



Sonic Urbanism for Cities

A Practical Guide for
the ReSilence Toolkit and Framework

For Municipal Planners, Urban Designers, Policymakers, and City Innovation Teams



Why Cities Should Care About Sound

Cities should care about sound because sound is an invisible infrastructure of urban life — the nervous system of the city. Through its vibrations and resonances, it connects bodies, spaces, and communities, shaping how people perceive their environment, experience emotions, and interact with one another. As ReSilience suggests, the city is not only built from streets and buildings but also from voices, rhythms, and atmospheres that form its sonic ecosystem.

By treating sound as a material, rather than merely a pollutant, cities can create more liveable, inclusive, and meaningful urban environments. Instead of asking how loud a city is, we need to ask how can we **Understand, Listen, Compose and Anticipate** the future city.

The Sonic Urbanism framework consists of four phases, forming a cycle of listening, analysis, design, and anticipation.

"This guide introduces a framework municipalities can use to integrate soundscape thinking into planning, policy, and urban design."



LISTEN

Observe and document urban sound environments through soundwalks, recordings, and participatory listening activities.



UNDERSTAND

Analyze sonic patterns, behavioral responses, emotional perception, and environmental context to extract insights.



COMPOSE

Design sonic interventions through participatory methods, spatial sound design, and mobility acoustics.



ANTICIPATE

Plan for sonic futures across practical, speculative, ecological, social, and experimental dimensions.

The L-U-C-A Process: Cities can enter at any phase and return to previous phases as needed.

Tools for Cities

The Sonic Urbanism framework draws on a range of methods and technologies documented in the [ReSilence Toolkit](#) — an open platform featuring 20 tools developed through the residency programme. The tools presented here are selected examples, illustrating possible approaches that can be adapted or combined depending on local contexts.



Listen Phase Tools

Listening Templates

Structured forms for documenting listening observations

Sonic Drift

Soundwalk methodology for urban exploration



Understand Phase Tools

Eco-Acoustic Environment Analysis

Computational analysis module

PyEyesWeb

Multimodal behavioral analysis platform



Compose Phase Tools

Invisible Choir

Participatory sound composition system

ReSilent app

Urban noise masking mobile app



Anticipate Phase Tools

BLOOMS

Data-driven sonic future scenarios

D.RIVE

Experimental mobility sound design

Note: Cities do not need to use all tools. Select methods that match your resources, goals, and local context. Many tools can be adapted or replaced with locally developed alternatives.

Listen — Diagnosing the Urban Soundscape

Cities begin by actively observing and documenting their sound environments. This phase combines direct listening and field documentation, with GDPR-safe data capture.

Key Actions



1. Conduct Soundwalks

- Organize guided listening walks through specific urban areas with planners, residents, and stakeholders.
- Spend time at selected locations to listen attentively and document dominant, background, and unexpected sounds.



2. Record Urban Sound Environments

- Capture acoustic samples at different times and locations through active field walks or stationary logging points.
- Combine these with community feedback to document layers of the urban soundscape and build a local sonic archive.



3. Map Sonic Features

- Create spatial maps of sound sources, quiet zones, acoustic landmarks, and areas of perceived discomfort or stress.
- Geolocate recordings and observations to produce datasets and mapped outputs (e.g., GeoJSON or CSV) for further analysis.

Expected Outcome: A qualitative and mapped understanding of how urban sound is experienced, providing an initial diagnosis of dominant sound sources, valued or restorative sound environments, areas of acoustic stress, and spatial patterns of sound perception. This data examines the sounds that matter to communities and can then be analysed in the *Understand* phase to identify sonic indicators and inform planning decisions.

Example Tools for Municipalities



1. Listening Templates

Structured forms for documenting listening observations (providing ethnographic insights), including perceived sound sources, emotional impressions, and spatial qualities.

Soundwalk Template

Interactive form for documenting soundwalk observations and experiences

Export Data

Basic Information

Title e.g., Downtown Waterfront Soundwalk	Date mm/dd/yyyy
Location(s) e.g., Vancouver, BC	Participants e.g., 12 community members
Facilitator e.g., Dr. Sarah Johnson	

1: Route Description

Starting Point
e.g., City Hall Plaza

Key Stops (list 4-8 sites)
e.g., 1. City Hall Plaza, 2. Market Street, 3. Waterfront Park...

