Sound Land Use Planning For Your Community:

Model Ordinance Language for Addressing Traffic Noise

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INTRODUCTION

Traffic noise wall along a roadway

Traffic noise issues are a concern for residents in communities across the country. This publication provides information to help planners and community officials better understand how to minimize or avoid traffic noise conflicts and address traffic related noise issues in their communities. This publication contains three main sections: an introduction which provides the reader with background information on noise and what municipalities can do to deal with traffic noise; general abatement and avoidance measures for municipalities to consider in establishing their own community noise guidelines; and a planning toolbox with sample model ordinance provisions for use with a community's existing planning tools such as zoning. Definitions of key terms and contact information are also provided. This publication serves as an informative and illustrative guide and is not intended for adoption in its entirety.

PENNDOT will analyze and consider when it is appropriate to commit to mitigating the noise impacts of new roadways in the Commonwealth where residential development precedes roadway improvements. The mitigation of noise that results from new development adjacent to roadways, however, is the responsibility of municipalities and developers. Over the long-term, land use planning is an effective way for municipalities to avoid or manage excessive noise.

What Municipalities Can Do

The Pennsylvania Municipalities Planning Code (MPC) grants local and county governments broad powers for controlling land use and for regulating the location, density, and intensity of development. The orientation and layout of new developments can also be regulated. Future transportation improvements, municipal rights-of-way, and common open space can be planned and managed by municipalities.

Through actions authorized by the MPC, municipalities can greatly minimize the impacts of roadway traffic noise. By working with citizens and developers, municipalities can be proactive in avoiding or mitigating problems resulting from traffic noise. A critical tool is the implementation of zoning for compatible uses along roadway corridors. Municipalities can also change zoning in order to phase out existing noise sensitive land uses over time. Some communities may choose to minimize or avoid traffic noise conflicts rather than mitigate them. This guide, and the model ordinance provisions that follow, can help municipalities take practical steps toward addressing traffic noise.

How Model Ordinance Provisions Can Help

To assist municipalities in addressing noise conflicts, PENNDOT has prepared model noise ordinance provisions that municipalities can use to minimize the effect of roadway noise on residential areas. This publication specifically addresses the problems of roadway traffic noise and land use planning solutions authorized by Pennsylvania's Municipalities Planning Code. This publication provides a range of options that can be used effectively by communities, whether they have a

Pennsylvania Municipalities are authorized to address traffic noise issues through subdivision and land development, zoning and other ordinances.

professional planning staff with ample resources or no planning staff. Contact information is included for PENNDOT and other agencies that can provide additional resources.

This publication contains general guidance on sound land use practices and presents a menu of options including sample land use ordinance language for:

- *The assessment of roadway traffic noise and roadway traffic noise impacts;*
- *The definition and establishment of traffic noise sensitive land uses;*
- *Subdivision and land development strategies including layout and arrangement of building lots, the location of structures, and required improvements such as traffic noise walls or earthen berms;*
- *Zoning strategies, including Planned Residential Development (PRD), overlay districts, setbacks, and conditional use/special use;*
- *Official Map Ordinances used to designate planned public improvements;*
- *Definitions of terms that may be used in developing municipal land use ordinances; and*
- *Resources for finding out more about roadway traffic noise and land use controls.*

Understanding Traffic Noise

Noise is measured in decibels. Most traffic noise mitigation techniques for roadways involve controlling traffic noise paths either through the construction of barriers or by increasing the distance between the traffic noise source and the receiver. The success of these mitigation efforts is often measured by the decrease in decibels experienced by the receiver.

Sound levels are also measured in decibels. Several common descriptors are used to quantify sound levels. Each descriptor depicts sound levels generated at a single point in time or over a period of time.

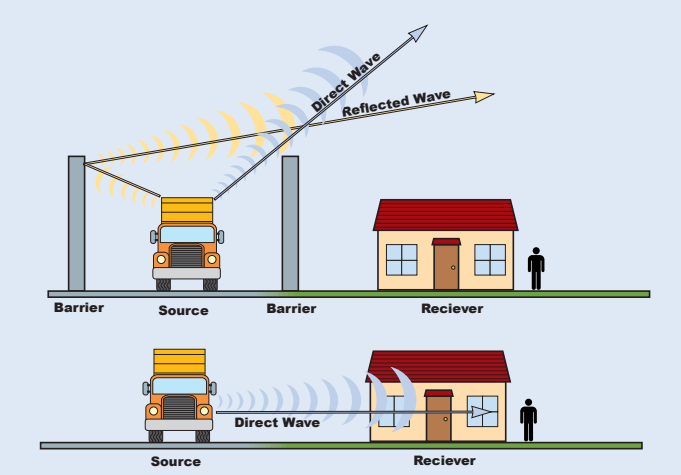

Figure 1: The Impact of Barriers on Sound Waves

Sound Pressure Level (SPL) measures the sound level at a point in time as a ratio compared to the reference sound pressure in decibels. This descriptor is useful for explaining sound at a particular point in time.

Equivalent Noise Level (Leq) measures the average sound level over a specified period of time. PENNDOT uses a period of time of 1-hour or Leq(h). This descriptor is useful for explaining average sound levels, taking louder and quieter periods into account.

Sound Exposure Level (SEL) measures the total noise level of a single event from the beginning to the end of the event. This descriptor is useful for illustrating sound generated over a relatively short period of time.

Day Night Average Sound Level (DNL) measures the average sound level over a 24-hour period with nighttime sound weighted with an additional 10 decibels. This descriptor can be used for depicting noise in residential areas where nighttime noise might interfere with common sleeping hours.

Traffic noise problems are determined by a number of factors including the level of sound generated at the source (roadway), the distance between the traffic noise and the receiver (homes, businesses, or institutions), presence of barriers or interruptions of sound waves, and the level of sensitivity of the receiver (Figure 1). In addition, the impact of traffic noise may affect people differently. For example, roadway traffic noise may not affect workers in a nearby manufacturing plant, but may disturb residents in an apartment complex.

How much noise is too much?

Figure 2 shows the decibel levels (dB) and associated sounds. The examples shown are common sounds that most people have experienced. *Very faint* sounds range from zero to 20 decibels and include sounds like a whisper and rustling leaves. *Faint* sounds range from 20 to 40 decibels and include normal household sounds. *Moderate* sounds range from 40 to 60 decibels and include normal office sound and the normal range of human speech. *Loud* sounds range from 60 to 80 decibels. Loud sounds could include the sound of an accelerating diesel truck experienced at the edge of a roadway. *Very loud* sounds, those louder than 80 decibels include urban street noise. Sounds louder than 100 decibels may become uncomfortable and sounds greater than 130 decibels may be painful.

