when building new housing or business premises. It is not uncommon at present for barriers to be erected on the boundary of the property without there being information specifying who is responsible for maintenance. Clear establishment of responsibility for maintenance of barriers erected in the city

is essential to the effectiveness of the measure and to the efficient use of the city's resources.

A measure that should be taken by the Urban Transport Administration and the City Planning Authority jointly is to provide written information to property owners on the building of noise barriers. The aim is to make sure that barriers erected privately give adequate noise protection and are appropriately designed.

## Documentation

The Urban Transport Administration is responsible for the maintenance of noise barriers and berms on municipal land. Barriers are listed in the administration's database with construction records and information on lengths and types of material. Photos and maps are also collected here. An inspection and inventory of noise barriers last took place in 2009 and is planned to be repeated every six years. There has not been a maintenance plan for barriers so it is necessary to produce one as part of the action plan.

## ACTIONS

- Produce a plan and procedures for maintenance of existing barriers and berms
- Create a routine for maintenance contracts for barriers when planning new housing where action on noise is required
- Produce a plan for places suitable for berms and for quick handling of filling material for noise control
- Compile informational literature on noise barriers addressed to property owners

## REQUIRED RESOURCES

- Producing plan, routine and informational material requires increased staff resources Urban Transport Committee



Photo: Helena Karlsson

# NOISE POLICY

## Responsible: Building Committee

For the City of Gothenburg it is important to be able to add housing, workplaces and service amenities around strategic nodes and in the city centre in order to achieve the goals of the master plan with regard to the city's development. Many of the areas earmarked for densification are adjacent to roads, railways and business areas with high noise levels. In order to create a dense city with a mixture of functions it is necessary to take full account of ambient noise and its effect on people's health. The Noise policy therefore fulfils an important function in the planning of the city.

In 2012 the directors of the technical departments decided that a new noise policy should be developed, which as well as noise in and beside dwellings also covered the noise environment in the vicinity of the dwelling. This may for example apply to parks or compulsory schools and preschools, in other words outdoor environments that are important for recreation and learning.

The work is being done as a multi-departmental project with the Building Committee together with the Environmental and Climate Committee as project leaders. The project is in progress. Action taken during the period of implementation will therefore adhere to the policy that will be developed. Towards the end of the period the policy should also be reviewed and evaluated.

## Documentation

The City of Gothenburg has a responsibility towards the population for plan-

ning a sustainable infrastructure and urban environment where people are not exposed to the unhealthy effects of traffic or other disturbances around the city. Taking account of ambient noise levels when siting housing, schools and parks is therefore the responsibility of the municipality. The City of Gothenburg is also responsible for traffic noise in the city, being the body responsible for upkeep of the roads, and planner of public transport and the city's municipal road network.

As planning support the city has had a multi-departmental municipal application of the guidelines for noise that were adopted in 2006. Application of these guidelines has been used in the planning and building process since then.

In 2008 the National Board of Housing, Building and Planning presented its General Advice, "Buller i planeringen – planera för bostäder i områden utsatta för buller från väg- och spårtrafik". [Noise in Planning – plan for housing in areas exposed to noise from road and rail traffic.]

### ACTIONS

- Apply current noise policy
- Evaluate the noise policy adopted in 2013

### REQUIRED RESOURCES

- No resources are expected to be required. On the contrary, application of the policy should lead to a more efficient handling of matters concerning planning and planning permission.

Guidelines in the general advice differ in several ways, and not wholly irrelevantly, from the guidelines in the city's application document, which has generated argument on how the noise question is to be treated in new planning in the city. Together with new research in the field of noise, from both the health and the planning aspect, the need has arisen for an update of the municipal handling of noise when planning and where new building takes place.

