Appendix E.12 – Noise and Vibration

APPENDIX E.12

NOISE AND VIBRATION – ERRATA SHEET

No changes were made to the materials in this appendix. This Volume 2 file contains the same information as was presented in the Tier 1 Draft EIS published November 2015.

NEC FUTURE
A Rail Investment Plan for the Northeast Corridor

Noise and Vibration Impact Assessment Methodology

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Revised Final

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Table of Contents

Tables

1. Noise and Vibration

1.1 INTRODUCTION

This methodology explains how the NEC FUTURE program will address the potential effects of the Tier 1 EIS Alternatives on noise and vibration in the Tier 1 EIS.

This methodology presents the regulatory framework, involved government agencies, expected regulatory and other outcomes of the Tier 1 EIS process and relevance to Tier 2, project-level assessments. It also identifies data sources, metrics and methods to be used to document existing conditions and analyze environmental consequences. This methodology may be revised as the NEC FUTURE program advances and new information is available.

1.1 DEFINITIONS

Rail related noise and vibration includes ambient noise and vibration conditions as defined below based on data from the U.S. Department of Transportation's (USDOT) Federal Railroad Administration (FRA) and the U.S.DOT's Federal Transit Administration (FTA). Consistent with FRA and FTA guidance, noise and vibration are assessed based primarily on their potential to cause annoyance.

- ***Noise**:* Noise is typically defined as unwanted or undesirable sound. For rail systems, airborne noise is generated by sources such as vehicle engines, wheel-rail interaction and audible warning devices including train horns that may cause annoyance at nearby sensitive receptors such as residences, hospitals, schools, churches, parks and ecological-sensitive habitats. In the case of high speed rail there can also be noise generated from aerodynamic motion, which occurs when train speeds start to exceed 160 mph. For a more detailed explanation of noise and how noise is measured, see Part B in the Appendix.
- ***Vibration**:* Wheel-rail interaction also generates ground-borne vibration (defined as the oscillatory motion of the ground), transmitted through the track structure into the ground, which may be perceptible and disturb people or sensitive activities in nearby buildings. For a more detailed explanation of vibration and how vibration is measured, see Part C in the Appendix.

1.2 RELATED RESOURCES

The effects assessments from other resources evaluated as part of the Tier 1 EIS will contribute to the assessment of effects on noise and vibration levels. These related resources are identified in Table 1. Note that the effects assessments for those related resources will be documented within their respective Tier 1 EIS sections.

Table 1 – Related Resource Inputs to Noise and Vibration Assessment

Resource	Input to Noise and Vibration Assessment
Demographics	▪ Supplemental resource used for identification of potentially affected population (from census data).
Environmental Justice	▪ Supplemental resource used for identification of potential sensitive receptors.
Land Cover	▪ Supplemental resource used for identification of developed land cover throughout the study area to locate potential sensitive receptors (see Part A of the Appendix).
Ecological Resources	▪ Supplemental resource used for identification of wildlife preserves.
Parklands and Wild and Scenic Rivers	▪ Supplemental resource used for identification of parks
Cultural Resources and Historic Properties	▪ Supplemental resource used for identification of cultural resources and historic properties
Section 4(f)/6(f) Resources	▪ Supplemental resource used for identification of Section 4(f) and 6(f) resources

Source: NEC FUTURE JV Team, 2014

1.3 AGENCY AND REGULATORY FRAMEWORK

Assessment of rail transportation-related noise and vibration effects is the subject of guidance by the FRA and the FTA, as listed in Table 2. Guidance by each of these agencies will be considered, consistent with a Tier 1 level of assessment, in the evaluation of noise and vibration for the NEC FUTURE program.

Table 2 – Federal Agency Guidance for Assessment of Noise and Vibration

Federal Agency	Regulatory Oversight	Description of Regulation	Regulated Resource
USDOT Federal Railroad Administration	▪ High Speed Ground Transportation Noise and Vibration Impact Assessment manual (September 2012)	▪ Regulates noise and vibration prediction methods and impact criteria	▪ Railroad noise and vibration that may occur as a result of operation of high-speed ground transportation projects
USDOT Federal Transit Administration	▪ Transit Noise and Vibration Impact Assessment manual (May 2006)	▪ Regulates noise and vibration prediction methods and impact criteria	▪ Railroad noise and vibration that may occur as a result of operation of proposed mass transit projects

Source: NEC FUTURE JV Team, 2014

The *High Speed Ground Transportation Noise and Vibration Impact Assessment* manual (FRA manual), and the *Transit Noise and Vibration Impact Assessment* manual (FTA manual), identified in Table 2, codify the technical approach, criteria thresholds, and model algorithms for noise and vibration for rail projects in the United States. Consequently, these two manuals define the analyses needed for the NEC FUTURE program.

1.3.1 Regulatory Compliance

No formal agency approvals would be requested for the Tier 1 EIS. However the FRA will engage in dialogue with the FTA on methodologies, assumptions, and findings of the Tier 1 EIS analysis. For the Tier 1 EIS, the FRA will describe the requirements associated with the FRA manual and the FTA manual.[1] During the Tier 1 EIS process, the FRA will identify potential opportunities to streamline subsequent Tier 2 environmental reviews (see Section 1.7). Coordination with other agencies will be consistent with the NEC FUTURE Agency Coordination Plan and support the Statement of Principles (SOP) established between the FRA and federal regulatory agencies as part of the Council on Environmental Quality (CEQ) Pilot program.

1.4 METHODOLOGY TO ASSESS EFFECTS

This effects assessment methodology identifies the approach and assumptions for describing existing conditions of noise and vibration and environmental consequences of the Tier 1 EIS Alternatives on existing noise and vibration. It identifies data sources, defines the Affected Environment and Context Area for noise and vibration, and the approach for evaluating potential direct effects.[2] Indirect effects,[3] such as those resulting from induced growth as a result of the Tier 1 EIS Alternatives, will be addressed in a separate methodology (see Indirect Effects Assessment Methodology).

1.4.1 Existing Conditions

The data sources listed in Table 3 will be used to establish the existing conditions for noise and vibration.

The documentation of existing conditions in the Tier 1 EIS will include a *qualitative* description of the sensitive land-use and existing noise and vibration sources within an established Affected Environment. In addition, *quantitative* estimates of overall existing noise and vibration levels from railroad and other sources, as well as typical background ambient noise will be estimated at various distances from the Representative Route for each of the Tier 1 EIS Alternatives. The Affected Environment is a 5,000-foot swath centered on the Representative Route[4] for each of the Tier 1 EIS Alternatives. The 5,000-foot swath is sufficiently wide to:

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[1] The FRA manual is intended for projects with train speeds of 90-125 mph whereas the FTA manual provides guidance for projects with conventional train speeds below 90 mph. Therefore, for this Tier I EIS, the FTA methodology will be used for noise and vibration modeling of conventional rail operations (e.g. most locomotive-hauled trains).

[2] Direct Effects are caused by the action and occur at the same time and place (40 CFR § 1508.8)

[3] Indirect effects are those that occur later in time or are further removed in distance (40 CFR § 1508.8)

[4] Representative Route refers to a proposed route or potential alignment for a Tier 1 EIS Alternative. The Representative Route includes the physical footprint of the improvements associated with the Tier 1 EIS Alternatives. The horizontal and vertical dimensions of the footprint of the Representative Route are based on prototypical cross-sections for these improvements. The Representative Route is used as a proxy for estimating the potential effects of a route whose location could shift during subsequent project-level reviews.

- Encompass and account for the improvements associated with a Representative Route including infrastructure improvements (such as embankments, aerial structures, track improvements), ancillary facilities (such as stations, yards and parking structures), or service changes.
- Consider a conservative area within which noise and vibration impacts may occur as a result of operation of the Tier 1 EIS Alternatives.
- Be consistent with recommended maximum screening distances identified in the FRA manual and FTA manual (see Table 2) for assessing noise and vibration effects.

The following steps will be undertaken to document the existing noise and vibration conditions within the Affected Environment:

1. Each of the Tier 1 EIS Alternatives will be subdivided into segments based on similar train operational characteristics (type of service, train frequency, etc.) as well as similar ambient noise characteristics (based on the typical background noise environment and exposure to other transportation sources). FRA will assess noise and vibration effects within the Affected Environment by segment for each Representative Route.[5]
2. Estimate the overall existing noise and vibration levels from railroad and other sources at various distances from the Representative Routes of each Tier 1 EIS Alternative, using the prediction models and algorithms found in the FRA manual and the FTA manual. Information will be presented in a tabular format and summarized by county and by civil station or milepost for each state.
   - Noise: Estimates of existing noise levels will be calculated at distances of 50, 100, 200, 400, and 800 feet from the Representative Routes of the Tier 1 EIS Alternatives within the Affected Environment. Existing noise exposure levels (Ldn in dBA) will be estimated based on data for existing rail operations, train frequency and speeds (see Table 3). The estimated noise from rail operations will be combined with estimates of noise from nearby major highways, airports (where available) and with estimates of typical levels of community background noise in urban, suburban and rural areas to estimate overall existing noise exposure levels.
   - Vibration: Estimates of existing maximum vibration velocity levels (VdB) will be calculated at distances of 50, 100, 200 and 300 feet from the Representative Routes within the Affected Environment. The vibration level estimates will be based on operational data (i.e., the types and speeds of rail vehicles, see Table 3) of existing rail traffic.
3. Overlay and analyze GIS data from land cover, parklands, ecological, demographics, environmental justice, cultural resource and historic properties and Section 4(f)/6(f) resources to qualitatively identify noise and vibration sensitive receptors within the Affected Environment (see Table 1 and Part A of the Appendix).

[5] In the areas close to the Representative Routes where impact is most likely, noise and vibration from one segment should not significantly affect an adjacent segment.

Table 3 – Data Sources for the Evaluation of Noise and Vibration

Data Source	Data Application
▪ Base Maps	▪ Aerial mapping of study area including GoogleEarth and GIS-based data – to facilitate land-use identifications, locations of grade crossings, and approximate distances to receptors including non-residential receptors such as schools and churches.
▪ Previous Studies	▪ Review of earlier studies to identify previously computed noise and vibration levels, rail operations assumptions, and grade crossings
▪ U.S. Census Bureau, 2010 Census	▪ Data will be queried for estimating the number of people potentially exposed to project noise and vibration levels within computed impact zones.
▪ Rail Operational Data - Type of train operation (high speed, commuter, freight, etc.) - Identification of train power source (electric or diesel) - Number of daytime (7AM - 10PM) and nighttime (10PM - 7AM) train operations - Train consists (i.e., number of locomotives and rail cars per train) - Maximum train speeds ▪ Train schedule and operations data will specifically be required for: - Amtrak Acela High Speed Interstate Service - Amtrak Regional and Long Distance Interstate Service - CSXT, Conrail, Norfolk Southern and Providence & Worcester Rail (P&W) Freight - Commuter Rail Services in each state: o Maryland Area Regional Commuter (MARC) o Southeastern Pennsylvania Transportation Authority (SEPTA) o Keystone Rail (Keystone) o New Jersey Transit (NJT) o Long Island Rail Road (LIRR) o Metro-North Railroad (MNRR) o Shore Line East (SLE) o Massachusetts Bay Transportation Authority (MBTA)	▪ These are input parameters to allow computation of rail noise emission and vibration levels. ▪ These data will allow computation of existing and future rail noise and vibration levels by using models and algorithms provided in the FRA *High Speed Ground Transportation Noise and Vibration Impact Assessment* manual, and the FTA *Transit Noise and Vibration Impact Assessment* manual.