It is important to note that sound levels vary with distance.

For example, a person standing 300 feet away from heavy auto traffic might experience sounds of 50 decibels. As the person moves closer, the noise level would rise considerably.

Municipalities should consult their solicitor prior to amending land use ordinances.

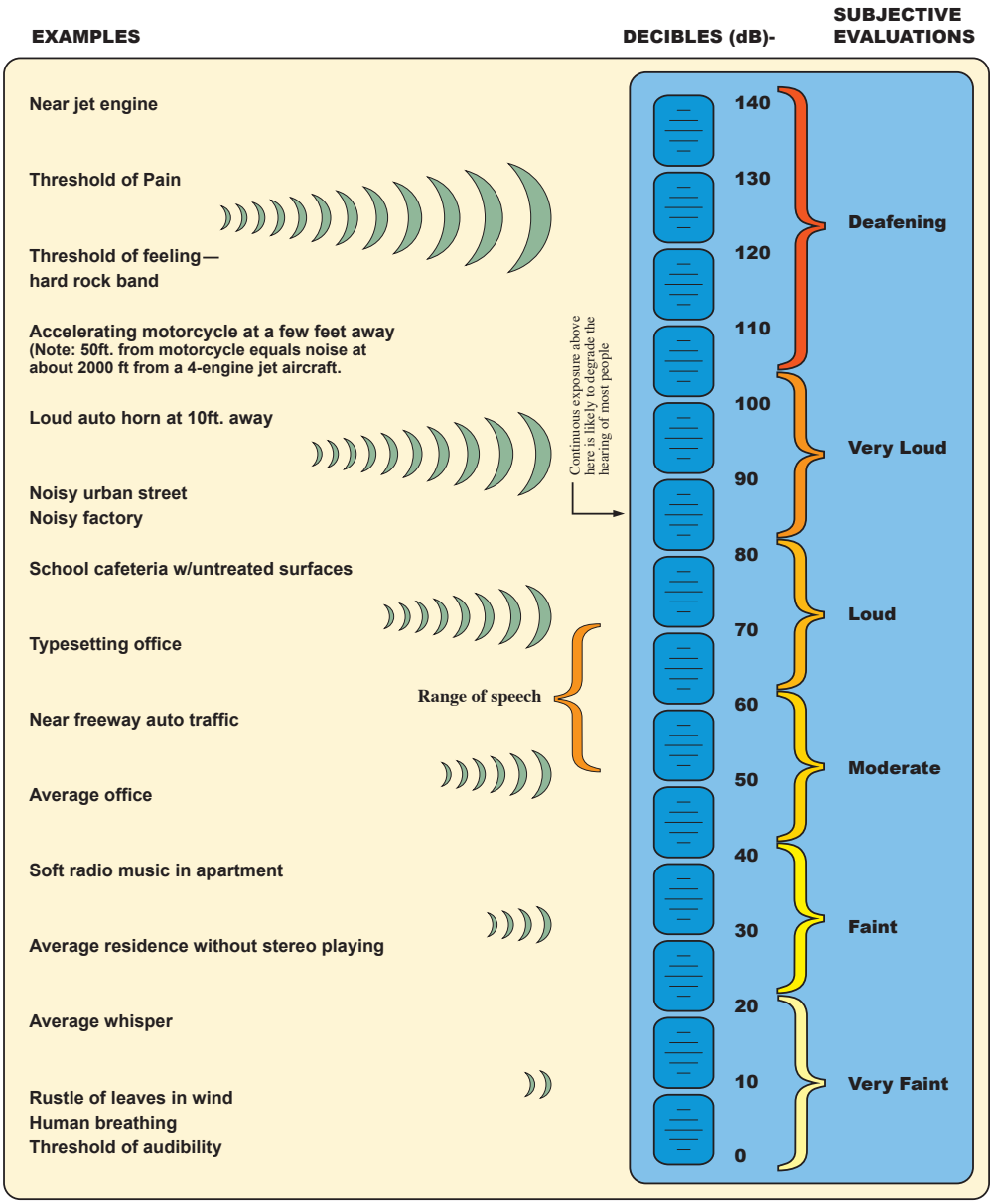

Figure 2: Sample Traffic Noise Compatibility

Sounds from multiple sources may combine and result in a noise level that is higher than the noise level from any single contributing noise source. For example, a receiver experiencing 65 decibels from one source and 65 decibels from a second source would receive 68 decibels in total. That is why sounds that are not considered loud on their own might combine with other sounds to exceed acceptable sound levels.

Further Actions

Each community should evaluate which areas are negatively impacted by traffic noise. In addition, municipalities should consider the effects of noise from all sources when establishing acceptable community noise guidelines. This can be done by developing a comprehensive noise ordinance.

ADDRESSING TRAFFIC NOISE IN YOUR COMMUNITY

This publication provides recommendations for addressing traffic noise conflicts. Many of these recommendations can be used in combination with one another. Each municipality needs to balance the costs and benefits of the planning tools they select for use in their community.

Planning Meeting

Abating Traffic Noise Conflicts

Traffic noise abatement strategies vary widely in their level of effectiveness. Common abatement measures include traffic noise walls, physical setbacks, and earthen berms. Vegetative screening alone is not an effective abatement measure, although it is frequently used to reduce the perception of traffic noise.

Traffic noise walls are a physical barrier parallel to the roadway that blocks and/or absorbs sound waves as they travel from the source (the vehicles) to the receiver (homes, businesses, or institutions that are incompatible with traffic noise). Traffic noise walls are a costly method for sound attenuation and are most practical where land use densities are high and where land uses are particularly sensitive to noise and in close proximity to a roadway.

Setbacks reduce the impact of traffic noise by increasing the distance between the roadway and the receiver. The distance of a setback can be measured from a property line, from a roadway right-of-way, or even from the center line of a roadway.

Earthen berms provide a physical separation between the roadway and the adjacent land uses. A berm forms a long mound that is generally parallel to the roadway and can be incorporated into a natural looking landscape. Like traffic noise walls, earthen berms can reduce traffic noise by interrupting sound waves and by absorbing traffic noise and vibration. In order to be effective earthen berms require a lot of space. Smaller earthen berms can be used for visual relief, although they may not provide effective noise relief.