Ending Point
e.g., Community Center

2: Observations at Each Stop

Add Stop

Stop #1

GPS Coordinates 49.2827° N, 123.1207° W	Time --:--	Weather Sunny, 18°C
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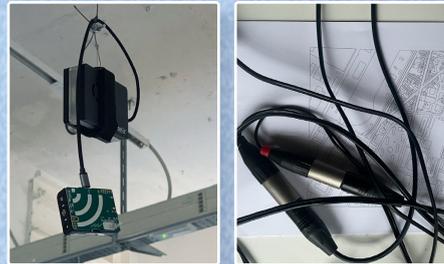
2.1 What do you hear?

Dominant sounds
Traffic noise, construction machinery...



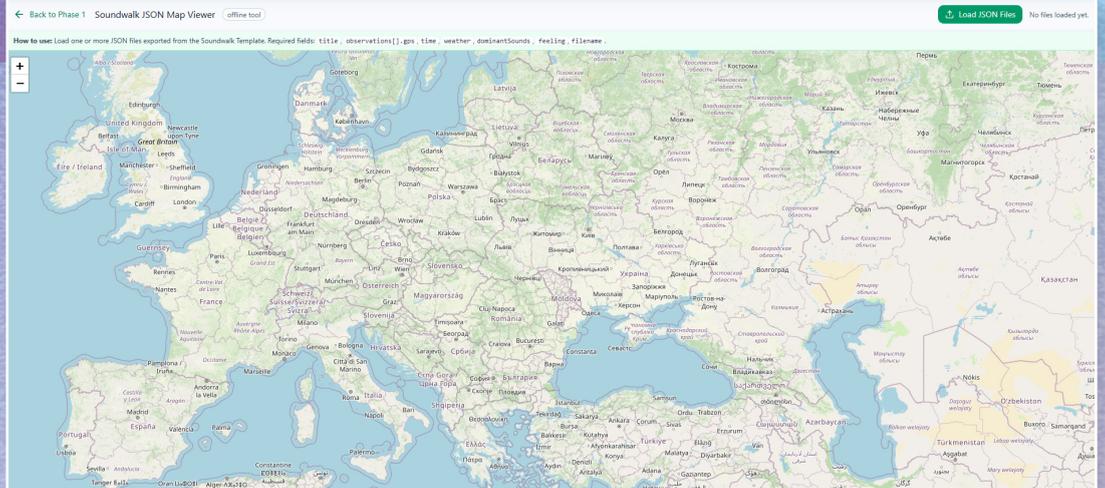
2. Sonic Drift (Caroline Claus)

Field Score and the Field Recording Protocol, which together define how sonic data are collected in the city through situated listening, active sidewalk recordings, passive rooftop logging, and public or stakeholder feedback sessions.



3. Soundwalk JSON Map Viewer

An interactive map for visualizing soundwalk observations using JSON files generated from the template.



Understand — Analysing Sonic Patterns

In this phase, cities analyze the data collected during the Listen phase to identify patterns, relationships, and actionable insights.

Key Actions



1. Understand what types of sounds shape an urban space

- Cities need to understand not only how loud an environment is, but what kinds of sounds are present and how they affect people.
- Eco-acoustic analysis assesses urban sound environments by identifying dominant sources (e.g., statistical analysis, comfort-over-time traces), estimating domain presence (biophony, anthropophony, technophony), and evaluating stress and calm levels using AER and the Valence – Arousal model, mapped on a normalized 0 – 1 2D scale.



2. Measure how people experience sound environments

- Cities need to understand not only what people say about sound, but also how they physically and emotionally respond to it.
- Multimodal experience analysis combines different types of data to evaluate how sound environments affect people in real-world conditions, including physiological data (e.g. heart rate, breathing), self-reported experience (surveys, feedback), and audio / environmental data.



3. Analyse Behavioural Responses to Sound

- Cities need to understand not only how environments sound, but how people physically respond to them.
- This step focuses on observing how sound influences movement patterns, stability and comfort, and social interaction.

