

Chapter 446 Noise

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446.01 Introduction

Noise is defined as unwanted sound. The Federal Highway Administration (FHWA) developed noise regulations to investigate traffic noise impacts in areas where humans exist adjacent to highways and effective control of the undesirable effects of traffic noise. The regulation requires investigation of actions that have the potential to alter the existing traffic noise environment such as the proposed construction of a new highway, significantly changing the horizontal or vertical alignment of an existing highway, increasing the number of through-traffic lanes.

Noise levels near roadways depend on six variables:

1. Traffic volume
2. Traffic speed
3. Percent of heavy trucks
4. Distance from the roadway
5. Intervening topography
6. Atmospheric conditions

Generally, traffic noise increases with heavier traffic volumes, higher speeds, and more heavy trucks.

WSDOT uses several strategies to control traffic noise at nearby noise sensitive receivers:

- Construct noise barriers (walls or earthen berms)
- Reduce traffic speeds
- Coordinate with local agencies to prevent “noise sensitive” development near highways
- Preserve existing buffer zones and beneficial topographic features
- Support local jurisdictions to establish principal routes for buses and trucks

See the noise study process flow chart in the Exhibit below and for detailed information see WSDOT’s [Noise](#) webpage.

446.02 Applicable statutes, regulations, executive orders, and agreements

446.02(1) *Federal*

- 42 United States Code (USC) 4321 National Environmental Policy Act of 1969 (NEPA)
- Federal Noise Control Act ([42 USC 4901](#)) and companion legislation ([23 USC 109\(i\)](#))
- FHWA [Procedures for Abatement of Highway Traffic Noise And Construction Noise \(23 CFR 772\)](#)

446.02(2) *State*

- State Noise Legislation ([RCW 70A.20](#)) and implementing regulations

The Washington State Department of Ecology (Ecology) is responsible for implementation under the following regulations:

- [WAC 173-58](#) – Establishes standard procedures for measuring sound levels of sources regulated by Ecology, including, but not limited to, environmental noise, motor racing vehicles, construction, float planes, and railroads.
- [WAC 173-60](#) – Establishes the maximum noise levels allowed in different environments and Environmental Designations for Noise Abatement (EDNA) standards as measured at the property line. Highway traffic is exempt from this regulation, but it does apply to highway construction noise at night from 10 p.m. to 7 a.m.
- [WAC 173-62](#) – Sets noise emission standards for new motor vehicles operating on public highways and provides methods for evaluating motor vehicle noise levels.

446.02(3) *Local*

Local Noise Ordinances – Noise from construction or maintenance on transportation facilities during nighttime hours (typically, 10 p.m. to 7 a.m.) are subject to local ordinances and may require a noise variance or exemption.

446.03 Noise considerations during project development

446.03(1) *Highway Projects*

Planning

Under Section [1310 of MAP-21](#), the Federal lead agency may adopt and use planning products in the environmental review process of a project, even where planning begins at the local level. This can provide an opportunity for [noise-compatible land use](#) planning or reconsideration of project alternatives.

Scoping

Determine if the project is a Type 1, Type 2, or Type 3 project according to the definitions in [23 CFR 772.5](#) and [WSDOT Noise Policies and Procedures \(2020\)](#) or identify what information is needed to make this determination during design phase. Refer to the current retrofit barrier priority list and determine whether there are any retrofit (Type 2) noise barriers within the project corridor.

If the project is Type 1 and there is high density housing within the project corridor that do not already have a noise wall, conduct a noise screening analysis following [WSDOT Noise Policies and Procedures \(2020\)](#) to determine potential need for noise barriers. This information can help to provide more accurate project cost estimates prior to design phase.

Recommend including replacement of access doors on existing noise walls within projects as necessary.

Design

The intent of the [WSDOT Noise Policies and Procedures \(2020\)](#) is to minimize and avoid noise impacts from transportation systems and facilities. Many of the Technical Guidance documents in [Section 446.02](#), above, also function as Policy Guidance.

Related guidance is available in the following documents.

