

Noise Sources and Land Uses:
Are They Compatible?

by

Edward P. Gorski

- Associate Member of the American Institute of Planners;
- Member of the American Society of Planning Officials;
- Employed by the Metropolitan Washington Council of Governments as an Environmental Planner in the area of Noise Control;
- Received a B.A. in Urban Affairs from Wilkes College, Wilkes Barre, Pennsylvania;
- Received a Master's of City and Regional Planning from the Catholic University of America, Washington, D.C. in May, 1977.

Abstract

There are a variety of techniques available to local governments for achieving noise-compatible land uses. The techniques are of two types: (1) administrative techniques, which can be used by local government officials and planners to require, or encourage improved noise-compatibility; and (2) the physical methods available to architects, urban designers, developers, and builders for achieving the desired noise impact reductions.

By expanding his area of concern to include considerations of source path and reception as they relate to noise, the planner can achieve noise-compatibility in concert with achieving other environmental and community planning goals. This would allow the planner to further enhance the quality of life in his community and, simultaneously, to move to the forefront in the "quiet revolution."

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Effective control of the undesirable effects of noise requires a three part approach:

- (1) Source emission reduction;
- (2) Improved product design; and
- (3) Effective land use control.

The first two components are currently being addressed by private industry and by the Federal government. The third area of concern has traditionally been an area of local governmental responsibility. Because of the limitations of each control approach when applied separately, cooperation among all levels of government, industry, and the public in implementing the three part approach, is essential to achieving noise control and abatement.

Source emission control requires the production of quieter motor vehicles, construction equipment, aircraft, and a myriad of other urban noise sources. Significant progress has been made in this area, but much remains to be done. A major need is the improvement of product design. The use of acoustic insulation in home appliances, production of quieter engines and exhaust systems, and manufacturing of quieter jet aircraft are just a few of the improved designs that are available to reduce noise. Notwithstanding this progress, there is still a void existing in the control and abatement of noise. As long as this void exists, land use control

will continue to be a crucial component in the abatement of noise. Local governments will continue to have the responsibility for discouraging the development of noise sensitive land uses (such as homes, schools, hospitals, and churches) in noise-impacted areas, or for ensuring that any such development that does occur, is planned to minimize the adverse effects of noise.

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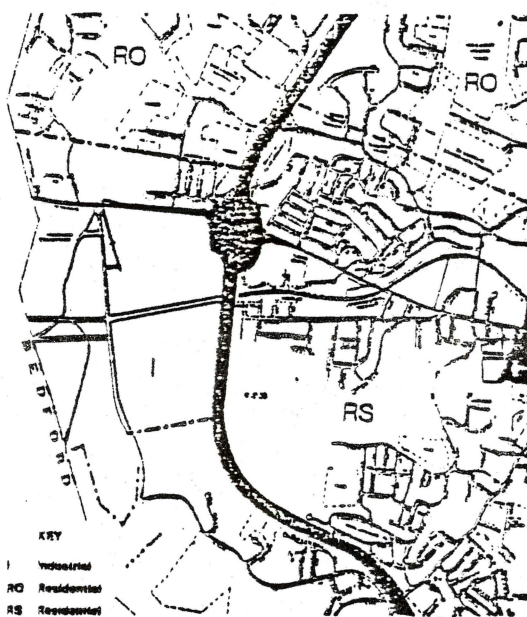
The administrative techniques available to community development planners to control land use near major sources of noise (such as airports, highways, industrial parks, quarries, etc.) fall into five categories:

- (1) Zoning;
- (2) Subdivision laws, building and health codes;
- (3) Municipal ownership, or control of the land;
- (4) Tax incentives for compatible use; and
- (5) Educational and advisory municipal services.