Vegetative screens are generally not effective for reducing traffic noise unless they are very dense and wide. Vegetative screens frequently include bamboo, conifers, and other evergreens. Vegetative screens can be used as aesthetic treatments for traffic noise walls.

Effective Planning and Land Use Control Can Prevent Conflict

Land use planning along transportation corridors can be effective in preventing traffic noise and land use conflicts. Municipal land use plans communicate the municipality's vision to private developers, PENNDOT, school districts, prospective homebuyers, and neighboring municipalities. By explicitly addressing traffic noise issues, land use plans can help raise awareness, and influence the type of development located in areas affected by traffic noise.

Direct public investment is another strategy for preventing traffic noise and land use conflicts. Municipalities can control development through land acquisition or purchase of development rights. While direct public investment can be very effective, this strategy is generally used when there are no other feasible alternatives for controlling land use. The cost and administrative burdens of direct acquisition can be substantial. Limited acquisitions of buffer areas adjacent to planned roadways have helped some municipalities prevent land use and transportation conflicts. Official map ordinances provide protection to land planned for public acquisition.

Taking Appropriate Action

An adopted land use plan or corridor study is a municipality's blueprint for its future physical form. However, it cannot effectively implement or enforce the vision without adopting subdivision, zoning, or official map ordinances. Each municipality must decide what steps it will take to avoid, minimize, or mitigate the conflict.

Avoiding Conflict through Proactive Measures

Communities can take proactive measures to avoid conflicts before they occur. These actions may include adopting effective comprehensive plans or land use ordinances. Comprehensive plans define the expectations of the municipality and encourage development to occur where it is most appropriate. Communities may include specific techniques and land development requirements in their Subdivision and Land Development Ordinance. A municipality may use its zoning ordinance to reserve lands adjacent to roadways for offices or other traffic noise compatible uses. A very proactive municipality may even decide to adopt an official map ordinance as a tool for acquiring buffer areas adjacent to major roadways. This acquisition might occur through the direct investment of public funds or by dedicating easements or public rights-of-way required as conditions of development.

Addressing Traffic Noise in Your Municipality

Whether a community is rural, growing, or even if it is completely developed, the

MPC provides effective strategies to address traffic noise conflicts. Land use ordinance provisions presented in this report include a wide range of options suitable for all municipalities. Tools presented include simple zoning and setback techniques as well as more complex techniques such as performance zoning.

The Planning Toolbox includes sections on Subdivision and Land Development Ordinances (SLDO), Zoning Ordinances, and Official Map Ordinances. Techniques described within each of these three sections are presented in order of complexity with more basic techniques presented first. More complex techniques require access to professional planners and engineers.

Land Use Compatibility

Specific land uses may be compatible with traffic noise, incompatible with traffic noise, or compatible under specific conditions. Municipalities may address noise problems by examining the land uses allowed near noise impacted areas. Municipalities should consider the extent of the local traffic noise problem, the planned abatement measures, and local sensibilities and preferences to determine which land uses should be permitted adjacent to busy roadways or proposed rights-of-way.

This noise compatibility chart (Figure 3) provides a sample assessment of land uses. Municipalities may use a similar chart to plan for the land uses their community will permit near heavily trafficked roadways. Each land use has a checked box in 1 to 4 categories denoting how compatible the use is with traffic noise. Mitigation measures such as earthen berms, landscaping, setbacks, lot layout, etc. can be used to change the compatibility of a given use. Each application should be determined on a case-by-case basis.

PRIMARY LAND USE	Permitted	Somewhat Restricted	More Restricted	Prohibited
SINGLE FAMILY RESIDENTIAL; Detached Dwelling, Duplex, Mobile Home				✓
MULTI-FAMILY RESIDENTIAL; Multiple Family, Dormitory			✓	✓
TRANSIENT LODGING; Hotel, Motel, Camp Ground			✓	
INSTITUTIONAL; Hospital, Nursing Home		✓	✓	
INSTITUTIONAL; School Classroom, Library, House of Worship, Public Meeting Room			✓	✓
COMMUNITY RECREATION -- ENTERTAINMENT; Auditorium, Concert Hall, Music Shell				✓
COMMUNITY RECREATION -- PASSIVE; Neighborhood Parks, Cemeteries				✓
COMMUNITY RECREATION -- ACTIVE; Golf Course, Riding Stable, Water Recreation, Playground		✓	✓	✓
COMMUNITY RECREATION -- CULTURAL; Historic Sites, Museums, Art Galleries	✓	✓		
COMMERCIAL -- OFFICE; Personal Services, Business Services, and Professional Services		✓	✓	
COMMERCIAL -- RETAIL; Retail shops, Movie Theatres, Eat- In Restaurants	✓	✓		
COMMERCIAL -- INTENSIVE; Warehouse, Distribution, Self-Service Retail Center, Indoor Shopping Mall	✓			
INDUSTRIAL/MANUFACTURING; Manufacturing plant, Salvage Yard, Postal Facility, Truck Terminal, Quarry	✓			
AGRICULTURAL -- GENERAL; Animal Hospital, Boarding Stable, Roadsidede Stand, Animal Husbandry (Non-Intensive)	✓	✓		
AGRICULTURAL -- INTENSIVE; Crop production, Animal Husbandry (Intensive), Greenhouse, Forestry, Silo	✓			

Figure 3: Noise Capability Chart

Prohibited: land uses which would be considered incompatible with noise associated with busy roadways.

More restricted uses: uses that would require effective noise mitigation such as earthen berms, etc. to be located near traffic noise.

Somewhat restricted uses: uses which could be allowed with modest conditions such as enhanced setbacks, etc.

Permitted: uses which would be compatible and permitted in areas affected by traffic noise. Municipalities will need to decide on a case by case basis.

THE PLANNING TOOLBOX

The most commonly used tools of the municipal planner are the Subdivision and Land Development Ordinance (SLDO), the Zoning Ordinance, and the Official Map Ordinance. The following sections provide more detailed explanations of these tools and model ordinance provisions for addressing roadway traffic noise and land use conflicts. A sampling of alternatives is provided. While these alternatives represent a fairly comprehensive overview, the list is not exhaustive of all possible strategies and it does not address all of the possible combinations or other innovative strategies that a municipality might employ.

