

Planning Information Sheet: Considering Community Noise Issues Through Comprehensive Planning and Ordinances



Metropolitan Design Center

Version 1.0

DESIGN FOR HEALTH is a collaboration between the University of Minnesota and Blue Cross and Blue Shield of Minnesota that serves to bridge the gap between the emerging research base on community design and healthy living with the every-day realities of local government planning.

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Overview

The Design for Health (DFH) *Planning Information Sheet Series* provides planners with useful information about opportunities to address important health issues through the comprehensive planning process and plan implementation. The series addresses a range of health issues that are relevant to many communities and can be integrated into local plans and policies. This information sheet discusses a number of opportunities that planners have to address community noise issues through planning and policy approaches.

loss; interference with speech communication; disturbance of rest and sleep; physiological, mental-health, and performance effects; effects on residential behavior and annoyance; and interference with intended activities. Special populations such as the young, elderly, blind, and people with certain medical conditions face even greater potential health effects

Key Points

- Depending upon the intensity, community noise (also referred to as environmental and neighborhood noise) can cause noise pollution. Harmful and unsafe noise pollution is where noise levels are greater than 70 decibels adjusted (dBA).
- The main sources of community noise include road, rail, and air traffic; industries; construction; and neighborhood activities, such as recreation and lawn care.
- Mitigating the effects of harmful noise pollution involves the collaboration of federal, state, and local levels of government. There are a variety of policy and planning approaches used for dealing with noise-related issues such as noise ordinances, noise assessments (models for forecasting and assessing source control action), noise limits and regulations, noise-compatible land use controls, noise barriers, and environmental impact assessment.
- Research is mixed and inconclusive regarding the influence of noise pollution on human health. To develop well-defined controls on noise, future research is needed to address the different types of noise, how it is measured, where noise comes from, and its effects on people.
- Based on our current knowledge, health outcomes associated with noise pollution include: hearing impairment and hearing



Housing located near freeways and rail lines is susceptible to traffic related noise.

Understanding the Relationship between Noise, Health and Planning

Community or neighborhood noise is emitted from a variety of sources including roads, rail, air traffic, industries, construction and neighborhood activities (Babisch 2006; Wende & Ortschield 2003). The health consequences of harmful levels of noise can be significant, including hearing impairment and loss, interference with speech communication, disturbance of rest and sleep, as well as the potential for physiological (e.g. heart rate, blood pressure), mental-health and performance effects (Bronzaft et al., 1998). It has been shown, mainly for workers and children, that noise can adversely affect performance of cognitive tasks. Although noise-induced arousal may produce better performance when doing simple tasks, cognitive performance substantially decreases for more complex tasks. Tasks such as reading, problem solving and memorization are among the cognitive activities most strongly affected by noise (WHO 1999). In addition to these health effects, noise can be an annoyance

and interfere with one’s day-to-day activities (WHO 1999). Table 1 below shows the average sound levels, in decibels, of typical noise sources. Hearing impairment or loss can occur at decibel levels of about 70.

Vulnerable subgroups of the general population should also be considered when recommending noise mitigation or regulations. These groups include: the elderly; young children; persons with existing diseases or medical problems; persons dealing with complex cognitive tasks (e.g. learning to read); and persons who have sight, hearing, or learning impairments. Because people in these groups may be less able to cope with noise exposure, they may be at higher risk for the health effects noted above (WHO 1999).

In terms of regulating the effects of noise to protect public health, efforts have been hampered by insufficient knowledge. In order to establish effective noise control standards, there needs to be a better understanding of the different types of noise and how we measure it, where noise comes from and its effects on individuals and communities (WHO 1999).

Noise control is a federal, state and local issue in the United States and ensuring “reasonable” levels of noise is the responsibility of a number of agencies at the different levels of government. However, what is considered “reasonable” or appropriate can differ by community and

individual. Health noise levels depend on the audience and include dimensions related to volume, predictability and perceived control over the noise source (Kryter, 1994).

