PRELIMINARY NOISE ANALYSIS

THREE CHOPT ROAD WIDENING

Henrico County

PROJECT: 9999-043-188, P101
UPC: 50528

From: 825 feet west of Barrington Hills
To: 1280 feet east of Gaskins Road

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1. Executive Summary

A preliminary design noise analysis was completed which evaluated potential traffic noise impacts and abatement measures associated with the proposed Three Chopt Road widening, in Henrico County, Virginia. Potential traffic noise impacts were assessed in accordance with the procedures and criteria approved by the Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT). A project location map is shown in ***Figure 1***. A detailed display of the modeling results are shown in the figures located in ***Appendix A*** of the report.

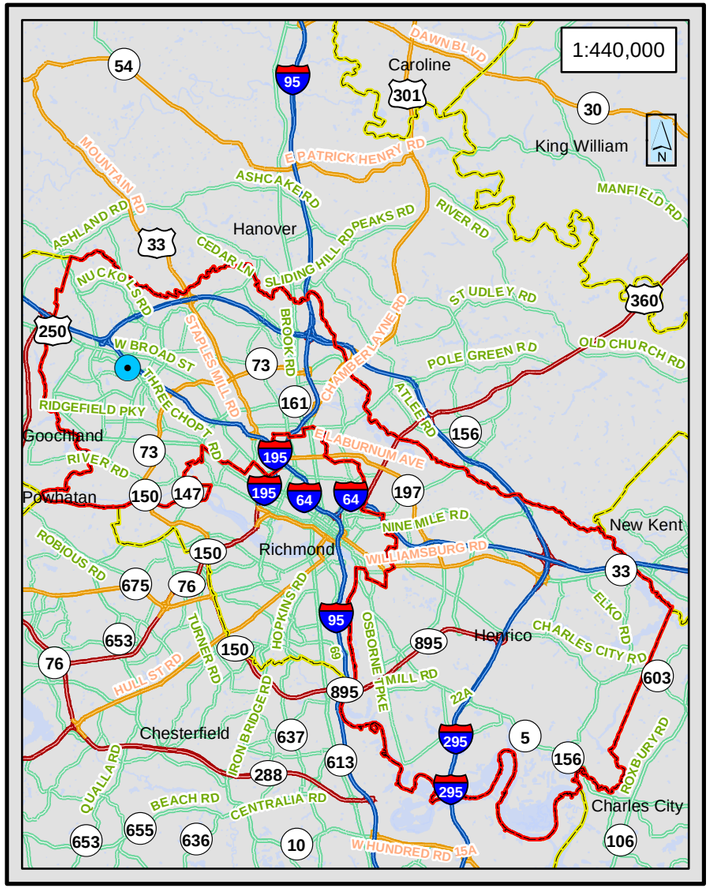
A total of 426 noise sensitive sites were modeled in the project study area representing 430 residences, three ball fields associated with the Pocahontas Middle School, one gazebo area, six pool areas, one tennis court, two apartment courtyards, one day care and its associated playground areas, one after school program facility and its associated playground areas, one cemetery, two church facilities, one retirement home and one assisted living facility. A total of 69 sites representing 52 residences, one school ball field, two day care playground areas, one cemetery, and 22 sites at a retirement home are predicted to be impacted by traffic noise under the future design year (2038) build condition, due to levels approaching or exceeding the Noise Abatement Criteria (NAC). For all sites studied, the existing year noise levels are predicted to range from 43 to 71 dBA. The future design year (2038) build noise levels are predicted to range from 44 to 72 dBA.

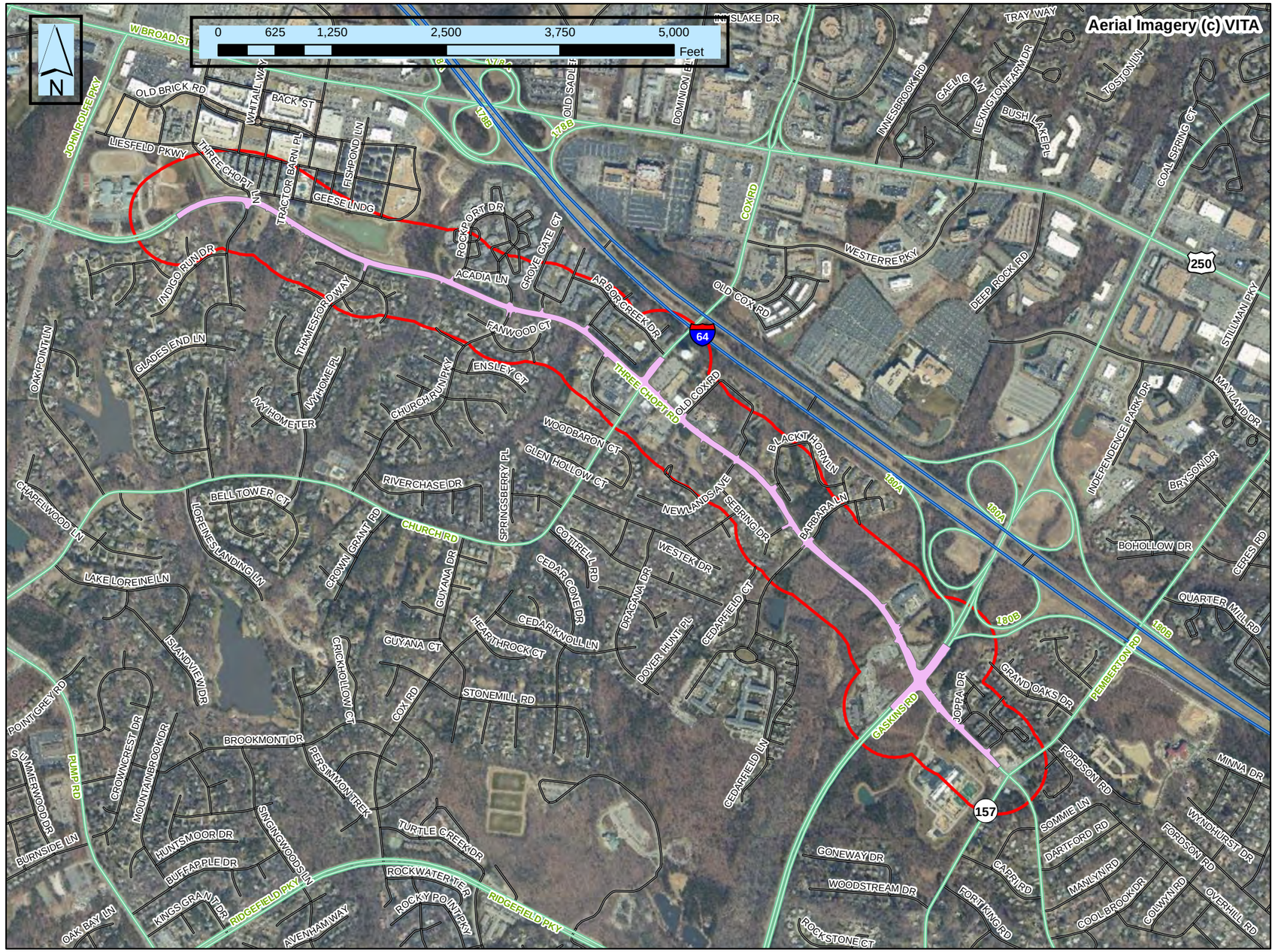
Noise abatement measures were evaluated where future noise impacts were predicted to occur. Seven noise barrier systems were evaluated as part of the preliminary design noise analysis. All seven barrier systems were found to be both feasible and reasonable under the VDOT's State Noise Abatement Policy.