Subdivision and Land Development Ordinances (SLDO) contain uniform provisions for regulating the layout and arrangement of proposed land developments. They also establish engineering, landscaping, and site design requirements to ensure that new developments and redevelopments comply with the guidelines and expectations articulated in the municipal Comprehensive Plan.

SUBDIVISION & LAND DEVELOPMENT ORDINANCES

A SLDO is particularly useful in areas that are less intensively developed or are growing. For example, subdivision and land development ordinances can require traffic noise attenuation strategies (including uniform setbacks or other physical barriers) as a condition of new development. To ensure their responsiveness to varying local conditions, subdivision and land development ordinances should be reviewed and updated in conjunction with the comprehensive planning process.

In most municipalities, the planning commission reviews subdivision and land development applications and the governing body decides whether to approve or deny them. Approval authority can be delegated to the planning commission in the SLDO.

Subdivision and Land Development Ordinance Standards / Required Improvements

This section contains descriptions of improvements that might minimize or avoid traffic noise impacts on land uses which are relatively more sensitive to traffic noise. The success of these strategies depends on traffic volume, climate, roadway geometry, topography, and other conditions.

Municipalities considering these noise mitigation techniques should consult a qualified engineer to ensure that the specifications will lead to the desired noise reduction.

There are additional tools that can be included in a SLDO. The developer is typically responsible for implementing these tools. These include building lot layout and orientation, earthen berms, landscaping, and the relationship of structures and ancillary structures.

Model Ordinance Provisions to Amend Subdivision and Land Development Ordinances

In order to include traffic noise considerations in a SLDO, a municipality may amend the Purpose and Intent statement of the existing SLDO by adding:

…to minimize the impact of roadway traffic noise on individuals, businesses, and other land uses and activities, and to prevent the loss of quality of life due to intrusive traffic noise.

Building Lot Layout and Orientation of Structures

In conjunction with a zoning ordinance, the SLDO can encourage the development of lots and buildings that minimize exposure to traffic noise (Figure 4).

Flexible regulations, such as clustering, can be used to locate or concentrate development structures on those portions of a site that are farthest away from the roadway traffic noise source. The large open spaces created in this form of land development may serve as effective noise buffers (Figure 5).

Where multiple land uses are planned for a tract, the SLDO could require plans that locate structures in a hierarchy based on distance from the area impacted by traffic

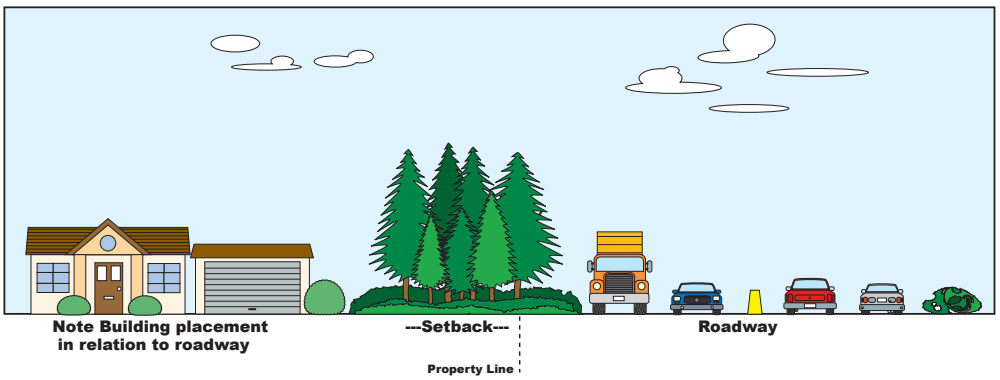

Figure 4: Building Lot Layout and Orientation

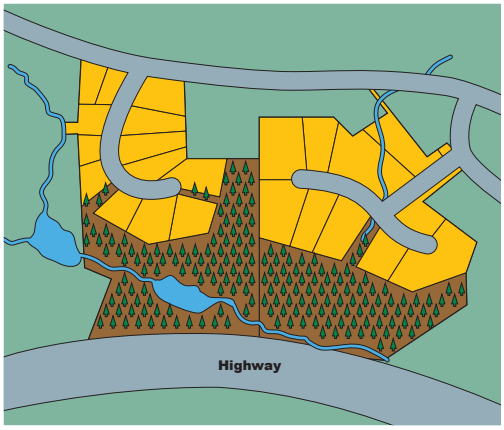

Figure 5: Clustered Development

noise with land uses that are most sensitive to traffic noise located farthest from the roadway. An example of hierarchy of uses from least sensitive to most sensitive would be: industrial, institutional, multi-family dwelling, and single-family dwelling.

Model Ordinance Provisions for Standards/Required Improvements

Noise sensitive land uses that are located on lots wholly or partly within the locally determined area impacted by traffic noise shall be discouraged. Required open space may be strategically located between major traffic noise sources and building lots.

Structures shall be oriented with the least window exposure facing the area impacted by traffic noise. Where multiple uses are planned for a tract, structures shall be situated in a hierarchy based on distance from the areas impacted by traffic noise according to the compatibility of each use with traffic noise.

The applicant may choose to cluster structures on the site so as to eliminate all structures within the area impacted by traffic noise. If residential structures are to be clustered, the minimum lot size per dwelling may be reduced by a specified percentage, (for example, 30%). If non-residential structures are to be clustered, the setbacks between buildings may be reduced by a specified percentage, (for example, 40 feet), provided that all landscaping, parking and buffering requirements can be met.

Where multiple land uses are proposed, structures shall be located according to a hierarchy based on distance from the area impacted by traffic noise. A table illustrating hierarchy should be provided in the ordinance.

Accessory / Ancillary Structures

Placing accessory structures and improvements, such as sheds, garages, storage structures, and parking lots, closer to roadways than occupied principal structures, such as homes or offices, can help buffer the occupied structures from roadway traffic noise impacts (Figure 6).

Model Ordinance Provisions for Standards/Required Improvements

Accessory (non-residential) structures and improvements, such as sheds, garages, storage structures, and parking lots, shall be located in closer proximity to areas impacted by traffic noise of the tract than occupied principal structures such as homes or offices.