1. **FHWA Highway Traffic Noise Analysis and Abatement, Policy and Guidance** – The basis for all state noise policies and the accompanying guidance used to support state DOT policy development.
 - Federal Rule [23 CFR 772](#), July 2010
 - [Highway Traffic Noise: Analysis and Abatement Guidance](#), December 2011
 - [FHWA Noise Measurement Handbook](#) – Final Report 2018.
 - [FHWA Consideration of Existing Noise Barrier in a Type 1 Noise Analysis](#) – FHWA-HEP-12-051
2. **FHWA Guidance on Construction Noise** – FHWA guidance on highway construction noise from the [FHWA Special Report Highway Construction Noise: Measurement, Prediction, and Mitigation](#) (May 2, 1977). Additional information can be found in the [FHWA Construction Noise Handbook](#) (August 2006).
3. **FHWA Guidance on Pavement as a Noise Abatement Measure** – Outlines when states can consider the use of quieter pavements for noise abatement (2016).
4. **FHWA Environmental Review Toolkit** – Contains links to numerous references on highway construction and traffic noise analysis and abatement.
5. **FHWA Recommended Best Practices for the Use of TNM** – Provides TNM users with the best sources for information and input data that are critical to the development of an accurate model of highway traffic noise (2015).
6. **NCHRP Supplemental Guidance on the Application of FHWA's TNM** – Provides State Department of Transportation staff and other transportation professionals with technical guidance on using TNM (2014).

WSDOT guidance

1. [Noise Policy and Procedures \(2020\)](#) – Both technical procedures and policy guidance for addressing roadway traffic and construction noise is included in the document.
2. [Guidance for Noise Modeling \(2020\)](#) – Technical procedures and guidance for traffic noise modeling using FHWA's Traffic Noise Model (TNM).
3. [Biological Assessment Manual](#) – Evaluation of noise impacts for fish and wildlife is located in the *Biological Assessment Manual*, Part 2: Guidance on Specific Biological Assessment Topics, under Chapter 7: Noise Impact Assessment.
4. [Roadside Manual M 25-30](#) – Provides additional information on safety, visual quality, and maintenance that may be useful for designers of noise barriers.
5. [Design Manual Chapter 1130](#) – Gives general guidelines that local jurisdictions and private developers should follow when considering development and noise impacts on state highways.
6. [Design Manual Chapter 1600](#) – Provides information on design choices for designers to use to minimize potential noise impacts from rumble strips and quieter options where needed.

FTA lead/co-lead projects

For many projects involving passenger rail, transit, and/or park and ride facilities, FTA criteria applies as outlined in *FTA Transit Noise and Vibration Impact Assessment Manual*, September 2018 (Report No. 0123). Noise studies are also required for these facilities.

An [Interagency Agreement](#) for coordinated noise analysis and abatement policy and procedures has been developed by FTA, FHWA, WSDOT, and Sound Transit. The current agreement (as of February 2001) documents an agreed upon noise methodology and criteria for integrated highway and transit projects. A copy of the agreement is included in [Appendix B](#) of the EM.

FTA technical guidance for mass transportation noise analysis is available in the FTA Noise and *Vibration Impact Assessment Manual*, September 2018 (Report No. 0123). The FTA [General Noise Assessment Spreadsheet](#) is designed as an aid in using the FTA General Noise Assessment Procedures.

FRA lead/Co-lead projects

Evaluation of railroad sound levels is regulated under [42 USC 4916](#) and [WAC 173-58](#). Rail projects may require a vibration analysis. Rail projects may also require a horn noise analysis if a new rail crossing is created, or an existing crossing is modified to introduce new horn warning signals. A process to address train horn noise and establish community quiet zones is now available through the [Federal Rail Administration \(FRA\)](#).

WSF projects

Ferry projects are considered multimodal facilities and are typically addressed under FTA criteria and policy for noise and vibration. Noise studies following FHWA criteria may also be required for these facilities. Ferry projects may require an Incidental Harassment Authorization (IHA) permit for pile driving in water. Biological Assessments (BA) should address noise impacts to species listed under the Endangered Species Act. Ferry vessels are regulated for noise under [RCW 79A.60](#).

WSDOT airports

WSDOT [airports](#) have [noise compatible land use guidelines](#).

Construction

Ensure Contractor complies with noise variance conditions set by local jurisdictions for night work. Respond to community complaints in a timely manner. Provide Design Builder with timely comments on potential design changes and/or updated noise study to ensure that they achieve the same results as in the original environmental documentation.

For more information on environmental commitments during construction see [Chapter 600](#).

Maintenance and Operations

Repair noise wall panels damaged by errant vehicles, paint over graffiti.