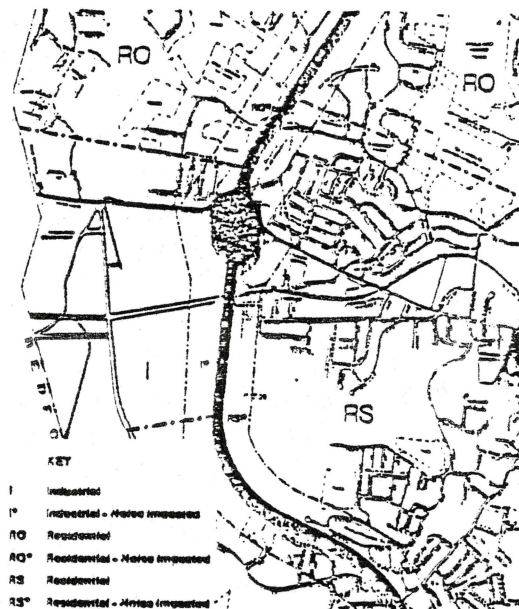
Zoning specifications have been used to control environmental emission, signs, off-street parking facilities, lot size, frontage, maximum building height, and ratio of open space to developed land. These precedents make zoning a useful tool for noise control in most localities.

Since the areas within a community which are impacted by excessive noise probably do not coincide with the traditional zoning districts, a method must be developed to define the areas where acoustical regulations might apply. One method would be the creation of a series of new noise-impacted zones on the existing zoning map. For example, each residential zone could be split into two zones identically controlled except for noise regulations. The same would hold true for each commercial or industrial zone. (See Figure I.)

Figure I



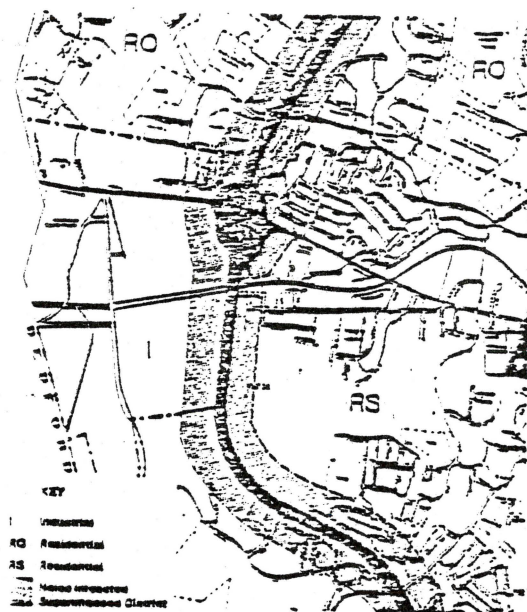
A portion of a zoning map without identification of noise-impacted zones



Identification of noise-impacted areas by creation of a series of new zones

A simpler alternative to the creation of an entire series of new zones is the creation of a single "overlay zone." An overlay zone is a special purpose zone which is superimposed over the regular zoning map. (See Figure II.)

Figure II



Identification of noise-impacted area by overlay zone

Often such zones are called "superimposed districts," and they are used for a variety of reasons, including wetlands protection and airport compatibility. In this case, the overlay zone could be all land which is exposed to noise over a certain level, such as, 65 dBA (relates to HUD Circular 1390.2, "Noise Abatement and Control Department Policy and Implementation Responsibilities and Standards). Or, it could be defined, more easily, but less appropriately, as all land within a certain distance from the source, such as, 500 feet. Land which falls in such a zone would be subject, not only to the

regulations pertaining to the regular zone in which it lies, but also to the additional regulations to the overlay zone (i.e., requiring double-glazed windows, buffer or barrier construction, etc.). Such a technique is much less cumbersome legally and administratively than the creation of an entire series of special zones in the noise-impacted portion of the community.

The land in a noise-impacted area can also be zoned for noise-compatible uses, such as, commercial, agricultural, or industrial. It is a simple and direct technique which will work if the community has a non-cumulative type of zoning law which prohibits, for example, residences or other sensitive uses in the industrial zone.

Unfortunately, there is usually not enough demand for such noise-compatible land uses to afford every community the luxury of lining both sides of a highway or railroad with them. If all the communities within a region were to adopt this technique, they would render the land involved as worthless. Thus, there could be legal action against the community to recover damages for what could be considered a "taking without compensation."

