Virginia Department of Transportation
I-66 Tier 2 Environmental Assessment

VDOT Project 0066-96A-297,
UPC #105500

Prince William and Fairfax County, Virginia

PRELIMINARY NOISE ANALYSIS

Submitted to:

Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, VA 23219

Prepared by:

4951 Lake Brook Drive, Suite 275
Glen Allen, VA 23060

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I. Executive Summary

The Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) completed a Tier 1 Final Environmental Impact Statement (FEIS) in November 2013 for the I-66 corridor from US 15 to I-495. FHWA issued a Record of Decision (ROD) on November 20, 2013 concurrently with publication of the Tier 1 FEIS. VDOT, in consultation with FHWA, has determined to move forward with Tier 2 studies for widening existing I-66 to result in two managed/HOV/bus lanes and three general purpose lanes in each direction from US 15 to I-495, a total distance of approximately 25 miles (**Figure 1**). The proposed physical construction would consist of building one new managed/HOV/bus lane and converting the existing concurrent HOV lane to a second managed/HOV/bus lane in each direction. Infrastructure elements to support express bus service in the managed lanes would be included in the project to provide additional multimodal options in the corridor. The I-66 managed/HOV/bus lanes are planned to connect to the existing managed lanes on I-495 to provide a seamlessly connected network of managed lanes between the two interstate highways. In addition, the I-66 managed/HOV/bus lanes would provide a direct connection for buses and HOVs to the I-66 HOV facility east of I-495. Direct access ramps are proposed to connect the managed lanes to and from the general purpose lanes and/or crossroads and interchanges.

The noise analysis in this document will focus solely on the Common Noise Environments, referred to as CNEs. Noise sensitive receptors within 500 feet of the proposed improvements were considered for this evaluation. This report documents the Existing (2015) and Design Year (2040) Build and No-Build noise levels associated with the I-66 Tier 2 Environmental Assessment (EA). A project field view was performed to thoroughly review the project area. During this field view, major sources of acoustic shielding (e.g., terrain lines, building rows, existing noise barriers, etc.) adjacent to the project corridor were noted for inclusion into the noise modeling effort. Noise monitoring was performed at 29 locations, while noise modeling was conducted for 7,466 additional sites to gain a thorough understanding of the existing noise environment and to determine how the proposed improvements would change the noise levels throughout the project area. Monitored sites were used solely for noise model validation and not for the purposes of predicting Existing (2015) or Design Year (2040) noise impacts.

Noise modeling was completed for Existing (2015) and Design Year (2040) Build and No-Build conditions. Design Year (2040) Build noise levels were predicted at each modeled receptor site under each of the proposed build alternatives. For the purposes of the No-build scenario, several interim improvements are expected to be in place and were modeled as such. A detailed description of these improvements can be found in the No-Build discussion in the following sections of this report. Under Design Year (2040) Build conditions for Build Alternative 2A, a total of 2,301 receptors representing 2,426 residences, the Manassas National Battlefield Park, Bull Run Regional Park, Idylwood Park, 15 playgrounds, six baseball fields, three outdoor picnic areas, one hotel pool, eight basketball courts, 13 publicly owned trails, four tennis courts, a public dog park and one soccer field are predicted to experience noise impacts. Under Design Year (2040) Build conditions for Build Alternative 2B, a total of 2,122 receptors representing 2,184 residences, the Manassas National Battlefield Park, Bull Run Regional Park, Idylwood

Park, three hotel balconies, 11 playgrounds, four outdoor picnic areas, three pools, six basketball courts, 14 publicly owned trails, four tennis courts, a public dog park and one soccer field are predicted to experience noise impacts. Noise barriers were evaluated and determined to be both feasible and reasonable for CNEs C, D, E, G, I, M, O, P, Q, S, T, V, Y, W, AA, AB, AM, AP, AS, AT, AW, AX, AZ, BA, BB, BC, BF, BD. A detailed discussion of the noise abatement evaluation follows in ***Section VII*** of this report.

The findings in this document are based on conceptual information. Therefore, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the Final Design Noise Analysis. Conversely, noise barriers that were not considered feasible and reasonable may meet the established criteria and be recommended for construction. A Final Design Noise Analysis would be performed for this project based on detailed engineering information. Thus, any conclusions derived in the report should be considered preliminary in nature and subject to change.

No considerable, long-term construction related noise impacts are anticipated. Any noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and would cease upon completion of the project construction phase.

II. Introduction and Background

Impacts associated with noise are often a prime concern when evaluating roadway improvement projects. Roadway construction at a new location or improvements to the existing transportation network may cause impacts to the noise-sensitive environment located adjacent to the project corridor. For this reason, FHWA and VDOT have established a noise analysis methodology and associated noise level criteria to assess the potential noise impacts attributed to the construction and use of transportation related projects.

This report details the steps involved in the preliminary noise analysis for the I-66 Tier 2 EA, including noise monitoring, noise modeling methodologies, results, and impact evaluation. The regional study area can be seen in **Figure 1**. Relevant information and assumptions used for this analysis are included in this report's appendices.

No-Build Alternative

Under the no action or No-Build Alternative, the improvements considered in the I-66 Corridor Improvements Tier 2 Environmental Assessment (EA) would not be constructed and the roadway, transit services in the corridor, and supporting facilities, such as park-and-ride lots, would continue to operate as they do today, with the exception of other programmed improvements in the corridor as contained in the *National Capital Region's Draft 2014 CLRP* (April 9, 2014) through 2025 and 2040. The Transportation Planning Board (TPB) adopted the 2014 CLRP in October 2014 after the initiation of this study. Some of the regionally significant and corridor-specific projects in the CLRP include the following

- Direct access ramps from I-66 HOV to Vaden Drive to provide access to Vienna Metrorail station.(http://www.virginiadot.org/projects/northernvirginia/vienna_metro_access_ramps.asp);
- Diverging-diamond interchange on US 15 at I-66 (under construction). (http://www.virginiadot.org/projects/northernvirginia/i-66_and_route_15_interchange.asp);
- I-66 and Route 28 improvements, which include widening Route 28 to eight lanes with interchanges and also redesigning the I-66 interchange (to be coordinated with the ongoing Route 28/I-66 Interchange project managed by VDOT).
- I-66 and Route 29/Linton Hall Road Interchange Improvements (under construction).
- I-66 widening to four lanes in each direction between US 29 in Gainesville and US 15 in Haymarket (currently under construction).
- VA 234 Bypass/Relocation at Balls Ford Road Interchange;
- Route 286 HOV, widen and upgrade to six and eight lanes between Route 267 and I-66;
- Bi-County Parkway, construct four lanes between Route 234 (Prince William Parkway) at I-66 and US 50.

Build Alternatives

This alternative is subdivided into two separate alternatives, 2A and 2B. Both alternatives would provide two express lanes and three general purpose lanes in each direction with a flexible barrier between the two sets of lanes. In addition, twelve-foot shoulders would be provided on both the right and left sides of the roadway. The difference in typical section between Alternatives 2A and 2B is the treatment of the median. With **Alternative 2A**, a 42-foot-wide median would be set aside for future fixed guide-way transit service, and auxiliary lanes would be provided if needed, resulting in a total typical section width of 246 feet from edge of shoulder to edge of shoulder. **Alternative 2B** would provide concrete barrier separation between the opposing lanes of traffic and the typical section width would decrease to 206 feet with auxiliary lanes, if needed, between interchanges. Alternative 2B would essentially eliminate much or most of the existing median in some sections.

There may be differences between the two alternatives with respect to interchanges, access points to enter and exit the express lanes, park-and-ride lots, bicycle and pedestrian elements, transit service, and tolling features. Differences between Alternatives 2A and 2B in each of these areas, if any, are identified within the technical reports being prepared in support of the EA and within the EA itself. At the conclusion of this Tier 2 study, a Preferred Alternative may be selected that includes a combination of elements that have been identified as part of either Alternative 2A or 2B. For example, the Alternative 2A and 2B typical sections may be selected for different sections of the corridor based on potential impacts at particular locations. Similarly, the interchange configurations associated with either Alternative 2A or 2B may be chosen for each interchange location. This method of mixing-and-matching allows for flexibility in the planning and design of I-66 improvements.

III. Noise Analysis Methodology, Terminology and Criteria

The methodologies applied to the noise analysis for the I-66 Project are in accordance with VDOT's "*State Noise Abatement Policy"* effective July 13, 2011 and the "*Highway Traffic Noise Impact Analysis Guidance Manual*", updated July 31, 2014. VDOT guidelines are based on Title 23 of the Code of Federal Regulations, Part 772 and the Procedures for Abatement of Highway Traffic Noise and Construction Noise, (23 CFR 772).

To determine the degree of highway noise impact, Noise Abatement Criteria (NAC) has been established for a number of different land use categories. ***Table 1*** documents the NAC for the associated activity land use category shown in the adjacent column. The project is considered highly developed with dense residential development, interspersed with mixed commercial land uses. Existing noise barriers were identified in portions of CNE C, D, E, Q, S, T, X, Y, AA, AC, AG, AP, AS, AT, AU, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, And BM.

Category D addresses interior noise levels associated with hospitals, libraries, schools, medical facilities, places of worship, public or nonprofit institutions, etc. Interior noise level impacts in the project area were analyzed. To assess potential interior noise impacts, modeling sites are placed in close proximity to the existing structure. The standard noise reduction for masonry construction with modern windows is 25 dBA when comparing exterior versus interior noise levels. Both exterior and interior noise levels will be quoted in ***Appendix H*** in this document.

The NAC are given in terms of an hourly, A-weighted, equivalent noise level. The A-weighted noise level frequency is used for human use areas because it is comprised of the noise level frequencies that are most easily distinguished by the human ear, out of the entire noise level spectrum. Highway traffic noise is categorized as a linear noise source, where varying noise levels occur at a fixed point during a single vehicle pass by. It is acceptable to characterize these fluctuating noise levels with a single number known as the equivalent noise level (L_{eq}). The L_{eq} is the value of a steady noise level that would represent the same acoustic energy as the actual time-varying sound evaluated over the same time period. For highway noise assessments, L_{eq} is typically evaluated over a one-hour period.

Noise abatement determination is based on VDOT's three-phase approach. The first phase (**Phase 1**) distinguishes if a sensitive receptor within a project corridor warrants highway traffic noise abatement. The following describes the **Phase 1** warranted criterion, as discussed in VDOT policy. Receptors that satisfy either condition warrants consideration of highway traffic noise abatement.

- Predicted highway traffic noise levels (for the design year) approach or exceed the highway traffic noise abatement criteria in ***Table 1***. "Approach" has been defined by VDOT as 1 dB(A) below the noise abatement criteria.

~or~

- A substantial noise increase has been defined by VDOT as a 10 dB(A) increase above existing noise levels for all noise-sensitive exterior activity categories. A 10 dB(A)

increase in noise reflects the generally accepted range of a perceived doubling of the loudness.

If traffic noise impact is identified within the project corridor, then consideration of noise abatement measures is necessary. The final decision on whether or not to provide noise abatement along a project corridor will take into account the feasibility of the design and overall cost weighted against the benefit.

Phase 2 and **Phase 3** of the three-phased approach will be discussed in the noise abatement evaluation, located in ***Section VII*** of this report.

IV. Noise Monitoring Methodology

The identification of noise-sensitive land uses guided the selection of noise monitoring locations along the project corridor. In order to validate the noise models, noise monitoring was conducted at 29 representative noise sensitive receptor sites. ***Figures 2-1*** through ***2-6*** show an overview of the Build Alternative and identify the project area and the locations of the nine noise monitoring sites.

Monitoring was performed at each of the selected noise sensitive receptors using Rion NL-42 sound level meters. The noise meters were placed at each receptor site in a manner that would yield a typical absolute ambient environment noise reading, and allowed for minimal influence from atypical background noise sources. Readings were taken on the A-weighted scale and reported in decibels (dB(A)). The noise monitoring equipment meets all requirements of the American National Standard Specifications for Sound Level Meters, ANSI S1.4-1983 (R1991), Type 2, and meets all requirements as defined by FHWA. Noise monitoring was conducted in accordance with the methodologies contained in FHWA-PD-96-046, *Measurement of Highway-Related Noise*, (FHWA, May 1996).

Short-term noise monitoring was performed between November 4^{th}-6^{th}, 2014 during hours of free flow conditions. Data collected by the sound analyzers included time, average noise level (L_{av}), maximum noise level (L_{max}), and instantaneous peak noise level (L_{pk}) for each recorded interval. The output of the noise meters is L_{av}, which is the average noise level over the duration of the monitoring test. This data is then converted into an average, hourly noise level (L_{eq}), for assessment purposes. Additional data collected at each monitoring location included atmospheric conditions, wind speed, background noise sources, and unusual/atypical noise events. Traffic data (vehicle volume and speed) were also video-recorded on all roadways, which were visible from the monitoring sites and substantially contributed to the overall noise levels. Traffic was grouped into one of three categories: cars, medium trucks and heavy trucks, per VDOT procedures. Combined, this data is used during the noise model validation process.

Short-term noise monitoring is not a process to determine design year noise impacts or barrier locations. Short-term noise monitoring provides a level of consistency between what is present in real-world situations and how that is represented in the computer noise model. Short-term

monitoring does not need to occur within every Common Noise Environment (CNE) to validate the computer noise model. CNEs are groupings of receptor sites that, by location, form distinct communities within the project area. These areas are used to evaluate traffic noise impacts and potential noise mitigation options to residential developments or communities as a whole, as well as for consideration of feasibility and reasonableness of possible noise abatement measures for specific communities.

V. Undeveloped Lands and Permitted Developments

Highway traffic noise analyses are and will be performed for developed lands as well as undeveloped lands if they are considered "permitted." Undeveloped lands are deemed to be permitted when there is a definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of at least one building permit.

In accordance with the *VDOT State Noise Policy,* an undeveloped lot is considered to be planned, designed, and programmed if a building permit has been issued by the local authorities prior to the Date of Public Knowledge for the relevant project. VDOT considers the Date of Public Knowledge as the date that the final National Environmental Policy Act (NEPA) approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after this date. The project has not yet received NEPA approval and therefore does not have a Date of Public Knowledge.

Coordination with Prince William and Fairfax County was conducted from January through March of 2015 to determine whether any undeveloped permitted land uses were present within the project corridor, including Category G. Category G represents undeveloped lands with no permits. It was determined that no permitted undeveloped land uses are present, nor are there any pending requests for zoning change. Coordination should occur during the Final Design Noise Analysis to ensure that these same changes have not occurred up to the Date of Public Knowledge for the project.

VI. Validation and Existing (2015) Conditions

Computer modeling is the accepted technique for predicting Existing (2015) and Design Year (2040) noise levels associated with traffic-induced noise. Currently, the FHWA Traffic Noise Model (TNM 2.5) is the approved highway noise prediction model. The Traffic Noise Model has been established as a reliable tool for representing noise generated by highway traffic. The information applied to the modeling effort includes the following: highway design files (existing and proposed conceptual design), traffic data, roadway cross-sections, and surveying of terrain. Base mapping and aerial photography were used to identify noise-sensitive land uses within the corridor and any terrain features that may shield roadway noise. The majority of the land uses in the project area are residential and categorized as a Category B land use.

The modeling process begins with model validation, as per VDOT requirements. This is accomplished by comparing the monitored noise levels with noise levels generated by the computer model, using the traffic volumes, speeds, and composition that were witnessed during

the monitoring effort. This comparison ensures that reported changes in noise levels between Existing (2015) and Design Year (2040) conditions are due to changes in traffic conditions and not to discrepancies between monitoring and modeling techniques. A difference of three dB(A) or less between the monitored and modeled level is considered acceptable, since this is the limit of change detectable by the typical human ear. ***Table 2*** provides a summary of the model validation for the existing monitored conditions. Column 5 represents the difference between the modeled levels produced by the noise model (Column 4) and the monitored level (Column 3). Receptor site M23 in CNE BC was not able to be evaluated during the noise monitoring phase due to the presence of atypical, non-roadway noise influence that could not be avoided. Receptor site M15 in CNE AG was situated directly behind an existing noise barrier due to the lack of available outdoor use areas at this location. It is expected that the modeled insertion loss of the noise barrier is being over predicted, thus not permitting the site to validate. Since 28 of the 30 analyzed receptors shows less than a 3 dB(A) difference between the monitored and modeled noise levels, the model is considered an accurate representation of actual existing conditions throughout the project area.

There are many factors that influence the measured noise levels that may cause differences with computed noise levels of several decibels. Such factors included atmospheric conditions (upwind, neutral or downwind), shielding by structures that may be difficult to model, and the representation of louder vehicles passing during the measurement period.

The validated noise model was the base noise model for the remainder of the noise analysis. Modeling sites were added to the validated model to thoroughly predict Existing (2015) noise levels throughout the project corridor. Additional noise modeling was then performed for existing conditions using 2015 traffic data supplied by the project team (see ***Appendix D***). This modeling step was performed to predict Existing (2015) worst-case noise levels associated with existing worst-case traffic volumes and composition. Columns 3 and 4 of ***Table 3*** provides a summary of the Existing (2015) worst-case noise levels.