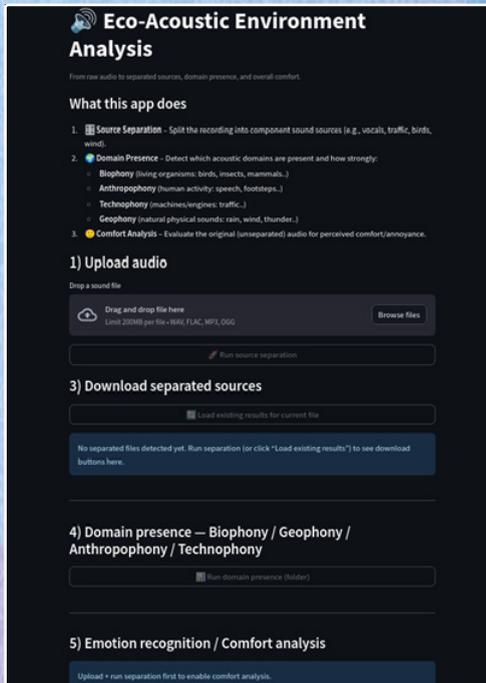
Expected Outcome: Clear understanding of which sound issues to address, where interventions are needed, and what design goals to prioritize.

Example Analysis Tools



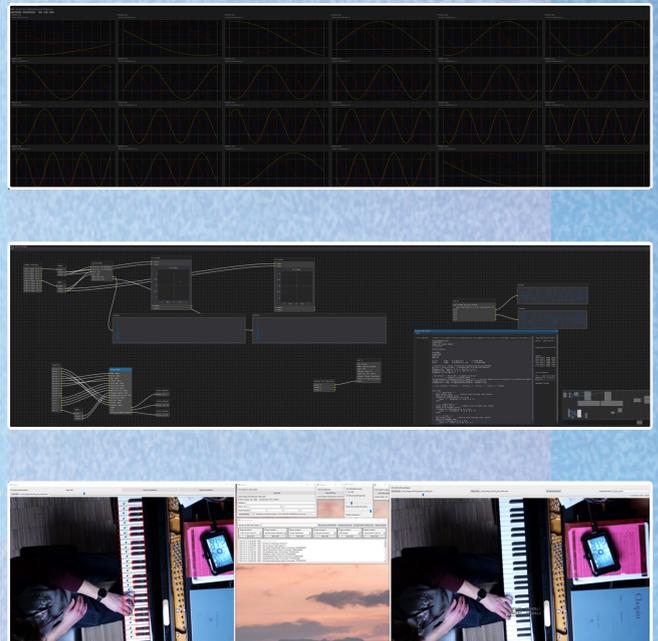
1. Eco-Acoustic Environment Analysis

Computational analysis module with interface outputs (stems, domain summary, valence–arousal trace).



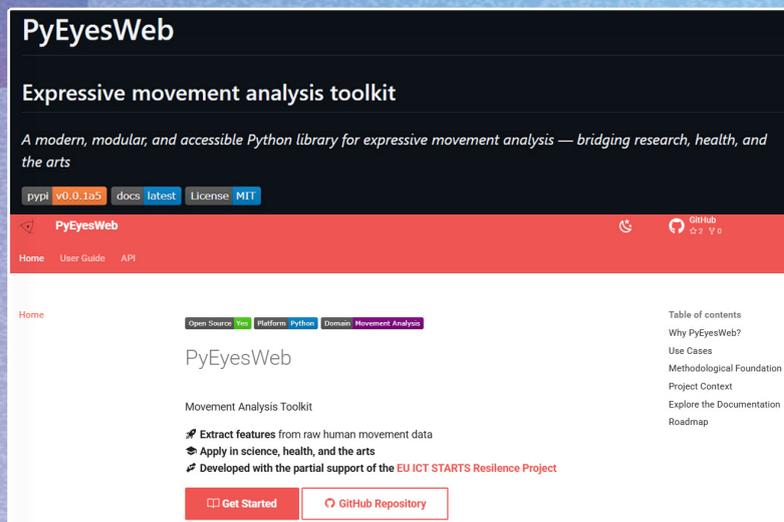
2. Multimodal Analysis

Framework for synchronization, visualization, storage, prototyping, and analysis of multimodal data.



3. PyEyesWeb | Movement Analysis

Software modules for analyzing individual and group movement behavior in relation to changes in urban soundscapes, supporting the assessment of intrusiveness and its impact on performance and stability.



Compose — Designing Sonic Interventions

With insights from listening and analysis, cities can now design and prototype sonic interventions. This phase emphasizes participatory co-design and spatial sound planning.

Key Actions



1. Create shared, location-based sound environments

- Develop participatory sound interventions where citizens contribute voices or sounds to create collective, site-specific soundscapes in public space.
- Use mobile or web-based tools to generate dynamic audio experiences that evolve based on location, presence, and interaction.