Earthen Berms

Earthen berms are constructed adjacent to the major roadway and can be incorporated into the overall landscaping plans for new developments. While they can occupy a great deal of space, earthen berms can be planted with trees or other vegetation and can be integrated into the surrounding landscape. Earthen berms that are not high or wide enough to serve as effective roadway traffic noise barriers may still be useful by providing a visual screen between roadway traffic noise and adjacent land uses (Figure 7).

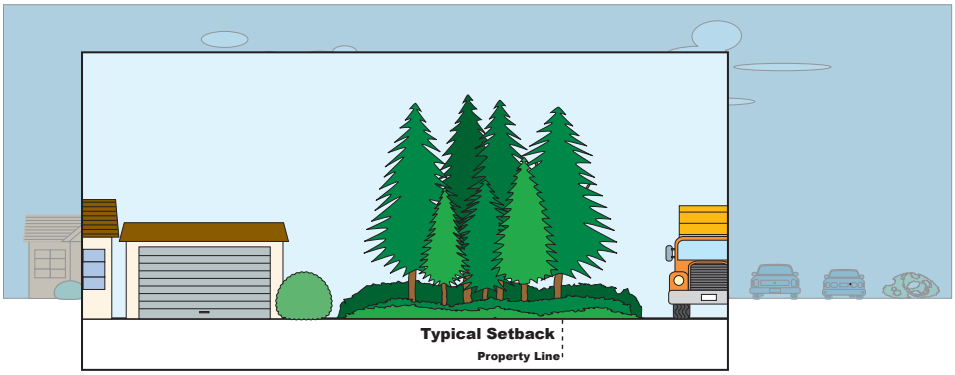

Figure 6: Ancilliary Structures

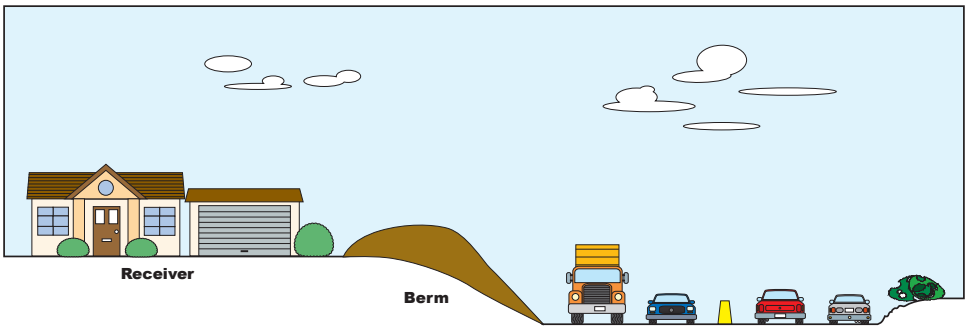

Figure 7: Earth Berm

Model Ordinance Provisions for Standards/Required Improvements

Earthen berms shall be erected along any residential property line abutting an arterial or collector roadway. Such berms shall be erected in accordance with accepted standards for safety and stability.

Any berm developed shall be shown in the landscaping plan and shall be designed and constructed in accordance with accepted engineering standards for safety, stability, and traffic noise attenuation.

Landscaping

Landscaping standards are a common element in most SLDOs. These may include general guidelines or specific regulations regarding plant type and size. Landscaping required for screening roadway traffic noise sources should provide screening during all seasons and mature vegetation should have dense foliage at eye level (Figure 8).

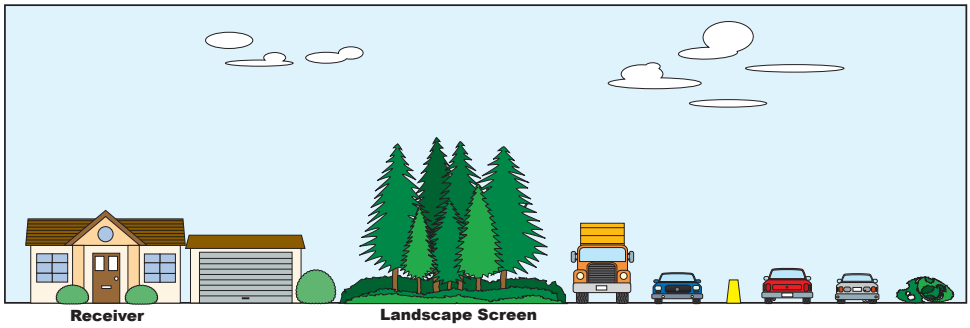

Figure 8: Landscaping

Model Ordinance Provisions for Standards/Required Improvements

Evergreen trees and shrubs shall be planted along any residential property line abutting a major arterial or collector roadway. Plant sizes and spacing shall be sufficient to ensure that mature vegetation forms a visual barrier from ground level to six feet above ground level.

Provision of required trees or shrubs is a condition of approval and shall be maintained and shall not be removed without the approval of the body authorized to approve applications.

ZONING

A zoning ordinance is used to implement a municipality's comprehensive plan and it is the primary tool for regulating the type and intensity of land use. A zoning ordinance controls the location of land uses, the size and configuration of structures, and the density and intensity of development.

Zoning directs where specific land uses shall be permitted or prohibited. Development for specified uses is permitted "by right" which means that a developer has the right to develop land for the use specified in accordance with the development requirements set forth by the zoning classification.

A municipality can use simple zoning to direct appropriate land uses, such as industry or agriculture, to areas impacted by traffic noise. Where land use and traffic noise conflicts already exist, nonconforming uses may be phased out over time by preventing the land from being redeveloped for incompatible uses in the future. A municipality could use its zoning ordinance to simply prohibit residential uses or other uses that are not compatible with roadway traffic noise.

More complex strategies can permit certain uses while requiring that they meet additional specific conditions or standards such as those related to roadway traffic noise. Conditional use and special exceptions are used in this way. Innovative zoning strategies such as overlay zoning, cluster zoning, or performance zoning can be effective in focusing higher development standards on those areas that would be affected by roadway traffic noise. Municipalities that choose to have residential zoning adjacent to busy roadways or planned roadways may employ complex or innovative zoning strategies to avoid, mitigate, or minimize traffic noise impacts.

Setbacks

The setback, also known as front, rear or side yard, is a very basic tool in zoning used to separate uses or structures, particularly incompatible uses such as a residential use and a busy roadway. Setbacks from arterials or roadways can effectively reduce traffic noise impacts. Setbacks can be utilized for parking, recreational open space, or other uses that might be less impacted by roadway traffic noise. Setbacks are frequently used in combination with overlay zones and planned residential development (PRD).