Furthermore, this type of strip-zoning may not be compatible with other plans for the orderly growth and development of the community. It is then necessary for the planner to consider whether it would be preferable to permit strip commercial or industrial development, rather than to expose residential uses to degraded local noise quality.

The technique of zoning noise-impacted areas for compatible land uses should only be considered in those areas where non-cumulative

zoning is legal under state law; the locality has determined that such a land use pattern is compatible with the growth plans, safety, and quality of life of the community and the region; and a local noise control or a similar ordinance within the zoning bylaws does exist which will prevent the uses in the zone from in turn becoming noise sources objectionable to uses in adjacent zones.

Although in many states subdivision control laws and zoning are closely related, they are usually separate laws sometimes administered by different local authorities. Subdivision control law is administered on the local level by a planning board or planning officer using subdivision rules and regulations, development standards or similar documents. These rules and regulations contain the various requirements which must be met by a developer in the creation of a subdivision. Such things as storm drainage, pavement type, curbs, sidewalks, maximum grades in streets, street width, and recreational land can all be specified in these requirements.

The requirements which a planning board can build into its rules and regulations are very specifically delineated in the state laws on subdivision control. Whether a noise-compatibility element can be required as part of a subdivision submittal, or whether requirements can be made for acoustical site planning, or architectural review is dependent on the state laws. It may also be possible, for example, to require a buffer strip, or to require acoustical site planning in an area near a highway or railroad. It may also be possible to specify acoustical limits in decibels which cannot be exceeded without the use of acoustical construction techniques.

In addition to direct specification of acoustical criteria for developments, the subdivision control rules and regulations can be used as a bargaining tool to obtain acoustical considerations from developers. For example, reducing lot sizes and increasing densities by requiring the creation of public open space is one option. This is most practical in cluster and planned unit development situations. Thus, there is an implicit ability to bargain for acoustical improvements, but it is quite dependent upon the bargaining ability of the local officials at the time they are considering the plans for approval.

Local building codes can be a powerful tool to insure that any of a series of noise-compatibility measures are taken. Requirements can take four basic forms:

- (1) Requirements for specific construction techniques, such as, double-glazed windows, double-studded walls, or air-conditioning;
- (2) Requirements for specific attenuation characteristics from construction in terms of a mandatory *Sound Transmission Class (STC) level;
- (3) Specification of certain noise levels after construction, such as, peak levels in bedrooms at night; and
- (4) Interpretive regulations with precise standards left up to the discretion of the building inspector in each case.

* Sound Transmission Class is equal to the number of decibels a sound is reduced as it passes through a material.

As with most legal techniques, the choices range from laws which are very specific but not always appropriate in a given case, to laws which are vague but which can be interpreted to optimize each individual situation. The key in writing a viable noise-compatibility section for a building code is to make it strong enough to be enforceable, and yet, discriminatory enough to be flexible. One way to attempt to satisfy both of these goals is to define the specific requirements as being applicable only in areas where the expected, or actual, exterior noise levels exceed certain levels.

Building codes have two weaknesses when used alone as a noise-compatibility control. They generally do not control the use of the land surrounding the buildings and thus cannot require barriers, site-planning, or planted buffers. As a result, they may not result in the most cost-effective noise reduction strategy, unless they contain mechanisms to allow the use of the less expensive techniques of site-planning and design where appropriate to achieve desired noise levels. In addition, building codes have no applicability to existing buildings, therefore, creating a gap in the community's attempt at achieving noise-compatibility. The use of building codes, along with one or several other techniques, is necessary, if overall noise-compatibility is desired.

Local and county health codes exist almost universally throughout the United States. Many of them could be adapted easily to include a provision for noise-compatibility in new construction. In some respects, the health code has distinct advantages over the other legal and administrative techniques previously discussed. The health code can stand on its own as a complete legal entity. It