Analysis locations were grouped into 67 CNEs which are groupings of receptor sites that, by location, form distinct communities within the project area and have a common noise environment. These areas were used to evaluate traffic noise impacts and potential noise abatement options and to assess the feasibility and reasonableness of potential noise abatement measures for specific communities. Where residential communities or groupings of noise-sensitive land use areas exist, both noise monitoring and noise modeling-only sites were grouped into a CNE. A detailed discussion of each CNE and its respective, predicted noise levels is contained in ***Section VI*** of this report.

VII. Evaluation of Design Year (2040) Noise Levels and Noise Impact Assessment

Following the development of the existing conditions model and the prediction of Existing (2015) worst-case noise levels, the assessment continued with the prediction of Design Year (2040) No-Build and Build noise levels. Design Year (2040) No-Build noise levels were predicted without the conceptual improvements in place. Design Year (2040) Build noise levels

were predicted by accounting for the proposed improvements and applying Design Year (2040) traffic volumes and composition to the validated computer model. Design Year (2040) Build noise levels were predicted with the conceptual improvements of the Build Alternative in place and in use.

The next step in the noise analysis is to determine if future noise levels at the noise sensitive receptors would approach or exceed the FHWA/VDOT NAC. If the criteria are approached or exceeded at any receptor, noise mitigation would be considered and evaluated in an attempt to reduce future noise to acceptable levels. The minimum and maximum noise levels associated with the Design Year (2040) No-Build modeling analysis are summarized in Columns 6 and 7 of ***Table 3***. The minimum and maximum noise levels associated with the Design Year (2040) Build modeling analysis are summarized in Column 6 and 7 of ***Table 3***. Noise levels at each receptor site for the Existing (2015) and Design Year (2040) No-Build and Build Conditions are shown in ***Appendix G***.

Traffic Data for the Noise Analysis

Design Year (2040) Build traffic volumes, vehicle composition, and speeds were assigned to proposed roadways. Traffic data used in the Design Year (2040) noise analyses were provided by the project team (refer to ***Appendix D)***. Detailed traffic data was developed and coordination with VDOT occurred to determine the loudest hour for evaluation purposes for the Existing (2015), Design Year (2040) Build, and Design Year (2040) No-Build. The traffic breakdown can be seen in ***Appendix D***. Operational speeds determined in the Draft I-95 IMR were applied to roadways in the TNM when greater than the posted speed, otherwise posted speed; were applied to modeled roadways.

Traffic data for traffic noise computations were developed by the I-66 Corridor Improvements Project Team, with oversight from VDOT. Hourly volumes and operating speeds for each roadway segment for the 2015 Existing, 2040 No-Build, 2040 Build 2A, and 2040 Build 2B conditions were documented. Per FHWA and VDOT policy, the traffic data used in the noise analysis must produce sound levels that are representative of worst (loudest) hour of the day. The year 2040 is the defined analysis year for the project-level noise analysis.
Noise analysis study area includes the following boundaries:

- **To the west** - 500 feet west of Route 15 interchange (500 feet beyond the ramp gore)
- **To the east** – up to Route 7 interchange (include I-66 EB off ramp to SB Route 7 and I-66 WB on ramp from SB Route 7)
- **To the north (I-495)** – 500 feet north of Idylwood Road
- **To the south (I-495)** – up to Route 50 interchange (include I-495 NB on ramp from WB Route 50 and I-495 SB off ramp to WB Route 50). No ENTRADA sheets were required for Route 50 at this interchange.
- **On arterial cross streets** – 500 feet north and 500 feet south of ramp termini on all facilities that provide direct access to I-66

VDOT's Environmental Traffic Data (ENTRADA) tool was used to develop traffic data needed for I-66 project-level noise analysis. Traffic was reported in hourly segments for 24 hours in

ENTRADA analysis sheets. A unique ENTRADA sheet was produced when there was a change in the number of travel lanes or a change in traffic volume (i.e. on- or off-ramp). The standard ENTRADA sheet was customized for the I-66 corridor project.
ENTRADA was provided for determining the loudest-hour conditions based on hourly volumes and speeds on the mainline segments. Medium and heavy truck percentages were provided separately for each roadway segment.
Existing, No-Build and Future Design Year Build Conditions ENTRADA was developed for I-66 General purpose, HOV/Express, and Collector-Distributor lanes and ramps at:

- US-15 / I-66 Interchange
- US-29 / I-66 Interchange
- Rt. 234 / I-66 Interchange
- Rt. 234 Business / I-66 Interchange
- US-29 / I-66 Interchange
- Rt. 28 / I-66 Interchange
- Rt. 286 (Fairfax County Parkway) / I-66 Interchange
- Monument Drive / I-66 Interchange
- US-50 / I-66 Interchange
- Rt. 123 (Chain Bridge Road) / I-66 Interchange
- Rt. 243 (Nutley Rd) / I-66 Interchange
- I-496 / I-66 Interchange

Additionally, all arterial roadway segments with direct access to I-66 were analyzed 500 feet north and 500 feet south of ramp termini. Future Design Year Build Condition ENTRADA was developed for Build 2A and Build 2B. In Virginia, the posted speed or operating speed may be used to predict highway traffic noise levels on Type I federally-funded projects. Operational speeds were used in the model, for all traffic segments, whenever the operational speeds were greater than the posted speeds. If the operational speeds were not available or lower than the posted speed, then the posted speed was used in the model.

Selection of Worst Noise Hour

As required by FHWA and VDOT, the noise analysis was performed for the loudest ("worst noise") hour of the day. Noise levels have been predicted for that hour of the day when the vehicle volume, operating speed, and number of trucks (vehicles with 3 or more axles) combine to produce the worst noise conditions. According to FHWA guidance, the "worst hourly traffic noise impact" occurs at a time when truck volumes and vehicle speeds are the greatest, typically when traffic is free flowing and at or near level of service (LOS) C conditions.

Due to the nature of the project corridor, the worst noise hour did not correlate with the peak traffic hour. It was assumed that the I-66 mainline would be the dominant noise source; therefore the worst hour analysis was mainly focused on volumes along the I-66 mainline. The hours between 6:00AM to 10:00AM and 4:00PM to 7:00PM exceeded capacity on at least one of the segments along the I-66 corridor. Consequently, these hours were eliminated from the 'loudest hour' analysis since the level of service would not be free flowing and conducive of the worst noise hour. From the hours remaining, the 11:00AM and 1:00PM hours were shown to be

the loudest hours, with the 11:00AM hour dominating. The difference between the two loudest hours was less than one decibel. Since the difference was small, the 11:00AM was chosen to represent the worst noise hour for the entire corridor for the two build alternatives. The same hour was also used as the worst noise hour for the existing and no-build conditions.

Traffic volumes and loudest hour analysis will be refined for the preferred alternative during the final design noise analysis.

In Virginia, the posted speed or operating speed may be used to predict highway traffic noise levels on Type I federally-funded projects. Operational speeds were used in the model, for all traffic segments, whenever the operational speeds were greater than the posted speeds. If the operational speeds were lower than the posted speed, then the posted speed was used in the model. The traffic volumes that were used for this study are located in ***Appendix D***. Many of the operational speeds for Alternatives 1 and 3 (mainline sections), and Alternatives 2 and 5 (bypass sections) were predicted to be greater than 75 mph (miles per hour). Due to physical limitations of the TNM, these predicted operational speeds, greater than 75 mph, were modeled at 74 mph. This is due to a known issue with the program itself, as the model would not run otherwise.

Flow control devices such stop signs and traffic lights were mostly not used. This was done to create a "worst-case" noise environment. However, traffic signals were modeled at the bypass intersections for Alternative 2. This was done because Alternative 2 largely shares the same alignment as Alternative 5, especially for the mainline section. Since Alternative 5 has a different typical section than Alternative 2, modeling the flow control devices at the bypass intersections was the only other distinction between the two Alternatives.
Additional flow control devices shall be modeled, where necessary, during the final design phase where more detailed engineering plans will be available and only for the preferred alternative.

Federal regulations (23 CFR Part 772) state that if a noise level at any given receptor approaches or exceeds the appropriate abatement criterion, or if predicted traffic noise levels substantially exceed the Existing (2015) noise levels (by 10 dB(A)), abatement considerations are warranted. ***Table 1*** summarizes the federal and State criteria for a variety of activity categories. Upon review of the initial TNM sound level output, there were a few areas where the sound levels predicted by the model were much lower than typical ambient conditions witnessed in the project area. Since the TNM can only produce a "roadway-only" noise level", professional judgement was used to interpret the minimum sound levels in these areas. It was determined that minimum sound levels were not lower than 45 dB(A) and thus, the sound level tables in the report were amended to reflect this interpretation. The following describes the predicted noise levels for each of the CNEs within the I-66 Tier 2 Preliminary Noise Analysis Project study area.

CNE A

CNE A is located north of I-66 and west of US Route 15 in Haymarket, VA. CNE A contains 20 modeling sites (A1-A20), which represent the Novant Health Haymarket Medical Center, 60

multi-story residences, north of Heathcote Boulevard and a proposed Park and Ride facility, which is situated adjacent to the I-66 westbound travel lanes. The locations of these receptor sites are shown in ***Figure 2-1***. Modeled Existing (2015) worst-case noise levels within CNE A are predicted to range from 49-64 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 37-65 dB(A), as shown in ***Table 3***. The dominant noise source within CNE A is I-66 with some influence from US Route 15. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 50-66 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 50-68 dB(A), with no noise impacts predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE B

CNE B is located south of I-66 and west of US Route 15 in Haymarket, VA. CNE B represents the Haymarket Village Center, which includes: Walmart and Kohl's shopping center. The location of CNE B is shown on ***Figure 2-1***. Due to the lack of outdoor noise sensitive land uses within CNE B, no modeling sites were added. Therefore, noise levels will not be predicted within CNE B for the Existing (2015), No-Build or Design Year (2040) Build scenarios.

CNE C

CNE C is located south of I-66 and east of US Route 15 in Haymarket, VA. CNE C contains 136 modeling sites (C1-C136), which represent 155 residences along Fayette Street, Jefferson Street, Hunting Path Road and Bleight Drive. The locations of these receptor sites are shown in ***Figures 2-2*** and ***2-3***. Modeled Existing (2015) worst-case noise levels within CNE C are predicted to range from 50-74 dB(A), as shown in ***Table 3***. As part of a separate project, two noise barriers are proposed for the entire length of CNE C. These noise barriers were included in the No-Build modeling scenario. Future, No-Build noise levels were predicted to be 49-68 dB(A), as shown in ***Table 3***. As part of Build Alternative 2A, the eastern noise barrier will be removed as part of the design and all noise predictions under this scenario will not include the benefits from the noise barrier. However, the barrier will be evaluated as an in-kind barrier replacement for this area. As part of Build Alternative 2B, the noise barriers will remain in place, unaffected and are included in the noise level predictions for CNE C. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 53-78 dB(A) for Build Alternative 2A, with noise impacts predicted at 70 receptors representing 62 residences, a baseball field, outdoor recreation area three playgrounds and a school playground. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 49-69 dB(A), with noise impacts predicted at one receptor representing two residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE D

CNE D is located north of I-66 and east of US Route 15 in Haymarket, VA. CNE D contains 166 modeling sites (D1-D166), which represent the 358 residences along Walter Robinson Lane, Jordan Lane and an unnamed street paralleling I-66. The locations of these receptor sites are shown in ***Figures 2-2*** and ***2-3***. Modeled Existing (2015) worst-case noise levels within CNE D are predicted to range from 45-69 dB(A), as shown in ***Table 3***. As part of two separate projects, three noise barriers are proposed for the entire length of CNE D. These noise barriers were included in the No-Build modeling scenario. Future, No-Build noise levels were predicted to be 45-71 dB(A), as shown in ***Table 3***. As part of Build Alternative 2A, the eastern noise barrier will be removed as part of the design and all noise predictions under this scenario will not include the benefits from the noise barrier. However, the barrier will be evaluated as an in-kind barrier replacement for this area. As part of Build Alternative 2B, the noise barriers will remain in place, unaffected and are included in the noise level predictions for CNE D. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-73 dB(A) for Build Alternative 2A, with noise impacts predicted at 24 receptors representing 43 residences, two basketball courts and a playground. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-67 dB(A), with noise impacts predicted at one receptor that represents one residence. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE E

CNE E is located north of I-66 and east of Catharpin Road in Gainesville, VA. CNE E contains 29 modeling sites (E1-E29), which represents 63 residences along Kona Drive and the Minnieland Academy at Heritage Hunt Day Care. The locations of these receptor sites are shown in ***Figures 2-3*** and ***2-4***. Modeled Existing (2015) worst-case noise levels within CNE E are predicted to range from 45-70 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-67 dB(A), as shown in ***Table 3***. The dominant noise source within CNE E is I-66 with influence from Route 29 to the east. The existing noise barrier protecting the residences along Kona Drive is expected to be in place under the No-Build scenario and under Build Alternative 2B. Due to design specifics, the existing barrier for CNE E will be removed as part of Build Alternative 2A. However, the barrier will be evaluated as an in-kind barrier replacement for this area. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-74 dB(A) for Build Alternative 2A, with noise impacts predicted at eight receptors representing 24 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-68 dB(A), with noise impacts predicted at two receptors representing six residences. Since the day care facility is a Category D land use, the prediction of interior noise levels is required. The interior noise level associated with the Minnieland Academy Day Care is shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE F

CNE F is located south of I-66 and east of Catharpin Road in Gainesville, VA, as shown in ***Figures 2-3*** through ***2-5***. CNE F is represented by a non-publicly owned trail, therefore is not noise sensitive per VDOT guidance. Due to the lack of outdoor noise sensitive land uses within CNE F, no modeling sites were added. Therefore, noise levels will not be predicted within CNE F for the Existing (2015), No-Build or Design Year (2040) Build scenarios.

CNE G

CNE G is located north of I-66 and east of the Route 234 interchange with I-66. CNE G contains 302 modeling sites (E1-E302), which represents the Manassas National Battle Park. The locations of these receptor sites are shown in ***Figures 2-5*** and ***2-6***. "Grid" modeling sites were added within 500 feet of the I-66 westbound edge-of-shoulder. Coordination between VDOT Department of Historic Resources and FHWA will occur during Final Design to refine the site placement for Section 4(f) properties. Modeled Existing (2015) worst-case noise levels within CNE G are predicted to range from 57-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 60-78 dB(A), as shown in ***Table 3***. The dominant noise source within CNE G is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 59-79 dB(A) for Build Alternative 2A, with noise impacts predicted at 234 receptors representing 234 grid units associated with the Park. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 59-78 dB(A), with noise impacts predicted at 221 receptors representing 221 grid units associated with the Park. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE H

CNE H is located south of I-66 and east of the Route 234 interchange with I-66. CNE H contains one modeling site (H1) and represents one single family home. The location of this receptor site is shown in ***Figure 2-6***. Modeled Existing (2015) worst-case noise levels within CNE H are predicted to be 60 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 63 dB(A), as shown in ***Table 3***. The dominant noise source within CNE H is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to be 64 dB(A) for Build Alternative 2A and Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE I

CNE I is located north of I-66 and east of Groveton Road. CNE I contains 225 modeling sites (I1-I225), which represents the Manassas National Battle Park. The locations of these receptor sites are shown in ***Figure 2-7***. "Grid" modeling sites were added within 500 feet of the I-66 westbound edge-of-shoulder. Coordination between VDOT Department of Historic Resources

and FHWA will occur during Final Design to refine the site placement for Section 4(f) properties. Modeled Existing (2015) worst-case noise levels within CNE I are predicted to range from 56-79 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 59-82 dB(A), as shown in ***Table 3***. The dominant noise source within CNE I is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 60-81 dB(A) for Build Alternative 2A, with noise impacts predicted at 191 receptors representing 191 grid units associated with the Park. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 60-80 dB(A), with noise impacts predicted at 182 receptors representing 182 grid units associated with the Park. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE J

CNE J is located south of I-66 and east of the Route 234 interchange with I-66. CNE J contains eight modeling sites (J1-J8*)* and represents six single family homes, the Iglesia de Restauracion Church and the Manassas Mosque. The location of these receptor sites are shown in ***Figures 2-7*** and ***2-8***. Modeled Existing (2015) worst-case noise levels within CNE J are predicted to range from 52-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 54-74 dB(A), as shown in ***Table 3***. The dominant noise source within CNE J is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-74 dB(A) for Build Alternative 2A, with noise impacts predicted at three receptors representing three residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 55-74 dB(A), with noise impacts predicted at three receptors representing three residences. Since the church is a Category D land use, the prediction of interior noise levels is required. The interior noise level associated with the Iglesia de Restauracion church is shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE K

CNE K is located north of I-66 and east of the Route 234 interchange with I-66 (Exit 47). CNE K contains 45 modeling sites (K1-K45*)* and represents 155 Category E balconies as part of the Courtyard Manassas Hotel, a trail, and a patio and a pool associated with the Sheraton Manassas Hotel. The location of these receptor sites are shown in ***Figure 2-8***. Modeled Existing (2015) worst-case noise levels within CNE K are predicted to range from 49-67 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 52-70 dB(A), as shown in ***Table 3***. The dominant noise source within CNE K is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 52-70 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 53-71 dB(A), with noise impacts predicted at one receptor representing three hotel balconies. While the noise abatement evaluation specifically focuses on Build Alternative 2A, should

Alternative 2B be selected, a detailed noise abatement evaluation for CNE K will be performed in Final Design.