A preliminary noise evaluation was performed and a more detailed review will be completed during final design. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may also 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.

The Environmental Traffic Data (ENTRADA) worksheets were used to determine the loudest hour within the project corridor. However, some of the ENTRADA links were generated without the actual traffic count data. Because of this, it is recommended that ENTRADA be updated during the final design stage of the project.

Construction activity may cause intermittent fluctuations in noise levels. During the construction phase of the project, all reasonable measures will be taken to minimize noise impact from these activities.





Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation

- Project Location
- Project Area
- Noise Study Area
- Interstate
- Primary Highway
- Secondary Highway
- State Route
- Local Roads

Three Chopt Road - Widening

Henrico County

Figure 1
Project Location Map

2. Introduction

VDOT has completed a preliminary traffic noise study and abatement analysis as a requirement for the proposed Three Chopt Road – Widening Project, in Henrico County, Virginia. The proposed project is a federal-funded project to improve Three Chopt Road from 1,055 feet west of Barrington Hill Drive to 1,000 feet east of Gaskins Road. This project, approximately 2.0 miles in length, will widen Three Chopt Road within the existing and proposed right-of-way. Existing Three Chopt Road is a roadway with a mix of two and four-lane configuration with essentially no sidewalks. The project will widen the road to produce a 52-foot-wide, four-lane undivided highway with curb and gutter, sidewalk, and storm drainage. At the intersection of Cox Road and Gaskins Road, the roadway section will be a four-lane divided highway with curb and gutter, turn lanes, sidewalk, and storm drainage. The four-lane configuration would be maintained throughout the project corridor.

The objective of this analysis is to assess the potential traffic noise impacts associated with the proposed roadway improvement project, and to evaluate potential noise abatement measures wherever impacts are predicted to occur.

This report documents a description of noise terminology, the applicable standards and criteria, a description of the computations of existing and future noise levels, a projection of future noise levels, identification of potential noise impacts, evaluate measures to mitigate noise impacts, noise abatement, and a discussion of construction noise.

3. Legislation and Noise Fundamentals

3.1 Regulatory Requirements

The Noise Control Act of 1972 gives the US Environmental Protection Agency (USEPA) the authority to establish noise regulations to control major noise sources, including motor vehicles and construction equipment. Furthermore, the USEPA is required to set noise emission standards for motor vehicles used for interstate commerce and the FHWA is required to enforce the USEPA noise emission standards through the Office of Motor Carrier Safety. The National Environmental Policy Act (NEPA) of 1969 gives broad authority and responsibility to Federal agencies to evaluate and mitigate adverse environmental impacts caused by Federal actions. FHWA is required to comply with NEPA including mitigating adverse highway traffic noise effects. The Federal-Aid Highway Act of 1970 mandates FHWA to develop standards for mitigating highway traffic noise. It also requires FHWA to establish traffic noise level criteria for various types of land uses. The Act prohibits FHWA approval of federal-aid highway projects unless adequate consideration has been made for noise abatement measures to comply with the standards. FHWA regulations for highway traffic noise for federal-aid highway projects are contained in 23 CFR 772. The regulations contain noise abatement criteria, which represent the maximum acceptable level of highway traffic noise for specific types of land uses. The regulations do not mandate that the abatement criteria be met in all situations, but rather require that reasonable and feasible efforts be made to provide noise mitigation when the abatement criteria are approached or exceeded.

The State Noise Abatement Policy was developed to implement the requirements of 23 Code of Federal Regulations (CFR) Part 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2011), FHWA's Highway Traffic Noise Analysis and Abatement Policy and Guidance (December 2011), and the noise related requirements of The National Environmental Policy Act of 1969. The current VDOT State Noise Abatement Policy became effective on July 13, 2011 and was updated on July 14, 2014. This policy is applicable to Type I federal-aid highway projects.

3.2 Traffic Noise Descriptors

Noise is generally defined as unwanted or annoying sound. Airborne sound occurs by a rapid fluctuation of air pressure above and below atmospheric pressure. Sound pressure levels are usually measured and expressed in decibels (dB). The decibel scale is logarithmic and expresses the ratio of the sound pressure unit being measured to a standard reference level.