Model Ordinance Provisions

No noise sensitive use shall be erected nearer than a specified distance; (for example 50 feet) measured from edge of the right of way line of any arterial or heavily trafficked roadway. Structures housing residents shall not be closer than a specified distance, (for example 100 feet) to an arterial or collector right of way.

Not less than a specified percentage, (for example, 50%) of all required parking and open space shall be located between the building foundation wall of any residential structure and the nearest major roadway right of way.

Conditional Use/Special Exception

Conditional uses and special exceptions require a higher level of review and scrutiny than zoning that allows land uses to be developed "by right." The standards for each must be specified in the zoning ordinance; applications are reviewed at a public hearing. Special exceptions are approved by the zoning hearing board, and conditional uses are approved by the governing body.

Both the governing body and zoning hearing board are allowed to attach conditions to their approval to minimize problems that are identified during the hearing process.

Requirements for applications for conditional uses or special exceptions should include analysis of traffic noise and/or traffic characteristics and volume studies. Also, the municipality should require the applicant to show how the proposed use will not be adversely affected by traffic noise. Finally, the zoning ordinance could require sound mitigation measures, such as setback, soundproofing, berms, and other strategies.

Section 605 of the PA Municipalities Planning Code permits modifications to zoning regulations "at, along or near major thoroughfares, their intersections and interchanges, transportation arteries and rail or transit terminals."

Overlay Districts

Overlay districts can be established where local conditions call for more stringent requirements than are normally provided for in the underlying zoning district. The geographic limits of overlay zones are frequently applied to natural features with uneven boundaries such as floodplains, or with infrastructure such as existing roadways or planned rights of way. Other areas delineated for overlay zones might include land requiring special regulation for the purpose of airport safety or land shown to be seriously affected by existing or future traffic noise.

Overlay zones may call for additional setback distances or reviews, or may include elements of other land use planning strategies. Requirements for roadway traffic noise overlay zones might also include considerations of topography or other natural features, and heightened requirements for building insulation, floor plan configuration, or sound screening.

Traffic Noise Impact Overlay District (NIOD)

NIOD overlay district provisions are intended to deal specifically with the impacts of roadway traffic noise on adjacent land uses.

Model Ordinance Provisions for NIOD

The designation of the overlay should be added to the existing zoning ordinance section establishing requirements for a zoning district.

The boundaries of the NIOD overlay district should be shown on the Official Zoning Map.

The section on Purpose or Intent of the zoning ordinance should be amended, as follows:

The purpose of these provisions is to minimize the impact of roadway traffic noise on individuals, businesses, and other activities; to prevent the loss of property value due to intrusive roadway traffic noise; to prohibit certain uses, activities, and development from being located within areas subject to projected intense roadway traffic noise.

Amend the section on Applicability of the Regulations, as follows:

These provisions shall apply to all lands within (name of municipality) and are shown as being located within the boundaries of the NIOD, which is considered part of the Official Zoning Map.

1. *The following land use categories shall be prohibited: (to be determined by municipality, e.g., single-family residential; multi-family residential; institutional).*
2. *No principal structure may be permitted closer than (100*) feet from the edge of the right of way of all arterial (or higher classified) roadways located within the NIOD.*

Performance Zoning

Performance zoning establishes standards that measure the impact or "performance" characteristics of development. Specific uses are permitted based on how well they meet measurable standards. Zoning ordinances may include performance standards that set forth particular land uses in a district, such as uses that are determined to be sensitive to traffic noise. The standards must be measurable and must include a temporal element. For example, a performance standard for roadway traffic noise might include roadway traffic noise levels predicted for a ten-year period from the date of the application. Traffic noise would be predicted using an accepted prediction model or prediction technique and scale for traffic noise measurement.

Performance zoning would allow the development of noise sensitive land uses where traffic noise conflicts will be mitigated as part of the development, thus avoiding the need to completely prohibit these uses from noisy roadway corridors. No single use would be permitted or prohibited outright; instead the basis of the regulation would be the avoidance or mitigation of land use and traffic noise conflicts.

A variation of the Overlay District approach would be to create a separate zoning district in the ordinance, for example, a Traffic Noise Impact Overlay District (NIOD).

Performance zoning gives the owner/developer considerable flexibility in meeting the applicable standard. The developer can place roadway traffic noise compatible uses closer to the source of the traffic noise, increase a setback, or construct earthen berms or other effective barriers along the roadway to effectively mitigate roadway traffic noise for uses that are incompatible with the level of noise. The developer can even incorporate sound reduction measures into the design of the structure or use sound absorption materials in construction. Because of the complexity of performance zoning, professional staff are usually needed for administration and enforcement.

* Note: The distance will vary from case to case. To determine distances municipalities should consider: current and projected traffic volume, road surface, use of structures, potential road expansion, and the presence or absence of earthen berms, and landscaping.

Model Ordinance Provisions

Add the following performance standards in the performance zoning district regulations.

1. *In this zoning district, the maximum traffic noise level predicted for ten (10) years from the date of the application shall not exceed the 66 dBA.*
2. *The traffic noise receivers that shall be used for the purpose of modeling shall be the property line of the subject parcel.*
3. *Traffic noise sensitive land uses will not be granted permits when a site is predicted to receive roadway traffic noise in excess of 66 dBA.*

Required Traffic Noise Model

The applicant shall submit the results from a prediction model demonstrating the traffic noise level projected for each of the next ten (10) years. The submission shall include factors for future roadway geometry, traffic volumes, truck traffic, and roadway speeds. The model should predict traffic noise at the appropriate receiver sites assuming that development occurs and also that all proposed mechanisms for traffic noise mitigation are implemented.

(The model should also predict traffic noise at these same receiver sites if no development is undertaken. To determine the predicted traffic noise level the applicant shall use current PENNDOT Standards.)

Clustering/Density

Clustering is a site design technique that maintains the permitted overall site density but arranges the proposed structures to occupy a smaller portion of the site, and thus provide more open space. Such open space would buffer structures from roadway noise. The cluster option may be included in various districts throughout the zoning ordinance.

Model Ordinance Provisions

The number of dwelling units per acre may be increased on a portion of the site to allow the area of the site most impacted by traffic noise to be used for non-residential or ancillary uses. The total number of units permitted shall not exceed total number of units that would otherwise be allowed on the site. (For example, given 100 acres and one acre parcels, if the development were clustered on 65% of the site, only 100 units would be allowed.)