CNE L

CNE L is located south of I-66 and east of the Route 234 interchange with I-66 (Exit 47). CNE L contains 11 modeling sites (L1-L11*)* and represents 11 single family residences, the interior noise levels at the Devry University Center, and an outdoor patio associated with the Holiday Inn hotel. The location of these receptor sites are shown in ***Figures 2-8*** and ***2-9***. Modeled Existing (2015) worst-case noise levels within CNE L are predicted to range from 63-76 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 47-78 dB(A), as shown in ***Table 3***. The dominant noise source within CNE L is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 65-79 dB(A) for Build Alternative 2A, with noise impacts predicted at seven receptors representing 10 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 65-79 dB(A), with noise impacts predicted at six receptors representing nine residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE M

CNE M is located north of I-66 and east of the Route 234 interchange with I-66 (Exit 47). CNE M contains 250 modeling sites (M1-M250*)* and represents two residences, two picnic areas and lands associated the Manassas National Battle Park. The location of these receptor sites are shown in ***Figures 2-8*** and ***2-9***. Modeled Existing (2015) worst-case noise levels within CNE M are predicted to range from 57-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 58-76 dB(A), as shown in ***Table 3***. The dominant noise source within CNE M is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 59-79 dB(A) for Build Alternative 2A, with noise impacts predicted at 179 receptors representing one residence, two picnic areas and 176 grid units associated with the Park. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 65-78 dB(A), with noise impacts predicted at 180 receptors representing one residence, two picnic areas and 177 grid units associated with the Park. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE N

CNE N is located south of I-66 and west of Bull Run Road. CNE N contains 25 modeling sites (N1-N25*)* and represents two single family residences, the interior noise levels at the University of Northern Virginia, a trail, two picnic areas and a recreational soccer field. The location of these receptor sites are shown in ***Figure 2-9***. Modeled Existing (2015) worst-case noise levels within CNE N are predicted to range from 59-71 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 60-73 dB(A), as shown in ***Table 3***. The dominant noise source within CNE N is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build

noise levels are predicted to range from 59-70 dB(A) for Build Alternative 2A, with noise impacts predicted at six receptors representing one residence, two picnic areas and three trail grid units with the Ben Lomond Park. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 60-72 dB(A), with noise impacts predicted at six receptors representing one residence, two picnic areas and three trail grid units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE O

CNE O is located north of I-66 and east of Bull Run Road. CNE O contains 87 modeling sites (O1-O65-4*)* and represents 82 residences and two trails. The location of these receptor sites are shown in ***Figures 2-9*** through ***2-11***. Modeled Existing (2015) worst-case noise levels within CNE O are predicted to range from 55-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 56-70 dB(A), as shown in ***Table 3***. The dominant noise source within CNE O is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 57-71 dB(A) for Build Alternative 2A, with noise impacts predicted at 50 receptors representing 26 residences and 30 trail grid units. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 58-72 dB(A), with noise impacts predicted at 54 receptors representing 33 residences and 30 trail grid units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE P

CNE P is located south of I-66 and east of Bull Run Road. CNE P contains 81 modeling sites (P1-P81*)* and represents the common grounds associated with the Bull Run Regional Park and the picnic areas at the Izaak Walton Park gun range. The gun range is a privately owned facility, thus will be evaluated as a Category E land use. The location of these receptor sites are shown in ***Figures 2-9*** through ***2-11***. Modeled Existing (2015) worst-case noise levels within CNE P are predicted to range from 59-77 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 60-78 dB(A), as shown in ***Table 3***. The dominant noise source within CNE P is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 60-81 dB(A) for Build Alternative 2A, with noise impacts predicted at 54 receptors representing three residences, 47 grid units with the Park and four locations within the shooting range. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 60-80 dB(A), with noise impacts predicted at 52 receptors representing three residences, 45 grid units with the Park and 4 locations within the shooting range. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE Q

CNE Q is located south of I-66 and west of the Route 29 Interchange (Exit 52) and is comprised of residences along Outpost Court, Saint Germain Drive, Golden Oak Road, Cool Oak Lane,

Turin Lane and Strasburg Drive. CNE Q contains 167 modeling sites (Q1-Q167*)* and represents 432 residences, two trails, five playgrounds, a pool, a basketball court and a common outdoor use recreational field. The location of these receptor sites are shown in ***Figures 2-11*** and ***2-12***. CNE Q currently has an existing noise barrier that provides shielding for its entirety. The barrier is impacted by both build alternatives. VDOT guidance (Section 6.3.6) will be followed to determine the barrier's effectiveness and resulting recommendations will be made, if any are determined to be necessary. Modeled Existing (2015) worst-case noise levels within CNE Q are predicted to range from 45-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-69 dB(A), as shown in ***Table 3***. The dominant noise source within CNE Q is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-77 dB(A) for Build Alternative 2A, with noise impacts predicted at 87 receptors representing 193 residences, two basketball courts, a community park, a playground and 12 trail grid units. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-77 dB(A), with noise impacts predicted at 86 receptors representing 186 residences, two basketball courts, a community park, a playground and 12 trail grid units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE R

CNE R is located south of I-66 and east of the Route 29 Interchange (Exit 52) and is comprised the SpringHill Suites Centerville Chantilly Hotel. The location of CNE R is shown on ***Figure 2-12***. Due to the lack of outdoor noise sensitive land uses within CNE R, no modeling sites were added. Therefore, noise levels will not be predicted within CNE R for the Existing (2015), No-Build or Design Year (2040) Build scenarios.

CNE S

CNE S is located north of I-66 and west of the Route 29 Interchange (Exit 52) and is comprised of residences along Havener House Way, Truro Parish Court, Netherton Street and Newton Patent Drive. CNE S contains 257 modeling sites (S1-S209*)* and represents 573 residences, a playground, and a basketball court. The location of these receptor sites are shown in ***Figure 2-12***. CNE S currently has an existing noise barrier that is impacted under both build alternatives. VDOT guidance (Section 6.3.6) will be followed to determine the barrier's effectiveness and resulting recommendations will be made, if any are determined to be necessary. Modeled Existing (2015) worst-case noise levels within CNE S are predicted to range from 45-73 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-74 dB(A), as shown in ***Table 3***. The dominant noise source within CNE S is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-79 dB(A) for Build Alternative 2A, with noise impacts predicted at 98 receptors representing 214 residences, a playground and a tennis court. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 47-78 dB(A), with noise impacts predicted at 97 receptors representing 208 residences, a playground and a tennis court.

Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE T

CNE T is located south of I-66 and west of the Route 28 Interchange (Exit 53) and is comprised of residences along Lotus Lane and the Centerville Methodist Church. CNE T contains 268 modeling sites (T1-T93-3*)* and represents 483 residences, a basketball court, a playground, a common picnic area and the Centerville Methodist Church. The location of these receptor sites are shown in ***Figure 2-16***. CNE T currently has an existing noise barrier that provides shielding for its entirety. The barrier is impacted by Build Alternative 2A, but will remain unaffected for Build Alternative 2B. VDOT guidance (Section 6.3.6) will be followed to determine the barrier's effectiveness and resulting recommendations will be made, if any are determined to be necessary. Modeled Existing (2015) worst-case noise levels within CNE T are predicted to range from 42-69 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 44-70 dB(A), as shown in ***Table 3***. The dominant noise source within CNE T is I-66. Since the church is a Category D land use, the prediction of interior noise levels is required. The interior noise level associated with the Centerville Methodist Church is shown in ***Table 3***. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-73 dB(A) for Build Alternative 2A, with noise impacts predicted at 39 receptors representing 61 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-70 dB(A), with noise impacts predicted at 27 receptors representing 37 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE U

CNE U is located south of I-66 and in the southwest quadrant of the Route 29/Route28 Interchange. CNE U contains two modeling sites (U1-U2*)* that represent the Minnieland Academy day care facility. The location of these receptor sites are shown in ***Figure 2-16***. Modeled Existing (2015) worst-case noise levels within CNE U are predicted to range from 49-56 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 53-58 dB(A), as shown in ***Table 3***. The dominant noise source within CNE U is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 51-55 dB(A) for Build Alternative 2A. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 53-57 dB(A), with no noise impacts predicted under either alternative. Since the day care is a Category D land use, the prediction of interior noise levels is required, in addition to the prediction at the outdoor play area. The interior noise level associated with the Minnieland Academy day care facility is shown in ***Appendix H***. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE V

CNE V is located north of I-66, along the southbound travel lanes of Route 28. CNE V contains 345 modeling sites (V1-V82-3*)* and represents 499 residences, the recreation fields associated with the Ellanor C. Lawrence Park, the Goddard School and its associated playground, the Bean Tree Learning Center and the Hyatt Place Hotel pool. The location of these receptor sites are shown in ***Figures 2-14*** and ***2-15***. Modeled Existing (2015) worst-case noise levels within CNE V are predicted to range from 45-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-74 dB(A), as shown in ***Table 3***. The dominant noise source within CNE V is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-75 dB(A) for Build Alternative 2A, with noise impacts predicted at 17 receptors representing eight residences, a basketball court and 13 grid units associated with the Park. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-74 dB(A), with noise impacts predicted at 23 receptors representing 17 residences and 16 grid units associated with the Park. Since the school is a Category D land use, the prediction of interior noise levels is required. The interior noise levels associated with the Goddard School and the Bean Tree Learning Center are shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE W

CNE W is located north of I-66, along the northbound travel lanes of Route 28. CNE W contains 72 modeling sites (W1-W72*)* and represents several recreational trails within the Ellanor C. Lawrence Park. Coordination between the VDOT Cultural Resources Section of the Environmental Division and FHWA will occur during Final Design to refine the site placement for Section 4(f) properties. The location of these receptor sites are shown in ***Figure 2-14*** and ***2-15***. Modeled Existing (2015) worst-case noise levels within CNE W are predicted to range from 51-70 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 52-72 dB(A), as shown in ***Table 3***. The dominant noise source within CNE W is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 53-75 dB(A) for Build Alternative 2A, with noise impacts predicted at 25 receptors representing 25 grid trail units. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 56-74 dB(A), with noise impacts predicted at 36 receptors representing 36 grid trail units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE X

CNE X is located north of I-66 and east of the Route 28 Interchange with I-66 (Exit 53). CNE X contains 108 modeling sites (X1-X108*)* and represents 175 residences along Eames Avenue, Eastcliff Circle, Fernbrook Court, Fernbrook Drive and Audrey Drive. Many of the residences within CNE X are protected by an existing noise barrier system and some portions will be impacted by both build alternatives. The location of these receptor sites are shown in ***Figure 2-13***. Modeled Existing (2015) worst-case noise levels within CNE X are predicted to range from

49-64 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 50-65 dB(A), as shown in ***Table 3***. The dominant noise source within CNE X is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-78 dB(A) for Build Alternative 2A, with noise impacts predicted at 43 receptors representing 68 residences and a playground. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 54-78 dB(A), with noise impacts predicted at 32 receptors representing 50 residences and a playground. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE Y

CNE Y is located south of I-66 and east of the Route 28 Interchange with I-66 (Exit 53). CNE Y contains 679 modeling sites (Y1-Y429) and represents 1,113 residences along Braddock Road, Willoughby Newton Drive, Melton Place, Stroud Court, Middlebourne Lane, Crystalford Court and Bobann Drive. The location of these receptor sites are shown in ***Figures 2-13, 2-16*** and ***2-17***. Many of the residences within CNE Y are protected by existing noise barriers and some portions will be impacted by both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. Modeled Existing (2015) worst-case noise levels within CNE Y are predicted to range from 45-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-73 dB(A), as shown in ***Table 3***. The dominant noise source within CNE Y is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-75 dB(A) for Build Alternative 2A, with noise impacts predicted at 105 receptors representing 150 residences, a basketball court, one playground, one tennis court and one trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-71 dB(A), with noise impacts predicted at 48 receptors representing 79 residences, a basketball court, one tennis court and one trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE Z

CNE Z is located south of I-66 and in the southeast quadrant of the Route 29/Route28 Interchange. CNE Z contains four modeling sites (Z1-Z2-3) that represent one single family home and outdoor land uses associated with the Alto Pizza Restaurant. The location of these receptor sites are shown in ***Figure 2-16***. Modeled Existing (2015) worst-case noise levels within CNE Z are predicted to range from 58-66 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 61-69 dB(A), as shown in ***Table 3***. The dominant noise source within CNE Z is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-59 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 61-69 dB(A), with no noise impacts

predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed in the following section of the report.

CNE AA

CNE AA is located south of I-66 and is situated between Stringfellow Road and the Fairfax County Parkway Interchange (Exit 55). CNE AA contains 49 modeling sites (AA1-AA49) that represent 84 residences along Collin Chase Place and Owens Glen Drive. The location of these receptor sites are shown in ***Figure 2-17***. The majority of CNE AA is currently protected by an existing noise barrier. The entire noise barrier will be impacted under the Build Alternative 2A scenario and only the eastern most portion will remain under the Build Alternative 2B scenario. These conditions are accounted for in the noise models and are represented by the resulting noise level predictions. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. Modeled Existing (2015) worst-case noise levels within CNE AA are predicted to range from 48-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 49-69 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AA is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 50-68 dB(A) for Build Alternative 2A, with noise impacts predicted at four receptors representing seven residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 50-73 dB(A), with noise impacts predicted at five receptors representing 10 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AB

CNE AB is located north of I-66 and is situated between Stringfellow Road and the Fairfax County Parkway Interchange (Exit 55). CNE AB contains 52 modeling sites (AB1-AB52) that represent 105 residences along Quail Creek Lane and commercial land uses (Home Goods, BJ's and Walmart) with no outdoor use area. The location of these receptor sites are shown in ***Figure 2-17***. Modeled Existing (2015) worst-case noise levels within CNE AB are predicted to range from 47-66 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 48-68 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AB is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 49-69 dB(A) for Build Alternative 2A, with noise impacts predicted at 14 receptors representing 29 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 49-68 dB(A), with noise impacts predicted at 15 receptors representing 31 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AC

CNE AC is located north of I-66 and is situated between Fair Lakes Parkway to the north and West Ox Road to the east. CNE AC contains 61 modeling sites (AC1-2-AC40-4) that represent

205 residences along Liberty Bridge Road. The location of these receptor sites are shown in ***Figure 2-18***. CNE AC is currently protected by an existing noise barrier. The entire noise barrier will be impacted under the Build Alternative 2A scenario; however it will remain under the Build Alternative 2B scenario. These conditions are accounted for in the noise models and are represented by the resulting noise level predictions. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. Modeled Existing (2015) worst-case noise levels within CNE AC are predicted to range from 47-69 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 48-69 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AC is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-73 dB(A) for Build Alternative 2A, with noise impacts predicted at four receptors representing 16 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-73 dB(A), with noise impacts predicted at four receptors representing 16 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AD

CNE AD is located north of I-66 and is situated between Fair Lakes Parkway to the south and West Ox Road to the east. CNE AC contains 179 modeling sites (AD1-2-AD67-4) that represent 218 residences along Cedar Lakes Drive and Fairfield House Drive, two playgrounds and two tennis courts. The location of these receptor sites are shown in ***Figure 2-18***. Modeled Existing (2015) worst-case noise levels within CNE AD are predicted to range from 45-64 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-65 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AD is West Ox Road. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-62 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-65 dB(A), with no noise impacts predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE AE

CNE AE is located north of I-66 and is situated between Fair Lakes Parkway to the south and West Ox Road to the west. CNE AE contains 155 modeling sites (AE1-AE57-3) that represent 181 residences along Pender Creek Circle and Hunt Club Circle, a trail and community center pool. The location of these receptor sites are shown in ***Figure 2-18***. Modeled Existing (2015) worst-case noise levels within CNE AE are predicted to range from 45-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 45-72 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AE is West Ox Road. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-70 dB(A) for Build Alternative 2A, with noise impacts predicted at nine receptors representing three residences and six trail grid units. Design Year (2040) Build noise levels for Build Alternative

2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-70 dB(A), with noise impacts predicted at nine receptors representing three residences and six trail grid units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AF

CNE AF is located north of I-66 and is situated between Fair Lakes Parkway to the north and West Ox Road to the west. CNE AF contains five modeling sites (AF1-AF5) that represent a trail and the Kaiser Permanente Health Care Center. The location of these receptor sites are shown in ***Figure 2-18***. Modeled Existing (2015) worst-case noise levels within CNE AF are predicted to range from 60-73 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 60-74 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AF is West Ox Road. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 60-77 dB(A) for Build Alternative 2A, with noise impacts predicted at four receptors representing four grid trail units. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 60-77 dB(A), with noise impacts predicted at four receptors representing four grid trail units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AG