Most sounds occurring in the environment do not consist of a single frequency, but rather a broad band of differing frequencies. The intensities of each frequency add to generate sound. Because the human ear does not respond to all frequencies equally, the method commonly used to quantify environmental noise consists of evaluating all of the frequencies of a sound according to a weighting system. It has been found that the A-weighted filter on a sound level meter, which includes circuits to differentially measure selected audible frequencies, best approximates the frequency response of the human ear.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources, creating a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of traffic noise, a statistical noise descriptor called the equivalent hourly sound level, or Leq (h), is commonly used. Leq (h) describes a noise sensitive receptor's cumulative exposure from all noise-producing events over a one-hour period.

Because decibels are logarithmic units, sound levels cannot be added by ordinary arithmetic means. The following general relationships provide a basic understanding of sound generation and propagation:

- An increase, or decrease, of 10 dB will be perceived by a receptor to be a doubling, or halving, of the sound level
- Doubling the distance between a highway and receptor will produce a 3 dB sound level decrease
- A 3 dB sound level increase is barely detectable by the human ear

4. Impact Criteria and Methodology

4.1 Noise Abatement Criteria

The State Noise Abatement Policy has adopted the Noise Abatement Criteria (NAC) that have been established by FHWA (23 CFR 772) for determining traffic noise impacts for a variety of land uses. The NAC, listed in ***Table 1*** for various activities, represent the upper limit of acceptable traffic noise conditions and also a balancing of that which may be desirable with that which may be achievable. The NAC applies to areas having regular human use and where lowered noise levels are desired. They do not apply to the entire tract of land on which the activity is based, but only to that portion where the activity takes place.

The NAC is given in terms of the hourly, A-weighted, equivalent sound level in decibels (dBA). The noise impact assessment is made using the guidelines listed in ***Table 1***. Noise-sensitive sites potentially affected by this project are classified as Category B, Category C, and Category D.

Table 1: FHWA Noise Abatement Criteria

Hourly A-Weighted Sound Level Decibels (dBA)			
Activity Category	**Activity Leq(h)**	**Evaluation Location**	**Description Of Activity Category**
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B*	67	Exterior	Residential
C*	67	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 nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E*	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or 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
Source: 23 CFR Part 772			
*: Includes undeveloped lands permitted for this activity category			

4.2 Definition of Noise Impact

Traffic noise impacts occur if either of the following two conditions is met:

- The predicted traffic noise levels approach or exceed the NAC, as shown in ***Table 1***. The VDOT State Noise Abatement Policy defines an approach level to be used when determining a traffic noise impact. The approach level shall be 1 dB(A) less than the NAC for Activity Categories A to E. For example, for a category B receptor, 66 dBA would be approaching 67 dBA and would be considered an impact. If design year noise levels "approach or exceed" the NAC, then the activity is impacted and a series of abatement measures must be considered.

- The predicted traffic noise levels are substantially higher than the existing noise levels. The VDOT State Noise Abatement Policy defines a substantial noise increase as when predicted highway traffic noise levels exceed existing noise levels by 10 dBA or more. For example, if a receptor's existing noise level is 50 dBA, and if the future noise level is 60 dBA, then it would be considered an impact. The noise levels of the substantial increase impact do not have to exceed the appropriate NAC.

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.

4.3 Highway Noise Computation Model

A review of the project corridor has established roadway traffic as the dominant source of noise for the build alternative. Since roadway noise can be determined accurately through computer modeling techniques for areas that are dominated by road traffic, design year traffic noise calculations have been performed using the Federal Highway Administration's Traffic Noise Model (FHWA TNM®) Version 2.5, which is the latest approved version. The FHWA TNM ® was developed and sponsored by the U. S. Department of Transportation and John A. Volpe National Transportation Systems Center, Acoustics facility. The TNM estimates vehicle noise emissions and resulting noise levels based on reference energy mean emission levels. The existing and proposed alignments (horizontal and vertical) are input into the model, along with the receptor locations, traffic volumes of cars, medium trucks (vehicles with 2 axles and 6 tires,) heavy trucks, average vehicle speeds, pavement type, and any traffic control devices. The TNM uses its acoustic algorithms to predict noise levels at the selected receptor locations by taking into account sound propagation variables such as, atmospheric absorption, divergence, intervening ground, barriers, building rows, and sometimes heavy vegetation.

4.4 Data Sources

4.4.1 Roadways and Alignments

The survey files for the existing condition and the design files for the proposed build condition scenario were provided by AECOM. The files were made available to VDOT Noise Section in July 2014. The design files were converted to three-dimensional (3D) DXF files that were then imported into the TNM with elevations already included. The majority of the existing elevations used for the modeling efforts were taken from the provided survey data. However, Geographic Information Systems (GIS) data was used to augment survey data in areas not covered by provided survey data. The existing GIS elevation data was obtained from the project Triangulated Irregular Network (TIN) file, and from the 2011 statewide TIN files, available courtesy of the Virginia Geographic Information Network (VGIN) and the Virginia Information Technologies Agency (VITA). The TIN file is a vector based representation of the physical land surface made up of irregularly distributed points with 3D coordinates (x,y,z) that are arranged in a network of non-overlapping triangles. Elevations for the proposed future design build condition were input from the appropriate plan and profile design files for the project.

4.4.2 Traffic Volumes and Flow Control

Traffic data for traffic noise computations were supplied by VDOT-Richmond District, as hourly volumes and operating speeds by roadway segment for the 2013 existing condition, and future design-year (2038) build and no-build conditions. Separate medium and heavy truck percentages were provided for each roadway segment.

As required by FHWA and VDOT, the noise analysis was performed for the loudest 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. Of the hourly traffic obtained for the project, the 5:00 PM traffic volumes were determined to best represent the worst noise hour. The traffic volumes that were used for this study are located in ***Appendix B***.

It should be noted that the ENTRADA spreadsheets would need to be updated during the final design stage of the project, since no count data was available for some of the links at the time the preliminary noise study was completed.