Source: NEC FUTURE JV, 2014

Existing conditions will also be addressed for an established Context Area. The Context Area is five miles wide, centered on the Representative Route for each of the Tier 1 EIS Alternatives. Within the Context Area, the general location of noise and vibration sensitive land use will be identified to qualitatively characterize the areas that could be affected by the Tier 1 EIS Alternatives should the Representative Routes shift. This information will be used to supplement the more detailed assessment of effects within the Affected Environment.

1.4.2 Environmental Consequences

This Tier 1 EIS noise and vibration assessment will include both *qualitative* and *quantitative* evaluations for the Affected Environment, based upon similar methodology used for other FRA Tier 1 EIS studies (e.g., the Chicago to Council Bluffs-Omaha Regional Passenger Rail System Planning Study, and the California High Speed Rail Project). For the Context Area, noise and vibration will be qualitatively discussed with regard to the potential to affect sensitive receptors should there be a shift in a Representative Route.

Three levels of detail are provided in the FRA manual and the FTA manual, depending on the planning status and purpose of a rail corridor study. These are the Screening Procedure, General Assessment, and Detailed Analysis. For this Tier 1 EIS, a slightly modified version of the General Assessment method, which is used for comparing alternatives, will be used to assess the potential noise and vibration impacts of the Tier 1 EIS Alternatives. Unlike the typical General Assessment methodology, this modified version will not include a detailed inventory of specific receptors where potential noise and vibration impacts are projected. The following steps will be taken to evaluate the environmental consequences of the Tier 1 EIS Alternatives on noise and vibration:

1. Apply the FRA manual and FTA manual prediction methodology to determine projected future program-induced noise and vibration levels as a function of distance from the Representative Routes associated with the Tier 1 EIS Alternatives. Compute the distances from the Representative Routes within which projected future program-induced noise and vibration levels might exceed the criteria limits contained in the FRA manual and the FTA manual.
   - Noise: The future rail operations noise projections will be compared to the criteria limits based on existing noise exposure levels to determine *noise impact zones* for each segment. This will be done for both the FRA *moderate* and *severe* impact criteria for *residential* (Category 2) land-use as shown in Figure 2 (in Part B of the Appendix). The noise effects of stationary sources, such as transit stations, ancillary facilities and special track work, are very localized and based upon detailed design information. Therefore, a quantitative noise analysis of these facilities is typically not included in a Tier 1 level study. However, a qualitative discussion of potential noise impacts (i.e. traffic-related) of such facilities for analysis during Tier 2 evaluations will be included in the Tier 1 EIS.
   - Vibration: The future vibration projections will be compared to the FRA impact criteria for *residential* (Category 2) land-use for *frequent* events as shown in Figure 3 (in Part C of the Appendix) to determine *vibration impact zones* for each segment.
   - The approach for both noise and vibration screening distances will be conservative in its assumptions to evaluate potential worst-case conditions.

- All residential land cover receptors will be considered to be sensitive residential dwellings with nighttime land-use
- Future levels will be modeled using maximum train speeds
- Consistent with the FRA and FTA General Assessment procedures, the noise propagation estimates will be based on a moderate amount of ground absorption as well as generic shielding assumptions that depend on general community type (i.e., urban, suburban or rural)

2. Using U.S. Census data, calculate the number of people located and potentially affected by future noise and vibration levels within the impact distances determined in Step 1.
3. Using information collected as part of documenting the existing conditions (as described in above in Section 1.5.1, Step 2), the number of park and wildlife preserves that are within the Affected Environment that have specific soundscape policies will be identified. The Tier 1 EIS will not evaluate the compatibility of noise from the Tier 1 EIS Alternatives with park soundscapes. Instead, soundscape management will be discussed as part of the Tier 2 analyses.
4. Create a general inventory of potential noise and vibration impacts, listing the approximate population (both EJ and non-EJ) within the impact screening distances. The number of parks, wildlife preserves, cultural resources and historic properties and Section 4(f)/6(f) resources within the Affected Environment will also be listed. Other sensitive noise receptors (e.g., schools, hospitals and churches) are not included in the inventory as data for these receptors are not available for the Tier 1 study. The inventory will be tabulated by county within each state for each of the Tier 1 EIS Alternatives.

Temporary construction-related annoyance effects to sensitive noise and vibration receptors will be described as to the location, duration and type of activity. The NEC FUTURE program overall approach to assessing construction-related effects at the Tier 1 EIS level is further described in a separate Construction Effects Assessment Approach document. Construction methods and activities for the Tier 1 EIS Alternatives will be the basis of this assessment and will be described in a separate chapter of the EIS.

The potential annoyance effects to health as a result of exposure to noise will be qualitatively described. The Construction Effects section of the Tier 1 EIS will also describe the potential health effects of the Tier 1 EIS Alternatives on construction workers and surrounding communities as a result of increased noise levels and construction-related vibration. As part of Tier 2 analysis, noise and vibration mitigation plans, personnel protection, workplace monitoring, alternative designs and methods of construction would be developed to minimize health effects from increased noise levels.

1.4.3 Mitigation Strategies

A menu of potential mitigation measures will be developed on a programmatic scale for further consideration in Tier 2. The potential strategies will focus on minimizing the impacts at the source (e.g., vehicle and track treatments, horn-free quiet zones, speed reductions), along the transmission path (e.g., sound barriers, track vibration isolation mats) and at the receiver (e.g., building sound insulation treatments).

1.5 TIER 1 EIS OUTCOMES

The Tier 1 EIS noise and vibration effects assessment will:

- Calculate the estimated EJ and non-EJ residential area population by state and by county that could potentially be exposed to rail noise and vibration impact from the Tier 1 EIS Alternatives.
- Identify the number of parks, wildlife preserves, cultural resources and historic properties and Section 4(f)/6(f) resources in the Affected Environment that could be potentially affected by noise and vibration from the Tier 1 EIS Alternatives.
- Identify potential mitigation strategies.

1.6 APPLICABILITY TO TIER 2 ASSESSMENTS

The Tier 1 Analysis will identify the number of people, parks, wildlife preserves, cultural resources and historic properties and Section 4(f)/6(f) resources potentially affected by noise and vibration impacts of the Tier 1 EIS Alternatives. A qualitative discussion of potential noise impacts from stations will be included in the Tier 1 EIS. However, due to the lack of detailed design information, the Tier 1 EIS will not include a quantitative analysis of impacts from ancillary facilities, stations and project-related changes in roadway and aircraft traffic. Tier 2 analyses would calculate the existing and future levels of ambient noise and vibration, and identify the actual numbers of residences, the types of land-uses, and locations of sensitive receptors. Tier 2 analyses will also include a quantitative evaluation of potential noise and vibration effects on wildlife and natural parks. The development of mitigation measures and designs that would avoid or minimize noise and vibration effects would be included in the Tier 2 analyses.

Appendix

PART A: IDENTIFYING SENSITIVE RECEPTORS

For the NEC FUTURE program, existing land-use and land-use patterns throughout the Study Area are being represented by the National Land Cover Database as described in the Tier 1 Land-Use section. However, the noise and vibration evaluation will use different descriptions of sensitive receptors. Therefore, the land-use descriptors for noise and vibration analyses have been categorized and cross-referenced to the land cover classifications being used in the Land Use section of the Tier 1 EIS, as shown in Table 1. The residential areas being used in the Tier 1 EIS all fall under the FRA/FTA Land Use Category 2.

TABLE 1 – LAND-USE AND LAND COVER CLASSIFICATIONS FOR USE IN NOISE AND VIBRATION EVALUATION

Land-Use Descriptors for Noise and Vibration Section of Tier 1 EIS	Land Cover Classifications for the Tier 1 EIS	Description
Urban Residential, Commercial, and/or Institutional	▪ Developed, High Intensity	▪ Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Suburban Residential, Commercial, and/or Institutional	▪ Developed, Medium Intensity	▪ Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
Rural Residential, Commercial, and/or Institutional	▪ Developed, Low Intensity	▪ Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
Parks	▪ Developed, Open Space	▪ Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

Source: NEC FUTURE JV Team, 2014

PART B: MEASURING NOISE

Environmental noise is a result of everyday sources such as transportation systems, industrial processes, building air handling and power generation systems, wind, human activities, etc. Noise can be quantified in many different ways, depending on its temporal (time), tonal (frequency), or intensity (loudness) characteristics. In general, environmental noise assessments address relative changes in noise levels over time and relate those changes to effects on human beings. Although specific effects on wildlife are typically not evaluated in a Tier 1 level study, nearby wildlife preserves and parks where such effects could occur can be identified.

Noise is typically measured in terms of the A-weighted sound level in decibels (dBA), a single-number descriptor that correlates with human subjective response to sounds on the basis of frequency (i.e., tone or pitch). Because environmental noise varies from moment to moment, it is common practice to condense all of this information into a single number, called the "equivalent sound level" (L_{eq}), which represents the cumulative noise exposure over a specified time period (typically one hour or 24 hours). The $L_{eq(h)}$ metric, for the loudest hour of project-related activity during hours of noise sensitivity, is used for evaluating tracts of land where quiet is an essential element in their intended purpose and institutional land-uses with primarily daytime use. Often the L_{eq} values over a 24-hour period are used to calculate cumulative noise exposure in terms of the Day-Night Sound Level (L_{dn}), which imposes a penalty on noise that occurs during the more sensitive nighttime hours. The L_{dn} metric is used for evaluating residences and buildings where sleeping may be affected. Both the L_{dn} and $L_{eq(h)}$ metrics are expressed in terms of A-weighted decibels (dBA).

Noise magnitude is expressed in units of decibels (dB) which is a logarithmic quantity comparing fluctuating air pressure to that of a standardized reference air pressure of 20 micro-pascals (i.e., dB re: 20 µPa). Noise is expressed as a logarithmic quantity because humans are sensitive to relative changes in noise levels. To illustrate, humans can just barely perceive a change in noise levels of +/- 3 dB, can easily perceive a change of +/- 5 dB, and will generally perceive a change of +/- 10 dB as a doubling or halving in noise levels.

With respect to tonal qualities (frequency), a frequency weighting adjustment has been standardized to account for human auditory response over the audible frequency range of approximately 20 Hz to 20,000 Hz. Humans respond less sensitively to low frequency noise ranges, exhibit a maximum sensitivity to tones in mid-frequency ranges, and are somewhat less sensitive at higher frequency ranges. This frequency weighted adjustment is referred to as "A-weighting", with results expressed as A-weighted decibels, or dBA. The A-weighted noise level is the basic descriptor for environmental noise.

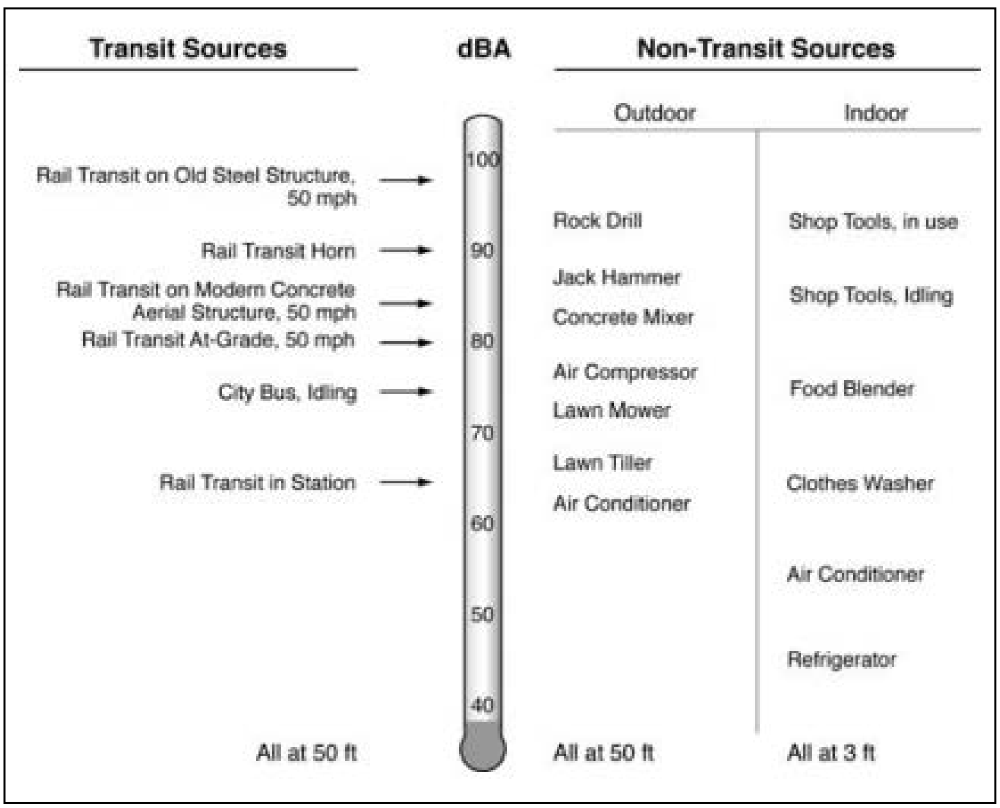
The A-weighted noise level is the basic descriptor for environmental noise. Typical A-weighted noise levels are illustrated in Figure 1.