2. Design of urban spaces that promote wellbeing and accessibility

- Create sensory-friendly environments that support relaxation, inclusion, and emotional regulation, particularly for users with sensory sensitivities.
- Integrate adaptive sound, light, and spatial design to develop responsive environments that adjust to user movement, presence, and behaviour.



3. Reduce intrusive sounds through adaptive sound masking

- Apply perceptual sound strategies to reduce the impact of intrusive or stressful sounds without necessarily removing them at the source.
- Use real-time sound processing tools to generate adaptive background audio that softens and blends disruptive sounds in urban environments.

Expected Outcome: Co-designed and tested sonic solutions that improve urban sound quality, support wellbeing and inclusion, while enabling those shaping urban environments to implement practical, scalable interventions.

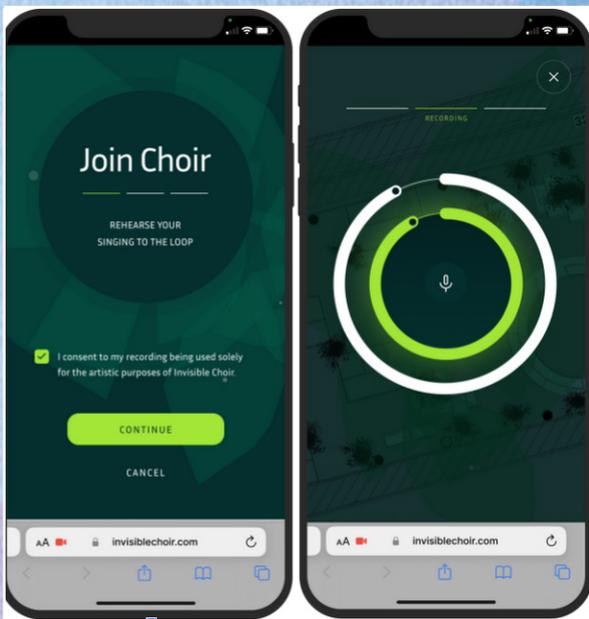
Example Tools for Municipalities



1. Invisible Choir

(Ari Benjamin Meyers & Halsey Burgund)

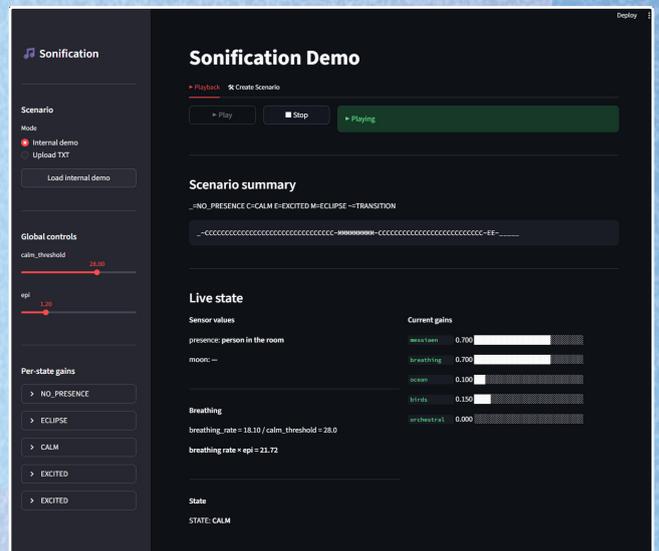
Participatory sound tool enabling people to co-create evolving, location-based soundscapes through their voices. On-site vocal recordings are layered into a dynamic, collective "choir" shaped by ongoing participation.



2. Echoes

(Loukia Tsafoulia & Severino Alfonso)