4.4.3 Receptors

A total of 426 noise sensitive sites were modeled in the project study area representing 430 residences, three ball fields associated with the Pocahontas Middle School, one gazebo area, six pool areas, one tennis court, two apartment courtyards, one day care and its associated playground areas, one after school program facility and its associated playground areas, one

cemetery, two church facilities, one retirement home and one assisted living facility. The location of all the receptors modeled in the TNM can be found in ***Appendix A*****.** Receptor locations were identified based on an aerial photo review and confirmed during a site visit. A default height of five feet above the base ground elevation was used to represent all first floor sites. A height increment of multiples of 10 feet was used for the second and third floor receptors. Specific receptor placement in the model is generally based on exterior areas where there is frequent human use.

4.4.4 Terrain Lines

Terrain lines were used in the model to represent important and intervening terrain features associated with the proposed project, such as drainage ditches, roadway centerlines, and general changes in elevation. Terrain lines input into the TNM were derived from the survey digital terrain model (DTM) used to create the project TIN file.

4.4.5 Barriers

The project corridor currently does not have existing noise barriers. However, barriers were evaluated in the project corridor for noise abatement evaluation. Refer to ***Section 7.4*** for the noise abatement barrier discussions.

5. Existing Noise Environment

To assess existing noise conditions within the project study area, short term noise monitoring was conducted. During the noise monitoring, a windshield survey of noise-sensitive land uses and identification of major sources of acoustical shielding was conducted to supplement the mapping provided.

Noise monitoring was conducted in the vicinity of noise-sensitive land uses near the proposed project alignment. The noise monitoring characterized existing noise levels in the study area but were not necessarily conducted during the loudest hour of the day. The monitoring data can be used as the baseline against which probable future noise levels are compared and potential impacts assessed. A validation exercise was carried out to evaluate the accuracy of the noise prediction model, and is presented in ***Section 5.2***, along with additional information about the computation methods.

5.1 Short Term Noise Monitoring

The purpose of noise monitoring is to gather data that is used to develop a comparison between the monitored results and the output obtained from the noise prediction model. This exercise is performed to validate the model so that it can be used with confidence to determine the worst hour noise levels, and predict the future noise levels.

Short-term noise measurements of 10 and 15 minute duration were obtained at three sites on August 8, 2014, within the project corridor. These short-term measurements were collected using a Larson Davis System 824 Type I (precision) noise meter. Prior to noise monitoring, the noise meter was calibrated to 114 dB using CAL200 precision acoustic calibrator. Readings were in the A-weighted scale and were reported in decibels (dBA). The data collection procedure involved the Leq measurements in consecutive 10-second intervals. This method allows individual time intervals that include noise events unrelated to traffic noise (such as aircraft over flights) to be excluded from consideration. Data collected by the noise meter included time, average noise level (Leq), maximum noise level (Lmax), and instantaneous peak noise level (Lpk) for each interval. Hourly average noise levels (Leq (h)) were derived at each location from the monitored Leq values. Existing noise measurements were collected under meteorologically acceptable conditions when the pavement was dry and winds were calm or light. Additional data collected at each monitoring location included atmospheric conditions such as wind speed, humidity, and ambient temperature. Measurements were conducted based on the acceptable collection of existing noise level readings according to the FHWA Report, FHWA-PD-96-046, "Measurement of Highway Related Noise."

A summary of the short-term noise monitoring results are presented in ***Table 2***. For each site, the table lists the assigned site number, the location and a description of the associated land use, the monitored sound level, and the dominant sources of noise. Traffic data (vehicle volume composition and speed) were also recorded on all roadways which were visible from the monitoring site and significantly contributed to the overall noise level. Traffic was grouped into one of the three categories: automobiles, medium trucks and heavy trucks, per VDOT procedure. The 10-minute and 15-minute traffic data was converted to one hour traffic data for validation of the noise model.

The location of each noise monitoring site in relation to the project roadway is shown on the graphics located on ***Figure 2***. The field data sheets are presented in ***Appendix C***. The monitored Leq in the study corridor ranged from 53.0 dBA to 55.3 dBA. Traffic noise from Three Chopt Road was the dominant source of noise within the study area.

Table 2: Short-term Noise Monitoring Summary

Site	Location	Land-use Description	Dominant Sources of Noise	Leq (dBA)
ST1	Barrington Hill Drive	Residence	Three Chopt	53.0
ST2	Fanwood Court	Residence	Three Chopt	53.5
ST3	Newlands Avenue	Residence	Three Chopt	55.3

NOTE: 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 CNE to validate the computer noise model.

5.2 Noise Model Validation

The modeling process began with model validation, as per VDOT requirements. This was accomplished by comparing the monitored noise levels and the noise levels generated by the computer model, using traffic volumes and speeds that were encountered during the monitoring process. This validation ensures that reported changes between the existing and future design-year conditions are due to changes in traffic, and not discrepancies between monitoring and modeling techniques. A difference of ±3 dBA or less between the monitored and modeled levels is considered acceptable, since this is the limit of change detectable by a typical human ear.

The model validation was performed for the existing traffic conditions. However, since no 24-hour monitoring was performed to obtain the existing loudest hour, the existing noise levels obtained during the monitoring sessions were not reported as the project's existing noise levels. Instead, existing worst case hour noise levels obtained from TNM after model validation were used as the existing noise levels for the project area.

A summary of the model validation is provided in ***Table 3***. As shown, for the validated sites, the difference between the modeled and monitored noise levels ranges from -1.2 to 1.5 dBA. The predicted levels that were modeled in the TNM differ from the recorded levels due to several factors: The complex intervening terrain features within the project area can be difficult to accurately capture, the precision of the supplemental input elevation data, and environmental factors such as wind, temperature, relative humidity, cloud cover, or atmospheric pressure. The ambient noise for all monitored sites was characterized by what sounded like crickets and cicadas chirping. In addition, for site ST2, the monitoring effort had to be stopped abruptly due to noise from a nearby lawnmower. As a result, the monitoring activity only lasted for 10 minutes instead of the planned 15 minutes.