CNE AG is located south of I-66 and is situated between West Ox Road to the west and Monument Drive to the east. CNE AG contains 345 modeling sites (AG1-AG121) that represent 449 residences along Post Forest Drive, Lincoln Lake Way and Elm Forest Way. In addition, the modeling sites within CNE AG represent a trail and a baseball field along Random Hills Road. The location of these receptor sites are shown in ***Figure 2-18***. CNE AG is currently protected by a two noise barrier system that will remain in place under build alternative 2B. Under build Alternative 2A, the eastern most barrier in the system will be impacted. CNE AG is protected by an existing noise barrier; however it is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. Modeled Existing (2015) worst-case noise levels within CNE AG are predicted to range from 39-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 41-76 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AG is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 37-80 dB(A) for Build Alternative 2A, with noise impacts predicted at 20 receptors representing 16 residences, a baseball field, a playground and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 39-79 dB(A), with noise impacts predicted at 17 receptors representing 16 residences, a baseball field, a playground and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AH

CNE AH is located south of I-66 and is situated between West Ox Road to the west and Post Forest Drive to the north. CNE AH contains 23 modeling sites (AH1-AH23) that represent a trail and the recreation areas associated with the Fair Oaks Church. The location of these receptor sites are shown in ***Figure 2-18***. In addition, since the Fair Oaks Church is considered Category D in nature, an assessment of interior noise levels is appropriate per VDOT guidance. The interior noise levels associated with the Fair Oaks Church can be seen in ***Table 3***. Modeled Existing (2015) worst-case noise levels within CNE AG are predicted to range from 55-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 56-73 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AH is West Ox Road. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 55-72 dB(A) for Build Alternative 2A, with noise impacts predicted at six receptors representing six trail grid units. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 56-72 dB(A), with noise impacts predicted at six receptors representing six trail grid units. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AJ

CNE AJ is located north of I-66, south of Fair Lakes Parkway and west of Monument Drive. CNE AJ contains one modeling site (AJ1) that represents an outdoor patio associated with Romano's Macaroni Grill, a Category E land use. The location of this receptor site is shown in ***Figure 2-18***. Modeled Existing (2015) worst-case noise levels within CNE AJ is predicted to be 59 dB(A), as shown in ***Table 3***. Future, No-Build noise levels were predicted to be 62 dB(A), as shown in ***Table 3***. The dominant noise source within CNE AJ is Monument Road. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to be 62 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to be 63 dB(A), with no noise impacts predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE AL

CNE AL is located north of I-66 and is situated between Monument Drive to the west and the Route 50 Interchange to the east (Exit 57). CNE AL contains 88 modeling sites (AL1-3-AL29-3) that represent 138 residences and a community pool along Monument Drive and Legato Road. The location of these receptor sites are shown in ***Figures 18*** and ***19***. The covered walkways at the Extended Stay America Hotel are not classified as balconies and will not be evaluated as part of this analysis. Modeled Existing (2015) worst-case noise levels within CNE AL are predicted to range from 45-61 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-63 dB(A). The dominant noise source(s) within CNE AL are Monument Drive and I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-64 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of

Table 3, are predicted to range from 45-64 dB(A), with no noise impacts predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further

CNE AM

CNE AM is located south of I-66, just west of I-66 / Route 50 interchange and encompasses the residences along Fairfax Hills Way and Random Hills Road. CNE AM contains 135 modeling sites (AM1-AM135) which represent 253 residences comprised of high density units, picnic area and a pool. The locations of these receptor sites are shown in ***Figure 2-19***. Modeled Existing (2015) worst-case noise levels within CNE AM are predicted to range from 49-70 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 49-71 dB(A). The dominant noise source within CNE AM is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 51-74 dB(A) for Build Alternative 2A, with noise impacts predicted at 46 receptors representing 82 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 51-74 dB(A), with noise impacts predicted at 47 receptors representing 84 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AN

CNE AN is located south of I-66, just west of Route 50 and encompasses the residences along Laurel Lake Square and Random Hills Road. CNE AN contains 81 modeling sites (AN1-AN81) which represent 137 residences comprised of high density units, trail, pool, tennis court and the Candlewood Suites Washington Fairfax Hotel. The locations of these receptor sites are shown in ***Figure 2-19***. Modeled Existing (2015) worst-case noise levels within CNE AN are predicted to range from 46-60 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 52-70 dB(A). The dominant noise source within CNE AN is the I-66 / Route 50 interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 52-69 dB(A) for Build Alternative 2A, with noise impacts predicted at eight receptors representing 16 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 53-71 dB(A), with noise impacts predicted at 11 receptors representing 22 residences and an outdoor patio. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AO

CNE AO is located north of I-66, just north of the I-66 / Route 50 interchange and encompasses the residences along Valley Ridge Road and Fairfax Farms Road. CNE AO contains 83 modeling sites (AO1-AO83) which represent 167 residences comprised of single family homes and multi-story high density units. The locations of these receptor sites are shown in ***Figure 2-19***. Modeled Existing (2015) worst-case noise levels within CNE AO are predicted to range from 52-62 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 53-66 dB(A). The dominant noise source within CNE AO is the I-66 / Route 50 interchange. As

shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-68 dB(A) for Build Alternative 2A, with noise impacts predicted at three receptors representing five residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 54-68 dB(A), with noise impacts predicted at two receptors representing three residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AP

CNE AP is located south of I-66, just west of the Waples Mill Road overpass and encompasses the residences along Fairfax Ridge Road. CNE AP contains 146 modeling sites (AP1-AP146) which represent 227 residences comprised of high density apartment complexes. The locations of these receptor sites are shown in ***Figure 2-20***. Modeled Existing (2015) worst-case noise levels within CNE AP are predicted to range from 46-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 47-68 dB(A). CNE AP is partially protected by an existing noise barrier. This noise barrier is impacted under build alternative 2A, but will remain unaffected under build Alternative 2B; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AP is I-66 / Route 50 interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 48-78 dB(A) for Build Alternative 2A, with noise impacts predicted at nine receptors representing 18 residences and an interior land use at the Museum. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 48-78 dB(A), with noise impacts predicted at nine receptors representing 18 residences and an interior land use at the Museum. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AQ

CNE AQ is located north of I-66, just west of the Waples Mill Road overpass and encompasses the residences along Valley Road and terminates northeast of the I-66 / Route 50 interchange. CNE AQ contains 18 modeling sites (AQ1-AQ18) which represent 21 residences comprised of single family homes. The locations of these receptor sites are shown in ***Figures 2-19*** and ***2-20***. Modeled Existing (2015) worst-case noise levels within CNE AO are predicted to range from 55-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 56-69 dB(A). The dominant noise source within CNE AQ is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 59-75 dB(A) for Build Alternative 2A, with noise impacts predicted at 11 receptors representing 13 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 59-75 dB(A), with noise impacts predicted at 11 receptors representing 13 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AR

CNE AR is located north of I-66, beginning at the Waples Mill Road overpass and continues east encompassing the residences along Phoenix Drive, Marseilles Drive, Virginia Oaks Drive and Mimosa Place and terminates near the Jermantown Road overpass. CNE AR contains 26 modeling sites (AR1-AR26) which represent 33 residences comprised of single family homes. The locations of these receptor sites are shown in ***Figure 2-20***. Modeled Existing (2015) worst-case noise levels within CNE AR are predicted to range from 49-73 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 50-72 dB(A). The dominant noise source within CNE AR is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 50-77 dB(A) for Build Alternative 2A, with noise impacts predicted at four receptors representing four residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 51-76 dB(A), with noise impacts predicted at four receptors representing four residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AS

CNE AS is located south of I-66, just west of the Jermantown Road overpass and encompasses the residences along Marilta Court and also includes the Providence Elementary School. CNE AS contains 53 modeling sites (AS1-AS53) which represent 13 residences comprised of single family homes, the Providence Elementary School and associated outdoor facilities including a playground, dog park and four baseball fields. The locations of these receptor sites are shown in ***Figure 2-20***. Modeled Existing (2015) worst-case noise levels within CNE AS are predicted to range from 55-65 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 56-65 dB(A). CNE AS is protected by an existing noise barrier; however it is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AS is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 61-82 dB(A) for Build Alternative 2A, with noise impacts predicted at 48 receptors representing 10 residences, a baseball field, a basketball court, dog park and three playgrounds. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 65-81 dB(A), with noise impacts predicted at 47 receptors representing 10 residences, a baseball field, a basketball court, dog park and three playgrounds. The school is a Category D land use; therefore the prediction of interior noise levels is required. The interior noise level associated with the Providence Elementary School is shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AT

CNE AT is located south of I-66, beginning at the Jermantown Road overpass and continues east encompassing the residences along Carol Street, Hill Street, Oak Place, Norman Avenue, Elmont Court, Oak Place Court and Breckinridge Lane and terminates near the I-66 / Chain Bridge Road interchange. CNE AT contains 73 modeling sites (AT1-AT73) which represent 119 residences comprised of single family homes and townhouses. The locations of these receptor sites are shown in ***Figures 2-20*** through ***2-22***. Modeled Existing (2015) worst-case noise levels within CNE AT are predicted to range from 47-63 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 48-63 dB(A). CNE AT is protected by an existing noise barrier and remains unaffected by either build alternative; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AT is I-66 with some contributions from the I-66 / Chain Bridge Road interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 49-77 dB(A) for Build Alternative 2A, with noise impacts predicted at four receptors representing five residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 49-76 dB(A), with noise impacts predicted at three receptors representing four residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AU

CNE AU is located north of I-66, beginning at the Jermantown Road overpass and continues east encompassing the residences along Pine Street, Spruce Street, Rosenhaven Street and Dudley Court and terminates near the I-66 / Chain Bridge Road interchange. CNE AU contains 62 modeling sites (AW1-AW198) which represent 97 residences comprised of single family homes, a tennis court and a playground. The locations of these receptor sites are shown in ***Figure 2-21***. Modeled Existing (2015) worst-case noise levels within CNE AU are predicted to range from 50-66 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 50-67 dB(A). CNE AU is protected by an existing noise barrier that is impacted under build Alternative 2A, but not under build Alternative 2B. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AU is I-66 with some minor contributions from the I-66 / Chain Bridge Road interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 53-69 dB(A) for Build Alternative 2A, with noise impacts predicted at five receptors representing nine residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 53-69 dB(A), with noise impacts predicted at five receptors representing nine residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AV

CNE AV is located north of the I-66 / Chain Bridge Road interchange and encompasses the residences along Rosenhaven Street. CNE AV contains 36 modeling sites (AV1-AV36) which represent 44 residences comprised of multi-story high density units. The locations of these receptor sites are shown in ***Figure 2-21***. Modeled Existing (2015) worst-case noise levels within CNE AV are predicted to range from 56-64 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 57-66 dB(A). The dominant noise source within CNE AV is Chain Bridge Road with some minor contributions from the I-66 / Chain Bridge Road interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 56-65 dB(A) for Build alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 58-66 dB(A), with noise impacts predicted at three receptors representing five residences. Since noise levels exceed the NAC under Build Alternative 2B, noise abatement is warranted and will be discussed further in Final Design if Alternative 2B is seleceted.

CNE AW

CNE AW is located south of I-66, beginning at the Chain Bridge Road interchange and continues east encompassing the residences along Viera Lane, Vineyard Lane, Willow Crescent Drive, Atlanta Street, Antietam Ave, Tecumseh Lane, Musket Court, Plantation Way, Jessie Court, Cyrandall Valley Road, Oaks Road, Oaks Road, Oak Pond Court and Steven Martin Drive and terminates near the Black Lane overpass. CNE AW contains 338 modeling sites (AW1-AW198) which represent 628 residences comprised of single family homes, multi-story high density units, three pools and a playground. The locations of these receptor sites are shown in ***Figures 2-22*** and ***2-23***. Modeled Existing (2015) worst-case noise levels within CNE AW are predicted to range from 45-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-69 dB(A). CNE AW is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AW is I-66 with some contributions from the I-66 / Chain Bridge Road interchange. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-80 dB(A) for Build Alternative 2A, with noise impacts predicted at 96 receptors representing 170 residences a pool and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-82 dB(A), with noise impacts predicted at 124 receptors representing 220 residences, a pool and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AX

CNE AX is located north of I-66, beginning at the Chain Bridge Road interchange and continues east encompassing the residences along White Granite Drive, Granite Creek Lane, Appalachian

Circle, Flagpole Lane, Valentino Drive, Oakton Terrace Road, Platten Drive, Sugar Lane and Sweet Mint Drive and terminates near the Black Lane overpass. CNE AX contains 542 modeling sites (AX1-AX514) which represent 893 residences comprised of single family homes and multi-story high density units (with one pool). The locations of these receptor sites are shown in ***Figures 2-21*** and ***2-23***. Modeled Existing (2015) worst-case noise levels within CNE AX are predicted to range from 45-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-76 dB(A). CNE AX is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AX is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-79 dB(A) for Build Alternative 2A, with noise impacts predicted at 351 receptors representing 553 residences, a playground, two pools and a tennis court. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-79 dB(A), with noise impacts predicted at 358 receptors representing 570 residences, a playground, two pools and a tennis court. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AY

CNE AY is located north of I-66, beginning at the Black Lane overpass and continues east encompassing the residences along Sutton Road, Country Creek Road, Vaden Drive, Lagersfield Circle and Pembsly Drive and terminates near the Route 243 Interchange. CNE AY contains 219 modeling sites (AY1-AY219) which represent 456 residences comprised of single family homes, multi-story high density units (with one pool) and Oakton High School. The locations of these receptor sites are shown in ***Figures 2-23*** and ***2-24***. Modeled Existing (2015) worst-case noise levels within CNE AY are predicted to range from 45-72 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-73 dB(A). CNE AY is protected by an existing two noise barrier system that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE AY is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-76 dB(A) for Build Alternative 2A, with noise impacts predicted at 21 receptors representing 48 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-76 dB(A), with noise impacts predicted at 16 receptors representing 35 residences. The school is a Category D land use; therefore the prediction of interior noise levels is required. The interior noise level associated with the Oakton High School is shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE AZ

CNE AZ is located south of I-66, beginning at the Black Lane overpass and continues east encompassing the residences along Five Oaks Road, James Street, Sayre Road, Saintsbury Drive, Deer Hollow Way and Hunters Glen Way and terminates near the Route 243 Interchange. CNE AZ contains 270 modeling sites (AZ1-BA270) which represent 410 residences comprised of single family homes and multi-story high density units. The locations of these receptor sites are shown in ***Figures 2-23*** and ***2-24***. Modeled Existing (2015) worst-case noise levels within CNE AZ are predicted to range from 45-69 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-68 dB(A). CNE AZ is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-80 dB(A) for Build Alternative 2A, with noise impacts predicted at 49 receptors representing 81 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 45-80 dB(A), with noise impacts predicted at 35 receptors representing 59 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BA

CNE BA is located south of I-66, beginning at the Route 243 overpass and continues east encompassing the residences along Topaz Street, Nutley Street, Hideaway Road, Greer Court, Elsmore Street, Mears Street, Delfield Lane and Hunter Road and terminates near Cedar Lane overpass. CNE BA contains 106 modeling sites (BA1-BA106) which represent 164 residences and Briarwood Park which contain a trail, basketball court and a playground. The locations of these receptor sites are shown in ***Figures 2-24*** and ***2-25***. Modeled Existing (2015) worst-case noise levels within CNE BA are predicted to range from 49-69 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 49-64 dB(A). CNE BA is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BA is I-66 with some contributions from Route 243 and Cedar Lane on the western and eastern edges of CNE BA. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-78 dB(A) for Build Alternative 2A, with noise impacts predicted at 44 receptors representing 63 residences, a basketball court, a playground and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 54-79 dB(A), with noise impacts predicted at 34 receptors representing 42 residences, a basketball court, a playground and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BB

CNE BB is located north of I-66, beginning at the Route 243 overpass and continues east encompassing the residences along Brian Drive, Dellwood Drive, Yeonas Drive, Pekway Street, Walker Street, Southside Park (George C. Yeonas Park), Ross Drive, Cottage Street, Patrick Circle and George Street and terminates near Cedar Lane overpass. CNE BB contains 149 modeling sites (BB1-BC149) which represent 172 residences, Marsh Road Elementary School (one baseball field, two soccer fields and a playground) and Southside Park which is comprised of five baseball fields. The locations of these receptor sites are shown in ***Figures 2-24*** and ***2-25***. Modeled Existing (2015) worst-case noise levels within CNE BB are predicted to range from 46-67 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 46-67 dB(A). CNE BB is protected by a two existing noise barrier system that is impacted under both build alternatives. Under build Alternative 2A, the eastern most barrier will be unaffected, whereas both are affected under build Alternative 2B. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement detailed in Section 6.3.6. The dominant noise source within CNE BB is I-66 with some minor contributions from Route 243 and Cedar Lane on the western and eastern edges of CNE BB. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 49-77 dB(A) for Build Alternative 2A, with noise impacts predicted at 44 receptors representing 56 residences and baseball fields. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 50-77 dB(A), with noise impacts predicted at 45 receptors representing 60 residences and baseball fields. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BC