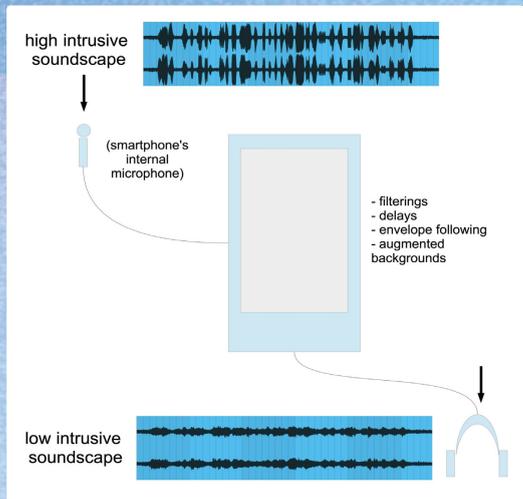
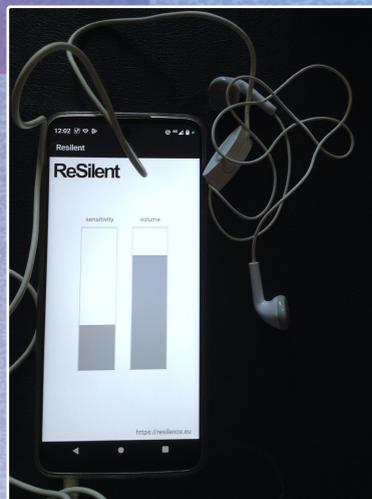
Integrated platform combining software modules and detection tools to foster awareness of neurodivergent spatial experiences, support sensory self-regulation, and illustrate how digital tools mediate multi-sensory well-being.



3. ReSilent app

(Andrea Cera)

An Android app that reduces intrusive urban sounds by generating background tones through headphones that mimic and mask unwanted noise.



Anticipate — Planning Sonic Futures

This phase enables cities, communities, and cultural actors to imagine their sonic futures through immersive experiences and participation.

Key Actions



1. Explore Future Mobility Sound Environments

- Explore how the transition to electric mobility is transforming the acoustic experience of the city.
- Develop new sound design approaches for mobility environments that respond to user experience across diverse urban contexts.



2. Integrate Ecological Sound Design into Urban Planning

- Design sound environments that support biodiversity, environmental awareness, and climate-responsive urban spaces.
- Use environmental sound systems to introduce natural and ecological sound layers into public spaces and explore multispecies sound interactions.



3. Address Sonic Inequality and Support Community Identity

- Experience sound as a cultural, social, and political resource, shaping identity, memory, and inclusion.
- Engage communities in documenting and shaping their sonic environments to support representation and inclusion.

Expected Outcome: Stakeholders engage in imagining and testing future sonic environments, including preferred, alternative, and experimental soundscapes, through the use of participatory and speculative tools (e.g. scenario workshops), exploring how sound can shape future urban life.

Example Tools for Municipalities



1. D.RIVE

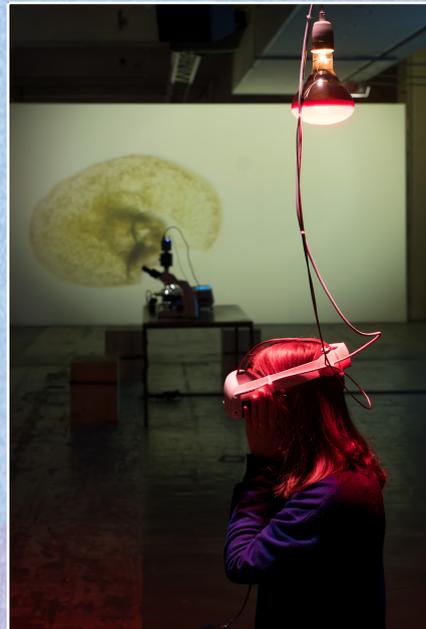
Interactive installation that examines how the electrification of mobility is reshaping the acoustic and perceptual conditions of the city.



2. BLOOMS

(Wendy Chua, Joyce Koh & Gustavo Maggio)

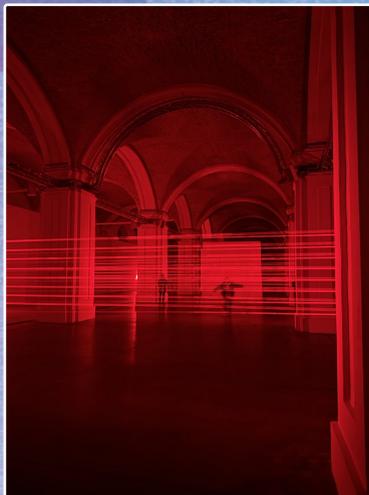
Multi-sensory VR tool combining data sonification, spatial audio, and haptic feedback to explore aquatic ecosystems and algal bloom dynamics.



3. Reds Are Always Longer?)

(Alevtina Kakhidze)

Research tool combining interviews, surveys, and VR-based audiovisual simulations to explore emotional and color associations with war sounds, informing artistic narratives.