Table 3: Noise Model Validation

Site	Monitored Noise Level (dBA)	Predicted Noise Level (dBA)	Difference (Predicted – Monitored) (dB)
ST1	53.0	53.8	0.8
ST2	53.5	52.3	-1.2
ST3	55.3	56.8	1.5

5.3 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.

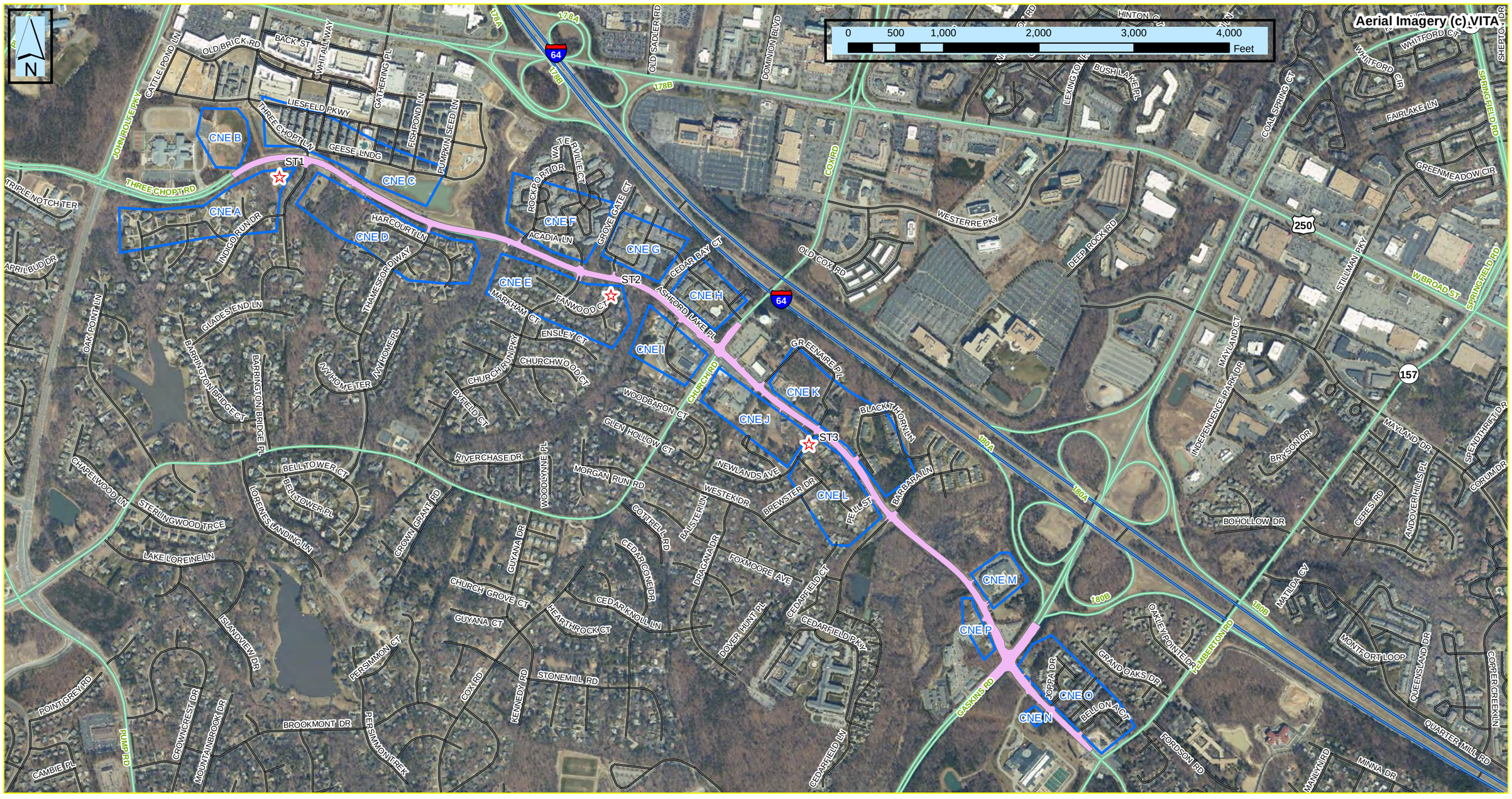
In accordance with the *VDOT Traffic Noise Policy*, an undeveloped lot is considered to be planned, designed, and programmed if a building permit has been issued by the local authorities prior to the Date of Public Knowledge for the relevant project. VDOT considers the "Date of

Public Knowledge" as the date that the final NEPA approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after this date.

Upon coordinating with the County, the following properties were found to have an active building permit.

- Permit on 5, BLD2013-01080-residential home
- Permits on 14, BLD2013-00070, 71 and 72-New Dawn Assisted Living Facility

It should be noted that during the monitoring exercise, both sites were observed to be under construction.



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Virginia Department of Transportation

- ☆ Monitoring sites
- Project Area
- Common Noise Environments (CNE'S)

Three Chopt Road - Widening

Henrico County

Figure 2
CNE and Monitoring Location Map

5.4 Modeled Existing Environment

For reporting purposes, the project area was divided into areas of Common Noise Environments (CNEs). CNEs are defined as a group of receptors within the same Activity Category ***(Table 1)*** that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. In accordance with VDOT guidance, noise sensitive receptors within 500 feet of the construction limits are considered as part of the evaluation.

All residential noise sensitive sites were modeled under NAC B. The active recreational areas, day center, retirement home and assisted living facility were modeled under NAC C. All interior noise levels were modeled under NAC D.

A total of 50 sites representing 38 residences, one school ball field, one cemetery, and 18 sites at a retirement home are predicted to be impacted by traffic noise under the existing condition due to levels approaching or exceeding the NAC. For all studied sites, the existing year noise levels are predicted to range from 43 to 71 dBA. A description of the CNEs is provided below. ***Figure 2*** shows the location of the CNE's described below. ***Appendix A*** contains graphics with all of the modeled receptor locations by CNE.