CNE BC is located north of I-66, beginning at the Cedar Lane overpass and continues east encompassing the residences along Occidental Drive, Antioch Circle, Depaul Drive, Bowling Green Drive, Berea Drive, Carnegie Drive, and the Sternwood Elementary School and terminates near Route 650 overpass. CNE BC contains 139 modeling sites (BC1-BC139) which represent 213 residences, playground, basketball court, baseball field and the Dunn Loring Community Park (trail). The locations of these receptor sites are shown in ***Figures 2-25*** and ***2-26***. Modeled Existing (2015) worst-case noise levels within CNE BC are predicted to range from 46-69 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 47-70 dB(A). CNE BC is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BC is I-66 with some minor contributions from Cedar Lane and Route 650 on the western and eastern edges of CNE BC. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 54-81 dB(A) for Build Alternative 2A, with noise impacts predicted at 84 receptors representing 122 residences, baseball fields, a basketball court, a playground and interior land uses at a school. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in

Columns 12 and 13 of ***Table 3***, are predicted to range from 55-81 dB(A), with noise impacts predicted at 88 receptors representing 130 residences, baseball fields, a basketball court, a playground and interior land uses at a school. The school is a Category D land use; the prediction of interior noise levels is required. The interior noise level associated with the Sternwood Elementary School is shown in ***Appendix H***. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BD

CNE BD is located south of I-66, beginning at the Cedar Lane overpass and continues east encompassing the residences along Hilltop Road, Dellway Lane, Prosperity Drive and terminates near Route 650 overpass. CNE BD contains 110 modeling sites (BD1-BD99-5) which represent 246 residences, tennis court and a playground. The locations of these receptor sites are shown in ***Figures 2-25*** and ***2-26***. Modeled Existing (2015) worst-case noise levels within CNE BD are predicted to range from 45-65 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-65 dB(A). CNE BD is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-79 dB(A) for Build Alternative 2A, with noise impacts predicted at 42 receptors representing 93 residences, one playground and a tennis court. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 46-79 dB(A), with noise impacts predicted at 14 receptors representing 26 residences, one playground and a tennis court. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BE

CNE BE is located southwest of the I-66 / I-495 interchange, beginning at the Route 650 overpass and continues southeast encompassing the residences along Pleasantdale Road, Keystone Lane, Heatherton Lane, Hartland Road, Providence Forest Drive and terminates near Route 29. CNE BE contains 349 modeling sites (BE1-BE130) which represent 540 residences, basketball court, pool and a playground. The locations of these receptor sites are shown in ***Figures 2-26*** and ***2-28***. Modeled Existing (2015) worst-case noise levels within CNE BE are predicted to range from 45-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 45-75 dB(A). CNE BE is protected by an existing noise barrier; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BE is I-66 and I-495 interchange area with some minor contributions from Route 650. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 45-76 dB(A) for Build Alternative 2A, with noise impacts predicted at 58 receptors representing 85 residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of

Table 3, are predicted to range from 45-76 dB(A), with noise impacts predicted at 62 receptors representing 94 residences. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BF

CNE BF is located northwest of the I-66 / I-495 interchange, beginning at the Route 650 overpass and continues northeast encompassing the residences along Stenhouse Place, Sandburg Street and Ithaca Street and terminates near the Washington and Old Dominion Trail. CNE BF contains 53 modeling sites (BF1-BF53) which represent 76 residences. The locations of these receptor sites are shown in ***Figures 2-26*** and ***2-27***. Modeled Existing (2015) worst-case noise levels within CNE BF are predicted to range from 50-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 53-76 dB(A). CNE BF is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BF is I-66 and I-495 interchange with some contributions from Route 650. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 53-76 dB(A) for Build Alternative 2A, with noise impacts predicted at 15 receptors representing 15 residences and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 57-76 dB(A), with noise impacts predicted at 18 receptors representing 20 residences and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BG

CNE BG is located west of I-495, beginning at the Idylwood Road overpass and continues south encompassing the residences along Spring Street. CNE BH contains four modeling sites (BG1-BG4) which represent eight residences. The locations of these receptor sites are shown in ***Figure 2-27***. Modeled Existing (2015) worst-case noise levels within CNE BG are predicted to range from 57-59 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 59-60 dB(A). CNE BG is protected by an existing noise barrier system that remain unaffected by both build alternatives; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BG is I-495. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 60-62 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 60-61 dB(A), with no noise impacts. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE BH

CNE BH is located west of I-495, beginning at the Idylwood Road overpass and encompasses the residences along Coal Train Drive. CNE BH contains two modeling sites (BH1 and BH2) which represent three residences. The locations of these receptor sites are shown in ***Figure 2-27***. Modeled Existing (2015) worst-case noise levels within CNE BH are predicted to range from 59-63 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 61-65 dB(A). CNE BH is protected by an existing noise barrier; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BH is I-495. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 62-67 dB(A) for Build Alternative 2A, with noise impacts predicted at one receptor representing one residence. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 61-66 dB(A), with noise impacts predicted at one receptor representing one residence. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BI

CNE BI is located east of the I-66 / I-495 Interchange, beginning at the Route 29 overpass to the west and encompassing the residences along Shreve Road, Oldewood Drive, Pioneer Lane, Roswell Drive, Shelby Lane, Roswell Court, Kirklyn Street, Hillsman Street, Ogdon Street, Avon Lane and Virginia Lane and terminates at Virginia lane. CNE BI contains 87 modeling sites (BI1-BI87) which represent 127 residences and a trail. The locations of these receptor sites are shown in ***Figures 2-28*** and ***2-29***. Modeled Existing (2015) worst-case noise levels within CNE BI are predicted to range from 49-70 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 50-71 dB(A). CNE BI is protected by an existing noise barrier that is predicted to be noise impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BI is I-66 and I-495. Receptors outside the protection of the existing barrier remain noise impacted. Per VDOT guidance, partial mitigation will be examined for this area in the final design phase of the project. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 53-72 dB(A) for Build Alternative 2A, with noise impacts predicted at 13 receptors representing 12 residences and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 54-72 dB(A), with noise impacts predicted at 13 receptors representing 12 residences and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BJ

CNE BJ is located east of I-495, beginning at the Idylwood Road overpass and encompasses the residences along Helena Drive and Providence Street and terminates at the Oakstreet Road

overpass. CNE BJ contains four modeling sites (BJ1- BJ4) which represent four residences. The locations of these receptor sites are shown in ***Figure 2-27***. Modeled Existing (2015) worst-case noise levels within CNE BI are predicted to range from 58-64 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 60-66 dB(A). CNE BJ is protected by an existing noise barrier that remains unaffected under both build alternatives; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BJ is I-495. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 63-68 dB(A) for Build Alternative 2A, with noise impacts predicted at two receptors representing two residences. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 62-68 dB(A), with noise impacts predicted at one receptor representing one residence. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BK

CNE BK is located northeast of the I-66 / I-495 Interchange, and continues northeast along I-66 to the Virginia Lane overpass as well as north along I-495 to the Idylwood overpass. CNE BK encompasses the residences along Wincanton Court, Nottingham Drive, Appledore Court, Virginia Lane, and Idylwood Road. CNE BK contains 91 modeling sites (BK1-BK91) which represent 59 residences and a soccer field, baseball field, playground facility, basketball court and a tennis court. The locations of these receptor sites are shown in ***Figures 2-27*** and ***2-29***. Modeled Existing (2015) worst-case noise levels within CNE BK are predicted to range from 53-75 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 54-76 dB(A). CNE BK is protected by an existing noise barrier that is impacted under both build alternatives. VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BK is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 57-75 dB(A) for Build Alternative 2A, with noise impacts predicted at 42 receptors representing 25 residences, baseball fields, soccer fields and a trail. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 59-77 dB(A), with noise impacts predicted at 46 receptors representing 28 residences, baseball fields, soccer fields and a trail. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

CNE BL

CNE BL is located northeast of I-66, beginning at the Virginia Lane overpass to the west and encompassing the residences along Helena Drive, Rudyard Street, Dunford Drive and Rockford Drive and terminates at the I-66 / Route 7 Interchange. CNE BL contains 20 modeling sites (BL1-BL20) which represent 26 residences. The locations of these receptor sites are shown in ***Figure 2-29***. Modeled Existing (2015) worst-case noise levels within CNE BL are predicted to

range from 51-62 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 53-63 dB(A). CNE BL is protected by an existing noise barrier that is unaffected by both build alternatives; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BL is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 52-63 dB(A) for Build Alternative 2A, with no noise impacts predicted. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 53-64 dB(A), with no noise impacts predicted. Since noise levels do not exceed the NAC, noise abatement is not warranted and will not be discussed further.

CNE BM

CNE BM is located southeast of I-66, beginning at the Virginia Lane overpass to the west and encompassing the residences along Salem Road, Lexington Road, Claremount Drive, Barbour Road, Gordons Road and Highland Estates place and terminates at the I-66 / Route 7 Interchange. CNE BM contains 24 modeling sites (BM1-BM24) which represent 29 residences. The locations of these receptor sites are shown in ***Figure 2-29***. Modeled Existing (2015) worst-case noise levels within CNE BM are predicted to range from 49-68 dB(A), as shown in ***Table 3***. Future, No-Build noise levels are predicted to be 50-69 dB(A). CNE BM is protected by an existing noise barrier that is unaffected under both build alternatives; however, VDOT's Highway Traffic Noise Impact Analysis Guidance Manual will be referenced when predicting Design Year (2040) Build noise levels and potential "in-kind" replacement as detailed in Section 6.3.6. The dominant noise source within CNE BM is I-66. As shown in Columns 9 and 10 of ***Table 3***, Design Year (2040) Build noise levels are predicted to range from 49-68 dB(A) for Build Alternative 2A, with noise impacts predicted at one receptor representing one residence. Design Year (2040) Build noise levels for Build Alternative 2B, as shown in Columns 12 and 13 of ***Table 3***, are predicted to range from 50-69 dB(A), with noise impacts predicted at one receptor representing one residence. Since noise levels exceed the NAC, noise abatement is warranted and will be discussed in the following section of the report.

VIII. Noise Abatement Evaluation

Design Year (2040) Build and No-Build noise levels are predicted to exceed the NAC in 50 out of 60 CNEs therefore, as per FHWA/VDOT procedures, noise abatement considerations are warranted, as discussed in **Phase 1** of VDOT's three-phased approach, for the impacted properties within these CNEs. It was agreed upon by FHWA and VDOT that if the differences between the noise levels for each build alternatives averaged less than 3 dB(A), the worst-case alternative would be utilized for the abatement analysis. As such, Build Alternative 2A is slightly louder on average, by 2.2 dB(A), therefore it is the alternative being used for the abatement analysis discussed below.

Phase 2 and **Phase 3** of VDOT's three-phased approach to considering noise abatement and determining the feasibility and reasonableness of noise barriers is discussed below in detail.

Phase 2: Feasibility Criteria for Noise Barriers

All receptors that meet the warranted criterion must progress to the "feasible" phase. Phase 2 of the noise abatement criteria requires that both of the following acoustical and engineering conditions be considered:

- At least a 5 dB(A) highway traffic noise reduction at impacted receptors. Per 23 CFR 772, FHWA requires the highway agency to determine the number of impacted receptors required to achieve at least 5 dB(A) of reduction. VDOT requires that fifty percent (50%) or more of the impacted receptors experience 5 dB(A) or more of insertion loss to be feasible; and

- The determination that it is possible to design and construct the noise abatement measure. The factors related to the design and construction include: safety, barrier height, topography, drainage, utilities, maintenance of the abatement measure, maintenance access to adjacent properties, and general access to adjacent properties (i.e. arterial widening projects).

- The noise abatement measure is said to be feasible if it meets both criteria.

FHWA and VDOT guidelines recommend a variety of abatement measures that should be considered in response to transportation-related noise impacts. While noise barriers and/or earth berms are generally the most effective form of noise abatement, additional abatement measures exist that have the potential to provide considerable noise reductions, under certain circumstances. A brief depiction of VDOT-approved noise abatement is below:

Traffic Control Measures (TCM): Traffic control measures, such as speed limit restrictions, truck traffic restrictions, and other traffic control measures that may be considered for the reduction of noise emission levels are not practical for this project. Reducing speeds would not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide adequate noise reduction. Typically, a 10 mph reduction in speed would result in only a 2 dBA decrease in noise level, would not effectively reduce impacts. Additionally, a reduction in speed is not practical for this project since the posted speed is already 65 miles per hour.

Alteration of Horizontal and Vertical Alignments: The alteration of the horizontal and vertical alignment has been considered to reduce or eliminate the impacts created by the proposed project. The condensed nature of the project area does not allow for significant shifts in the horizontal or vertical alignment. Shifting the horizontal alignment to the outside or inside will create undesirable impacts such as right-of-way acquisition, temporary/permanent easements, and retaining walls. Shifting the roadway alignment away from the impacted residences will increase impacts to other residences located on the opposite side of the interstate.

Acoustical Insulation of Public-Use and Non-Profit Facilities: This noise abatement measure option applies only to public and institutional use buildings. Since no public use or institutional structures are anticipated to have interior noise levels exceeding FHWA's interior NAC, this noise abatement option will not be applied.

Acquisition of Buffering Land: The purchase of property for noise barrier construction or the creation of a "buffer zone" to reduce noise impacts is only considered for predominantly unimproved properties because the amount of property required for this option to be effective would create significant additional impacts (e.g., in terms of residential displacements), which were determined to outweigh the benefits of land acquisition.

Construction of Berms / Noise Barriers: Construction of noise barriers can be an effective way to reduce noise levels at areas of outdoor activity. Noise barriers can be wall structures, earthen berms, or a combination of the two. The effectiveness of a noise barrier depends on the distance and elevation difference between roadway and receptor and the available placement location for a barrier. Gaps between overlapping noise barriers also decrease the effectiveness of the barrier, as opposed to a single continuous barrier. The barrier's ability to attenuate noise decreases as the gap width increases.

Noise walls and earth berms are often implemented into the highway design in response to the identified noise impacts. The effectiveness of a freestanding (post and panel) noise barrier and an earth berm of equivalent height are relatively consistent; however an earth berm is perceived as a more aesthetically pleasing option. In contrast, the use of earth berms is not always an option due to the excessive space they require adjacent to the roadway corridor. At a standard slope of 2:1, every one-foot in height would require four feet of horizontal width. This requirement becomes more complex in urban settings where residential properties often abut the proposed roadway corridor. In these situations, implementation of earth berms can require significant property acquisitions to accommodate noise mitigation, and the cost associated with the acquisition of property to construct a berm can significantly increase the total costs to implement this form of noise mitigation and make it unreasonable.

Availability of fill material to construct the berm also needs to be considered. On proposed projects where proposed grading yields excess waste material, earth berms can often be a cost effective mitigation option. On balance or borrow projects the implementation of earth berms is often an expensive solution due to the need to identify, acquire, and transport the material to the project site. Earth berms may be considered a viable mitigation option throughout the project area, and would be evaluated further where possible in the final design stage.

Additionally, the Code of Virginia (§33.1-223.2:21) states: "Whenever the Commonwealth Transportation Board or the Department plan for or undertake any highway construction or improvement project and such project includes or may include the requirement for the mitigation of traffic noise impacts, first consideration should be given to the use of noise reducing design and low noise pavement materials and techniques in lieu of construction of noise walls or noise barriers. Vegetative screening, such as the planting of appropriate conifers, in such a design

would be utilized to act as a visual screen if visual screening is required." Since there is a noise impact, HB 2577 requires coordination with the Project Manager and Environmental Contact to inquire about the possibility of noise reducing design, the usage of low noise pavement, and visual screening. The HB 2577 documentation for this project can be seen in ***Appendix E***. Detailed engineering has not been done because this project is a location study; therefore, methods to reduce noise through engineering will be looked at during the design phase of the project.

In summary, due to right-of-way constraints, noise barriers were considered the only form of abatement having the potential to reduce Design Year (2040) Build noise levels.

Phase 3: Reasonableness Criteria for Noise Barriers

A determination of noise barrier reasonableness will include the consideration of the parameters listed below. The parameters used during the NEPA process are also used during the final design phase when making a determination of noise barrier reasonableness. All of the reasonableness factors must collectively be achieved in order for a noise abatement measure to be deemed reasonable.

- **Viewpoints of the benefited receptors**
  VDOT shall solicit the viewpoints of all benefited receptors through certified mailings and obtain enough responses to document a decision as to whether or not there is a desire for the proposed noise abatement measure. Fifty percent (50%) or more of the respondents shall be required to favor the noise abatement measure in determining reasonableness. Community views in and of themselves are not sufficient for a barrier to be found reasonable if one or both of the other two reasonableness criteria are not satisfied.

- **Cost-effectiveness**
  Typically, the limiting factor related to barrier reasonableness is the cost effectiveness value, where the total surface area of the barrier is divided by the number of benefited receptors receiving at least a 5 dB(A) reduction in noise level. VDOT's approved cost is based on a maximum square footage of abatement per benefited receptor, a value of 1,600 square feet per benefited receptor.

  Where multi-family housing includes balconies at elevations that exceed a 30-ft high barrier or the topography causes receptors to be above the elevation of a 30-ft barrier, these receptors are not assessed for barrier benefits and are not included in the computation of the barrier's reasonableness.

  For non-residential properties such as parks and public use facilities, a special calculation is performed in order to quantify the type and duration of activity and compare to the cost effectiveness criterion. The determination is based on cost, severity of impact (both in

terms of noise levels and the size of the impacted area and the activity it contains), and amount of noise reduction.