Numerous indices have been developed to quantify the temporal characteristics (changes over time) of environmental noise. The following noise metrics are typically used in community noise assessments:

- *$L_{eq(h)}$, or Hourly Equivalent Sound Level*, is the energy-averaged single noise level that represents the same (equivalent) energy that was contained in the fluctuating noise level over a period of an hour. The $L_{eq(h)}$ is useful for describing the "average" noise level over time, and is expressed in dBA.

- *L_n, or Percentile Level*, is a statistical representation of changing noise levels indicating that over some time period, the fluctuating noise level was equal to, or greater than, the stated level for "n" percent of the time. For example, the L_{10}, L_{33}, L_{50}, and L_{90} represent the noise levels exceeded 10, 33, 50, and 90 percent of the time. The L_{10} is often used to identify impacts of transportation or construction noise sources, while the L_{90} is considered to represent steady ambient background noise levels. Ln percentile levels are expressed in dBA.
- *L_{dn}, or Day-Night Sound Level*, represents an average noise level evaluated over 24 hours in which a 10 dBA "penalty" is added to the $L_{eq(h)}$ noise level for each of the nine nighttime hours (10 PM to 7 AM). The penalty is applied to account for both increased human sensitivity to nighttime noise intrusions during quiet activities (such as sleeping) and the reduction in ambient noise levels during the nighttime hours which may allow offending noise sources to be more noticeable. The L_{dn} is expressed in dBA.

Figure 1 – Typical A-weighted Noise Levels



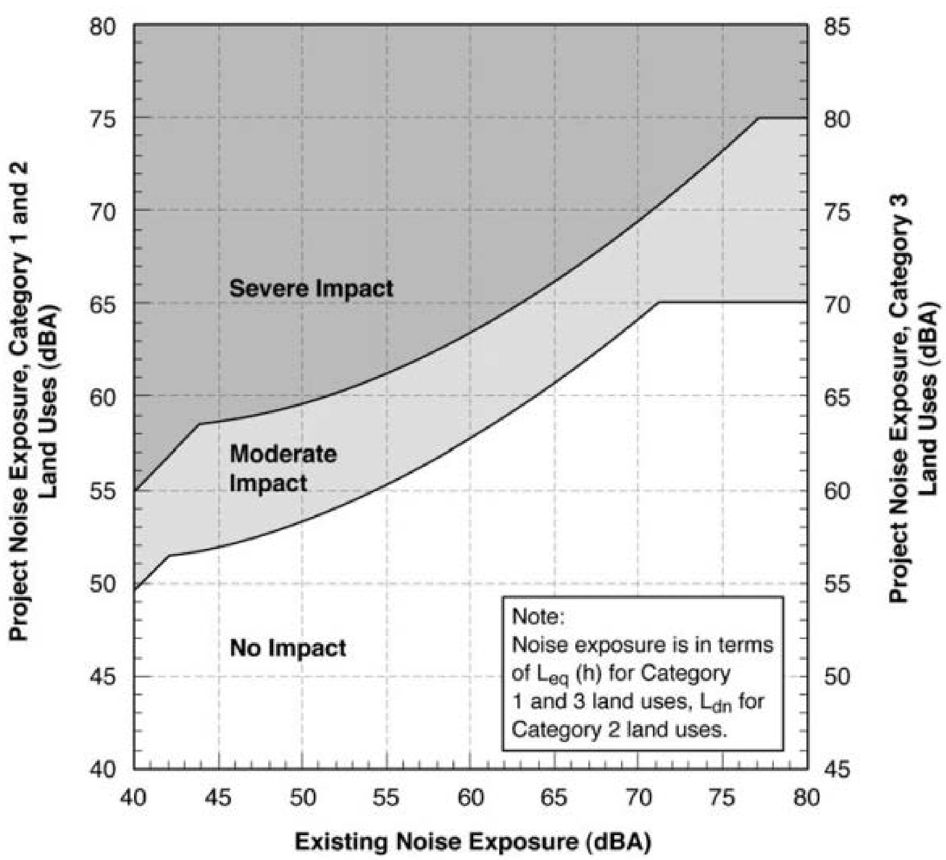
Source: FRA/FTA

FRA and FTA specify identical criteria for noise impact, based on sensitive land-use category and the relative change in noise exposure *caused by the project*. Although the impact criteria allow higher levels of project noise in areas with high levels of existing noise, smaller *relative* increases in total noise exposure are allowed in such areas. The FRA/FTA noise criteria limits incorporate both absolute criteria, which consider activity interference caused by the project alone, and relative criteria, which consider annoyance due to the change in the noise environment caused by the project.

As shown in Figure 2, the noise criteria define two threshold levels of impact in terms of human annoyance, *moderate impact* and *severe impact*, based on a receptor's existing noise exposure and the land-use of the receptor. The interpretation of these two levels of impact is summarized below:

- **Severe Impact:** Project-generated noise in the severe impact range can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation.
- **Moderate Impact:** In this range of noise impact, the change in the cumulative noise level is noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These factors include the existing noise level, the predicted level of increase over existing noise levels, the types and numbers of noise-sensitive land uses affected, the noise sensitivity of the properties, community views, and the cost of mitigating noise to more acceptable levels.

Figure 2 – FRA/FTA Project Noise Impact Criteria



Source: FRA/FTA

Noise impact criteria are also dependent on the land-use category of the receptor. Category 1 land-use includes tracts of land where quiet is an essential element in their intended purpose, such as outdoor concert pavilions, recording studios, concert halls, and historical sites with significant outdoor land-use. Category 2 land-use includes residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where nighttime sensitivity to noise is assumed to be of utmost importance. Category 3 land-use includes institutional properties with primarily daytime and evening use, such as medical offices, churches, schools, libraries, and theaters. Places with meditation or study associated with cemeteries, museums, monuments, and recreational facilities are also included in this category. Most general purpose commercial buildings are not included in any category.

The relevant noise metric when evaluating Category 2 receptors is the L_{dn}, due to the receptor's sensitivity to nighttime noise intrusion. Category 1 and 3 receptors are analyzed using the L_{eq} for the loudest hour of transit-related activity, or $L_{eq(h)}$, during hours of noise sensitivity. All noise levels measured or predicted using the FRA/FTA procedure are expressed in A-weighted decibels (dBA) and are evaluated at the *exterior* of the receptor at a position closest to or facing the project.

PART C: MEASURING VIBRATION

Environmental vibration can be generated by transportation systems such as trains, subways, trucks and automobiles; power generation or other large mechanical systems; or by actual seismic motion. Ground-borne vibration can be described in terms of ground displacement, velocity or acceleration. While vibratory motion can be generated in all directions, vertical vibration (i.e., Raleigh waves) typically contains more energy than either the longitudinal or latitudinal directions. Only the vertical component is addressed in environmental studies as vibration level in terms of velocity in the vertical direction has been found to correlate most suitably to human response to vibration in buildings and is the metric commonly used for evaluating ground-borne vibration from rail projects.

Due to human perception of vibration, ease of quantifiable measurement, and predictability within the low frequencies of interest (1 Hz to 100 Hz), *vibration velocity* has been standardized as the metric for evaluating environmental vibration impacts. As such, vibration results can be expressed in linear units of inches per second. However, due to the very large velocity range over which vibration energy can be found (.0001 to 1.0 inch/sec), a more convenient decibel scale has also been adopted. The *Vibration Velocity Level*, expressed in decibels relative to 1 micro-inch/sec (VdB), allows for the compression of this large velocity range into a more practical scale of about 40 to 120 VdB.

According to the FRA and FTA manuals, the frequency range over which human vibration annoyance should be examined ranges from about 1 Hz to 100 Hz. The broadband VdB level is typically summed over this frequency range. However, the frequency spectrum range over which vibration levels are measured can be filtered to examine the amount of vibration energy within a finite bandwidth. Octave band and third-octave band filters serve this purpose.

Vibration magnitude can be described using various quantities depending on the intent of the analysis and type of sensitive receptor being evaluated. In accordance with FRA/FTA procedures, all vibration measurements and predictions in this study are in the form of energy-averaged *Root*

Mean Square (RMS) levels. RMS represents a mathematically averaged level which is more proportional to the energy-of-motion generated by a vibrating surface. The RMS vibration velocity level has been shown to correlate better with the human body's sensitivity to vibration when computed with a one-second response time (i.e., RMS 'slow'). Train vibration events are typically expressed in VdB levels using the *maximum* RMS levels within each frequency band in order to evaluate worst-case potential consequences.

A related vibration metric would be the *Peak Particle Velocity (PPV)* which is a measure of the vibration signal's absolute highest instantaneous magnitude. Being a measure of vibration velocity, the PPV is also expressed in linear units of inches/second. Human annoyance is generally not a function of instantaneous PPV levels, however potential damage to buildings and structures can be, so an analysis of PPV levels can be used to assess potential cosmetic or major damages to structures. For example, PPV levels are used to describe potential building damages from impact sources such as construction.

Vibration criteria identified by the FRA and FTA, as shown in Figure 3, are intended to avoid human annoyance and are based on root-mean-squared (RMS) vertical vibration velocity levels expressed in decibel units of VdB relative to one micro-inch per second (VdB re: 1 micro-inch/second). The vibration criteria limits are absolute levels, not relative increases above existing conditions, and thus do not require ambient vibration levels to be established. However, the assessment of impact may also depend on the existing vibration levels for projects that are located along existing rail corridors, so existing vibration levels are also estimated in a Tier 1 EIS.

The FRA and FTA vibration limits vary based on a receptor's categorized land-use and frequency of vibration events (i.e., train operations). Residential receptors are considered as Category 2 receptors, while institutional land-uses are placed in Category 3. Most general purpose commercial buildings are not included in any category. "Frequent" events are defined as more than 70 vibration events per day, "Occasional" events range from 30 to 70 per day, and "Infrequent" events are defined as fewer than 30 per day. Most commuter and inter-city rail systems fall into the latter two categories.

In addition, vibration criteria for special buildings such as concert halls, TV and recording studios, auditoriums and theaters have been established, as have criteria limits for ground-borne vibration-induced interior noise levels. However, these criteria are applied on a site-specific basis as part of Tier 2 evaluations and are not used in the current Tier 1 study.