CNE A – South of Three Chopt Road between John Rolfe Pkwy and Barrington Hill Drive

CNE A is located south of the Three Chopt Road, between John Rolfe Parkway and Barrington Hill Drive. CNE A consists of 41 residential homes represented by sites A1 to A41.

NOTE: Site A11 represents a residential home. The home currently does not show up on the aerials. The home was included in the noise study since it has an approved building permit and precedes the date of public knowledge. During the monitoring exercise, it was noted that the construction activities for the home were near completion. The site plans for the house are included as an attached in emails located in ***Appendix G***.

Existing noise levels within CNE A are predicted to range from 43 to 64 dBA. There are no sites that are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE B – Ball fields at Pocahontas Middle School

CNE B is located north of the Three Chopt Road, between John Rolfe Parkway and Three Chopt Lane. CNE B consists of 22 sites B1 to B22. The sites represent ball fields located at the Pocahontas Middle School. Since the ball fields are considered a Category C activity, the grid system was applied for receiver placement per Appendix E of the Noise Guidance Manual.

Existing noise levels within CNE B are predicted to range from 50 to 67 dBA. One site is predicted to be impacted under the existing (2013) condition due to levels approaching or exceeding the NAC. Three Chopt Road is the dominant noise source.

CNE C – West Broad Village (WBV)

CNE C is located north of the Three Chopt Road, and represents sites at the West Broad Village (WBV). WBV consists of a mixture of residential (single family attached homes) and commercial land use. CNE C consists of 38 sites C1 to C38. The sites represent 36 residential homes, one pool area and one gazebo.

NOTE: For the residential sites, receptor placement was mainly at the balconies/patios. Some of the homes at the WBV have multiple balconies per unit. The plan layout for these homes is such that there is a balcony/patio on each non-ground level, i.e. second, third and fourth floor. For these units, the receptor was placed on the fourth floor patio since this represents the worst-case noise scenario.

Existing noise levels within CNE C are predicted to range from 44 to 66 dBA. Two sites are predicted to be impacted under the existing (2013) condition due to levels approaching or exceeding the NAC. Three Chopt Road is the dominant noise source.

CNE D – Thamesford Way

CNE D is located south of the Three Chopt Road, and represents sites mainly in the vicinity of Thamesford Way. CNE D consists of 42 residential homes represented by sites D1 to D42.

Existing noise levels within CNE D are predicted to range from 48 to 67 dBA. Seven sites are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE E – Thamesford Way

CNE E is located south of the Three Chopt Road, and represents sites in the vicinity of Church Run Parkway. CNE E consists of 39 residential homes represented by sites E1 to E39.

Existing noise levels within CNE E are predicted to range from 48 to 67 dBA. Three sites are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE F – Rockford Drive

CNE F is located north of the Three Chopt Road, and represents sites in the vicinity of Rockford Drive. CNE F consists of 34 sites, representing 32 apartment units (F1 to F14), one pool area (F15) and one tennis court (F16).

NOTE: The apartments in CNE F have multistory balconies. Therefore, receptor placement for the apartments was at the balconies.

Existing noise levels within CNE F are predicted to range from 50 to 59 dBA. There are no sites that are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE G – Grove Gate Lane

CNE G is located north of the Three Chopt Road, and represents sites in the vicinity of Grove Gate Lane. CNE G consists of 19 sites, representing 17 apartment units (G1 to G6, and G9 to G11), and one courtyard area (G7 and G8).

NOTE: The apartments in CNE G have multistory balconies. Therefore, receptor placement for the apartments was at the balconies.

Existing noise levels within CNE G are predicted to range from 43 to 63 dBA. There are no sites that are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE H – Ashford Lake Place

CNE H is located north of the Three Chopt Road, and represents sites in the vicinity of Ashford Lake Place. CNE H consists of 39 sites, representing 36 apartment units (H1 to H17, and H19), one courtyard area (H18 and H19), and one pool area (H21).

NOTE: The apartments in CNE H have multistory balconies. The balconies go up to the third floor. Therefore, receptor placement for the apartments was at the balconies.

Existing noise levels within CNE H are predicted to range from 48 to 66 dBA. One site is predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE I – Barony Crescent

CNE I is located south of the Three Chopt Road, and represents sites in the vicinity of Barony Crescent. CNE I consists of 10 sites representing one day care (Tuckaway Child Development) Center, and one church (Velocity Christian Church).

NOTE: The CNE also consists of commercial facilities. However, commercial facilities were not evaluated for noise due to absence of outdoor noise sensitive activities.

The day care has playground areas represented by sites I1 to I4, I6 and I7, and two pool areas represented by sites I8 and I9. Indoor noise levels at the day care were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site I5 was used to evaluate the interior noise levels at the daycare. The existing (2013) condition noise level for the exterior for this site is predicted to be 59 dBA. Since the exterior for the day care building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA “Highway Traffic Noise

Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 33 dB(A). Therefore the indoor noise level for the day care is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

The church does not appear to have outdoor areas of frequent human use; as such no exterior sites were modeled for the church. Indoor noise levels at the church were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site I10 was used to evaluate the interior noise levels at the church. The existing (2013) condition noise level for the exterior for this site is predicted to be 58 dBA. Since the exterior for the church building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 33 dB(A). Therefore the indoor noise level for the church is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

Existing exterior noise levels within CNE I are predicted to range from 52 to 65 dBA. There are no sites predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE J – South of Three Chopt Road between Church Road and Newlands Avenue

CNE J is located south of the Three Chopt Road, between Church Road and Newlands Avenue. CNE J consists of 11 sites representing one after school program facility (Rainbow Station at Three Chopt) (J1 to J4), residential homes (J5 to J8 and J11) and one church (Deep Run Baptist Church) (J9 and J10).