The following language is applicable where a density bonus is granted to encourage clustered development that preserves a specified portion of the site for non-residential uses including passive recreation, wildlife and other less traffic noise sensitive activities:

The number of dwelling units per acre shall be increased on a portion (to be specified by the municipality, for example 65%) of the site to allow for the area of the site closest to the traffic noise source (roadway) to be used for non-residential or ancillary uses. The total number of units on the site, in the case where a density bonus is used, will be higher than if the site were otherwise developed. (For example, given 100 acres and one acre parcels, if development was clustered in 65 acres, with a 20% density bonus, 120 units would be allowed.)

Planned Residential Development

Planned Residential Development (PRD) is a land control device that combines elements of the zoning and the subdivision and land development ordinances. A PRD permits a large tract to be developed as a planned community. A mix of residential, commercial, industrial, institutional, and recreational uses is commonly allowed and/or encouraged in a PRD. The flexibility provided by a PRD allows developers to use land adjacent to arterial or higher classification of roadways for dedicated open space or uses that are compatible with traffic noise. A PRD requires considerable planning and collaboration between a developer and the municipality. It also requires a parcel of land large enough to accommodate a large number of homes as well as other uses.

Model Ordinance Provisions

The section on Purpose or Intent of the zoning ordinance should be amended as follows:

1. *The purpose of these PRD regulations is to encourage innovation and promote flexibility, economy, and ingenuity in development.*
2. *To authorize increases in the permissible density of dwelling units or intensity of land uses.*
3. *To authorize alterations in site requirements and encourage practices in accordance with modern and evolving principles of site planning and development.*

Approval of PRD:

1. *A PRD may be located in the areas specified in the zoning ordinance.*
2. *A PRD shall be approved based on the requirements of Article VII of the Pennsylvania Municipalities Planning Code (MPC).*
3. *As an incentive for using the PRD provisions in the ordinance, density bonuses shall be permitted, based on a schedule of increased density for: single-family residential (attached and detached) uses, multi-family residential, office, industrial, institutional, recreational, and other uses.*

PRD Design Criteria:

1. *Where a PRD is located adjacent to a major roadway, the location of open space on the tract shall be designed to serve as a buffer between the development on the tract and the adjacent source of roadway traffic noise.*
2. *Residential uses shall be located in areas of the development tract that are located at the greatest feasible distance from sources of major roadway traffic noise.*

Transferable Development Rights

Transferable Development Rights (TDRs) allow for the transfer of permitted use development from one area of a municipality to another. The municipality establishes "sending areas" where development is discouraged and "receiving areas" where development is encouraged. The TDR option allows a landowner to sell development rights from the "sending area" to another landowner in the "receiving area". This technique is used to encourage development in the most suitable areas and where infrastructure is in place. When the TDR technique is used it is common for the property owner to receive a bonus, usually in the form of additional dwelling units or floor area, because the transfer is beneficial to the entire municipality.

The municipality could use Transferable Development Rights (TDR) to encourage development, particularly residential development, away from roadway traffic noise. This can be accomplished by designating the areas impacted by traffic noise as the "sending area" and area(s) of the municipality better suited for such development as "receiving area(s)".

The zoning ordinance defines, in narrative description and by a delineated map, which areas are the "sending areas" and which are the "receiving areas". TDRs are best used in conjunction with overlay zoning districts, such as a NIOD. The Municipalities Planning Code specifically permits TDRs.

TDRs are the most complex of the zoning tools presented in this document. Municipalities which choose to use them to mitigate traffic noise conflicts should refer to additional planning resources for information about their use and implementation.

THE OFFICIAL MAP

An official map ordinance provides an opportunity for municipalities to plan for future public improvements or acquisitions. An official map ordinance includes purpose and intent, requirement and time frames, and enforcement provisions. The ordinance also includes the "Official Map" which shows the locations of planned public improvements and acquisitions.

An official map ordinance provides a measure of protection by providing information about planned public acquisitions and by allowing additional time (up to one year from the developer’s stated intention to build) for the municipality to make planned acquisitions.

For this and other reasons, the creation, use, enforcement, and other work with a community’s official map requires the involvement of legal counsel.

With regard to roadway traffic noise, an Official Map Ordinance can be useful for municipalities that do not currently have zoning or subdivision regulations in place. The Official Map could place public uses (such as parks, recreational areas, trails, and preserved open space) that would be more compatible in the areas impacted by traffic noise than other uses (such as a large development of single-family dwelling units). Additionally, the designation of open space next to roadways that are expected to experience higher volume traffic could be prudent as it may eliminate future complaints of roadway traffic noise .

DEFINITIONS

Arterial Roadways and Expressways - main function of expressways and major arterials is to provide for traffic mobility. These roadways generally carry higher volumes of traffic at higher speeds. Truck traffic may also be concentrated on arterial roadways and expressways.

Bonus or Incentive Zoning - The awarding of bonus credits to a development in the form of allowing more intensive use if it meets certain public benefit requirements, such as open space preservation and public plazas.

Buffer Zone - designated area between the traffic noise source and impacted facility in order to reduce the impact of traffic noise. May be planted and maintained with shrubs, bushes, trees, grass, or other landscaping material.

Building Code - Regulations that govern building design, construction, and maintenance in the interests of public health, safety, and welfare.

Bulk Regulations - Regulations that control the height, mass, density and location of buildings and set a limit on the intensity of development in order to provide light, air, and open space.

Collector Roadways - Collector roadways and local roads provide network interconnectivity and access to individual parcels. Traffic volumes should be lower and speeds slower on these roadways.

Common Open Space - a parcel or parcels of land or an area of water, or a combination of land and water within a development site, designed and intended for the use or enjoyment of residents of a development, not including streets, off-street parking areas, and areas set aside for public facilities.

Community Facilities - Publicly or privately owned facilities used by the public, including streets, schools, libraries, parks, and playgrounds. Also includes civic institutions such as churches and neighborhood associations.

Compatibility - The characteristics of different uses or activities that permit or prevent them from being located near each other and coexisting without conflict.

Decibel - a unit of sound level, which is a division of a logarithmic scale, used to express the ratio of the sound pressure of the source to the pressure of an arbitrarily chosen reference pressure.