446.04 Analysis and documentation requirements

This section describes analysis and documentation requirements based on regulatory requirements. Determine level of detail based on complexity/size of project, expected severity of impacts, and potential for public controversy.

446.04(1) ***Analysis and documentation for NEPA***

When noise impacts are found or anticipated on highway projects a full noise analysis and report must be completed following [WSDOT Noise Policies and Procedures \(2020\)](#). Noise analysis, where there are federal funds or a federal nexus associated with the project, must include the entire project corridor and both sides of the highway regardless of whether there are Type 1 activities along the entire project corridor or not.

If no noise impacts are anticipated on a highway project a noise screening analysis can be conducted using a 'straight-line' model or under specific conditions the [FHWA Traffic Noise Screening Tool \(TNST\)](#) can be used following [WSDOT Noise Policies and Procedures \(2020\)](#). A simple memorandum report format is acceptable.

446.04(2) ***Analysis and documentation for SEPA only (No federal nexus)***

If there are no federal funds or no federal nexus associated with the project, the same applies as it does for NEPA above, however, in [Appendix 1 of WSDOT Noise Policies and Procedures \(2020\)](#) there is an option to analyze only those areas and only the side of the roadway where Type 1 activities are occurring on the project. For projects with no federal funds or federal nexus, areas where no Type 1 activities are occurring may be eliminated from the analysis and reporting.

446.04(3) Analysis and documentation for projects under FTA/FRA under NEPA/SEPA

For projects involving passenger rail, transit, and/or park and ride facilities, FTA criteria applies as outlined in [FTA Transit Noise and Vibration Impact Assessment](#) for both NEPA and SEPA documentation. Reporting under NEPA would include a full noise and vibration report and a simpler memorandum format could be used under SEPA reporting.

446.05 External engagement

446.05(1) Methods of public outreach for noise abatement

The WSDOT Air Quality, Noise and Energy Program manager, with the project engineering office, will decide on the appropriate method and level of initial public involvement.

Depending on the size, controversy, and impact of the project, public outreach may include:

- Open houses
- Community group briefings
- Environmental document hearings
- Mailers
- Workshops
- Community polling
- Joint WSDOT/Citizen committees

For communities where noise levels are above the impact criteria and abatement is not proposed for construction and there is significant community concern about noise, the project design team may augment its community involvement activities to conduct specific outreach. This is intended to determine if there are other possible low-cost solutions to address the community concerns within the existing project budget ([WSDOT Noise Policies and Procedures \(2020\), Appendix 2](#)). These would not be eligible for federal-aid highway funds.

It is generally assumed that noise abatement is desired by a community, however, if there is opposition to the proposed abatement by the community the project engineering office will be responsible for:

- Ensuring that the department is aware of these concerns
- Documenting the concerns
- Considering changes to the design if possible
- Responding to those who expressed concerns
- Working with the WSDOT Air Quality, Noise and Energy Program manager, conduct a poll of eligible property owners and residents

446.06 Internal roles and responsibilities

446.06(1) Region/modal environmental manager

Final review of noise discipline report and NEPA/SEPA documentation.

446.06(2) Project engineer office

The Project Office provides traffic data, MicroStation design files including alignments, cross sections, contours, and structures out to 500 feet from the edge of pavement to the noise analyst. The Project Office reviews the draft and final noise discipline report to ensure that it aligns with the project description, and they incorporate any noise walls recommended for construction into the final design.

For some larger projects (e.g., Megaprograms) the staff editor performs a final editorial review. If there are any conflicts with construction of the proposed noise wall (e.g., buried utilities or overhead powerlines), the Project Office communicates these to the noise analyst. If the noise wall requires changes in the alignment due to these conflicts the noise analyst must update the noise study.

446.06(3) Region environmental coordinator

The environmental coordinator reviews the draft and final noise discipline report to ensure that it aligns with the project description, ensures the format is consistent with the other discipline reports, and checks for grammatical errors.

446.06(4) Environmental services office

The [Air Quality, Noise and Energy Program manager](#) reviews the draft and final noise discipline report to ensure that it is consistent with the FHWA regulations and [WSDOT Noise Policies and Procedures \(2020\)](#), that the methodology is technically correct, and checks for grammatical errors. During the final design stage, the Air Quality, Noise and Energy Program manager ensures that the designed top of wall elevation is consistent with what was proposed in the noise discipline report. The Program manager also leads all consultations with FHWA if needed to clarify any policy or regulatory questions or changes.

