



# Non-Residential Receptors (NRRs)

for Activity Categories A - E

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For analysis of Activity Categories C, D, and E, the Federal Highway Administration's (FHWA) Noise Regulation (23 CFR 772) states that 'Each highway agency shall adopt a standard practice [...] that is consistent and uniformly applied statewide.' FHWA Guidance further states that 'the highway agency should develop a method to evaluate the number of receptors used to represent these locations' and introduces the concept of 'equivalent number of residences' to equate other land uses to a number of residential receptors. This is based on the evaluation of AC B (residential) lands, where one residence equals one receptor.

These responses or decisions are typically captured in a State's Noise Policy and/or ancillary guidance manuals. There is no standard method for calculating and placing NRRs. There are several methods available to determine the number of NRRs for a site; and for determining where those calculated receptors should be placed within the site. The different methods will produce different results on the feasibility and reasonableness of noise abatement and can thus have important consequences for whether a State provides noise abatement for a site.

## OBTAINING THE NECESSARY INFORMATION

The most accurate methodology for calculating NRR values is one based on site-specific data collected during a field review and after discussion with the site owner. This method can be difficult and time-consuming. Statewide guidance should explain whether data substitutions are allowed in such cases. Site-specific data from a field review can be substituted with online data for the site; or data relating to larger areas, such as a County, State, or Region. General data regarding residential lot sizes can be sourced from sites such as the US Census Bureau.

The nationwide noise barrier inventory information (collected per 23 CFR 772.13(f)) can also inform the calculation of the average frontage protected by a noise barrier in a given state. It should be noted that this methodology for calculating frontage for Methodologies 2, 3, and 4 is most useful in States with a large number of noise barriers. States with fewer noise barriers may have difficulties in calculating averages that are meaningful.

23 CFR 772.11(c)(2)(iii), (iv), and (v) requires a consistent statewide policy for the analysis of Activity Categories C, D, and E. The various methods that States have adopted result in a wide range of Non-Residential Receptor values, which, in addition to their spatial placement in property, can have impacts on whether noise abatement is feasible and reasonable.

## CONSIDERATIONS IN CHOOSING (A) METHODOLOGY(IES)

Consider an example where a park's NRR Values are calculated based on Usage (Method 5), but placed based on Activity Areas (Method 1). If such activity areas are far from the road, it is unlikely that the receptor points will receive the minimum 5 dB(A) benefit from any proposed abatement. As such, abatement is unlikely to be constructed.

Alternately, consider a scenario where the NRR Values are calculated by Lot Size for a very large park, but placed in close proximity to the roadway along a Frontage that corresponds to the typical first-row residential receptor in that State. This could result in a very large amount of receptors being placed in an area where activities do not normally occur. Abatement would likely be feasible and reasonable, but would not protect very many actual activity areas.

## Summary of Methodologies for Determining and Placing NRRs

Methodology	Value Step 1 (number of receptors)	Point Step 2 (location of the receptors)
1 <b>Single-Point</b>	One receptor is assigned for: 1) The entire land use/facility, or 2) Each discrete parcel/activity area.	1) At the center of the facility or at the center of each activity area. 2) At the point closest to the noise source for the overall facility or the point closest to the noise source at each activity area.
2 <b>Frontage-Based</b>	Number of receptors is calculated based on the frontage of a land use as related to average residential frontage in a given area. 1) Define a standard frontage-length section (For example: 100 feet). 2) Base the frontage-length sections on the average frontage of residential properties using an equation.	Each receptor is equally spaced in the center of each frontage line section.
3 <b>Lot Size-Based</b>	Number of receptors is calculated based on the area of a land use as related to average residential lot size in a given area. 1) Within the project area. 2) Local (city, subdivision). 3) CMSA, MSA, or county wide. 4) Statewide.	1) By placing the entire NRR value at one NRR point in the center of the parcel. 2) At a point along the property line. 3) At a point representing front row receptors. 4) At some other predetermined setback distance. 5) As grid with the NRR value distributed evenly among the grid points
4 <b>Grid-Based</b>	Use of a grid-based methodology to calculate the appropriate number of receptors. 1) Place a grid over an entire parcel. 2) Place a grid only over the portion of a parcel that has been determined to be impacted.	Each receptor is placed where the grid lines intersect.
5 <b>Usage-Based</b>	Number of receptors is calculated based on intensity of use, time of use, facility enrollment, facility capacity, and other use-related factors.	1) At the centroid of each identified land use. 2) A point closest to the noise source. 3) By distributing the points within the land use (similar to Methods 2 – 4). 4) Based on the activity-specific magnitude of the NRR value and the size of the land use.
6 <b>Combination</b>	A combination of two or more of the above methods.	A combination of two or more of the above methods.

*The combinations of Values and Points provided here are not an exhaustive list of combinations.*