How Cities Can Test Sonic Urbanism

This indicative 3-month pilot timeline enables municipalities to experiment with a selection of Sonic Urbanism tools, adapting them to their specific and integrating other relevant methods as needed to support sound-aware urban design.

Week 1-2

Project Preparation

- Define pilot area and stakeholders
- Assemble project team (planners, researchers, community liaisons)
- Identify key questions and goals
- Prepare listening tools and templates

Week 3-5

Listening and Sound Mapping

- Conduct soundwalks with residents and staff
- Record sound samples at different times and locations
- Collect community listening experiences
- Map sonic features and problem areas

Week 6-7

Analysis

- Analyse sound sources and patterns
- Identify behavioral and emotional responses
- Synthesise findings into planning insights
- Present preliminary results to stakeholders

Week 8-10

Design and Prototype

- Co-design workshops with community
- Develop 1-2 prototype interventions
- Test interventions in pilot area
- Gather initial feedback

Week 11-12

Evaluation and Next Steps

- Evaluate pilot project outcomes
- Document lessons learned
- Plan for scaling or permanent implementation
- Present final report to decision-makers

Where Cities Can Apply Sonic Urbanism

Sonic Urbanism principles enable cities to move beyond noise control towards soundscape design across diverse urban contexts. Each of the following application areas follows the L-U-C-A process, from observation to future planning.

Public Squares and Plazas



Integrate social activity, rest, and cultural expression in inclusive sound design.

[L] Capture diverse user experiences and sensory responses across different times and uses

[U] Identify acoustic and perceptual needs, including sensitivity, overstimulation, and accessibility

[C] Introduce adaptive and inclusive interventions (e.g. responsive, multi-sensory installations such as Echoes)

[A] Test future sound environments supporting wellbeing, inclusion, and self-regulation

Mobility Corridors



Improve the acoustic experience of movement while reducing traffic-related impact.

[L] Map sound intensity, temporal variation, and emerging mobility conditions

[U] Analyse behavioural and perceptual responses to evolving mobility soundscapes

[C] Rethink vehicle–environment interaction through experimental sound design (e.g. D.RIVE)

[A] Explore adaptive and biomimetic mobility sound solutions (e.g. B:N:S)

Parks and Green Spaces



Enhance restorative soundscapes by addressing perceptually intrusive sounds.

[L] Document natural, human, and technological sound interactions, including intrusive events

[U] Assess perceived calmness and bodily responses to sound intrusiveness

[C] Enhance biophony and mask intrusive sounds (e.g. ReSilent app)

[A] Plan low-intrusiveness soundscapes that support climate and biodiversity

Nightlife Districts



Balance cultural vibrancy with residential wellbeing through sound-aware planning.

[L] Capture nighttime sound profiles and user experiences

[U] Identify thresholds of tolerance, conflict points, and spatial usage patterns

[C] Develop adaptable spatial sound environments for cultural use (e.g. An Uaimh Bhinn)

[A] Test scenarios for flexible, multi-use nightlife spaces that support coexistence

Urban Regeneration Projects



Embed soundscape thinking from the early stages of planning and redevelopment.

[L] Collect spatiotemporal sound data and document sensory conditions

[U] Analyse acoustic quality, lived experience, and “sonic space shifts” from urban transformation

[C] Integrate data-driven and experiential sound analysis into design processes (e.g., Sonic Drift)

[A] Explore future urban soundscapes with affective mapping and GIS analysis

Towards Sound-Aware Cities

Sonic Urbanism offers cities a practical framework for moving beyond noise control towards actively designing urban sound environments that support health, inclusion, and vibrant public life.

How Municipalities Can Start

1

Run a Pilot Project

Test the ReSilence tools in a specific neighborhood or urban context using the 3-month timeline outlined in this guide.

2

Integrate Soundscape Analysis into Planning

Include soundscape impact, beyond noise levels. Define acoustic qualities that support wellbeing and inclusion. Address evolving urban sound environments (e.g. electric mobility).

3

Build Partnerships

Collaborate with universities, sound artists, cultural organizations, and community groups to bring diverse expertise and perspectives.



Cities that actively design their sound environments

can create more inclusive, and more vibrant urban spaces.

For More Information:

<https://resilience.eu/resilience-toolkit/> | https://resilience.eu/sonic_urbanism_framework/