The federal Noise Control Act of 1972 (NCA) was established “to promote an environment for all Americans free from noise that jeopardizes their public health and welfare.” The NCA provides for a division of powers between the federal, state and local governments. In the past, the Environmental Protection Agency (EPA) coordinated all federal noise control activities through its Office of Noise Abatement and Control; however, in 1982, the EPA officially shifted the primary responsibility of regulating noise to state and local governments. Exceptions include transportation noise sources including aircraft and railroad operations and commercial motor vehicle traffic involved in interstate transport, which have some federal oversight (U.S EPA 2007).

Another means of addressing noise impacts at the federal level is through the National Environmental Policy Act (NEPA), which requires the documentation of environmental impacts of federal agency actions and federally funded projects. While the NEPA statute does not specifically address noise, various federal agencies provide guidance related to identifying and mitigating noise impacts. For example, the Federal Highway Administration’s (FHWA)

Table 1: Common Outdoor and Indoor Noises

| Outdoor Noises | Indoor Noises | Sound Pressures (uPa) | Sound Pressure Levels (dB) |
|------------------------|------------------------|-----------------------|----------------------------|
| Jet Flyover at 300 m | Rock Band at 5m | 6,324,555 | 110 |
| Gas Lawn Mower at 1 m | Inside Subway Train | 2,000,000 | 100 |
| Noisy Urban Daytime | Garbage Disposal at 1m | 200,000 | 80 |
| Gas Lawn Mower at 30 m | Normal Speech at 1 m | 63,246 | 70 |
| Quiet Urban Daytime | Dishwasher Next Room | 6,325 | 50 |
| Quiet Urban Nighttime | Small Theatre | 2,000 | 40 |
| Quiet Rural Nighttime | Bedroom at night | 632 | 30 |

Source: Corbusier 2003

guidance related to the format and content of Environmental Impact Statements (EISs) require a noise analysis (FHWA 1987). Furthermore, they suggest that EISs should contain a description of noise sensitive areas such as residences, businesses, schools and parks, as well as the extent of impact (measured in decibels) for each sensitive area (FHWA 1987).

In addition to the federal government's role as described above, state and local governments can be responsible for controlling noise sources and the levels of noise emitted into the environment. There are a number of tools employed by local agencies to minimize the harmful effects of noise pollution. For example, municipal jurisdictions have adopted noise ordinances, which serve as enforcement mechanisms for controlling noise. Some communities include noise elements in their local plans, which set general planning guidelines to ensure compatibility and minimal impacts among nearby land uses (California State Water Resources Control Board, 1999).

In addition, local planners working cooperatively with other public and private agencies can plan, design and construct development projects and roadways that minimize the adverse effects of noise. Effective land-use planning and development may discourage sensitive land uses near highways and other noise sources, promote the use of open space separating roads from developments and require special construction techniques or time of day requirements that minimize the impacts of road-related noise (FHWA 2006, 1995). More design-specific tools for limiting roadway noise may include building barriers or berms, establishing traffic controls such as speed limits, altering vertical or horizontal alignment for new roadways, establishing buffer zones along a right-of-way and using quiet pavement (Miller, 2005).



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Wall barriers can help reduce roadway noise for residential areas adjacent to freeways.

Planning for Noise Prevention and Mitigation

This section provides a number of practices that communities might use to more effectively prevent and/or mitigate existing and future sources of noise. This section addresses both planning and regulatory options related to noise prevention and mitigation.

Addressing Noise in Community Plans

In some cases, local city and county comprehensive or general plans are required to address noise through including a specific noise element. For example, the State of California's Government Code § 65302 requires that a noise element be prepared to "identify and appraise noise problems in the community." The noise element must address various noise sources including roadways, railroads, transit systems, aviation, industrial facilities and other stationary sources such as military installations. Noise analysis is intended to inform the pattern of land uses specified in the land use element.

Illustrating the implementation of this requirement, the City of Salinas, with an estimated 2006 population of 145,000 and located just east of California’s central coast, included a noise element in its general plan. The element states as its purpose (City of Salinas 2002, page N1):

To identify and appraise existing noise problems in the community and to provide guidance to avoid noise and land use incompatibility problems in the future. This element addresses existing and projected noise sources in the community and identifies ways to reduce existing and potential noise impacts. In particular, the Noise element contains policies and programs to achieve and maintain noise levels compatible with various types of land uses. These policies and programs emphasize the need to control noise through land use regulation, as well as enforcement of other City ordinances.