- **Noise Reduction Design Goals**
  The design goal is a reasonableness factor indicating a specific reduction in noise levels that VDOT uses to identify that a noise abatement measure effectively reduces noise. The design goal establishes a criterion, selected by VDOT, which noise abatement must achieve. VDOT's noise reduction design goal is defined as a 7 dB(A) of insertion loss for at least one impacted receptor, meaning that at least one impacted receptor is predicted to achieve a 7 dB(A) or greater noise reduction with the proposed barrier in place. The design goal is not the same as acoustic feasibility, which defines the minimum level of effectiveness for a noise abatement measure. Acoustic feasibility indicates that the noise abatement measure can, at a minimum, achieve a discernible reduction in noise levels.

Noise reduction is measured by comparing the future design year build condition pre-and post-barrier noise levels. This difference between unabated and abated noise levels is known as "insertion loss" (IL). It is important to optimize the noise barrier design to achieve the most effective noise barrier in terms of both noise reduction (insertion losses) and cost. Although at least a 5 dB(A) reduction is required to meet the feasibility criteria, the following tiered noise barrier abatement goals are used to govern barrier design and optimization.

- Reduction of future highway traffic noise by 7 dB(A) at one (1) or more of the impacted receptor sites (required criterion).

- Reduction of future highway traffic noise levels to the low-60-decibel range when practical (desirable).

- Reduction of future highway traffic noise levels to existing noise levels when practical (desirable).

At the beginning of the noise abatement analysis phase, it is important to effectively evaluate the existing noise barriers in the project area, as stipulated in VDOT's policy manual. Section 6.3.6 of the guidance details the evaluation of "in-kind barrier replacement". For the purposes of this analysis, it was determined that the proposed project improvements do physically impact some of the existing barriers in the project area as described above. An analysis of the effectiveness of the existing noise barriers was performed and where necessary, modifications to the existing barriers were evaluated per the policy, if the project was found to make noise levels louder behind the existing barrier. Existing noise barriers were identified in portions of CNE C, D, E, Q, S, T, X, Y, AA, AC, AG, AP, AS, AT, AU, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, AND BM.

The following is a discussion of the potential abatement measures for the impacted CNEs under Build Alternative 2A. In some cases, proposed noise abatement provided insertion losses to more

than one CNE. These areas will be identified and described as such. Noise abatement was evaluated where noise impacts are predicted to occur. Where a noise barrier was evaluated the effectiveness was measured in terms of achievable insertion loss. Noise abatement measures in the project area were evaluated at heights ranging from 15 to 30 feet, at five-foot increments. Noise barriers were not optimized during this abatement analysis, as a more detailed process will be performed in final design. Barrier dimensions may change during the final design noise analysis. ***Appendix H*** shows the Design Year (2040) Build noise levels the abated noise levels, and the net insertion losses for the barriers that were determined to be feasible and reasonable. Feasible and reasonable noise abatement was optimized based on constructability, and the VDOT acoustic design goals. Noise abatement was determined to be feasible and reasonable for CNEs C, D, E, G, I, M, O, P, Q, S, T, V, Y, W, AA, AB, AM, AP, AS, AT, AW, AX, AY, AZ, BA, BB, BC, BF, BD and BK. Further study is required in Final Design to refine the abatement options and no commitments on noise abatement are made until the Final Design phase of the project. ***Appendix F*** provides completed warranted, feasible, and reasonable worksheets.

CNE C

Design Year (2040) Build noise levels are predicted to exceed the NAC at 71 modeling sites representing 108 residences within CNE C. A noise barrier was evaluated for CNE C along the eastbound travel lanes of I-66. An existing barrier, part of the UPC 93577 project has been accounted for in this analysis and is not being impacted as part of Build Alternative 2A. In total, the preliminary barrier system has a length of 6,671 feet (see ***Table 4***). The proposed barrier for CNE C has an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 106 of the 108 impacted units (see ***Appendix I***) and provides feasible noise reduction at an additional 43 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 106 impacted receptors. The total area for the CNE C barrier is 133,423 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 895, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier system for CNE C is considered both feasible and reasonable at this time and is recommended for further consideration. Furthermore, during the final design phase, a detailed evaluation will be performed for this area to ensure that minimum noise reductions identified in the Final Noise Report for UPC93577 are met or exceeded. A summary of the abatement for CNE C is shown in ***Table 4***.

CNEs D & E

Design Year (2040) Build noise levels are predicted to exceed the NAC at 32 modeling sites representing 70 residences within CNE D & E. A noise barrier was evaluated for CNEs D and E combined, due to the proximity of the two CNEs to each other. The barrier was evaluated along the westbound travel lanes of I-66. An existing barrier, not currently constructed and as part of a separate project has been accounted for in this analysis for Build Alternative 2B, however will be impacted and not constructed in its currently planned location for Build Alternative 2A. In total, the preliminary barrier system evaluated for this project has a length of 8,830 feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise

reductions at all 70 impacted units (see ***Appendix I***) and provides feasible noise reduction at an additional 90 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 66 impacted receptor. The total area for the barrier is 176,592 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,104, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNEs D and E is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNEs D and E is shown in ***Table 4***.

CNEs G & I

Design Year (2040) Build noise levels are predicted to exceed the NAC at 328 modeling sites representing 328 grid units within the Manassas National Battlefield Park. A noise barrier was evaluated for CNEs G and I combined, due to the proximity of the two CNEs to each other. The barrier was evaluated along the westbound travel lanes of I-66. In total, the preliminary barrier system evaluated for this project has a length of 12,831 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 320 of the 328 impacted grid units (see ***Appendix I***) and provides feasible noise reduction at an additional 8 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 259 impacted receptors. The total area for the barrier is 192,472 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 587, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNEs G and I is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNEs G and I is shown in ***Table 4***.

CNE J

Design Year (2040) Build noise levels are predicted to exceed the NAC at three modeling sites representing three residences within CNE J. A noise barrier was evaluated for CNE J along the eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 1,232 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at two of the three impacted receptors (see ***Appendix I***) and does not provide feasible noise reductions at any non-impacted receptors. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at one impacted receptor. The total area for the barrier is 18,485 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 9,243, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE J is considered feasible, but not reasonable at this time. A summary of the abatement for CNE J is shown in ***Table 4***.

CNE L

Design Year (2040) Build noise levels are predicted to exceed the NAC at eight modeling sites representing 11 residences within CNE L. A noise barrier was evaluated for CNE L along the

eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 4,019 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at all eleven of the impacted receptors (see ***Appendix I***) and provides feasible noise reductions at one non-impacted receptor. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at six impacted receptors. The total area for the barrier is 60,292 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 5,024, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE L is considered feasible, but not reasonable at this time. A summary of the abatement for CNE L is shown in ***Table 4***.

CNE M

Design Year (2040) Build noise levels are predicted to exceed the NAC at 179 modeling sites representing 179 grid units within the Manassas National Battlefield Park. A noise barrier was evaluated for CNE M, along the westbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 9,410 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 176 of the 179 impacted grid units (see ***Appendix I***) and provides feasible noise reduction at an additional 47 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 172 impacted receptors. The total area for the barrier is 141,158 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 633, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE M is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE M is shown in ***Table 4***.

CNE N

Design Year (2040) Build noise levels are predicted to exceed the NAC at four modeling sites representing four residences within CNE N. A noise barrier was evaluated for CNE N along the eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 1,293 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at all of the impacted receptors (see ***Appendix I***) and provides feasible noise reductions at one non-impacted receptors. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at four impacted receptors. The total area for the barrier is 19,399 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 3,880, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE N is considered feasible, but not reasonable at this time. A summary of the abatement for CNE N is shown in ***Table 4***.

CNE O

Design Year (2040) Build noise levels are predicted to exceed the NAC at 48 modeling sites representing 54 residential land uses within CNE O. A noise barrier was evaluated for CNE O, along the westbound travel lanes of I-66. Modeling receptors O5 and O6, and another barrier

(O1)were included in the barrier analysis, however made abatement for CNE O not reasonable. Therefore, partial abatement was evaluated for the eastern portion of CNE O and is being discussed here. In total, the preliminary barrier evaluated for this project has a length of 5,448 feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 54 of the 54 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 46 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 50 impacted receptors. The total area for the barrier is 108,969 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,090, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE O is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE O is shown in ***Table 4***.

CNEs P & Q

Design Year (2040) Build noise levels are predicted to exceed the NAC at 105 modeling sites representing 198 residences, the Bull Run Regional Park and the Izaac Walton Gun Range within CNEs P and Q. An existing noise barrier currently protects CNE Q. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. The new proposed noise barrier was evaluated along the eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 12,354 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at all 176 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 74 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 176 impacted receptors. The total area for the barrier is 185,318 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 741, which is below the (MaxSF/BR) value of 1,600. While some impacts are still present under this abatement evaluation, re-analysis of this area during final design will occur to address impacts resulting from the selected build alternative. Therefore, the barrier for CNEs P and Q is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNEs P and Q is shown in ***Table 4***.

CNE S

Design Year (2040) Build noise levels are predicted to exceed the NAC at 59 modeling sites representing 122 residential land uses within CNE S. A noise barrier was evaluated for CNE S, along the westbound travel lanes of I-66. An existing noise barrier currently protects CNE S. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. The demolition factor of this barrier equates to approximately 6,766 square feet being added to the new proposed barrier minus the area of the existing barrier being demolished. In total, the preliminary barrier evaluated for this project has a length of 4,823 feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 118 of the 122 impacted

receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 80 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 118 impacted receptors. The total area for the barrier is 38,794 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 196, which is below the (MaxSF/BR) value of 1,600. While some impacts are still present under this abatement evaluation, re-analysis of this area during final design will occur to address impacts resulting from the selected build alternative. Therefore, the barrier for CNE S is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE S is shown in ***Table 4***.

CNE T

Design Year (2040) Build noise levels are predicted to exceed the NAC at 14 modeling sites representing 21 residential land uses within CNE T. A noise barrier was evaluated for CNE T, along the eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 1,972 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 20 of the 21 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 25 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 20 impacted receptors. The total area for the barrier is 49,289 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,095, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE T is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE T is shown in ***Table 4***.

CNE V

Design Year (2040) Build noise levels are predicted to exceed the NAC at 17 modeling sites representing 22 residential land uses within CNE V. A noise barrier was evaluated for CNE V, along the southbound travel lanes of Route 28. In total, the preliminary barrier evaluated for this project has a length of 4,693 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 22 of the 22 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 41 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 22 impacted receptors. The total area for the barrier is 70,400 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,117, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE V is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE V is shown in ***Table 4***.

CNE W

Design Year (2040) Build noise levels are predicted to exceed the NAC at 25 modeling sites representing 25 residential land uses within CNE W. A noise barrier was evaluated for CNE W,

along the northbound travel lanes of Route 28. In total, the preliminary barrier evaluated for this project has a length of 4,472 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 25 of the 25 impacted receptors (see ***Appendix I***) provides feasible noise reduction at an additional 16 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 22 impacted receptors The total area for the barrier is 65,576 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,117, which is below the (MaxSF/BR) value of 1,599. Therefore, the barrier for CNE W is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE W is shown in ***Table 4***.

CNE X

CNE X currently has an existing noise barrier that protects portions of the CNE. For ease of analysis, the eastern portion of CNE X was combined in an abatement evaluation with CNE AB, which is contained in the CNE AB and X abatement discussion.

CNE Y

CNE Y currently has an existing noise barrier that protects portions of the CNE. For ease of analysis, the eastern portion of CNE Y was combined in an abatement evaluation with CNE AA, which is contained in the CNE AA abatement discussion. This discussion focuses on the western portion of CNE Y and the resulting abatement analysis. Design Year (2040) Build noise levels are predicted to exceed the NAC at 17 modeling sites representing 31 residential land uses CNE Y. An existing noise barrier currently protects CNE Y. This abatement evaluation merely examined filling in the gaps in the existing barrier system, therefore demolition was not required. The new proposed three-barrier system was evaluated along the eastbound travel lanes of I-66. In total, the preliminary barriers evaluated for this project have a combined length of 1,280 feet (see ***Table 4***), with an average height of 15 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 25 of the 31 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional nine non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 24 impacted receptors. The total area for the barrier is 19,192 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 564, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier system for CNE Y is considered both feasible and reasonable at this time and is recommended for further consideration. While some impacts are still present under this abatement evaluation, re-analysis of this area during final design will occur to address impacts resulting from the selected build alternative. A summary of the abatement for CNE Y is shown in ***Table 4***.

CNEs AA & Y

Design Year (2040) Build noise levels are predicted to exceed the NAC at 24 modeling sites representing 36 residential land uses within CNEs AA and X. Existing noise barriers currently

protect CNEs AA and Y and are unaffected by Build Alternative 2A. Therefore, barrier extensions were evaluated to provide better reductions to the sensitive land uses. In total, the preliminary barrier extensions evaluated for this project have a combined length of 2,652 feet (see ***Table 4***), with an average height of 22.5 feet. The noise barriers achieve feasible (>5 dB(A)) noise reductions at 18 of the 36 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 29 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 11 impacted receptors. The total area for the barrier extensions is 59,800 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,272, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier system for CNEs AA and Y is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNEs AA and Y is shown in ***Table 4***.

CNE AB & X

Design Year (2040) Build noise levels are predicted to exceed the NAC at 47 modeling sites representing 80 residential land uses within CNEs AB and X. CNEs AB and X are being evaluated together due to their proximity to each other. An existing noise barrier currently protects CNE X. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a combined length of 8,708feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 66 of the 80 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 45 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 52 impacted receptors. The total area for the barrier is 174,160 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,569, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier system for CNEs AB and X is considered both feasible and reasonable at this time and is recommended for further consideration. There are remaining noise impacts at the sensitive land uses along Stringfellow Road. A barrier along Stringfellow Road may be evaluated in the final design phase of the project. A summary of the abatement for CNEs AB and X is shown in ***Table 4***.

CNEs AC & AF

Design Year (2040) Build noise levels are predicted to exceed the NAC at six modeling sites representing 16 residential land uses and a trail within CNEs AC and AF. An existing barrier currently protects CNE AC; therefore an extension was evaluated to better provide protection form flanking noise to the east. In total, the preliminary barrier extension evaluated for this project has a length of 1,024 feet (see ***Table 4***), with an average height of 30 feet. The noise barriers achieve feasible (>5 dB(A)) noise reductions at one of the 18 impacted receptors (see ***Appendix I***) and is therefore not feasible. Therefore, the barrier extension for CNEs AC and AF are considered not feasible will not be discussed further at this time. A summary of the abatement for CNEs AC and AF is shown in ***Table 4***.

CNE AE

Design Year (2040) Build noise levels are predicted to exceed the NAC at seven modeling sites representing three residential land uses and a trail. CNE AE is situated over 500 feet from I-66 mainline and is reasonable to assume that the noise impacts are as a result of local roadway noise. Since the abatement evaluation is being based on the mainline impacts for preliminary, CNE AE will not be evaluated for noise abatement as part of this analysis. All areas that warrant noise abatement will be evaluated with refined information in the Final Design phase of the project.

CNE AG

Design Year (2040) Build noise levels are predicted to exceed the NAC at 18 modeling sites representing 20 residential land uses within CNE AG. Two existing noise barriers currently protect CNE AG and are unaffected by Build Alternative 2A, however noise impacts are present due to the gap between the barriers. Therefore, barrier extensions were evaluated to provide better reductions to the sensitive land uses and to close this "gap". In total, the preliminary barrier evaluated for this project has a length of 320 feet (see ***Table 4***), with an average height of 30 feet. The noise barrier was unable to achieve feasible (>5 dB(A)) noise reductions at any of the impacted receptors (see ***Appendix I***). Since the barrier does not achieve feasible reductions at 50% of the impacted receptors, it is not considered feasible and will not be discussed further at this time. While some impacts are still present and a feasible and reasonable abatement solution was not determined, re-analysis of this area during final design will occur to address impacts resulting from the selected build alternative, in addition to impacts where an abatement evaluation did not occur as part of this analysis. A summary of the abatement for CNE AG is shown in ***Table 4***.

CNE AM

Design Year (2040) Build noise levels are predicted to exceed the NAC at 46 modeling sites representing 82 residential land uses. A two-barrier system was evaluated to reduce project-related sound levels to acceptable levels. The noise barrier system achieves feasible (>5 dB(A)) noise reductions at 65 of the 82 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 26 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 50 impacted receptors. In total, the preliminary barrier evaluated for this project has a length of 2,075 feet (see ***Table 4***), with an average height of 30 feet. The total area for the barrier is 62,262 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 684, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier system for CNE AM is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE AM is shown in ***Table 4***.

CNEs AQ & AR

Design Year (2040) Build noise levels are predicted to exceed the NAC at 15 modeling sites representing 17 residential land uses. A barrier was evaluated along I-66 westbound travel lanes to reduce project-related sound levels to acceptable levels. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 17 of the 17 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 18 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 12 impacted receptors. In total, the preliminary barrier evaluated for this project has a length of 6,165 feet (see ***Table 4***), with an average height of 15 feet. The total area for the barrier is 92,481 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 2,642, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNEs AQ and AR is considered feasible but not reasonable at this time. A summary of the abatement for CNE AQ and AR is shown in ***Table 4***.