Figure 3 – FRA/FTA Criteria for Ground-Borne Vibration Impact

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

Source: FRA/FTA

Application of Effects-Assessment Methodology

12.1 NOISE AND VIBRATION

12.1.1 Variations to Effects-Assessment Methodology

The following variations from the Effects-Assessment Methodology occurred during the process of developing the Tier 1 Draft EIS analysis:

- The Effects-Assessment Methodology proposed estimating the total population subject to potential noise and vibration impact rather than separately estimating the potentially affected EJ and non-EJ populations as originally proposed in the methodology. During the analysis, it was determined that it would be more appropriate to address the EJ noise and vibration impacts as part of the EJ resource assessment based on the geographic areas where potential noise and vibration impacts were identified.
- The Effects-Assessment Methodology proposed that the assessment would identify the number of parks, wildlife preserves, cultural resources and historic properties, and Section 4(f)/6(f) resources within the Affected Environment. However, during the analysis it was determined that it would be more appropriate to focus on the geographic areas where noise and vibration effects could occur for these related resources rather than the entire Affected Environment area. Thus, the Environmental Consequences document the presence of the related resources in areas where the potential for residential noise and vibration impacts have been identified within the Affected Environment of the Action Alternatives by state and county.

12.1.2 Data Variations

The following variations from the identified data sources in the Effects-Assessment Methodology occurred during the process of developing the Tier 1 Draft EIS analysis:

- The GIS data were updated to include available airport noise contours that fall within the Affected Environment of the existing NEC and the Action Alternatives. Data Organization and Presentation

12.1.3 Criteria for Analysis

Existing Conditions and Environmental Consequences

- The criteria for estimating noise and vibration existing conditions and environmental consequences have been explained in Section 7.12, Noise and Vibration, of the Tier 1 Draft EIS.
- Noise and vibration data have been organized into multiple datasets based on the distance buffers.

12.1.4 Noise Prediction Methodology

Noise sources along the alternative routes for the NEC FUTURE Program include various types of rail operations as well as highway traffic, airport operations and general community background. The methods used to determine the noise exposure from these sources are described below.

- Rail Operations (for the existing NEC and the Action Alternatives' Representative Routes) – Ldn at a reference distance of 50 feet is determined for different types of operations as follows:

- Amtrak Acela and Electric Multiple Unit (EMU) Trainsets
  - Use FRA General Assessment method
  - Apply model for steel-wheeled electric vehicles
- Non-Acela Amtrak Trains and Commuter Trains (with Diesel or Electric Locomotives)
  - Use FTA General Assessment method
  - For diesel locomotives, assume operation at throttle 5 or lower
- Freight Trains and all Locomotive Horns
  - Use FRA noise model and source levels from Appendix E for locomotives and freight cars
  - Use FTA General Assessment method for locomotive horns
- Consists (lengths)
  - Assume 663 feet for existing Acela trains
  - Assume 85 feet for EMU vehicles
  - Assume 70 feet for freight locomotives
  - Assume 60 feet for freight cars

- Rail Operations (for rail lines that are directly adjacent to the rail corridor)
  - Freight or passenger rail lines (with locomotive-hauled trains)
    - Use FRA General Assessment method
    - Assume Ldn = 70 dBA at a reference distance of 50 feet
  - Long Island Railroad (primarily electrically-powered trains)
    - Use measurement data from LIRR Main Line Improvements Project EIS (2005)
    - Assume Ldn = 75 dBA at a reference distance of 50 feet
- Highway Traffic (for major roads that are directly adjacent to the rail corridor)
  - Interstate Highways and other roads with four or more lanes that permit trucks
    - Use FRA General Assessment method
    - Assume Ldn = 70 dBA at a reference distance of 50 feet
    - Parkways and major arterial roads
    - Use FRA General Assessment method
    - Assume Ldn = 65 dBA at a reference distance of 50 feet
- Airport Operations
  - Use site-specific noise contours for nearby major airports (where available)
- Community Background Noise (based on qualitative description of area)
  - Assume Ldn = 60 dBA in Urban Areas
  - Assume Ldn = 55 dBA in Suburban Areas (List Bullet 2 style)
  - Assume Ldn = 50 dBA in Rural Areas

Propagation Effects

Apply sound propagation adjustments for rail and highway traffic sources as follows:

- Adjustment for Distance from Center of Corridor
  - Use FRA/FTA General Assessment method
    - Ldn at distance d = Ldn at 50 feet – 15*log(d/50)
- Adjustment for Track Geometry
  - At-Grade or Embankment: 0 dB
  - Trench: -5 dB
  - Aerial: +4 dB
  - Tunnel: Not applicable for noise impact assessment
- Adjustment for Shielding by Intervening Buildings
  - Use combined FRA/FTA General Assessment method
  - Urban Areas
    - Assume 4.5 dB shielding at 100 feet
    - Assume an additional 1.5 dB shielding at each subsequent 100 feet
    - Assume a maximum attenuation of 10 dB
  - Suburban Areas
    - Assume 3 dB shielding at 200 feet
    - Assume an additional 1.5 dB shielding at each subsequent 200 feet
    - Assume a maximum attenuation of 10 dB
  - Rural Areas
    - Assume no shielding attenuation

Overall Noise Exposure

Estimate the overall existing noise exposure as follows:

- Calculate the combined noise exposure (Ldn) at 50 feet for rail and highway sources. Ldn is a 24-hour noise exposure metric that accounts for increased noise sensitivity during nighttime hours in residential areas.
- Adjust the noise exposure at 50 feet to obtain the combined noise exposure for rail and highway sources (assumed to be equidistant for simplicity) at 100, 200, 400, and 800 feet.
- Combine the results at each distance with the appropriate airport and background noise exposures
- Summarize the results by Ldn range at each distance within each county or municipality for each state

12.1.5 Vibration Prediction Methodology

Vibration levels are described in terms of the maximum overall root-mean-square (rms) vertical vibration velocity level (Lv, in VdB referenced to one micro-inch per second). Vibration levels are estimated for individual vibration sources and adjusted for distance and vehicle speed to determine the range of maximum vibration levels as outlined below.

Vibration Sources

Sources of vibration along the existing NEC and the Representative Routes for the Action Alternatives include rail operations and highway traffic. The methods used to determine the vibration levels from these sources are described below.

- Use the FRA/FTA Generalized Ground-Borne Vibration Prediction Curves to calculate the maximum vibration level at 50, 100, 200, and 300 feet for train operations and roadway traffic:
  - Use the FRA/FTA prediction curve for at-grade steel wheel/rapid transit vehicles for Amtrak Acela and Electric Multiple Unit (EMU) trains
  - Use the FTA locomotive powered passenger or freight prediction curve for non-Acela locomotive-hauled passenger and freight trains
  - For rail lines directly adjacent to the corridor with locomotive-hauled trains, use the FTA locomotive powered passenger or freight prediction curve at 50 mph
  - For Long Island Rail Road (LIRR) trains, use the FTA locomotive powered passenger or freight prediction curve at 50 mph, with levels reduced by 5 VdB (based on measurement data from the 2005 LIRR Main Line Improvements Project EIS)
  - Use the FTA rubber-tired vehicle prediction curve at 50 mph for roadway traffic
- Include an adjustment of -10 VdB for Aerial track
- Assume a background vibration level of 50 VdB where there are no major vibration sources

Adjustment for Speed

- Adjust the rail and roadway vibration levels at each distance for speed:
  - Use FRA/FTA General Assessment method
    - Lv at speed S = Lv at 50 mph + 20*log(S/50)
  - Select speed based on source:
    - Use maximum train speed for existing NEC and Representative Routes
    - Assume 50 mph for rail lines and major highways directly adjacent to the rail corridor
    - Assume 30 mph for arterial roads

Data Matrices

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)	Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 50 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	77	77	78	77	79 - 80	77	83	77	83	77	83	77	83
MD	Prince George's	77	77	78	77	79 - 80	77	83 - 87	77	83 - 87	77	83 - 87	77	83 - 87
MD	Anne Arundel	77	77	78	77	79	77	78 - 83	77	78 - 83	77	78 - 83	77	78 - 83
MD	Baltimore County	77 - 80	77 - 80	78 - 81	77 - 80	79 - 81	70 - 80	79 - 86	70 - 80	79 - 86	70 - 80	79 - 86	70 - 80	79 - 86
MD	Baltimore City	60 - 80	60 - 80	60 - 81	60 - 80	72 - 82	60 - 80	71 - 83	60 - 80	71 - 83	60 - 80	71 - 83	60 - 80	71 - 83
MD	Harford	76 - 80	76 - 80	76 - 81	76 - 80	77 - 81	70 - 80	70 - 86	70 - 80	70 - 86	70 - 80	70 - 86	70 - 80	70 - 86
MD	Cecil	79 - 80	79 - 80	79 - 80	50 - 80	50 - 81	50 - 80	50 - 85	50 - 80	50 - 85	50 - 80	50 - 85	50 - 80	50 - 85
DE	New Castle	74 - 79	74 - 79	76 - 79	55 - 79	55 - 79	55 - 79	55 - 86	55 - 79	55 - 86	55 - 79	55 - 86	55 - 79	55 - 86
PA	Delaware	74	74	76	71 - 74	70 - 81	60 - 74	60 - 84	60 - 74	60 - 84	60 - 74	60 - 84	60 - 74	60 - 84
PA	Philadelphia	60 - 77	60 - 77	60 - 78	60 - 77	60 - 82	60 - 80	60 - 87	60 - 80	60 - 87	60 - 80	60 - 87	60 - 80	60 - 87
PA	Bucks	76 - 77	76 - 77	77 - 78	76 - 77	78 - 79	76 - 77	83	76 - 77	83	76 - 77	83	76 - 77	83
NJ	Mercer	76 - 77	76 - 77	78	77	79	76 - 80	83 - 87	76 - 80	83 - 87	76 - 80	83 - 87	76 - 80	83 - 87
NJ	Middlesex	77 - 78	77 - 78	78 - 79	55 - 78	55 - 80	55 - 78	55 - 84	55 - 78	55 - 84	55 - 78	55 - 84	55 - 78	55 - 84
NJ	Union	79	79	80	79	76 - 81	78 - 79	79 - 84	78 - 79	79 - 84	78 - 79	79 - 84	78 - 79	79 - 84
NJ	Essex	79	79	80 - 82	79	76 - 83	79 - 80	79 - 86	79 - 80	79 - 86	79 - 80	79 - 86	79 - 80	79 - 86
NJ	Hudson	60 - 80	60 - 80	60 - 82	60 - 80	60 - 83	55 - 80	55 - 86	55 - 80	55 - 86	55 - 80	55 - 86	55 - 80	55 - 86
NY	New York	60 - 77	60 - 77	60 - 81	60 - 77	60 - 83	60 - 77	60 - 84	60 - 77	60 - 84	60 - 77	60 - 84	60 - 77	60 - 84
NY	Queens	60 - 76	60 - 76	60 - 80	60 - 76	60 - 82	60 - 76	60 - 84	60 - 76	60 - 84	60 - 76	60 - 84	60 - 76	60 - 84
NY	Kings								60	60	60	60		
NY	Bronx	72 - 76	72 - 76	74 - 80	72 - 76	75 - 82	60 - 76	78 - 87	72 - 76	76 - 84	72 - 76	76 - 84	60 - 76	78 - 87
NY	Westchester	74 - 76	74 - 76	77 - 79	70 - 76	77 - 83	50 - 76	50 - 87	74 - 76	50 - 81	74 - 76	50 - 81	50 - 76	50 - 87
NY	Putnam						50	50					50	50
NY	Nassau								55 - 75	55 - 75	55 - 75	55 - 75		
NY	Suffolk								55 - 75	55 - 84	55 - 75	55 - 84		
CT	Fairfield	73 - 76	73 - 76	77 - 82	55 - 76	55 - 83	55 - 75	55 - 84	55 - 76	55 - 83	55 - 76	55 - 83	55 - 75	55 - 84
CT	New Haven	55 - 75	55 - 75	55 - 78	55 - 75	55 - 80	50 - 75	55 - 80	50 - 75	55 - 86	50 - 75	55 - 85	50 - 75	55 - 80
CT	Hartford				55 - 70	55 - 81	55 - 70	55 - 84	55 - 70	55 - 86	55 - 70	55 - 85	55 - 70	55 - 84
CT	Tolland				50 - 55	50 - 75	50 - 55	50 - 81	50 - 55	50 - 81	50 - 70	50 - 84	50 - 70	50 - 84
CT	Windham				50	50 - 79	50	50 - 85	50	50 - 85				
CT	Middlesex	73	73	75	73	73	73	76	72 - 73	76	72 - 73	78	73	78
CT	New London	50 - 79	50 - 79	70 - 78	71 - 79	50 - 80	71 - 79	75 - 82	71 - 79	75 - 82	71 - 79	77 - 82	71 - 79	77 - 82
RI	Washington	50 - 74	50 - 74	70 - 76	71 - 74	50 - 75	71 - 74	75 - 77	71 - 74	75 - 77	71 - 74	77 - 79	71 - 74	77 - 79
RI	Kent	74 - 75	74 - 75	76 - 77	74 - 75	75 - 77	74 - 75	77 - 78	74 - 75	77 - 78	74 - 75	79	74 - 75	79
RI	Providence	60 - 75	60 - 75	60 - 77	50 - 75	60 - 77	50 - 75	60 - 81	50 - 75	60 - 81	72 - 75	60 - 79	72 - 75	60 - 79
MA	Worcester										50 - 70	50 - 84	50 - 70	50 - 84
MA	Middlesex										55 - 73	0	55 - 73	0
MA	Bristol	72	72	76	70 - 72	75 - 78	70 - 72	76 - 82	70 - 72	76 - 82	72	78 - 79	72	78 - 79
MA	Norfolk	72	72	76	72	78	72	82 - 87	72	82 - 83	72 - 73	79 - 81	72 - 73	79 - 83
MA	Suffolk	60 - 76	60 - 76	60 - 79	60 - 76	60 - 80	60 - 76	60 - 83	60 - 76	60 - 83	60 - 76	60 - 84	60 - 76	60 - 84