Dedication - A transfer of private land for public use by a private owner or developer. Comprehensive plans and regulations usually specify dedications for open space, roadways, parks, school sites, or other public uses. Generally occurs as a required condition for development approval.

Density, control of - A limitation of the occupancy of land through use restrictions, minimum lot size requirements, floor area ratio, setback and yard requirements, and other limitations.

Density, bonus or incentive - The awarding of an increase in density to a development if it meets certain public benefit requirements, such as open space preservation and public plazas.

Developer - any landowner, agent of such landowner, or tenant with the permission of such landowner, who makes or causes to be made a subdivision of land or a land development.

Development Plan - the provisions for development, including a planned residential development, a plat of subdivision, all covenants relating to use and location of buildings and other structures, intensity of use or density of development, streets, ways and parking facilities, common open space, and public facilities.

Development Right - A separate estate in land. The development rights therein, and the same are declared to be severable and separately conveyable from the estate in fee simple to which they are applicable.

Easement - The right to use property owned by another for specific purposes. Generally used by municipal or state agencies for conservation of open space, utility facilities, and pedestrian and vehicular pathways or roadways.

Governing Body – The council in cities, boroughs, and incorporated towns; the board of commissioners in townships of the first class; the board of supervisors in townships of the second class; the board of commissioners in counties of the second through eighth class or as may be designated in the law providing for the form of government.

Impact Fee - a charge or fee imposed by a municipality against new development in order to generate revenue needed to provide the facilities necessary to support the development.

Industrial Use - any use of land or structures for construction, manufacturing, mining, and transportation, or designated as industry by the municipal code. Generally does not include municipal or state functions, such as public works and roadways.

Lot - a designated parcel of land established by a plat or otherwise as permitted by the code (of a municipality) to be used, developed, or built upon as a unit.

Multi-Municipal Plan - a plan developed and adopted by any number of contiguous municipalities, including a joint municipal plan as authorized by the PA Municipalities Planning Code.

Municipal Engineer - a professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the engineer for a municipality, planning agency, or joint planning commission.

Municipalities Planning Code - act of

Assembly of July 31, 1968, P.L. 805 and its amendments.

Municipality, Municipal Government - a local government or jurisdiction authorized to adopt land use regulation. (Including local and county governments.)

Nonconforming Use - a use, whether land or structure, which does not comply with the applicable use provisions set out in municipal zoning ordinances.

Official Map - a map adopted by municipal ordinance pursuant to Article IV of the Pennsylvania Municipalities Planning Code.

Open Space - land used for recreation, resource protection, amenities, or buffers, and protected by the provision of municipal ordinances to ensure that it remains in such use(s).

Overlay Zone - A special purpose zone that is superimposed over the primary zoning classification.

Planned Residential Development - a development plan that includes more than one type of housing and encompasses more than one building lot. The development plan may include land uses other than residential and provisions for public facilities and open spaces.

Planning Agency - the planning organization of a municipality as defined by the Municipalities Planning Code.

Principal Use - The main use of land or structures, as opposed to secondary or accessory uses such as garages or utility sheds. Zoning ordinances usually specify that only one principal use is permitted on each lot.

Property Line - an imaginary line drawn through the points of contact of adjoining lands, residences or spaces owned, rented, or leased by different persons. A line of separation of properties.

Public Grounds – include parks, playgrounds, trails, and paths, other recreational, and public areas. Also, sites for schools, sewage treatment, refuse disposal, and other publicly owned or operated facilities, and publicly owned or operated scenic and historic sites

Public Right-of-Way - any street, avenue, boulevard, road, highway, sidewalk, alley, and adjoining land or easement owned, leased, or controlled by a government or utility.

Residential Area - any group of residential properties including abutting public rights-of-way and public spaces.

Right-of-Way- The right of passage over another's property. The public may acquire a right-of-way through implied dedication.

Setback - a set distance, depending on the zoning requirements that apply to the facility, between the property line and the nearest foundation wall of the nearest building.

Structure - any man made object having ascertainable stationary location on or in land or water, whether or not affixed to the land.

Subdivision - the division or redivision of a lot, tract, or parcel of land by any means into two or more lots, tracts, parcels, or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, partition by the court for distribution to heirs or devisees, transfer of ownership or building or lot development; provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Traffic Noise Sensitive Land Use - Lands on which community members carry out their day to day activities of life, where traffic noise is considered undesirable.

Transferable Development Rights - the attaching of development rights to specified lands which are desired by a municipality to be kept undeveloped, but permitting those rights to be transferred from those lands so that the development potential which they represent may occur on other lands where more intensive development is deemed appropriate.

Zoning Districts - those districts set forth on the Zoning Map of the municipality. Each district prescribes certain allowable land uses, and building and development standards .

ADDITIONAL RESOURCES

PENNDOT
Keystone Building
400 North Street
Harrisburg, PA 17120
717-787-2838
www.dot.state.pa.us

Transportation Research Board
Keck Center of the National Academies
Transportation Research Board
500 Fifth Street, NW
Washington, DC 20001}
202-334-2934
www.nas.edu/trb

Pennsylvania Planning Association
587 James Drive
Harrisburg, PA 17112-2273
717 671-4510
www.planningpa.org

Federal Highway Administration
400 7th Street, S.W.
Washington, D.C. 20590
202-366-0537
www.fhwa.dot.gov

Pennsylvania Department of Community and Economic Development
400 North Street, 4th Floor
Commonwealth Keystone Building
Harrisburg, PA 17120-0225
1-800-379-7448
www.inventpa.com

Pennsylvania Municipal Planning
Education Institute
257 Nimitz Avenue
State College, PA 16801
814 237-2382
http://cax.aers.psu.edu/pmpei/

U.S. Department of Housing and Urban Development
451 7th Street S.W.
Washington, DC 20410
202 708-1112
www.hud.gov

Other Publications

Entering the Quiet Zone: Noise Compatible Land Use Planning
May 2002
Federal Highway Administration Brochure
www.fhwa.dot.gov/environment/noise.htm

Making Sound Decisions about Highway Noise Abatement
PENNDOT Brochure
Publication No. 21
July 2003

How can I get more information about PennDOT's noise policy?

For more information about PENNDOT's noise abatement policy and how it is applied, or about how noise is perceived, measured and controlled contact your local PENNDOT engineering district. Your call will be forwarded to the environmental manager who can discuss these issues with you.