The Air Quality, Noise and Energy specialists conduct air quality and noise and energy studies, provide technical assistance and advice pertaining to air quality and noise and vibration issues on projects, working with the environmental coordinator and the Project Office obtain nighttime noise variances or exemptions for night work in various jurisdictions and working with Local Programs provide technical reviews of air quality and noise reports.

446.07 Applicable permits and approval process

The only permits required for noise are variances or exemptions from state and local noise regulations for construction and maintenance activities during nighttime hours ([WAC 173-60](#)). Nighttime noise limits are typically in effect between 10 pm and 7 am but vary by jurisdiction or type of land use adjacent to the construction noise source. The application process will vary by jurisdiction and tribe. Contact the [Air Quality, Noise and Energy Program manager](#) for information or assistance.

For more information on the permitting process, see [Chapter 500](#).

446.08 Mitigation

Avoiding or minimizing noise impacts through the design process is always the first choice, but it is not viable in all locations. Where noise impacts are present, a noise barrier or berm near the source or the receiver provides the most efficient form of noise mitigation (abatement). Regardless of the type of noise abatement proposed, it must meet both feasibility and reasonableness criteria to be considered noise abatement and be eligible for federal funds. Any noise abatement constructed is required to be maintained in-perpetuity.

For projects where noise impacts occur and noise abatement does not meet the feasibility and reasonableness criteria and there are substantial concerns from the community regarding noise, other options can be considered that will not provide noise reduction but can either give the perception of noise reduction or address other community issues using a 'green to gray' approach ([WSDOT Noise Policies and Procedures, \(2020\), Appendix 2](#)). These community-scale options are intended to enhance community participation. They are not eligible for federal funds and must be within available project scopes and budgets.

WSDOT cannot use quieter pavement or insulation of non-institutional and non-public use facilities.

446.09 Abbreviations and acronyms

BA	Biological Assessment
CFR	Code of Federal Regulations
DOT	Department of Transportation
EDNA	Environmental Designation for Noise Abatement
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
MAP-21	Moving Ahead for Progress in the 21 st Century Act
NEPA	National Environmental Policy Act
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
TNM	Traffic Noise Model
USC	United States Code
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WSF	Washington State Ferries

446.10 Glossary

Abatement – Reduction in degree or intensity sometimes referred to as noise mitigation.

Approach – In Washington State defined as within one decibel of the federal noise abatement criteria (NAC).

Barrier – A solid wall or earth berm located between the roadway and receiver location that provides noise reduction.

Design Year – The future year used to estimate the probable traffic volume for which a highway is designed, usually 20 years from the beginning of construction for WSDOT projects.

Environmental Designation for Noise Abatement (EDNA) – an area or zone within which maximum permissible noise levels are established.

Existing Noise Level – Modeled traffic noise level(s) based on the Existing Year peak hour traffic data. Current noise measurements can also be used as Existing Year where no roadway exists.

Impacted Community – Noise sensitive receptor sites (such as schools or neighborhoods) where people would be exposed to substantially increased noise levels or noise levels that approach abatement criteria.

Noise Abatement Criteria (NAC) – Noise levels that when approached or exceeded are traffic noise impacts. NAC vary by activities and/or land use.

Noise Compatible Land Use – Planning of non-noise sensitive land use development and activities adjacent to sources of high noise levels.

Roadway – The entire width between the right of way boundary lines of a publicly maintained travel way when any part thereof is open to the public use for purposes of motorized vehicular travel. May also be referred to as a street, road, or highway.

Traffic Noise Impacts – When the predicted Design Year traffic noise levels approach (within 1 dBA) or exceed the NAC or when the predicted Design Year traffic noise levels substantially exceed (≥ 10 dBA) the Existing Year noise levels.

Type 1 Project – Construction of a new highway; significant realignment of an existing highway (either horizontal or vertical realignment); increasing the number of through traffic lanes on an existing roadway; or changing the near road topography to create a new line-of-sight from noise sensitive receivers to the roadway.

Type 2 Project (noise wall retrofit) – Noise abatement on an existing highway targeting residences that existed before May 14, 1976, when traffic noise evaluations were first required.

Type 3 Project – Federal projects that do not meet the requirements of a Type 1 or Type 2 project and do not require a noise analysis.

446.11 Exhibit

Exhibit 446-1 Traffic noise study process