This section of the plan specifically acknowledges the potential physiological and psychological effects of noise, as well as the potential for stress and irritation caused by loud noise sources (City of Salinas 2002).

The City of Salinas also makes the direct connection between noise and land use and transportation issues in the general plan. The noise element specifies several goals and policies that address these connections (City of Salinas 2002):

Goal N-1: Minimize the adverse effects of noise through proper land use planning.

Policy N-1.1: Ensure that new development can be made compatible with the noise environment by using noise/land use compatibility standards and the Noise Contours Map as a guide for future planning and development decisions.

Policy N-1.2: Require the inclusion of noise-reducing design features in development and reuse/revitalization projects to address the impact of noise on residential development.

Policy N-1.3: Locate only urban development within the Salinas Municipal Airport “area of influence” that is compatible with the airport noise environment and meets the guidelines of the Caltrans handbook.

Policy N-1.4: Ensure proposed development meets Title 24 Noise Insulation Standards for construction.

Goal N-2: Minimize transportation-related noise impacts.

Policy N-2.1: Ensure noise impacts generated by vehicular sources are minimized through the use of noise control measures (e.g. earthen berms, landscaped walls, lowered streets).

Policy N-2.2: Control truck traffic routing to reduce transportation-related noise impacts on sensitive uses.

Policy N-2.3: Ensure new development within the vicinity of the airport does not result in a land use/noise compatibility conflict or hazard.

Goal N-3: Minimize non-transportation related noise impacts.

Policy N-3.1: Enforce the City of Salinas Noise Ordinance to ensure stationary noise sources and noise emanating from construction activities, private developments/residences and special events are minimized. (City of Salinas 2002).

In another California city, San Diego, the general plan goes further, specifying policies related to a number of different noise types including motor vehicle traffic; trolleys and trains; aircraft; commercial and mixed-use activities; industrial activities; construction, refuse vehicles, parking lot sweepers and public activities; and events (City of San Diego 2007). In addition to these policies, the city specifies noise compatibility guidelines for various types of land uses. Future development of various types (e.g. parks, agricultural residential, offices, institutional, industrial) is rated as compatible, conditionally

compatible (pending an acoustical study) and incompatible based on the level of exterior noise exposure (in decibels) present in that location (City of San Diego 2007).

Regulating Noise Impacts

In addition to addressing noise in local plans, communities can establish a range of regulations intended to document, prevent and mitigate noise impacts. The Noise Pollution Clearinghouse (2008) provides links to a number of ordinances established in communities across the U.S. This section summarizes a number of these, as well as other approaches to regulating noise impacts.

For example, the City of Minneapolis, Minnesota, has an extensive noise ordinance. One unique feature of the ordinance is its approach in identifying the characteristics and conditions of a noise that can be used to determine if it is a nuisance under the code. The characteristics and conditions include:

- Whether the nature of the noise is usual or unusual.
- Whether the origin of the noise is natural or unnatural.
- The proximity of the noise to sleeping facilities.
- The land use, nature and zoning of the area from which the noise emanate and the area where it is received.
- The time of day or night when the noise occurs.
- The duration of the noise.
- Whether the noise is recurrent, intermittent, or constant.
- Whether the noise is produced by a commercial or noncommercial activity.

- Whether or not noise abatement measures are possible and whether or not they are used to reduce the sound level.
- The number of people and their activities that are affected by the noise.
- The sound peak pressure level of the noise on the A scale, if known.
- The A scale level of ambient noise, if known. (City of Minneapolis 2008)

In another example, the City of Wichita, Kansas, addresses noise in the public health section of its Code of Ordinances (2008). The code prohibits loud and unnecessary noises, stating that:

It is unlawful for any person to make, continue, or allow to be made or continued, any excessive, unnecessary, unusual or loud noise which creates a nuisance or injures or endangers the comfort, repose, health or safety of others, or which interferes with the use or enjoyment of property of any person of reasonable sensibilities residing in or occupying the area unless the making and continuing of such noise is necessary for the protection and preservation of property or the health and safety of some individual" (City of Wichita 2008).

