



## Draft Dulles Toll Road Highway Noise Policy

### 1. Purpose

The Metropolitan Washington Airports Authority (the Authority) strives to be a good neighbor to adjacent communities and endeavors to address traffic noise concerns along the Dulles Toll Road and Dulles Airport Access Highway. In order to address concerns related to traffic noise protection, the Authority has developed this traffic noise policy.

It is the policy of the Authority to employ the following guidelines for traffic noise evaluation and abatement along the Dulles Toll Road. U.S. Code of Federal Regulations, Title 23; Federal Highway Administration, Part 772 - "Procedures for Abatement of Highway Traffic Noise and Construction"; (23 CFR 772), will be the guiding document for the analysis and abatement of highway traffic noise.

### 2. Definitions

Abatement: Measures used to mitigate or reduce traffic noise levels such as noise barriers. Examples of abatement can include traffic management measures, alteration of horizontal and vertical alignments, acquisition of property, construction of noise barriers, or noise insulation of public use or nonprofit institutional structures. Planting vegetation between the noise source and receptor(s) is not considered an abatement measure because it is rarely acoustically effective.

Approach, as used in 23 CFR 772.5(g): Noise levels  $Leq(h)$  which are 1 decibel [dBA] below the levels shown in the Noise Abatement Criteria (NAC; Table 1) of the guidelines in 23 CFR 772.

Barrier: A solid wall, earth berm, or combination earth berm and wall to provide traffic noise reduction for impacted properties. It is typically designed to break the line-of-sight between the receiver and the roadway noise sources.

Berm: Linear earthen mound constructed to provide a traffic noise reduction for impacted receptors.

Benefited: If a property is impacted by traffic noise, it is "benefited" if an abatement measure reduces the noise level at the receiver by at least 5 decibels. For multi-family, developed properties (such as apartments, condominiums, or manufactured home developments), each individual dwelling unit receiving at least a 5 dBA reduction will be considered a benefited customer.

CFR: Code of Federal Regulations.

Date of Public Knowledge: The date that a project's environmental analysis and documentation is approved.

A-Weighted Sound Level (dBA): The unit used to measure noise that best corresponds to the frequency response of the human ear. More weight is given to the frequencies that people hear more easily, between 1000 and 6000 Hertz (cycles per second).

Decibel (dB): A unit used to measure sound pressure levels.

Design Year: The future year for which the estimated probable traffic volume is used as the basis for a highway design. A period of time, usually 10 to 20 years from the start of construction, is used to determine the design year.

Existing Noise Level: The noise, resulting from natural and mechanical sources and human activity, considered usually present in a particular area.

Feasibility: The ability of a noise abatement measure to provide either a 5-decibel reduction in noise levels at impacted properties or to provide enough noise protection that the sound level at impacted properties is below the Noise Abatement Criteria, whichever results in a lower sound level. It also deals primarily with engineering considerations such as constructability, utility impacts, safety concerns, and access restrictions.

FHWA: Federal Highway Administration.

Future Noise Level: The sound level predicted to occur in the design year. The future noise level accounts for noise increases or decreases associated with traffic growth or contraction.

Impacted: Any receiver/receptor or property that has a worst-case Leq approaching (within 1 dBA) or exceeding the Noise Abatement Criteria for the corresponding land use category, or that has predicted future noise levels in the build conditions substantially exceed existing noise levels, even though the predicted future levels may not exceed the NAC.

Insertion Loss (IL): The amount of noise reduction that is provided by the noise abatement measure. It is calculated by subtracting the sound level with the noise abatement measure in place from the sound level without noise abatement.

L<sub>10</sub>: The sound level that is exceeded 10 percent of the time (the 90<sup>th</sup> percentile) for the period under consideration.

L<sub>10</sub>(h): The value of L<sub>10</sub> for a one hour period.

Leq: The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period.

Leq (h): The value of Leq for a one hour period.

NAC: The Noise Abatement Criteria as shown in Table 2 of this Highway Noise Policy.

Noise: Unwanted or excessive sound.

Noise Sensitive Area (NSA): An area that includes a number of noise receivers/receptors within a geographic location.

Reasonableness: The ability of a noise abatement measure to meet criteria concerning the rationality of construction. This generally pertains to the cost-effectiveness of a noise abatement measure and opinion of the property owners that the noise abatement measure would provide benefit. Other factors that can be considered include visual impacts, adjacent historical properties, or cultural impacts.