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)	Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 100 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	68	68	70	68 - 69	71	69	74	69	74	69	74	69	74
MD	Prince George's	72	72	74	72 - 73	75	72 - 73	78 - 82	72 - 73	78 - 82	72 - 73	78 - 82	72 - 73	78 - 82
MD	Anne Arundel	72	72	74	72	75	72	73 - 78	72	73 - 78	72	73 - 78	72	73 - 78
MD	Baltimore County	72 - 75	72 - 75	74 - 76	72 - 75	75 - 77	66 - 75	74 - 81	66 - 75	74 - 81	66 - 75	74 - 81	66 - 75	74 - 81
MD	Baltimore City	60 - 71	60 - 71	64 - 72	60 - 71	65 - 73	60 - 71	64 - 74	60 - 71	64 - 74	60 - 71	64 - 74	60 - 71	64 - 74
MD	Harford	71 - 75	71 - 75	72 - 76	71 - 75	72 - 77	66 - 75	66 - 81	66 - 75	66 - 81	66 - 75	66 - 81	66 - 75	66 - 81
MD	Cecil	74 - 75	74 - 75	75 - 76	50 - 75	50 - 76	50 - 75	50 - 81	50 - 75	50 - 81	50 - 75	50 - 81	50 - 75	50 - 81
DE	New Castle	66 - 74	66 - 74	68 - 75	55 - 74	55 - 74	55 - 74	55 - 81	55 - 74	55 - 81	55 - 74	55 - 81	55 - 74	55 - 81
PA	Delaware	66 - 70	66 - 70	68 - 71	66 - 70	63 - 77	60 - 70	60 - 76	60 - 70	60 - 76	60 - 70	60 - 76	60 - 70	60 - 76
PA	Philadelphia	60 - 68	60 - 68	60 - 69	60 - 69	60 - 74	60 - 72	60 - 78	60 - 72	60 - 78	60 - 72	60 - 78	60 - 72	60 - 78
PA	Bucks	71 - 72	71 - 72	72 - 73	71 - 72	74	71 - 72	78	71 - 72	78	71 - 72	78	71 - 72	78
NJ	Mercer	68 - 73	68 - 73	69 - 74	69 - 73	70 - 75	68 - 73	74 - 79	68 - 73	74 - 79	68 - 73	74 - 79	68 - 73	74 - 79
NJ	Middlesex	69 - 74	69 - 74	70 - 75	55 - 74	55 - 75	55 - 74	55 - 79	55 - 74	55 - 79	55 - 74	55 - 79	55 - 74	55 - 79
NJ	Union	75	75	75	70 - 75	71 - 76	73 - 75	75 - 80	73 - 75	75 - 80	73 - 75	75 - 80	73 - 75	75 - 80
NJ	Essex	70 - 71	70 - 71	71 - 73	70 - 71	68 - 74	70 - 71	71 - 77	70 - 71	71 - 77	70 - 71	71 - 77	70 - 71	71 - 77
NJ	Hudson	60 - 75	60 - 75	60 - 77	60 - 75	60 - 78	55 - 75	55 - 80	55 - 75	55 - 80	55 - 75	55 - 80	55 - 75	55 - 80
NY	New York	60 - 73	60 - 73	60 - 76	60 - 73	60 - 78	60 - 73	60 - 80	60 - 73	60 - 80	60 - 73	60 - 80	60 - 73	60 - 80
NY	Queens	60 - 68	60 - 68	60 - 71	60 - 68	60 - 73	60 - 68	60 - 75	60 - 68	60 - 75	60 - 68	60 - 75	60 - 68	60 - 75
NY	Kings								60	60	60	60		
NY	Bronx	65 - 68	65 - 68	66 - 72	65 - 68	67 - 74	60 - 69	70 - 79	65 - 68	68 - 75	65 - 68	68 - 75	60 - 69	70 - 79
NY	Westchester	70 - 71	70 - 71	73 - 74	66 - 71	73 - 79	50 - 71	50 - 83	70 - 71	50 - 76	70 - 71	50 - 76	50 - 71	50 - 83
NY	Putnam						50	50					50	50
NY	Nassau								55 - 71	55 - 71	55 - 71	55 - 71		
NY	Suffolk								55 - 72	55 - 79	55 - 72	55 - 79		
CT	Fairfield	65 - 71	65 - 71	70 - 78	55 - 71	55 - 79	55 - 71	55 - 80	55 - 71	55 - 79	55 - 71	55 - 79	55 - 71	55 - 80
CT	New Haven	55 - 70	55 - 70	55 - 73	55 - 70	55 - 75	50 - 70	55 - 76	50 - 70	55 - 81	50 - 70	55 - 81	50 - 70	55 - 76
CT	Hartford				55 - 66	55 - 77	55 - 66	55 - 80	55 - 66	55 - 81	55 - 66	55 - 80	55 - 66	55 - 80
CT	Tolland				50 - 55	50 - 70	50 - 55	50 - 76	50 - 55	50 - 76	50 - 66	50 - 79	50 - 66	50 - 79
CT	Windham				50	50 - 74	50 - 66	50 - 80	50 - 66	50 - 80				
CT	Middlesex	68	68	71	68	69	68	71	68	71	68	73	68	73
CT	New London	66 - 75	50 - 75	66 - 74	66 - 75	50 - 76	66 - 75	70 - 77	66 - 75	70 - 77	66 - 75	73 - 78	66 - 75	73 - 78
RI	Washington	66 - 69	50 - 69	65 - 72	66 - 69	50 - 71	66 - 69	70 - 72	66 - 69	70 - 72	66 - 69	73 - 74	66 - 69	73 - 74
RI	Kent	69 - 71	69 - 71	72 - 73	69 - 71	71 - 72	69 - 71	72 - 73	69 - 71	72 - 73	69 - 71	74 - 75	69 - 71	74 - 75
RI	Providence	60 - 71	60 - 71	60 - 73	50 - 71	60 - 72	50 - 71	60 - 77	50 - 71	60 - 77	65 - 71	60 - 75	65 - 71	60 - 75
MA	Worcester										50 - 66	50 - 80	50 - 66	50 - 80
MA	Middlesex										55 - 69	0	55 - 69	0
MA	Bristol	68	68	72	66 - 68	71 - 73	66 - 68	72 - 78	66 - 68	72 - 78	68	74	68	74
MA	Norfolk	67 - 68	67 - 68	72	67 - 68	73 - 74	67 - 68	78 - 82	67 - 68	78	65 - 68	72 - 75	65 - 68	72 - 79
MA	Suffolk	60 - 68	60 - 68	60 - 72	60 - 68	60 - 74	60 - 68	60 - 77	60 - 68	60 - 77	60 - 68	60 - 76	60 - 68	60 - 76