CNEs AP, AS & AT

Design Year (2040) Build noise levels are predicted to exceed the NAC at 51 modeling sites representing 54 residential land uses within CNEs AP, AS and AT. Existing barriers currently protect each CNE. Build Alternative 2A will require the demolition of the sound barrier for CNE AS and in-kind replacement guidance was referenced in evaluating the new proposed barrier. A barrier was evaluated along I-66 eastbound travel lanes to reduce project-related sound levels to acceptable levels. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 51 of the 54 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional six non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 50 impacted receptors. In total, the preliminary barrier evaluated for this project has a length of 4,038 feet (see ***Table 4***), with an average height of 20 feet. The total area for the barrier is 80,755 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,417, which is within the allowable (MaxSF/BR) value of 1,600. Therefore, the barrier for CNEs AP, AS and AT is considered feasible and reasonable and recommended for further consideration at this time. A summary of the abatement for CNE AP, AS and AT is shown in ***Table 4***.

CNE AW

Design Year (2040) Build noise levels are predicted to exceed the NAC at 75 modeling sites representing 133 residential land uses within CNE AW. A noise barrier was evaluated for CNE AW, along the eastbound travel lanes of I-66. An existing noise barrier currently protects CNE AW. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a length of 8,295 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 129 of the 133 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 131 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7

dB(A) at 122 impacted receptors. The total area for the barrier is 207,374 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 798, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE AW is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE AW is shown in ***Table 4***.

CNE AX

Design Year (2040) Build noise levels are predicted to exceed the NAC at 73 modeling sites representing 124 residential land uses within CNE AX. A noise barrier was evaluated for CNE AX, along the westbound travel lanes of I-66. An existing noise barrier currently protects CNE AX. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a length of 7,306 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 123 of the 124 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 17 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 119 impacted receptors. The total area for the barrier is 182,641 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,305, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE AX is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE AX is shown in ***Table 4***.

CNE AY

Design Year (2040) Build noise levels are predicted to exceed the NAC at five modeling sites representing 11 residential land uses within CNE AY. A noise barrier was evaluated for CNE AY, along the westbound travel lanes of I-66, just west of the portion of the existing barrier that will remain unaffected. An existing two-barrier system currently protects CNE AY. The eastern barrier will remain unaffected, whereas Build Alternative 2A will require the demolition of the western barrier. A barrier was initially evaluated as a whole, but was found to be not reasonable. Therefore, a barrier will be replaced "in-kind" and a western extension to this barrier will be evaluated. This extension has a length of 544 feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at three of the three impacted receptors (see ***Appendix I***). It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at three impacted receptors. The total area for the barrier is 10,880 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 3,627, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE AY is considered feasible, but not reasonable at this time. A summary of the abatement for CNE AY is shown in ***Table 4***. This area will also be re-evaluated in the final design phase of the project.

CNE AZ

Design Year (2040) Build noise levels are predicted to exceed the NAC at 47 modeling sites representing 79 residential land uses within CNE AZ. A noise barrier was evaluated for CNE AZ, along the eastbound travel lanes of I-66. An existing noise barrier currently protects CNE AZ. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a length of 2,259 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 75 of the 79 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 87 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 75 impacted receptors. The total area for the barrier is 56,480 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 349, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE AZ is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE AZ is shown in ***Table 4***.

CNE BA

Design Year (2040) Build noise levels are predicted to exceed the NAC at 37 modeling sites representing 59 residential land uses within CNE BA. A noise barrier was evaluated for CNE BA, along the eastbound travel lanes of I-66. An existing noise barrier currently protects CNE BA. Build Alternative 2A will require the demolition of the sound barrier and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a length of 5,842 feet (see ***Table 4***), with an average height of 30 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 59 of the 59 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 67 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 58 impacted receptors. The total area for the barrier is 175,265 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,391, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE BA is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE BA is shown in ***Table 4***.

CNE BB

Design Year (2040) Build noise levels are predicted to exceed the NAC at 44 modeling sites representing 67 residential land uses within CNE BB. A noise barrier was evaluated for CNE BA, along the westbound travel lanes of I-66. An existing two-barrier system currently protects CNE BB. Build Alternative 2A will require the demolition of the barriers and in-kind replacement guidance was referenced in evaluating the new proposed barrier. The noise barrier protecting the baseball fields is expected to remain under this alternative; however this area will be re-evaluated in the final design phase of the project. In total, the preliminary barrier evaluated for this project has a length of 4,586 feet (see ***Table 4***), with an average height of 30 feet. The

noise barrier achieves feasible (>5 dB(A)) noise reductions at 58 of the 67 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 63 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 56 impacted receptors. The total area for the barrier is 137,594 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,137, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE BB is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE BB is shown in ***Table 4***.

CNEs BC & BF

Design Year (2040) Build noise levels are predicted to exceed the NAC at 61 modeling sites representing 110 residential land uses within CNEs BC and BF. Due to the proximity of CNE BC to CNE BF, and the fact that each of the individual barriers contributes benefit to the other CNE, this was evaluated as a barrier system. The existing barrier for CNE BF, also impacted by the project, will be evaluated and replaced in-kind during the final design noise analysis. A two-barrier system was evaluated for CNEs BC and BF, along the westbound travel lanes of I-66, allowing for a break at the Route 650 overpass. An existing barrier currently protects each CNE. Build Alternative 2A will require the demolition of the barriers and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier system evaluated for this project has a combined length of 7,102 feet (see ***Table 4***), with an average height of 25 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 102 of the 110 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 39 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 100 impacted receptors. The total area for the barrier is 177,576 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,259, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNEs BC and BF is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNEs BC and BF is shown in ***Table 4***.

CNE BD

Design Year (2040) Build noise levels are predicted to exceed the NAC at 29 modeling sites representing 64 residential land uses within CNE BD. A noise barrier was evaluated for CNE BD, along the eastbound travel lanes of I-66. An existing barrier currently protects CNE BD. Build Alternative 2A will require the demolition of the barriers and in-kind replacement guidance was referenced in evaluating the new proposed barrier. In total, the preliminary barrier evaluated for this project has a length of 2,821 feet (see ***Table 4***), with an average height of 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 64 of the 64 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional 23 non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 62 impacted receptors. The total area for the barrier is 56,416 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor

(MaxSF/BR) value of 648, which is below the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE BD is considered both feasible and reasonable at this time and is recommended for further consideration. A summary of the abatement for CNE BD is shown in ***Table 4***.

CNE BE

Design Year (2040) Build noise levels are predicted to exceed the NAC at 42 modeling sites representing 59 residential land uses within CNE BE. A noise barrier extension to the existing barrier was evaluated for CNE BE, to the west, along the eastbound travel lanes of I-66. An existing barrier currently protects CNE BE and will remain unaffected by Build Alternative 2A. In total, the preliminary barrier extension evaluated for this project has a length of 971feet (see ***Table 4***), with an average height of 25 feet. Due to a complex noise environment and multiple areas contributing flanking noise, the noise barrier was unable to receive 5 dB(A) reductions at any of the impacted receptors (see ***Appendix I***). Therefore, the barrier extension for CNE BE is considered not feasible and will not be discussed further at this time. A summary of the abatement for CNE BE is shown in ***Table 4***.

CNE BK

Design Year (2040) Build noise levels are predicted to exceed the NAC at 23 modeling sites representing 23 grid units associated with recreation fields within Idylwood Park. A noise barrier was evaluated for CNE BK, along the eastbound travel lanes of I-66. In total, the preliminary barrier evaluated for this project has a length of 1,296 feet (see ***Table 4***), with an average height of 30 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at 16 of the 23 impacted receptors (see ***Appendix I***) and provides feasible noise reduction at an additional four non-impacted units. It also achieves the design goal of an insertion loss (IL) of 7 dB(A) at 14 impacted receptors. The total area for the barrier is 18,124 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 1,943, which exceeds the (MaxSF/BR) value of 1,600. Therefore, the barrier for CNE BK is considered feasible, but not reasonable at this time. A summary of the abatement for CNE BK is shown in ***Table 4***. The existing barrier for CNE BK, along I-495, also impacted by the project, will also be evaluated and replaced in-kind during the final design noise analysis.

IX. Construction Noise

VDOT is also concerned with noise generated during the construction phase of the proposed project. While the degree of construction noise impact will vary, it is directly related to the types and number of equipment used and the proximity to the noise-sensitive land uses within the project area. Land uses that are sensitive to traffic noise are also potentially sensitive to construction noise.

Any construction noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and will cease upon completion of the project construction

phase. A method of controlling construction noise is to establish the maximum level of noise that construction operations can generate.

In view of this, VDOT has developed and FHWA has approved a specification that establishes construction noise limits. This specification can be found in VDOT's 2007 *Road and Bridge Specifications, Section 107.16(b.3), "Noise"*. The contractor will be required to conform to this specification to reduce the impact of construction noise on the surrounding community.

The specifications have been reproduced below:

- The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise-sensitive activity is occurring. A noise-sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.

- VDOT may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.

- VDOT may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 PM and 6 AM. If other hours are established by local ordinance, the local ordinance shall govern.

- Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.

- When feasible, the Contractor shall establish haul routes that direct his vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.

- These requirements shall not be applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

X. Public Involvement/Local Officials Coordination

FHWA and VDOT policies require that VDOT provides certain information to local officials within whose jurisdiction the highway project is located, to minimize future traffic noise impacts of Type I projects on currently undeveloped lands. (Type I projects involve highway

improvements with noise analysis.) This information must include details on noise-compatible land-use planning and noise impact zones for undeveloped lands within the project corridor. The aforementioned details are provided below and shown on the graphics in ***Figures 2-1*** through ***2-6***. Additional information about VDOT's noise abatement program has also been included in this section.

Sections 12.1 and 12.2 of VDOT's 2011 Highway Traffic Noise Impact Analysis Guidance Manual outline VDOT's approach to communication with local officials, and provide information and resources on highway noise and noise-compatible land-use planning. VDOT's intention is to assist local officials in planning the uses of undeveloped land adjacent to highways to minimize the potential impacts of highway traffic noise.

Entering the Quiet Zone is a brochure that provides general information and examples to elected officials, planners, developers, and the general public about the problem of traffic noise and effective responses to the noise. The following is a link to this brochure on FHWA's website: http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/qz00.cfm.

A wide variety of administrative strategies may be used to minimize or eliminate potential highway noise impacts, thereby preventing the need or desire for costly noise abatement structures such as noise barriers in future years. There are five broad categories of such strategies:

- Zoning,
- Other legal restrictions (subdivision control, building codes, health codes),
- Municipal ownership or control of the land,
- Financial incentives for compatible development, and
- Educational and advisory services.

The Audible Landscape: A Manual for Highway and Land Use is a very well-written and comprehensive guide addressing these noise-compatible land use planning strategies, with detailed information. This document is available through FHWA's website, at http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/al00.cfm.

Also required under the revised FHWA and VDOT noise policies is information on the noise impact zones adjacent to project roadways in undeveloped lands. To determine these zones, noise levels are computed at various distances from the edge of the project roadways in each of the undeveloped areas of the project study area. The distances from the edge of the roadway to the NAC noise levels are then determined through interpolation. Distances vary in the project corridor due to changes in traffic volumes or terrain features. The distances for this project are summarized in ***Table 5.*** Any noise sensitive sites within these zones should be considered noise impacted if no barrier is present to reduce noise levels.

Noise level contours are lines of equal noise exposure that typically parallel roadway alignments. Highway traffic noise is considered a linear noise source and noise levels can drop considerably over distance. The degree that noise levels decrease can vary based on a number of different factors including objects that shield the roadway noise, terrain features and ground cover type (e.g., pavement, grass or snow). The use of noise level contours have become increasingly popular over the last several years, as they have been implemented in planning programs for undeveloped areas with roadway noise influence. Through conscious planning efforts and noise contour generation, municipal officials can restrict future development inside the noise impact zone (i.e., the area within the 66 dB(A) noise contour). ***Figures 2-2*** through 2-***29*** show the approximate 66 dB(A) noise level contours when considering the improvements made to the Interstate 66 Tier 2 Improvements Project with the Design Year (2040) traffic volumes, speeds and composition. ***Table 5*** shows the approximate distance of the 66 dB(A) contour line from the centerline of the Build Alternative to each CNE throughout the project area.

XI.Conclusion

Under Design Year (2040) Build conditions for Build Alternative 2A, a total of 2,301 receptors representing 2,426 residences, the Manassas National Battlefield Park, Bull Run Regional Park, Idylwood Park, 15 playgrounds, six baseball fields, three outdoor picnic areas, one hotel pool, eight basketball courts, 13 publicly owned trails, four tennis courts, a public dog park and one soccer field are predicted to experience noise impacts. Under Design Year (2040) Build conditions for Build Alternative 2B, a total of 2,122 receptors representing 2,184 residences, the Manassas National Battlefield Park, Bull Run Regional Park, Idylwood Park, three hotel balconies, 11 playgrounds, four outdoor picnic areas, three pools, six basketball courts, 14 publicly owned trails, four tennis courts, a public dog park and one soccer field are predicted to experience noise impacts. Noise barriers were evaluated for the worst-case alternative (Build Alternative 2A) and were determined to be both feasible and reasonable for CNEs C, D, E, G, I, M, O, P, Q, S, T, V, Y, W, AA, AB, AM, AP, AS, AT, AW, AX, AZ, BA, BB, BC, BF and BD. The findings in this report are based on conceptual and preliminary design information. Firm commitments on noise abatement will not be made until the Final Design phase of the project.

TABLE 1

I-66 Tier II EA

FHWA/VDOT Noise Abatement Criteria

Hourly-A-Weighted Sound Level in Decibels (dB(A)) [1]

Activity Category	Activity L_{eq} (h)[4]	Criteria[2] L10 (h)	Evaluation Location	Description of Activity Category
A	57	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[3]	67	70	Exterior	Residential.
C[3]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties of activities not included in A-D or F.
F	--	--	Exterior	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

[1] Either Leq (h) or L10 (h) (but not both) may be used on a project.

[2] The Leq (h) and L10 (h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measure.

[3] Includes undeveloped lands permitted for this Activity Criteria.

[4] VDOT utilizes the Leq(h) designation.

Table 2
I-66 Tier 2 Preliminary Noise Analysis - (2014) Noise Monitoring and Validation Results

1	2	3	4	5	6
CNE Designation	**Receptor Site Number**	**Existing, Monitored Noise Level**	**TNM Modeled Noise Level**	**Difference (Mod.-Mon.)**	**Validates?**
CNE D	1	64.3	64.3	0.0	Yes
CNE C	2	58.5	59.8	-1.3	Yes
CNE D	3	59.8	60.6	-0.8	Yes
CNE C	4	64.4	66.5	-2.1	Yes
CNE D	5	60.4	63.3	-2.9	Yes
CNE J	6	73.2	75.4	-2.2	Yes
CNE L	7	62.3	65.2	-2.9	Yes
CNE O	8	65.8	66.4	-0.6	Yes
CNE Q	9	61.5	63.3	-1.8	Yes
CNE Q	10	60.2	61	-0.8	Yes
CNE S	11	60.3	59.4	0.9	Yes
CNE X	12	67.4	65.6	1.8	Yes
CNE Y	13	63.8	61.5	2.3	Yes
CNE AA	14	66.0	64	2.0	Yes
CNE AG	15	71.1	65.7	5.4	No
CNE AM	16	67.5	65.7	1.8	Yes
CNE AT	17	66.7	63.7	3.0	Yes
CNE AU	18	58.8	60	-1.2	Yes
CNE AW	19	66.6	63.8	2.8	Yes
CNE AX	20	64.7	62.4	2.3	Yes
CNE BB	21	65.1	64.9	0.2	Yes
CNE BA	22	63.9	61.1	2.8	Yes
CNE BC	23*	N/A	N/A	N/A	N/A
CNE BI	24	63.4	62	1.4	Yes
CNE BG	25	63.1	60.1	3.0	Yes
CNE Y	26	63.9	63.9	0.0	Yes
CNE X	27	60.3	60.3	0.0	Yes
CNE AS	28	59.4	59.5	-0.1	Yes
CNE AR	29	54.1	56.9	-2.8	Yes
CNE BB	30	60.9	59.5	1.4	Yes

* Receptor site was removed due to adverse monitoring conditions at time of testing.