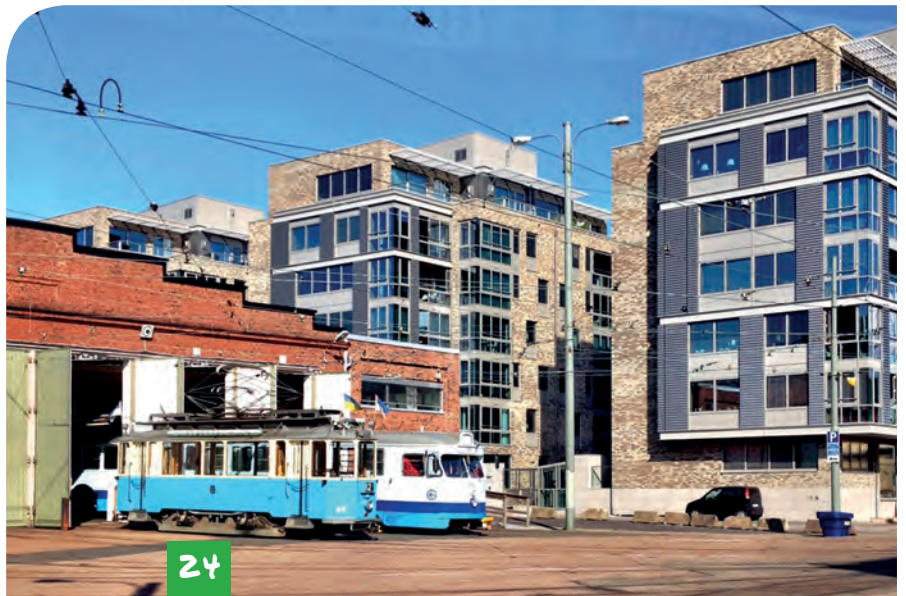


Photo: Helena Karlsson



# NOISE MAP

Responsible: Environmental and Climate Committee

The purpose of this measure is to ensure that there is a comprehensive and up-to-date noise map in the city's internal mapping tool Infovisaren. The map should cover as much as possible in order to be a useful tool for the city's officers in community planning, dealing with building permission, and handling complaints. It should be updated regularly for use as a relevant and practical tool. The documentation should facilitate correct and consistent processing of matters that are in any way connected with noise.

Work has begun on producing a map and is expected to be completed during 2013. All departments affected will have access to the map when it is complete and

in the future parts of it, at least, should be made available to the public on the city website.

The Environmental Administration, aided by the City Planning Authority (Geo-Data), is responsible for carrying out the project.

## ACTIONS

- Inform relevant departments of the value and application of the noise map
- Make the noise map available on the City of Gothenburg website
- Update the noise map regularly

## REQUIRED RESOURCES

- Within existing budget: Environmental and Climate Committee





# AREAS PROPOSED FOR INVESTIGATION BEFORE THE NEXT NOISE ACTION PLAN

Responsible: Environmental and Climate Committee

## COORDINATION

- Initiate a multi-departmental group for collaboration on noise-related issues (noise network)
- Develop and create room and platforms for collaboration on noise-related issues with research institutes, universities and experts

## REQUIRED RESOURCES

- Staff resources required for managing and coordinating the noise issue and monitoring action taken 2014–2018: Environment and Climate Committee.

## NOISE PROTECTION MEASURES

- Work for the testing of innovative noise-attenuation solutions (in new and existing environments) in Gothenburg.
- Test and evaluate noise attenuation in the form of green roofs and other soft surfaces (examine the possibility of pilot projects on municipal properties).
- Test and evaluate speed reductions and variable speeds

## SUPPLEMENTARY INVESTIGATIONS

- Strengthen and clarify the link between noise levels and health effects in efforts to limit noise.
- Examine the possibility of evaluating the effect of noise in housing (examine factors such as rate of moving or property values)
- Examine the possibility of combining noise control with other aims (solar panels, bus stops, green areas)
- Examine noise at bridges and tunnel mouths for more reliable models for calculation

## CITY AND TRAFFIC PLANNING

- Examine the possibility of using sound planning and sonotopes (soundscapes) in city planning and of deciding which sounds are desirable in a specific area and plan accordingly
- Identify and preserve quiet and noise-controlled areas of the city

## DOCUMENTS AND PROCEDURES

- Create a tool kit for different noise-attenuating solutions and their effects
- Examine the possibility of introducing operating agreements where the city or the entrepreneur accepts noise-attenuating undertakings in new planning facilitated by the detailed development plan, e.g. building noise barriers, reducing speeds, prohibiting studded tyres (environmental programme measures).

During production of the noise action plan proposals were made regarding areas for consideration that can be included in the work on the next action plan. The proposals can facilitate new solutions to noise-reducing problems in the city and help to keep the City of Gothenburg at the forefront of city planning as far as noise levels are concerned. The more detailed work can help to lay the foundation for a review of the action plan that should be ready in 2018, just as each sub-project prepared documentation for action for the present action plan.