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)	Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 200 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	64	64	65	64	66	64	69	64	69	64	69	64	69
MD	Prince George's	65 - 68	65 - 68	66 - 69	65 - 68	68 - 70	65 - 68	71 - 75	65 - 68	71 - 75	65 - 68	71 - 75	65 - 68	71 - 75
MD	Anne Arundel	65 - 68	65 - 68	66 - 69	65 - 68	68 - 70	65 - 68	66 - 74	65 - 68	66 - 74	65 - 68	66 - 74	65 - 68	66 - 74
MD	Baltimore County	65 - 70	65 - 70	66 - 70	65 - 70	68 - 71	60 - 70	67 - 74	60 - 70	67 - 74	60 - 70	67 - 74	60 - 70	67 - 74
MD	Baltimore City	60 - 66	60 - 66	61 - 67	60 - 66	62 - 67	60 - 66	61 - 68	60 - 66	61 - 68	60 - 66	61 - 68	60 - 66	61 - 68
MD	Harford	64 - 71	64 - 71	65 - 71	64 - 71	65 - 72	60 - 71	60 - 74	60 - 71	60 - 74	60 - 71	60 - 74	60 - 71	60 - 74
MD	Cecil	67 - 70	67 - 70	68 - 70	50 - 70	50 - 72	50 - 71	50 - 76	50 - 71	50 - 76	50 - 71	50 - 76	50 - 71	50 - 76
DE	New Castle	62 - 67	62 - 67	63 - 68	55 - 67	55 - 67	55 - 67	55 - 74	55 - 67	55 - 74	55 - 67	55 - 74	55 - 67	55 - 74
PA	Delaware	62 - 63	62 - 63	63 - 64	62 - 63	59 - 70	60 - 63	60 - 70	60 - 63	60 - 70	60 - 63	60 - 70	60 - 63	60 - 70
PA	Philadelphia	60 - 64	60 - 64	60 - 65	60 - 66	60 - 68	60 - 66	60 - 72	60 - 66	60 - 72	60 - 66	60 - 72	60 - 66	60 - 72
PA	Bucks	64 - 67	64 - 67	65 - 68	64 - 67	66 - 69	64 - 67	71 - 73	64 - 67	71 - 73	64 - 67	71 - 73	64 - 67	71 - 73
NJ	Mercer	64 - 66	64 - 66	65 - 67	64 - 66	65 - 68	63 - 66	68 - 72	63 - 66	68 - 72	63 - 66	68 - 72	63 - 66	68 - 72
NJ	Middlesex	65 - 66	65 - 66	65 - 67	55 - 66	55 - 68	55 - 66	55 - 72	55 - 66	55 - 72	55 - 66	55 - 72	55 - 66	55 - 72
NJ	Union	67	67	68	65 - 67	64 - 69	66 - 67	67 - 72	66 - 67	67 - 72	66 - 67	67 - 72	66 - 67	67 - 72
NJ	Essex	65 - 66	65 - 66	66 - 67	65 - 66	63 - 68	65 - 66	66 - 71	65 - 66	66 - 71	65 - 66	66 - 71	65 - 66	66 - 71
NJ	Hudson	60 - 68	60 - 68	60 - 70	60 - 68	60 - 71	55 - 68	55 - 73	55 - 68	55 - 73	55 - 68	55 - 73	55 - 68	55 - 73
NY	New York	60 - 65	60 - 65	60 - 69	60 - 65	60 - 71	60 - 65	60 - 72	60 - 65	60 - 72	60 - 65	60 - 72	60 - 65	60 - 72
NY	Queens	60 - 64	60 - 64	60 - 66	60 - 64	60 - 68	60 - 64	60 - 69	60 - 64	60 - 70	60 - 64	60 - 70	60 - 64	60 - 69
NY	Kings								60	60	60	60		
NY	Bronx	61 - 65	61 - 65	62 - 66	61 - 65	63 - 68	60 - 65	66 - 72	61 - 65	64 - 69	61 - 65	64 - 69	60 - 65	66 - 72
NY	Westchester	63 - 64	63 - 64	65 - 67	60 - 64	66 - 71	50 - 67	50 - 75	63 - 64	50 - 69	63 - 64	50 - 69	50 - 67	50 - 75
NY	Putnam						50	50					50	50
NY	Nassau								55 - 64	55 - 64	55 - 64	55 - 64		
NY	Suffolk								55 - 67	55 - 72	55 - 67	55 - 72		
CT	Fairfield	62 - 64	62 - 64	65 - 70	55 - 64	55 - 71	55 - 64	55 - 72	55 - 64	55 - 71	55 - 64	55 - 71	55 - 64	55 - 72
CT	New Haven	55 - 64	55 - 64	55 - 66	55 - 64	55 - 68	50 - 64	55 - 71	50 - 64	55 - 74	50 - 64	55 - 73	50 - 64	55 - 71
CT	Hartford				55 - 60	55 - 69	55 - 60	55 - 72	55 - 60	55 - 74	55 - 60	55 - 73	55 - 60	55 - 72
CT	Tolland				50 - 55	50 - 66	50 - 55	50 - 72	50 - 55	50 - 72	50 - 61	50 - 75	50 - 61	50 - 75
CT	Windham				50	50 - 70	50	50 - 76	50	50 - 76				
CT	Middlesex	62	62	64	62	62	62	64	61 - 62	64	61 - 62	66	62	66
CT	New London	50 - 68	50 - 68	60 - 68	60 - 68	50 - 68	60 - 68	63 - 70	60 - 68	63 - 70	60 - 68	65 - 70	60 - 68	65 - 70
RI	Washington	50 - 63	50 - 63	60 - 67	60 - 63	50 - 64	60 - 63	63 - 66	60 - 63	63 - 66	60 - 63	65 - 68	60 - 63	65 - 68
RI	Kent	63 - 65	63 - 65	65 - 67	63 - 65	64 - 66	63 - 65	65 - 67	63 - 65	65 - 67	63 - 65	67 - 68	63 - 65	67 - 68
RI	Providence	60 - 64	60 - 64	60 - 66	50 - 64	59 - 66	50 - 64	60 - 72	50 - 64	60 - 72	62 - 64	60 - 67	62 - 64	60 - 67
MA	Worcester										50 - 61	50 - 75	50 - 61	50 - 75
MA	Middlesex										55 - 62	0	55 - 62	0
MA	Bristol	61	61	64	60 - 61	64 - 66	60 - 61	65 - 70	60 - 61	65 - 70	61	66 - 67	61	66 - 67
MA	Norfolk	61	61	64 - 65	61	66	61	70 - 75	61	70 - 71	61 - 62	67 - 68	61 - 62	67 - 71
MA	Suffolk	60 - 63	60 - 63	60 - 65	60 - 63	60 - 67	60 - 63	60 - 70	60 - 63	60 - 70	60 - 63	60 - 70	60 - 63	60 - 70

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)	Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 400 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	61	61	61	61	62	61	63	61	63	61	63	61	63
MD	Prince George's	60 - 63	60 - 63	61 - 65	60 - 63	62 - 66	60 - 63	65 - 69	60 - 63	65 - 69	60 - 63	65 - 69	60 - 63	65 - 69
MD	Anne Arundel	60 - 63	60 - 63	61 - 65	60 - 63	62 - 66	60 - 63	61 - 69	60 - 63	61 - 69	60 - 63	61 - 69	60 - 63	61 - 69
MD	Baltimore County	60 - 67	60 - 67	61 - 67	60 - 67	62 - 67	57 - 67	62 - 68	57 - 67	62 - 68	57 - 67	62 - 68	57 - 67	62 - 68
MD	Baltimore City	60 - 62	60 - 62	60 - 62	60 - 62	60 - 63	60 - 62	60 - 63	60 - 62	60 - 63	60 - 62	60 - 63	60 - 62	60 - 63
MD	Harford	60 - 66	60 - 66	60 - 67	60 - 66	60 - 67	57 - 66	57 - 70	57 - 66	57 - 70	57 - 66	57 - 70	57 - 66	57 - 70
MD	Cecil	62 - 65	62 - 65	62 - 66	50 - 65	50 - 67	50 - 66	50 - 72	50 - 66	50 - 72	50 - 66	50 - 72	50 - 66	50 - 72
DE	New Castle	58 - 62	58 - 62	60 - 62	55 - 62	55 - 62	55 - 62	55 - 68	55 - 62	55 - 68	55 - 62	55 - 68	55 - 62	55 - 68
PA	Delaware	58 - 61	58 - 61	60 - 61	58 - 62	57 - 65	58 - 61	60 - 64	58 - 61	60 - 64	58 - 61	60 - 64	58 - 61	60 - 64
PA	Philadelphia	60 - 61	60 - 61	60 - 61	60 - 66	60 - 66	60 - 62	60 - 65	60 - 62	60 - 65	60 - 62	60 - 65	60 - 62	60 - 65
PA	Bucks	60 - 63	60 - 63	60 - 64	60 - 63	61 - 65	60 - 63	65 - 69	60 - 63	65 - 69	60 - 63	65 - 69	60 - 63	65 - 69
NJ	Mercer	61	61	61	61	61 - 62	61 - 62	63 - 66	61 - 62	63 - 66	61 - 62	63 - 66	61 - 62	63 - 66
NJ	Middlesex	61	61	61 - 62	55 - 61	55 - 63	55 - 61	55 - 66	55 - 61	55 - 66	55 - 61	55 - 66	55 - 61	55 - 66
NJ	Union	62	62	63	62	60 - 63	61 - 62	62 - 66	61 - 62	62 - 66	61 - 62	62 - 66	61 - 62	62 - 66
NJ	Essex	62	62	62 - 63	62	61 - 63	62	62 - 65	62	62 - 65	62	62 - 65	62	62 - 65
NJ	Hudson	60 - 64	60 - 64	60 - 64	60 - 64	60 - 65	55 - 64	55 - 67	55 - 64	55 - 67	55 - 64	55 - 67	55 - 64	55 - 67
NY	New York	60	60	60 - 63	60	60 - 65	60	60 - 66	60	60 - 66	60	60 - 66	60	60 - 66
NY	Queens	60 - 61	60 - 61	60 - 62	60 - 63	60 - 63	60 - 63	60 - 64	60 - 63	60 - 64	60 - 63	60 - 64	60 - 63	60 - 64
NY	Kings								60	60	60	60		
NY	Bronx	58 - 63	58 - 63	60 - 64	58 - 63	61 - 64	58 - 63	63 - 66	58 - 63	61 - 64	58 - 63	61 - 64	58 - 63	63 - 66
NY	Westchester	58 - 59	58 - 59	60 - 62	57 - 59	61 - 66	50 - 66	50 - 71	58 - 59	50 - 64	58 - 59	50 - 64	50 - 66	50 - 71
NY	Putnam						50	50					50	50
NY	Nassau								55 - 59	55 - 59	55 - 59	55 - 59		
NY	Suffolk								55 - 66	55 - 66	55 - 66	55 - 66		
CT	Fairfield	58 - 61	58 - 61	60 - 65	55 - 61	55 - 66	55 - 61	55 - 67	55 - 61	55 - 65	55 - 61	55 - 65	55 - 61	55 - 67
CT	New Haven	55 - 60	55 - 60	55 - 62	55 - 60	55 - 63	50 - 60	55 - 67	50 - 60	55 - 68	50 - 60	55 - 67	50 - 60	55 - 67
CT	Hartford				55 - 57	55 - 64	55 - 57	55 - 66	55 - 57	55 - 68	55 - 60	55 - 67	55 - 60	55 - 66
CT	Tolland				50 - 55	50 - 61	50 - 55	50 - 67	50 - 55	50 - 67	50 - 57	50 - 70	50 - 57	50 - 70
CT	Windham				50	50 - 65	50	50 - 71	50	50 - 71				
CT	Middlesex	58	58	59	58	58	58	60	58	59 - 60	58	61	58	61
CT	New London	50 - 62	50 - 62	57 - 64	57 - 62	50 - 63	57 - 62	59 - 64	57 - 62	59 - 64	57 - 62	61 - 65	57 - 62	61 - 65
RI	Washington	50 - 58	50 - 58	57 - 63	57 - 58	50 - 59	57 - 58	59 - 61	57 - 58	59 - 61	57 - 58	61 - 64	57 - 58	61 - 64
RI	Kent	58 - 63	58 - 63	60 - 63	58 - 63	59 - 63	58 - 63	60 - 63	58 - 63	60 - 63	58 - 63	62 - 64	58 - 63	62 - 64
RI	Providence	59 - 61	59 - 61	60 - 61	50 - 61	57 - 61	50 - 61	60 - 67	50 - 61	60 - 67	59 - 61	60 - 62	59 - 61	60 - 62
MA	Worcester										50 - 60	50 - 70	50 - 60	50 - 70
MA	Middlesex										55 - 58	0	55 - 58	0
MA	Bristol	58	58	60	57 - 58	59 - 61	57 - 58	60 - 65	57 - 58	60 - 65	58	61 - 62	58	61 - 62
MA	Norfolk	57 - 58	57 - 58	60	57 - 58	61	57 - 58	65 - 69	57 - 58	65	57 - 60	62	57 - 60	62 - 66
MA	Suffolk	58 - 61	58 - 61	60 - 62	58 - 61	60 - 62	57 - 61	60 - 64	57 - 61	60 - 64	57 - 61	59 - 64	57 - 61	60 - 64