NOTE: The CNE also consists of commercial facilities. However, commercial facilities were not evaluated for noise due to absence of outdoor noise sensitive activities.

The Rainbow Station at Three Chopt has playground areas represented by sites J1 to J3. Indoor noise levels at the facility were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site J4 was used to evaluate the interior noise levels at the facility. The existing (2013) condition noise level for the exterior for this site is predicted to be 59 dBA. Since the exterior for the day care building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 34 dB(A). Therefore the indoor noise level for the facility is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

The Deep Run Baptist Church has a cemetery area represented by sites J10. Indoor noise levels at the church were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site J9 was used to evaluate the interior noise levels at the church. The existing (2013) condition noise level for the exterior for this site is predicted to be 66 dBA. Since the exterior for the church building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be

25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 41 dB(A). Therefore the indoor noise level for the church is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

Existing exterior noise levels within CNE J are predicted to range from 51 to 67 dBA. One site is predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE K – North of Three Chopt Road between Cox Road and Barbara Lane

CNE K is located south of the Three Chopt Road, between Cox Road and Barbara Lane. CNE K consists of 26 sites representing one cemetery (K1 and K2), residential sites (K3 to K25) and one assisted living facility (The New Dawn Assisted Living) (K26).

NOTE: The New Dawn Assisted Living (K26) currently does not appear on the aerials. The facility was included in the noise study since it has an approved building permit and precedes the date of public knowledge. According to the site plans provided by the County, the Assisted Living facility has outdoor patio areas. The site plans are included as an attachment in an email which is located in Appendices G. Site K26 was used to represent the patio area closest to Three Chopt Road. During the monitoring exercise, it was noted that the facility was under construction.

Existing noise levels within CNE K are predicted to range from 44 to 71 dBA. Three sites are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE L – South of Three Chopt between Newlands Pkwy and Cedarfield Pkwy

CNE L is located south of the Three Chopt Road, between Newlands Pkwy and Cedarfield Pkwy. CNE L consists of 19 sites (L1 to L19) representing 34 residential homes.

Existing noise levels within CNE E are predicted to range from 46 to 68 dBA. Seven sites representing 11 residential homes are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE M – Dogwood Terrace Retirement Living

CNE M is located north of the Three Chopt Road, close to the Gaskins Road intersection. CNE M consists of 42 sites (M1 to M17) representing a retirement home (Dogwood Terrace Retirement Living) and a residential home (M18).

NOTE: The Dogwood Terrace Retirement Living has multistory balconies. The balconies go up to the third floor. Consequently, the noise sensitive receptors for the retirement home were placed at the balconies.

Existing noise levels within CNE M are predicted to range from 53 to 69 dBA. A total of 18 sites at the retirement home are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE N – South of Three Chopt between Gaskins Road and Pemberton Road

CNE N is located south of the Three Chopt Road, between Gaskins Road and Pemberton Road. CNE N consists of one site representing one residential home (N1).

Existing noise levels within CNE N are predicted to be 67 dBA. One site is predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE O – North of Three Chopt between Gaskins Road and Pemberton Road

CNE O is located north of the Three Chopt Road, between Gaskins Road and Pemberton Road. CNE O consists of 40 sites representing 100 residential units (O1 to O39), and one pool area (O40).

NOTE: The CNE also consists of commercial facility which was not modeled due to lack of apparent outdoor noise sensitive activities. The facility would also be displaced by the project.

Existing noise levels within CNE O are predicted to range from 48 to 68 dBA. Three sites representing seven residential homes are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

CNE P – South of Three Chopt between Wickford Road and Gaskins Road

CNE P is located south of the Three Chopt Road, between Wickford Road and Gaskins Road. CNE P consists of three sites representing three residential homes (P1 to P3).

NOTE: The CNE also consists of an abandoned structure and commercial facilities which were not modeled due to lack of apparent outdoor noise sensitive activities.

Existing noise levels within CNE P are predicted to range from 67 to 71 dBA. Three sites representing three residential homes are predicted to be impacted under the existing (2013) condition. Three Chopt Road is the dominant noise source.

6. Future Noise Environment

Noise levels in the study area were predicted for the future design year build (2038) condition and the using the TNM. An analysis of future design year no-build (2038) noise levels is not required for this traffic noise study since the project is not related to the interstate, nor is there section 4(f) constructive use, as stated in the VDOT State Noise Abatement Policy.

Assessment of traffic noise impact requires these comparisons:

(1) The noise levels under existing conditions must be compared to those under design year build conditions. This comparison shows the change in noise levels that will occur between the existing year and the design year if the project is constructed, to determine if the substantial increase impact criteria has been met.

(2) The noise levels under design year build conditions must be compared to the applicable NAC. This comparison determines if the impact criteria has been met under future build conditions and can be used to assist in noise compatible land use planning.

Noise impacts are predicted under the future design year build condition (2038) due to noise levels approaching or exceeding the NAC. Calculated noise levels for all noise sensitive sites and conditions are listed in ***Table 4***. Descriptions of each CNE are included in ***Section 5.4***.

6.1 Build Alternative

A total of 69 sites representing 52 residences, one school ball field, two day care playground areas, one cemetery, and 22 sites at a retirement home are predicted to be impacted by traffic noise under the future design year (2038) build condition, due to levels approaching or exceeding the Noise Abatement Criteria (NAC). For all studied sites, the future design year (2038) build noise levels range from 44 to 72 dBA.