Table 3

I-66 Tier II EA

Noise Impact Summary by CNE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
CNE	Site Representation	Existing Noise Level Range (dB(A))			No-Build Noise Level Range (dB(A))			Build 2A Noise Level Range (dB(A))			Build 2B Noise Level Range (dB(A))		
		Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts
A	61 Residences, 1 Pool, 2 Medical Centers	49	64	0	51	67	0	50	66	0	50	68	1 Residence
C	155 Residences, Baseball Fields, Day Care Center, Outdoor Use Areas, 3 Playgrounds, 1 School, School Playgrounds	50	74	55 Residences, Baseball Fields, Outdoor Use Areas, 1 Playground, School Playgrounds	49	68	2 Residences	53	78	62 Residences, Baseball Fields, Outdoor Use Areas, 3 Playgrounds, School Playgrounds	49	69	2 Residences
D	358 Residences, 3 Playgrounds, 2 Basketball Courts	45	69	13 Residences, 1 Basketball Court, 1 Playground	45	71	3 Residences, 1 Playground	45	73	43 Residences, 2 Basketball Courts, 1 Playground	45	67	1 Residence, 1 Playground
E	63 Residences, 1 Day Care Center, 1 Playground, 1 Pool	45	70	18 Residences	45	67	3 Residences	45	74	24 Residences	45	68	6 Residences
G	National Park	57	75	National Park	60	78	National Park	59	79	National Park	59	78	National Park
H	1 Residence,	60	60	0	63	63	0	64	64	0	64	64	0
I	National Park	56	79	National Park	59	82	National Park	60	81	National Park	60	80	National Park
J	6 Residences, 1 Church, 1 Mosque	52	72	2 Residences	54	74	3 Residences	54	74	3 Residences	55	74	3 Residences
K	155 Apartment Complex Balconies, 1 Pool, 1 Outdoor Patio	49	67	0	52	70	0	52	70	0	53	71	Hotel Balcony
L	11 Residences, 1 Patio, Schools	63	76	8 Residences	65	78	9 Residences, School	65	79	10 Residences	65	79	9 Residences
M	2 Residences, National Park, 2 Picnic Areas	57	75	1 Residence, National Park, 2 Picnic Areas	58	76	1 Residence, National Park, 2 Picnic Areas	59	79	1 Residence, National Park, 2 Picnic Areas	59	78	1 Residence, National Park, 2 Picnic Areas
N	2 Residences, 2 Picnic Areas, 1 School, Soccer Fields, Trail	59	71	1 Residence, 2 Picnic Areas, Trail	60	73	1 Residence, 2 Picnic Areas, Trail	59	70	1 Residence, 2 Picnic Areas, Trail	60	72	1 Residence, 2 Picnic Areas, Trail
O	82 Residences, Trail	55	68	6 Residences, Trail	56	70	20 Residences, Trail	57	71	26 Residences, Trail	58	72	33 Residences, Trail
P	3 Residences, Regional Park, Shooting Center Picnic Area	59	77	2 Residences, Regional Park, Shooting Center Picnic Area	60	78	2 Residences, Regional Park, Shooting Center Picnic Area	60	81	3 Residences, Regional Park, Shooting Center Picnic Area	60	80	3 Residences, Regional Park, Shooting Center Picnic Area

Table 3

I-66 Tier II EA

Noise Impact Summary by CNE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
CNE	Site Representation	Existing Noise Level Range (dB(A))			No-Build Noise Level Range (dB(A))			Build 2A Noise Level Range (dB(A))			Build 2B Noise Level Range (dB(A))		
		Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts
Q	432 Residences, 2 Basketball Courts, Community Park, Playgrounds, 1 Pool, Trail	45	68	1 Residence	45	69	6 Residences	45	77	193 Residences, 2 Basketball Courts, Community Park, Playgrounds, Trail	45	77	186 Residences, 2 Basketball Courts, Community Park, Playgrounds, Trail
S	573 Residences, 1 Basketball Court, 2 Playgrounds, 1 Tennis Court	45	73	21 Residences	45	74	25 Residences	45	79	214 Residences, 1 Playground, 1 Tennis Court	47	78	208 Residences, 1 Playground, 1 Tennis Court
T	483 Residences, 1 Basketball Court, 1 Church, 1 Picnic area, 1 Playground	45	69	13 Residences	45	70	36 Residences	45	73	61 Residences	45	70	37 Residences
U	1 Daycare, 1 Playground	49	56	0	53	58	0	51	55	0	53	57	0
V	499 Residences, 1 Basketball Court, 1 Daycare Center, Park, Playgrounds, 1 Pool, 1 School	45	72	2 Residences, Park	45	74	13 Residences, Park	45	75	8 Residences, 1 Basketball Court, Park	45	74	17 Residences, Park
W	Trail	51	70	Trail	52	72	Trail	53	75	Trail	56	74	Trail
X	175 Residences, 1 Playground	49	64	0	50	65	0	54	78	68 Residences, 1 Playground	54	78	50 Residences, 1 Playground
Y	1112 Residences, 3 Basketball Courts, 1 Church, Mount Gilead House, 2 Playgrounds, 3 Pools, 3 Tennis Courts, Trail	45	72	14 Residences, Trail	45	73	29 Residences, Trail	45	75	150 Residences, 1 Basketball Court, Mount Gilead House, 1 Playground, 1 Tennis Court, Trail	45	75	79 Residences, 1 Basketball Court, Mount Gilead House, 1 Tennis Court, Trail
Z	1 Residence, Restaurants	58	66	0	61	69	0	54	59	0	61	69	0
AA	84 Residences	48	68	1 Residence	49	69	7 Residences	50	68	7 Residences	50	73	10 Residences
AB	105 Residences, 1 Tennis Court	47	66	9 Residences	48	68	18 Residences	49	69	29 Residences	49	68	31 Residences
AC	205 Residences, 1 Playground	47	69	8 Residences	48	69	8 Residences	45	73	16 Residences	45	73	16 Residences
AD	218 Residences, 1 Playground, 1 Pool, 1 Tennis Court	45	64	0	45	65	0	45	65	0	45	65	0
AE	181 Residences, Trail, 1 Pool, 1 Community Pool Deck	45	72	2 Residences, Trail	45	72	4 Residences, Trail	45	70	3 Residences, Trail	45	70	3 Residences, Trail
AF	1 Health Center, Trail	60	73	Trail	60	74	Trail	60	77	Trail	60	77	Trail

Table 3

I-66 Tier II EA

Noise Impact Summary by CNE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
CNE	Site Representation	Existing Noise Level Range (dB(A))			No-Build Noise Level Range (dB(A))			Build 2A Noise Level Range (dB(A))			Build 2B Noise Level Range (dB(A))		
		Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts
AG	449 Residences, Baseball Fields, 1 Playground, 1 Pool, Trail	45	75	10 Residences, Baseball Fields, Trail	45	76	12 Residences, Baseball Fields, Trail	45	80	15 Residences, Baseball Fields, 1 Playground, Trail	45	79	16 Residences, Baseball Fields, 1 Playground, Trail
AH	Trail, Baseball Fields	55	72	Trail	56	73	Trail	55	72	Trail	56	72	Trail
AJ	1 Outdoor Patio	59	59	0	62	62	0	62	62	0	63	63	0
AL	138 Residences, 1 Pool	45	61	0	45	63	0	45	64	0	45	64	0
AM	253 Residences, 1 Picnic Area, 1 Pool	49	70	51 Residences	49	71	61 Residences	51	74	82 Residences	51	74	84 Residences
AN	137 Residences, 1 Outdoor Patio, 1 Pool, 1 Tennis Court, Trail	46	60	0	52	70	22 Residences, 1 Outdoor Patio	52	69	16 Residences	53	71	22 Residences, 1 Outdoor Patio
AO	167 Residences,	52	62	0	53	66	1 Residence	54	68	5 Residences	54	68	3 Residences
AP	227 Residences, Fairfax Ridge Building, Museum, 1 Outdoor Patio, 1 Playground, 1 Pool	46	72	10 Residences	47	74	12 Residences	48	78	18 Residences, 1 Museum (Interior)	48	78	18 Residences, 1 Museum (Interior)
AQ	21 Residences,	55	68	2 Residences	56	69	6 Residences	59	75	13 Residences	59	75	13 Residences
AR	33 Residences,	49	73	3 Residences	50	72	4 Residences	50	77	4 Residences	51	76	4 Residences
AS	13 Residences, Baseball Fields, 2 Basketball Courts, 1 Dog Park, 3 Playgrounds	55	65	0	56	65	0	61	82	10 Residences, Baseball Fields, 1 Basketball Court, Dog Park, 3 Playgrounds	61	81	10 Residences, Baseball Fields, 1 Basketball Court, Dog Park, 3 Playgrounds
AT	119 Residences,	47	63	0	48	63	0	49	77	5 Residences	49	76	4 Residences
AU	97 Residences, 1 Playground, 1 Tennis Court, 1 Volleyball Court	50	66	2 Residences	50	67	2 Residences	53	69	9 Residences	53	69	9 Residences
AV	44 Residences,	56	64	0	57	66	5 Residences	56	65	0	56	66	5 Residences
AW	628 Residences, 1 Outdoor Patio, 3 Playgrounds, 4 Pools, Trail	45	68	6 Residences	45	69	11 Residences	45	80	170 Residences, 1 Pool, Trail	45	82	220 Residences, 1 Pool, Trail
AX	893 Residences, 1 Picnic Area, 2 Playgrounds, 2 Pools, 1 Tennis Court	45	75	18 Residences	45	76	20 Residences	45	79	553 Residences, 1 Playground, Pool, Tennis Court	45	79	570 Residences, 1 Playground, 2 Pools, 1 Tennis Court
AY	456 Residences, 1 School, 1 Pool	45	72	12 Residences	45	73	19 Residences	45	76	48 Residences	45	76	35 Residences
AZ	410 Residences,	45	69	9 Residences	45	68	8 Residences	45	80	81 Residences	45	80	59 Residences

Table 3

I-66 Tier II EA

Noise Impact Summary by CNE

1	2	3	4	5	6	7	8	9	10	11	12	13	14
CNE	Site Representation	Existing Noise Level Range (dB(A))			No-Build Noise Level Range (dB(A))			Build 2A Noise Level Range (dB(A))			Build 2B Noise Level Range (dB(A))		
		Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts	Min	Max	# Impacts
BA	164 Residences, 1 Basketball Court, 1 Playground, Trail	49	69	2 Residences	49	64	0	54	78	63 Residences, 1 Basketball Court, 1 Playground, Trail	54	79	42 Residences, 1 Basketball Court, 1 Playground, Trail
BB	172 Residences, Baseball Fields, 1 School	46	67	Baseball Field	46	67	Baseball Field	49	77	56 Residences, Baseball Fields	50	77	60 Residences, Baseball Fields
BC	213 Residences, Baseball Fields, 1 Basketball Court, 2 Playgrounds, Schools, Trail	46	69	Baseball Field	47	70	2 Residences, Baseball Field, Trail	54	81	122 Residences, Baseball Fields, 1 Basketball Court, 1 Playground, 1 School (Interior)	55	81	130 Residences, Baseball Fields, 1 Basketball Court, 1 Playground, 1 School (Interior)
BD	246 Residences, 1 Playground, 1 Pool, 1 Tennis Court	45	65	0	45	65	0	45	79	93 Residences, 1 Playground, 1 Tennis Court	46	79	26 Residences, 1 Playground, 1 Tennis Court
BE	540 Residences, 1 Basketball Court, 3 Playgrounds, 1 Pool	45	75	40 Residences	45	75	0	45	76	85 Residences	45	76	94 Residences
BF	76 Residences, Trail	50	75	Trail	53	76	6 Residences, Trail	53	76	15 Residences, Trail	57	76	20 Residences, Trail
BG	8 Residences	57	59	0	59	60	0	60	62	0	60	61	0
BH	3 Residences	59	63	0	61	65	0	62	67	1 Residence	61	66	1 Residence
BI	127 Residences, Trail	49	70	Trail	50	71	Trail	53	72	12 Residences, Trail	54	72	12 Residences, Trail
BJ	4 Residences,	58	64	0	60	66	1 Residence	63	68	2 Residences	62	68	1 Residence
BK	59 Residences, Baseball Fields, 1 Basketball Court, 1 Playground, Soccer Fields, 1 Tennis Court, Trail	53	75	Baseball Field, Soccer Fields, Trail	54	76	3 Residences, Baseball Field, Soccer Fields, Trail	57	77	25 Residences, Baseball Fields, Soccer Fields, Trail	59	77	28 Residences, Baseball Fields, Soccer Fields, Trail
BL	26 Residences, 1 Picnic Area	51	62		53	63	0	52	63	0	53	64	0
BM	32 Residences	49	68	1 Residence	50	69	1 Residence	49	68	1 Residence	50	69	1 Residence

TABLE 4
Interstate 66 Tier 2 Environmental Assessment
Noise Abatement Acoustical Feasibility and Reasonableness Evaluation Summary

CNE	Existing Barrier	Proposed Barrier								
	Equivalent SF Based on Demolition Factor of 0.105 ($3.25/sf/$31/SF)	Number of Benefited Receptor Units	Combined Noise Barrier Length (ft.)	Average Noise Barrier Height (ft.)	Square Footage (SF)	Net Square Footage (Including Equivalent Demolition SF)	Net SF per Benefited Receptor	Barrier Cost (@$31/ ft^2	Feasible?	Reasonable?
C	N/A	149	6,671	20	133,423	133,423	895	$4,136,113	Yes	Yes
D & E	N/A	160	8,830	20	176,592	176,592	1,104	$5,474,352	Yes	Yes
G & I	N/A	328	12,831	15	192,472	192,472	587	$5,966,632	Yes	Yes
J	N/A	2	1,232	15	18,485	18,485	9,243	$573,035	Yes	No
L	N/A	12	4,019	15	60,292	60,292	5,024	$1,869,052	Yes	No
M	N/A	223	6,527	15	141,158	141,158	633	$4,375,898	Yes	Yes
N	N/A	5	1,293	15	19,399	19,399	3,880	$601,369	Yes	No
O	N/A	100	5,448	20	108,969	108,969	1,090	$3,378,039	Yes	Yes
P & Q	N/A	250	12,354	25	185,318	185,318	741	$5,744,858	Yes	Yes
S	6,766	198	4,823	20	96,463	38,794	196	$2,990,353	Yes	Yes
T	N/A	45	1,972	25	49,289	49,289	1,095	$1,527,959	Yes	Yes
V	N/A	63	4,693	15	70,400	70,400	1,117	$2,182,400	Yes	Yes
Y	N/A	34	1280	15	19,192	19,192	564	$594,952	Yes	Yes
W	N/A	41	4,472	15	65,576	65,576	1,599	$2,032,856	Yes	Yes
AA & Y	N/A	47	1,352	22.5	59,800	59,800	1,272	$1,853,800	Yes	Yes
AB & X	N/A	111	8,708	20	174,160	174,160	1,569	$5,398,960	Yes	Yes
AC & AF	N/A	1	1,024	30	30,731	30,731	N/A	N/A	No	No
AG	N/A	3	320	30	9,598	9,598	N/A	N/A	No	N/A
AM	N/A	91	2,075	30	62,262	62,262	684	$1,930,122	Yes	Yes
AP, AS & AT	N/A	57	4,038	20	80,755	80,755	1417	$2,503,405	Yes	Yes
AQ & AR	N/A	35	1,975 4,190	15 15	92,481	92,481	2,642	$2,866,911	Yes	No

TABLE 4 continued
Interstate 66 Tier 2 Environmental Assessment
Noise Abatement Acoustical Feasibility and Reasonableness Evaluation Summary

CNE	Existing Barrier	Proposed Barrier								
	Equivalent SF Based on Demolition Factor of 0.105 ($3.25/sf/$31/SF)	Number of Benefited Receptor Units	Combined Noise Barrier Length (ft.)	Average Noise Barrier Height (ft.)	Square Footage (SF)	Net Square Footage (Including Equivalent Demolition SF)	Net SF per Benefited Receptor	Barrier Cost (@$31/ ft^2	Feasible?	Reasonable?
AW	N/A	260	8,295	25	207,374	207,374	798	$6,428,594	Yes	Yes
AX	N/A	140	7,306	25	182,641	182,641	1,305	$5,661,871	Yes	Yes
AY	N/A	3	544	20	10,880	10,880	3,627	$337,280	Yes	No
AZ	N/A	162	2,259	25	56,480	56,480	349	$1,750,880	Yes	Yes
BA	N/A	126	5,842	30	175,265	175,265	1,391	$5,433,215	Yes	Yes
BB	N/A	121	4,586	30	137,594	137,594	1,137	$4,265,414	Yes	Yes
BC & BF	N/A N/A	141	7,102	25	177,576	177,576	1,259	$5,504,856	Yes	Yes
BD	N/A	87	2821	20	56,416	56,416	648	$1,748,896	Yes	Yes
BE	N/A	0	971	25	24,268	24,268	N/A	N/A	No	N/A
BK	N/A	20	1,296	30	38,865	38,865	1,943	$1,204,815	Yes	No

TABLE 5

I-66 Tier II EA
CNE Specific Noise Contours

CNE	Distance (feet)
A	N/A
B	N/A
C	30-330
D	40-330
E	180-250
F	250-280
G	280-520
H	400
I	260-495
J	260-325
K	150-260
L	220-330
M	290-410
N	220-300
O	230-730
P	250-480
Q	280-520
R	N/A
S	30-300
T	60-180
U	70
V	40-260
W	20-400
X	100-400
Y	25-350
Z	180
AA	70-500
AB	29-430
AC	40
AD	50
AE	80
AF	90-100
AG	220
AH	100
AJ	90
AL	100-225
AM	230-515

AN	100
AO	100-215
AP	20-80
AQ	500-700
AR	150-350
AS	330-500
AT	30-150
AU	30-190
AV	50
AW	175-325
AX	145-410
AY	30-320
AZ	120-450
BA	190-420
BB	20-590
BC	90-500
BD	100-375
BE	100-240
BF	30-230
BG	40
BH	200
BI	30-500
BJ	120-230
BK	50-480
BL	30-160
BM	40

*Distance to 66 dB(A) line does not differ between alternatives in the CNEs