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)	Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)		Noise Level, Ldn (dBA) at 800 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	60	60	60	60	61	60	61	60	61	60	61	60	61
MD	Prince George's	56 - 59	56 - 59	57 - 60	56 - 59	57 - 62	56 - 59	59 - 65	56 - 59	59 - 65	56 - 59	59 - 65	56 - 59	59 - 65
MD	Anne Arundel	56 - 62	56 - 62	57 - 62	56 - 62	57 - 62	56 - 62	57 - 65	56 - 62	57 - 65	56 - 62	57 - 65	56 - 62	57 - 65
MD	Baltimore County	56 - 66	56 - 66	57 - 66	56 - 66	57 - 66	55 - 66	57 - 66	55 - 66	57 - 66	55 - 66	57 - 66	55 - 66	57 - 66
MD	Baltimore City	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61	60 - 61
MD	Harford	56 - 62	56 - 62	56 - 62	56 - 62	57 - 63	55 - 62	55 - 65	55 - 62	55 - 65	55 - 62	55 - 65	55 - 62	55 - 65
MD	Cecil	57 - 61	57 - 61	57 - 62	50 - 61	56 - 63	50 - 62	50 - 68	50 - 62	50 - 68	50 - 62	50 - 68	50 - 62	50 - 68
DE	New Castle	56 - 60	56 - 60	56 - 60	55 - 60	57 - 60	55 - 60	55 - 62	55 - 60	55 - 62	55 - 60	55 - 62	55 - 60	55 - 62
PA	Delaware	56 - 60	56 - 60	56 - 60	56 - 61	55 - 62	56 - 60	56 - 62	56 - 60	56 - 62	56 - 60	56 - 62	56 - 60	56 - 62
PA	Philadelphia	60	60	60	60 - 65	60 - 66	60 - 61	60 - 62	60 - 61	60 - 62	60 - 61	60 - 62	60 - 61	60 - 62
PA	Bucks	56 - 58	56 - 58	57 - 59	56 - 58	57 - 60	56 - 58	59 - 65	56 - 58	59 - 65	56 - 58	59 - 65	56 - 58	59 - 65
NJ	Mercer	57 - 60	57 - 60	57 - 60	57 - 60	57 - 61	57 - 61	60 - 63	57 - 61	60 - 63	57 - 61	60 - 63	57 - 61	60 - 63
NJ	Middlesex	57 - 60	57 - 60	57 - 60	55 - 60	55 - 61	55 - 60	55 - 61	55 - 60	55 - 61	55 - 60	55 - 61	55 - 60	55 - 61
NJ	Union	57	57	58	57 - 61	56 - 58	57	57 - 60	57	57 - 60	57	57 - 60	57	57 - 60
NJ	Essex	60 - 61	60 - 61	61	60 - 61	60 - 61	61	61 - 62	61	61 - 62	61	61 - 62	61	61 - 62
NJ	Hudson	58 - 63	58 - 63	58 - 63	58 - 63	59 - 64	55 - 63	55 - 63	55 - 63	55 - 63	55 - 63	55 - 63	55 - 63	55 - 63
NY	New York	57 - 60	57 - 60	58	57 - 60	59	57 - 60	60	57 - 60	60	57 - 60	60	57 - 60	60
NY	Queens	60	60	60 - 61	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63	60 - 63
NY	Kings								60	60	60	60		
NY	Bronx	56 - 63	56 - 63	56 - 63	56 - 63	57 - 63	56 - 63	59 - 64	56 - 63	58 - 63	56 - 63	58 - 63	56 - 63	59 - 64
NY	Westchester	56	56	57	55 - 56	57 - 60	50 - 65	50 - 66	56	50 - 58	56	50 - 58	50 - 65	50 - 66
NY	Putnam						50	50					50	50
NY	Nassau								55 - 56	55 - 56	55 - 56	55 - 56		
NY	Suffolk								55 - 66	55 - 65	55 - 66	55 - 65		
CT	Fairfield	56 - 60	56 - 60	57 - 61	55 - 60	55 - 60	55 - 60	55 - 61	55 - 60	55 - 61	55 - 60	55 - 61	55 - 60	55 - 61
CT	New Haven	55 - 60	55 - 60	55 - 60	55 - 60	55 - 60	50 - 60	55 - 62	50 - 60	55 - 61	50 - 60	55 - 61	50 - 60	55 - 62
CT	Hartford				55	55 - 58	55	55 - 60	55	55 - 61	55 - 60	55 - 61	55 - 60	55 - 60
CT	Tolland				50 - 55	50 - 57	50 - 55	50 - 63	50 - 55	50 - 63	50 - 55	50 - 66	50 - 55	50 - 66
CT	Windham				50	50 - 61	50	50 - 67	50	50 - 67				
CT	Middlesex	56	56	56	56	56	56	56	56	56	56	57	56	57
CT	New London	50 - 57	50 - 57	55 - 59	55 - 57	50 - 58	55 - 57	56 - 59	55 - 57	56 - 59	55 - 57	57 - 59	55 - 57	57 - 59
RI	Washington	50 - 56	50 - 56	54 - 59	54 - 56	50 - 56	54 - 56	56 - 57	54 - 56	56 - 57	54 - 56	57 - 60	54 - 56	57 - 60
RI	Kent	56 - 61	56 - 61	56 - 62	56 - 61	56 - 62	56 - 61	57 - 62	56 - 61	57 - 62	56 - 61	57 - 62	56 - 61	57 - 62
RI	Providence	56 - 60	56 - 60	57 - 60	50 - 60	55 - 60	50 - 60	56 - 63	50 - 60	56 - 63	56 - 60	57 - 61	56 - 60	57 - 61
MA	Worcester										50 - 60	50 - 66	50 - 60	50 - 66
MA	Middlesex										55 - 56	0	55 - 56	0
MA	Bristol	56	56	56	55 - 56	56 - 57	55 - 56	56 - 59	55 - 56	56 - 59	56	57	56	57
MA	Norfolk	56	56	56	56	57	56	59 - 62	56	59	56 - 60	57 - 61	56 - 60	57 - 61
MA	Suffolk	56 - 60	56 - 60	57 - 60	56 - 60	57 - 61	56 - 60	57 - 61	56 - 60	57 - 61	55 - 60	56 - 62	55 - 60	56 - 62

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Vibration Level (VdB) at 50 Feet (Min-Max Range)	Vibration Level (VdB) at 50 Feet (Min-Max Range)		Vibration Level (VdB) at 50 Feet (Min-Max Range)		Vibration Level (VdB) at 50 Feet (Min-Max Range)		Vibration Level (VdB) at 50 Feet (Min-Max Range)		Vibration Level (VdB) at 50 Feet (Min-Max Range)		Vibration Level (VdB) at 50 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	93	93	93	93	93	93	93	93	93	93	93	93	93
MD	Prince George's	93	93	93	93	93	93	83 - 93	93	83 - 93	93	83 - 93	93	83 - 93
MD	Anne Arundel	93	93	93	93	93	93	93	93	93	93	93	93	93
MD	Baltimore County	93	93	93	93	93	68 - 93	82 - 93	68 - 93	82 - 93	68 - 93	82 - 93	68 - 93	82 - 93
MD	Baltimore City	50 - 93	50 - 93	50 - 93	50 - 93	93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93
MD	Harford	93	93	93	93	93	50 - 93	82 - 93	50 - 93	82 - 93	50 - 93	82 - 93	50 - 93	82 - 93
MD	Cecil	93	93	93	50 - 93	83 - 93	50 - 93	82 - 93	50 - 93	82 - 93	50 - 93	82 - 93	50 - 93	82 - 93
DE	New Castle	93	93	93	93	92 - 93	50 - 93	76 - 93	50 - 93	76 - 93	50 - 93	76 - 93	50 - 93	76 - 93
PA	Delaware	93	93	93	85 - 93	85 - 93	50 - 93	76 - 93	50 - 93	76 - 93	50 - 93	76 - 93	50 - 93	76 - 93
PA	Philadelphia	93	93	93	85 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93
PA	Bucks	93	93	93	93	93	93	93	93	93	93	93	93	93
NJ	Mercer	93	93	93	93	93	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93
NJ	Middlesex	93	93	93	50 - 93	50 - 93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93
NJ	Union	93	93	93	93	93	93	92 - 93	93	92 - 93	93	92 - 93	93	92 - 93
NJ	Essex	93	93	93	93	93	93	93	93	93	93	93	93	93
NJ	Hudson	93	93	93	93	93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93	50 - 93	92 - 93
NY	New York	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93
NY	Queens	83 - 93	83 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	80 - 93	50 - 93	80 - 93	50 - 93	83 - 93
NY	Kings								50	86	50	86		
NY	Bronx	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	50 - 93	83 - 93	83 - 93	83 - 93	83 - 93	83 - 93	50 - 93	83 - 93
NY	Westchester	93	93	93	68 - 93	83 - 93	50 - 93	76 - 93	93	93	93	93	50 - 93	76 - 93
NY	Putnam						50	86					50	86
NY	Nassau								50 - 80	86	50 - 80	86		
NY	Suffolk								50 - 80	76 - 86	50 - 80	76 - 86		
CT	Fairfield	93	93	83 - 93	68 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93	50 - 93	83 - 93
CT	New Haven	93	93	93	50 - 93	73 - 93	50 - 93	86 - 93	50 - 93	76 - 93	50 - 93	76 - 93	50 - 93	86 - 93
CT	Hartford				50 - 85	83 - 85	50 - 85	85 - 86	50 - 85	76 - 86	50 - 85	76 - 86	50 - 85	85 - 86
CT	Tolland				50	83	50	86	50	86	50 - 68	76 - 86	50 - 68	76 - 86
CT	Windham				50	73 - 83	50	76 - 86	50	76 - 86				
CT	Middlesex	93	93	93	93	85	93	86	93	86	93	86	93	86
CT	New London	50 - 93	50 - 93	73 - 93	93	85	93	86	93	86	93	86	93	86
RI	Washington	50 - 93	50 - 93	73 - 93	93	85 - 92	93	86 - 92	93	86 - 92	93	86 - 92	93	86 - 92
RI	Kent	93	93	93	93	92	93	92	93	92	93	92	93	92
RI	Providence	93	93	93	50 - 93	83 - 92	50 - 93	86 - 92	50 - 93	86 - 92	93	92	93	86 - 92
MA	Worcester										50 - 85	76 - 92	50 - 85	76 - 92
MA	Middlesex										50 - 85	92	50 - 85	92
MA	Bristol	93	93	93	85 - 93	85 - 92	85 - 93	92	85 - 93	92	93	92	93	92
MA	Norfolk	93	93	93	93	92	93	82 - 92	93	92	85 - 93	92	85 - 93	82 - 92
MA	Suffolk	93	93	93	93	92 - 93	93	92	93	92 - 93	68 - 93	85 - 93	68 - 93	85 - 93