Wichita, with a population of 358,000, prohibits noise nuisances emitted from radios and other electronic equipment, steam whistles, musical instruments, motor vehicles, peddlers, loading and unloading (e.g. trash) and construction noise during specific time periods (City of Wichita 2008). Wichita’s code also specifies decibel (dBA) limits based on the prevalent type of land use in an area. Table 2 below provides a summary:

Table 2: City of Wichita Excessive Noise Limitations

| Zone | 8 am to next 10 pm | 10 pm to next 8 am |
|------------------|--------------------|--------------------|
| Residential | 55 dBA | 50 dBA |
| Commercial | 60 dBA | 55 dBA |
| Light Industrial | 70 dBA | 65 dBA |
| Industrial | 80 dBA | 75 dBA |

Source: City of Wichita 2008

The City of Mesa, Arizona, a suburb of Phoenix, also puts limits on vehicle noise, requiring that the following limits be met, when measured at 50 feet from the noise source (City of Mesa 2008). These regulations are included in the police regulations section of the City Code. Table 3 below provides a summary.

Recognizing the sensitivity of some noise receptors, Mesa also limits construction activities within 500 feet of residential zones, except during specified daytime and weekday hours (City of Mesa 2008). In addition, noise regulations prohibit “offensive or excessive noise on any street, sidewalk, or public place adjacent to any school, institution of learning, or church while the same is use or adjacent to any hospital which interferes with the workings of such institution” (City of Mesa 2008).

In addition to the typical content seen in other noise regulations, Takoma Park, Maryland, has established an additional organizational structure to address noise issues. This city, a small suburb of Washington, DC, has established a Noise Control Board charged with administering and enforcing the City’s Noise Control Ordinance. The Board holds open hearings related to noise disturbance complaints, with parties providing sworn testimony and presenting and rebutting evidence provided (City of Takoma Park 2008).

One other commonly-used approach to abate and mitigate noise impacts, beyond noise and nuisance regulations, is airport overlay districts.

While these zoning districts have a broader focus on safety, noise is an additional issue addressed in these regulations. For example, High Point, North Carolina has established such an ordinance with a particular focus on noise from the Piedmont Triad International Airport in the Greensboro-Winston-Salem area in central North Carolina. Specifically, one of the purposes of the ordinance is to “Ensure land use compatibility by protecting noise sensitive land uses from objectionable aircraft noise impacts” (City of High Point 2008). The overlay district consists of four zones based on the noise impacts experienced in the vicinity of the airport, with land uses limited in certain zones. In addition, the ordinance requires noise reducing construction practices for residential development in certain zones. One zone requires an indoor noise reduction of at least 30 decibels accomplished through building design, building materials and construction standards. Another zone requires that a “windows closed environment standard” be met through the installation of mechanical ventilation systems that enable windows to be closed in all climate conditions (City of High Point 2008).

Transportation corridor overlay districts may also be used to mitigate noise impacts from major roadways. For example, the Town of Gilbert, a Phoenix, Arizona, suburban with a population of 200,000, has established the Santan Freeway Corridor Overlay District. One of the stated purposes of the district is to, “Mitigate the effects of freeway noise impacts on noise sensitive uses

Table 3: City of Mesa Sound Pressure Limits for Motor Vehicles

| Vehicle Class | Operated on a local street | Operated on a paved surface or arterial street |
|---|----------------------------|--|
| Motor vehicles with a manufacturer’s gross vehicle weight rating of 10,000 pounds or more | 86 dBA | 90 dBA |
| Any other vehicle or combination of vehicles | 76 dBA | 82 dBA |
| Motorcycles | 82 dBA | 86 dBA |

Source: City of Mesa 2008

and protect the public health, welfare and safety by establishing noise reduction requirements applicable to development of noise sensitive uses” (Town of Gilbert 2007). The overlay district applies to noise sensitive uses that are located on parcels fully or partially within 300 feet of the edge of the right-of-way for the freeway. To reduce noise impacts on sensitive uses, the ordinance limits building heights to 150 feet and requires developers to construct noise barriers that reduce noise levels by at least 5 decibels (Town of Gilbert 2007).

Final Thoughts

This document summarizes many of the salient connections among noise, planning and health. Planners can employ a variety of means through planning and regulatory tools to abate and mitigate noise impacts for general and specialized populations. Effective plans and policies require extensive knowledge of noise conditions and a means of assessing the impacts of future development.

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