Receiver/Receptor: The precise location where traffic noise levels are either measured or modeled. It is typically located on a property where frequent outdoor activity occurs.

| Section 4(f) Resources: Parks and recreation areas, wildlife and waterfowl refuges, and historic sites.

Sound: The sensation produced in the organs of hearing by certain pressure variations or vibrations in the air.

Substantially exceed the existing noise levels, as cited in 23 CFR 772.5(g): Increases of 10 dBA or more above the existing noise level.

Traffic Noise Impacts: Impacts which occur when the predicted traffic noise levels approach or exceed the noise abatement criteria (Table 2), or when the predicted traffic noise levels substantially exceed the existing noise levels.

Type I Project: A proposed federal or federal-aid highway project for the construction of a highway on new location or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes. For the purpose of discussion in this policy, all proposed projects that would meet the above criteria, regardless of federal funding, are considered Type I Projects.

Type II Project: A proposed federal or federal-aid highway project for noise abatement on an existing highway. For the purpose of discussion in this policy, all proposed projects for noise abatement on an existing highway, regardless of federal funding, are considered Type II Projects.

Worst Case Noise Levels: The traffic noise levels that result from traffic conditions that would create the theoretical loudest noise scenario.

### **3. Sound Fundamentals**

Sound is created when an object moves and the movements create sound pressure waves, or vibrations, in the air to move. When these vibrations reach our ears, they cause us to hear what we call sound. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels (dB). Sound frequency is as important as pressure in how a human perceives noise. The human ear does not respond identically to all sound frequencies. Therefore, more weight is given to the frequencies that people hear more easily, between 1000 and 6000 Hertz (cycles per second). The weighted scale that is used to measure noise that best corresponds to the frequency response of the human ear is called A-scale. Sound pressure levels measured on the A-scale are abbreviated dBA.

When considering the impacts of changes to the sound environment, it is important to understand how sound level changes are perceived. In Table 1, sound level change is compared to how it is typically perceived by the human ear.

**Table 1. Noise Perception**

<b>Sound Level Change dBA</b>	<b>Relative Loudness Change</b>
+10	Twice as Loud
+5	Readily Perceptible Increase
+3	Barely Perceptible Increase
0	No Change
-3	Barely Perceptible Decrease
-5	Readily Perceptible Decrease
-10	Half as Loud

Because highway noise intensities fluctuate with varying levels of traffic, a “metric” representing a composite sound level, or  $Leq$ , is used in the industry. This is the equivalent steady-state sound level that, in a stated period of time, contains the same acoustic energy as the time-varying sound levels during the same time period.  $Leq(h)$  is the equivalent sound level for a one-hour period. An additional descriptor of time variation, the  $L10$ , is sometimes used. This is simply the A-weighted sound level that is exceeded 10 percent of the time within the period of observation or prediction.

#### **4. Traffic Noise Fundamentals**

Traffic noise is a combination of the noises produced by the engine, exhaust, and tires of vehicles. For the purpose of highway traffic noise analyses, motor vehicles fall into one of five categories:

- (1) Automobiles - vehicles with two axles and four wheels,
- (2) Medium trucks - vehicles with two axles and six wheels,
- (3) Heavy trucks - vehicles with three or more axles,
- (4) Busses, and
- (5) Motorcycles.

Traffic noise levels depend on:

- Traffic volume
- Vehicle speed
- Vehicle category mix
- Duration and frequency of traffic
- Distance between vehicles and receptors
- Intervening barriers
- Ambient environment
- Terrain

Generally, heavier traffic volumes, higher speeds, and greater numbers of trucks increase the loudness of traffic noise.

## 5. Federal Noise Abatement Criteria

**Table 2. Noise Abatement Criteria**

<b>Noise Abatement Criteria</b> <b>[Hourly A-Weighted Sound Level—decibels (dBA)]<sup>1</sup></b>			
<b>Activity Category</b>	<b>Leq(h)</b>	<b>L<sub>10</sub>(h)</b>	<b>Description of Activity Category</b>
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	-	-	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

<sup>1.</sup> Either L<sub>10</sub>(h) or Leq(h) (but not both) may be used on a project.

Source: Code of Federal Regulations, Title 23, Part 772 (23 CFR, Part 772).