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Vibration Level (VdB) at 100 Feet (Min-Max Range)	Vibration Level (VdB) at 100 Feet (Min-Max Range)		Vibration Level (VdB) at 100 Feet (Min-Max Range)		Vibration Level (VdB) at 100 Feet (Min-Max Range)		Vibration Level (VdB) at 100 Feet (Min-Max Range)		Vibration Level (VdB) at 100 Feet (Min-Max Range)		Vibration Level (VdB) at 100 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	87	87	87	87	87	87	87	87	87	87	87	87	87
MD	Prince George's	87	87	87	87	87	87	77 - 87	87	77 - 87	87	77 - 87	87	77 - 87
MD	Anne Arundel	87	87	87	87	87	87	87	87	87	87	87	87	87
MD	Baltimore County	87	87	87	87	87	61 - 87	75 - 87	61 - 87	75 - 87	61 - 87	75 - 87	61 - 87	75 - 87
MD	Baltimore City	87	50 - 87	50 - 87	50 - 87	87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87
MD	Harford	87	87	87	87	87	50 - 87	75 - 87	50 - 87	75 - 87	50 - 87	75 - 87	50 - 87	75 - 87
MD	Cecil	87	87	87	50 - 87	77 - 87	50 - 87	75 - 87	50 - 87	75 - 87	50 - 87	75 - 87	50 - 87	75 - 87
DE	New Castle	87	87	87	87	85 - 87	50 - 87	70 - 87	50 - 87	70 - 87	50 - 87	70 - 87	50 - 87	70 - 87
PA	Delaware	87	87	87	79 - 87	79 - 87	50 - 87	70 - 87	50 - 87	70 - 87	50 - 87	70 - 87	50 - 87	70 - 87
PA	Philadelphia	87	87	87	79 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87
PA	Bucks	87	87	87	87	87	87	87	87	87	87	87	87	87
NJ	Mercer	87	87	87	87	87	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87
NJ	Middlesex	87	87	87	50 - 87	50 - 87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87
NJ	Union	87	87	87	87	87	87	85 - 87	87	85 - 87	87	85 - 87	87	85 - 87
NJ	Essex	87	87	87	87	87	87	87	87	87	87	87	87	87
NJ	Hudson	87	87	87	87	87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87	50 - 87	85 - 87
NY	New York	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87
NY	Queens	77 - 87	77 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	74 - 87	50 - 87	74 - 87	50 - 87	77 - 87
NY	Kings								50	80	50	80		
NY	Bronx	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	50 - 87	77 - 87	77 - 87	77 - 87	77 - 87	77 - 87	50 - 87	77 - 87
NY	Westchester	87	87	87	61 - 87	77 - 87	50 - 87	70 - 87	87	87	87	87	50 - 87	70 - 87
NY	Putnam						50	80					50	80
NY	Nassau								50 - 74	80	50 - 74	80		
NY	Suffolk								50 - 74	70 - 80	50 - 74	70 - 80		
CT	Fairfield	87	87	77 - 87	61 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87	50 - 87	77 - 87
CT	New Haven	87	87	87	50 - 87	67 - 87	50 - 87	80 - 87	50 - 87	70 - 87	50 - 87	70 - 87	50 - 87	80 - 87
CT	Hartford		87		50 - 79	77 - 79	50 - 79	79 - 80	50 - 79	70 - 80	50 - 79	70 - 80	50 - 79	79 - 80
CT	Tolland		87		50	77	50	80	50	80	50 - 61	70 - 80	50 - 61	70 - 80
CT	Windham				50 - 61	67 - 77	50	70 - 80	50	70 - 80				
CT	Middlesex	87	87	87	87	79	87	80	87	80	87	80	87	80
CT	New London	87	50 - 87	67 - 87	87	79	87	80	87	80	87	80	87	80
RI	Washington	87	50 - 87	67 - 87	87	79 - 85	87	80 - 85	87	80 - 85	87	80 - 85	87	80 - 85
RI	Kent	87	87	87	87	85	87	85	87	85	87	85	87	85
RI	Providence	87	87	87	50 - 87	77 - 85	50 - 87	80 - 85	50 - 87	80 - 85	87	85	87	80 - 85
MA	Worcester		87								50 - 79	70 - 85	50 - 79	70 - 85
MA	Middlesex		87								50 - 79	85	50 - 79	85
MA	Bristol	87	87	87	79 - 87	79 - 85	79 - 87	85	79 - 87	85	87	85	87	85
MA	Norfolk	87	87	87	87	85	87	75 - 85	87	85	79 - 87	85	79 - 87	75 - 85
MA	Suffolk	87	87	87	87	85 - 87	87	85	87	85 - 87	61 - 87	79 - 87	61 - 87	79 - 87

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Vibration Level (VdB) at 200 Feet (Min-Max Range)	Vibration Level (VdB) at 200 Feet (Min-Max Range)		Vibration Level (VdB) at 200 Feet (Min-Max Range)		Vibration Level (VdB) at 200 Feet (Min-Max Range)		Vibration Level (VdB) at 200 Feet (Min-Max Range)		Vibration Level (VdB) at 200 Feet (Min-Max Range)		Vibration Level (VdB) at 200 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	79	79	79	79	79	79	79	79	79	79	79	79	79
MD	Prince George's	79	79	79	79	79	79	69 - 79	79	69 - 79	79	69 - 79	79	69 - 79
MD	Anne Arundel	79	79	79	79	79	79	79	79	79	79	79	79	79
MD	Baltimore County	79	79	79	79	79	55 - 79	68 - 79	55 - 79	68 - 79	55 - 79	68 - 79	55 - 79	68 - 79
MD	Baltimore City	50 - 79	50 - 79	50 - 79	50 - 79	79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79
MD	Harford	79	79	79	79	79	50 - 79	68 - 79	50 - 79	68 - 79	50 - 79	68 - 79	50 - 79	68 - 79
MD	Cecil	79	79	79	50 - 79	69 - 79	50 - 79	68 - 79	50 - 79	68 - 79	50 - 79	68 - 79	50 - 79	68 - 79
DE	New Castle	79	79	79	79	78 - 79	50 - 79	63 - 79	50 - 79	63 - 79	50 - 79	63 - 79	50 - 79	63 - 79
PA	Delaware	79	79	79	72 - 79	72 - 79	50 - 79	63 - 79	50 - 79	63 - 79	50 - 79	63 - 79	50 - 79	63 - 79
PA	Philadelphia	79	79	79	72 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79
PA	Bucks	79	79	79	79	79	79	79	79	79	79	79	79	79
NJ	Mercer	79	79	79	79	79	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79
NJ	Middlesex	79	79	79	50 - 79	50 - 79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79
NJ	Union	79	79	79	79	79	79	78 - 79	79	78 - 79	79	78 - 79	79	78 - 79
NJ	Essex	79	79	79	79	79	79	79	79	79	79	79	79	79
NJ	Hudson	79	79	79	79	79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79	50 - 79	78 - 79
NY	New York	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79
NY	Queens	69 - 79	69 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	67 - 79	50 - 79	67 - 79	50 - 79	69 - 79
NY	Kings								50	73	50	73		
NY	Bronx	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	50 - 79	69 - 79	69 - 79	69 - 79	69 - 79	69 - 79	50 - 79	69 - 79
NY	Westchester	79	79	79	55 - 79	69 - 79	50 - 79	63 - 79	79	79	79	79	50 - 79	63 - 79
NY	Putnam						50	73					50	73
NY	Nassau								50 - 67	73	50 - 67	73		
NY	Suffolk								50 - 67	63 - 73	50 - 67	63 - 73		
CT	Fairfield	79	79	69 - 79	55 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79	50 - 79	69 - 79
CT	New Haven	79	79	79	50 - 79	60 - 79	50 - 79	73 - 79	50 - 79	63 - 79	50 - 79	63 - 79	50 - 79	73 - 79
CT	Hartford				50 - 72	70 - 72	50 - 72	72 - 73	50 - 72	63 - 73	50 - 72	63 - 73	50 - 72	72 - 73
CT	Tolland				50	70	50	73	50	73	50 - 55	63 - 73	50 - 55	63 - 73
CT	Windham				50	60 - 70	50	63 - 73	50	63 - 73				
CT	Middlesex	79	79	79	79	72	79	73	79	73	79	73	79	73
CT	New London	50 - 79	50 - 79	60 - 79	79	72	79	73	79	73	79	73	79	73
RI	Washington	50 - 79	50 - 79	60 - 79	79	72 - 78	79	73 - 78	79	73 - 78	79	73 - 78	79	73 - 78
RI	Kent	79	79	79	79	78	79	78	79	78	79	78	79	78
RI	Providence	79	79	79	50 - 79	70 - 78	50 - 79	73 - 78	50 - 79	73 - 78	79	78	79	73 - 78
MA	Worcester										50 - 72	63 - 78	50 - 72	63 - 78
MA	Middlesex										50 - 72	78	50 - 72	78
MA	Bristol	79	79	79	72 - 79	72 - 78	72 - 79	78	72 - 79	78	79	78	79	78
MA	Norfolk	79	79	79	79	78	79	68 - 78	79	78	72 - 79	78	72 - 79	68 - 78
MA	Suffolk	79	79	79	79	78 - 79	79	78	79	78 - 79	55 - 79	72 - 79	55 - 79	72 - 79

Geography		Existing NEC	Alternative 1		Alternative 2		Alternative 3 Via CC and PVD (3.1)		Alternative 3 Via LI and PVD (3.2)		Alternative 3 Via LI and WOR (3.3)		Alternative 3 Via CC and WOR (3.4)	
State	County	Vibration Level (VdB) at 300 Feet (Min-Max Range)	Vibration Level (VdB) at 300 Feet (Min-Max Range)		Vibration Level (VdB) at 300 Feet (Min-Max Range)		Vibration Level (VdB) at 300 Feet (Min-Max Range)		Vibration Level (VdB) at 300 Feet (Min-Max Range)		Vibration Level (VdB) at 300 Feet (Min-Max Range)		Vibration Level (VdB) at 300 Feet (Min-Max Range)	
		Predicted Existing	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future	Predicted Existing	Predicted Future
DC	District of Columbia	75	75	75	75	75	75	75	75	75	75	75	75	75
MD	Prince George's	75	75	75	75	75	75	65 - 75	75	65 - 75	75	65 - 75	75	65 - 75
MD	Anne Arundel	75	75	75	75	75	75	75	75	75	75	75	75	75
MD	Baltimore County	75	75	75	75	75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75
MD	Baltimore City	50 - 75	50 - 75	50 - 75	50 - 75	75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75
MD	Harford	75	75	75	75	75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75
MD	Cecil	75	75	75	50 - 75	65 - 75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75	50 - 75	64 - 75
DE	New Castle	75	75	75	75	74 - 75	50 - 75	59 - 75	50 - 75	59 - 75	50 - 75	59 - 75	50 - 75	59 - 75
PA	Delaware	75	75	75	67 - 75	67 - 75	50 - 75	59 - 75	50 - 75	59 - 75	50 - 75	59 - 75	50 - 75	59 - 75
PA	Philadelphia	75	75	75	67 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75
PA	Bucks	75	75	75	75	75	75	75	75	75	75	75	75	75
NJ	Mercer	75	75	75	75	75	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75
NJ	Middlesex	75	75	75	50 - 75	50 - 75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75
NJ	Union	75	75	75	75	75	75	74 - 75	75	74 - 75	75	74 - 75	75	74 - 75
NJ	Essex	75	75	75	75	75	75	75	75	75	75	75	75	75
NJ	Hudson	75	75	75	75	75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75	50 - 75	74 - 75
NY	New York	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75
NY	Queens	65 - 75	65 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	62 - 75	50 - 75	62 - 75	50 - 75	65 - 75
NY	Kings								50	69	50	69		
NY	Bronx	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	50 - 75	65 - 75	65 - 75	65 - 75	65 - 75	65 - 75	50 - 75	65 - 75
NY	Westchester	75	75	75	50 - 75	65 - 75	50 - 75	59 - 75	75	75	75	75	50 - 75	59 - 75
NY	Putnam						50	69					50	69
NY	Nassau								50 - 62	69	50 - 62	69		
NY	Suffolk								50 - 62	59 - 69	50 - 62	59 - 69		
CT	Fairfield	75	75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75	50 - 75	65 - 75
CT	New Haven	75	75	75	50 - 75	56 - 75	50 - 75	69 - 75	50 - 75	59 - 75	50 - 75	59 - 75	50 - 75	69 - 75
CT	Hartford				50 - 67	66 - 67	50 - 67	67 - 69	50 - 67	59 - 69	50 - 67	59 - 69	50 - 67	67 - 69
CT	Tolland				50	66	50	69	50	69	50	59 - 69	50	59 - 69
CT	Windham				50	56 - 66	50	59 - 69	50	59 - 69				
CT	Middlesex	75	75	75	75	67	75	69	75	69	75	69	75	69
CT	New London	50 - 75	50 - 75	56 - 75	75	67	75	69	75	69	75	69	75	69
RI	Washington	50 - 75	50 - 75	56 - 75	75	67 - 74	75	69 - 74	75	69 - 74	75	69 - 74	75	69 - 74
RI	Kent	75	75	75	75	74	75	74	75	74	75	74	75	74
RI	Providence	75	75	75	50 - 75	66 - 74	50 - 75	69 - 74	50 - 75	69 - 74	75	74	75	69 - 74
MA	Worcester										50 - 67	59 - 74	50 - 67	59 - 74
MA	Middlesex										50 - 67	74	50 - 67	74
MA	Bristol	75	75	75	67 - 75	67 - 74	67 - 75	74	67 - 75	74	75	74	75	74
MA	Norfolk	75	75	75	75	74	75	64 - 74	75	74	67 - 75	74	67 - 75	64 - 74
MA	Suffolk	75	75	75	75	74 - 75	75	74	75	74 - 75	50 - 75	67 - 75	50 - 75	67 - 75