The areas for examination vary in scope and orientation but are generally intended to:

- utilize the possibility of better noise mapping for the city's planning and measures
- coordinate efforts with and reports on existing environments
- create coordination forums both within the city and with other cities, universities, organizations and research institutes

It is the task of the Environmental and Climate Committee to lead the city's

environmental strategy processes and propose action and decisions within the environmental area. The proposal is also that the Environmental and Climate Committee is responsible for coordination and production of the next action plan. It is therefore reasonable for the Environmental and Climate Committee also to coordinate work on new areas for action. Some of the measures proposed are research projects whereas others can be tested and implemented by the city.

For efficient handling of the noise question and new areas for action there should be a multisectoral noise group to deal with general questions. The development of new solutions for noise attenuation will continue and will still need to be tested in practice. The hope is that the City of Gothenburg will be very prominent in creating an organization where it is simple to carry out these types of tests and pilot projects with research experts and the business sector.

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Some of the measures proposed are research projects whereas others can be tested and implemented by the city.

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# PRODUCTION OF THE NOISE ACTION PLAN

The previous noise action plan was adopted by the City Council in 2009 and applies to the period 2009–2013. That action plan was very general in nature and has not led to action being taken to any greater extent than was already being done, in other words measures involving window replacement in housing and in a few isolated cases screening measures.

The intention when producing the noise action plan for 2014–2018 has been to

take an entirely new approach, in the light of experience of the management and effect of the previous plan. The focus has been on a more detailed plan that gives support to a wider range of measures. The intention has been to take a holistic approach to the city's noise problems and to permit the creation of good sound environments in the city, and also to improve knowledge of noise within the city. In the course of the work the goal of a Good built environment

was added to the local environmental quality objective, which has also made the possibility of attaining the sub-goal of Good sound environment one of the objectives.

The work of producing the noise action plan has been carried out as eight sub-projects since 2010. The Environmental Administration has coordinated the work and representatives of the City Premises Administration, the Parks and Land-

Sub-projects 2010–2012		Departments participating	Documentation produced
<b>Outdoor environments, schools and preschools</b>	Make an inventory of and produce action plans for playgrounds at preschools and compulsory schools with high noise levels	City Premises Administration, Environmental Administration, Urban Transport Administration	Basis for measures on traffic noise at preschools and compulsory schools
<b>Sound environments in parks and green areas</b>	Establish which parks or recreational areas it is important to protect from noise and identify and prioritize action	Environmental Administration, Parks and Landscape Department, Urban Transport Administration	Basis for measures against noise in parks and green areas
<b>Noise-control measures in residential areas</b>	Identify and establish priority between residential areas exposed to noise in regard to work on noise-control measures	Environmental Administration, Urban Transport Administration	Grounds for priority
<b>Mapping tool</b>	Develop a comprehensive noise map in Infovisaren that can be used as a tool by city employees in community planning, dealing with building permission, answering complaints	Environmental Administration, City Planning Authority, Urban Transport Administration	
<b>Noise policy</b>	Create a shared vision on how the city should deal with noise from traffic and businesses in conjunction with planning or new building of housing	Environmental Administration, City Planning Authority, Urban Transport Administration, Real estate Administration	Project plan
<b>Noise from buses and trams</b>	Deal with the subject of noise when procuring, operating and maintaining public transport facilities	Environmental Administration, Urban Transport Administration	Action plan for noise from buses and trams
<b>Quiet side</b>	Ensure a quiet sound environment in courtyards in environments exposed to noise	Environmental Administration	Monitoring strategy
<b>Barriers and berms</b>	Create routines for care and maintenance of existing noise barriers and berms and point out possible sites for berms	Environmental Administration, City Planning Authority, Urban Transport Administration	



scape Administration, the City Planning Authority and the Urban Transport Administration have taken part in the different projects. The sub-projects have facilitated multi-departmental work on the various dimensions of the issue of

noise, which has led to greater knowledge and clearer prioritization of the city's efforts. The aim of the sub-projects has been to create a basis and input data to give the city a good platform on which to build when specifying measures and

strategies in the noise action plan 2014–2018 and the ongoing work on noise. In the case of several of the sub-projects this has resulted in documentation or in action plans for the continuing work.