## 6. Impact Criteria

Impact criteria set the standards that a property must meet to warrant investigation of traffic noise abatement. Impact criteria for Type I and Type II Projects are listed below.

### Type I Projects

For Type I Projects, a property is considered impacted if either:

1. future noise levels are predicted to have a worst case Leq approaching [within 1 dBA] or exceeding the Noise Abatement Criteria for the corresponding land use category,
- or
2. future noise levels are predicted to have a worst-case Leq that substantially exceeds the existing noise levels.

### Type II Projects

Any receiver/receptor or property that has an existing worst-case Leq approaching [within 1 dBA] or exceeding the Noise Abatement Criteria for the corresponding land use category. For Type II Projects, the Authority will only consider traffic noise impacts for properties that have active land use categories (i.e., Active Categories A, B, C, and E from Table 2) that predate the adoption of this policy.

## **7. Feasibility/Reasonableness Criteria**

In order for a noise abatement measure to be approved by the Authority, it must meet both feasibility and reasonableness criteria. The Authority may make exceptions on a case-by-case basis.

### Feasibility Criteria

To be considered feasible, a traffic noise abatement measure must meet all of the following:

1. Overall traffic noise reduction of at least 5 decibels is achievable. In certain cases, if it is not feasible to achieve an overall noise reduction of 5 dBA, the Authority will consider constructing noise barriers that provide partial abatement, i.e. reduction in noise levels at 3 or 4 dBA.
2. The predicted noise level with the noise abatement measure will not approach or exceed the Noise Abatement Criteria.
3. The placement of the noise abatement measure will not restrict pedestrian or vehicular access.
4. The construction of the noise abatement measure will not cause any safety or maintenance problems.
5. The traffic noise abatement measure is constructible considering constraints related to utilities, topography, drainage, maintenance of traffic, and other site-specific constraints.
6. Non-highway noise sources, such as urban streets, industrial facilities and airplane flight paths, do not reduce or limit the effectiveness of a proposed traffic noise abatement measure.
7. There are no zoning laws or ordinances passed by a local jurisdiction that restricts heights of walls or barriers.
8. For properties subject to Section 4(f) protection, impacts must be evaluated on a case-by-case basis to determine if there is a "substantial impairment" to the intended use of the property, consistent with federal law.

### Reasonableness Criteria

To be considered reasonable, a traffic noise abatement measure must meet all of the following:

1. Properties are impacted by traffic noise impacts.
2. The total cost of the traffic noise abatement measure is equal to or less than \$40,000 per benefited property, adjusted annually for inflation. A property's inclusion in the abatement measure calculation is contingent on the property receiving a minimum 5 dBA traffic noise reduction due to construction of the barrier.
3. The views of the property owners impacted by traffic noise in the noise study area are considered and those owners generally approve of the proposed traffic noise abatement measure.
4. Right-of-way that may be required for the construction or permanent location of a noise abatement measure is donated to the Authority.

## **8. Funding**

When the cost of a noise abatement measure exceeds the Authority's cost effectiveness ceiling but the measure otherwise satisfies the criteria contained in this policy, the measure can still be constructed, provided:

1. a third party funds the amount above the cost ceiling  
and

2. the Authority receives the third party share prior to the date of submittal of the plans, specifications, and estimates (PS&E).

The cost effectiveness ceiling is \$40,000 per benefited property, adjusted annually for inflation.

The option to allow third party funds may be revised or revoked entirely at a later date in order for this policy to continue to comply with criteria set forth in the Federal Highway Administration regulations set forth in 23 CFR 772.

## **9. Ranking**

The Authority will prioritize noise study areas for traffic noise abatement. Factors that affect ranking would be the total cost of noise abatement, the cost effectiveness of noise abatement, and the sound levels in the noise study area.

## **10. Reconstruction of Existing Noise Walls**

Based on an evaluation of an existing noise barrier's continued effectiveness to achieve desired noise abatement standards or based on an engineering determination that a barrier has experienced certain structural damage, the Authority will repair or replace existing noise walls in kind.

## **11. Other Obligations and Agreements**

Nothing in this Traffic Noise Policy shall be construed to alter or amend any obligations or agreements between the Authority and any other entity concerning standards for noise abatement that were already in effect on the date this Traffic Noise Policy was adopted.