CNE A – South of Three Chopt Road between John Rolfe Pkwy and Barrington Hill Drive

Future design year build noise levels within CNE A are predicted to range from 45 to 64 dBA. None of the sites are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE B – Ball fields at Pocahontas Middle School

Future design year build noise levels within CNE B are predicted to range from 51 to 69 dBA. One site (B3) representing the ball field is predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE C – West Broad Village (WBV)

Future design year build noise levels within CNE C are predicted to range from 46 to 67 dBA. Seven residential sites (C22 to C26 and C37) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE D – Thamesford Way

Future design year build noise levels within CNE D are predicted to range from 50 to 68 dBA. Six residential sites (D7 to D13) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE E – Thamesford Way

Future design year build noise levels within CNE E are predicted to range from 51 to 68 dBA. Five residential sites (E5, E6 and E16 to E18) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE F – Rockford Drive

Future design year build noise levels within CNE F are predicted to range from 53 to 65 dBA. No sites are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE G – Grove Gate Lane

Future design year build noise levels within CNE G are predicted to range from 44 to 64 dBA. No sites are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE H – Ashford Lake Place

Future design year build noise levels within CNE H are predicted to range from 48 to 67 dBA. Seven residential sites (H2, H3, H8, H9 and H10) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE I – Barony Crescent

Future design year build noise levels within CNE I are predicted to range from 55 to 67 dBA. Two sites (I2 and I3) representing playgrounds at the day care are predicted to be impacted by traffic noise under the future design year build (2038) condition.

Indoor noise levels at the day care were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site I5 was used to evaluate the interior noise levels at the daycare. The design year (2038) condition noise level for the exterior for this site is predicted to be 61dBA. Since the exterior for the day care building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 36 dB(A). Therefore the indoor noise level for the day care is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

Indoor noise levels at the church were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site I10 was used to evaluate the interior noise levels at the church. The design year (2038) condition noise level for the exterior for this site is predicted to be 59 dBA. Since the exterior for the church building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 34 dB(A). Therefore the indoor noise level for the church is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

CNE J – South of Three Chopt Road between Church Road and Newlands Avenue

Future design year build noise levels within CNE J are predicted to range from 52 to 68 dBA. One site (J11) representing a residence is predicted to be impacted by traffic noise under the future design year build (2038) condition.

Indoor noise levels at the facility were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site J4 was used to evaluate the interior noise levels at the facility. The design year (2038) condition noise level for the exterior for this site is predicted to be 60 dBA. Since the exterior for the day care building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 35 dB(A). Therefore the indoor noise level for the facility is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

Indoor noise levels at the church were evaluated under Activity Category D in Table 1 (FHWA Noise Abatement Criteria). Site J9 was used to evaluate the interior noise levels at the church. The design year (2038) condition noise level for the exterior for this site is predicted to be 68 dBA. Since the exterior for the church building is composed of masonry material and modern air conditioning is installed, the reduction in noise levels in the interior as a result of the building is predicted to be 25 dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). This results in indoor noise levels of 43 dB(A). Therefore the indoor noise level for the church is not predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

CNE K – North of Three Chopt Road between Cox Road and Barbara Lane

Future design year build noise levels within CNE K are predicted to range from 45 to 72 dBA. Three sites representing a cemetery (K1 and K2) and two residential units (K3) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE L – South of Three Chopt between Newlands Pkwy and Cedarfield Pkwy

Future design year build noise levels within CNE L are predicted to range from 47 to 70 dBA. Seven sites representing 11 residences (L1 to L7) are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE M – Dogwood Terrace Retirement Living

Future design year build noise levels within CNE M are predicted to range from 51 to 69 dBA. Twenty two sites (M1 to M10) representing balconies at a retirement home are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE N – South of Three Chopt between Gaskins Road and Pemberton Road

Future design year build noise levels within CNE N are predicted to be 67 dBA. One site (N1) representing one residence is predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE O – North of Three Chopt between Gaskins Road and Pemberton Road

Future design year build noise levels within CNE O are predicted to range from 48 to 68 dBA. Four sites (O17 and O28 to O30) representing nine residences are predicted to be impacted by traffic noise under the future design year build (2038) condition.

CNE P – South of Three Chopt between Wickford Road and Gaskins Road

Future design year build noise levels within CNE P are predicted to range from 68 to 71 dBA. Three sites (P1 to P3) representing three residences are predicted to be impacted by traffic noise under the future design year build (2038) condition.

Table 4: Predicted Noise Levels

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
CNE A – South of Three Chopt Road between John Rolfe Pkwy and Barrington Hill Drive							
A1	B	Residential	1	62	63	66	No
A2	B	Residential	1	58	59	66	No
A3	B	Residential	1	56	56	66	No
A4	B	Residential	1	54	55	64	No
A5	B	Residential	1	54	55	64	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
A6	B	Residential	1	57	58	66	No
A7	B	Residential	1	62	63	66	No
A8	B	Residential	1	61	61	66	No
A9	B	Residential	1	64	64	66	No
A10	B	Residential	1	58	60	66	No
A11	B	Residential	1	64	64	66	No
A12	B	Residential	1	55	57	65	No
A13	B	Residential	1	55	56	65	No
A14	B	Residential	1	57	58	66	No
A15	B	Residential	1	59	60	66	No
A16	B	Residential	1	55	56	65	No
A17	B	Residential	1	52	53	62	No
A18	B	Residential	1	53	54	63	No
A19	B	Residential	1	51	53	61	No
A20	B	Residential	1	49	50	59	No
A21	B	Residential	1	49	50	59	No
A22	B	Residential	1	45	47	55	No
A23	B	Residential	1	44	46	54	No
A24	B	Residential	1	43	45	53	No
A25	B	Residential	1	46	48	56	No
A26	B	Residential	1	46	48	56	No
A27	B	Residential	1	45	46	55	No
A28	B	Residential	1	49	50	59	No
A29	B	Residential	1	46	47	56	No
A30	B	Residential	1	45	46	55	No
A31	B	Residential	1	47	48	57	No
A32	B	Residential	1	45	47	55	No
A33	B	Residential	1	44	46	54	No
A34	B	Residential	1	46	48	56	No
A35	B	Residential	1	50	51	60	No
A36	B	Residential	1	52	52	62	No
A37	B	Residential	1	53	54	63	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
A38	B	Residential	1	55	55	65	No
A39	B	Residential	1	58	59	66	No
A40	B	Residential	1	55	56	65	No
A41	B	Residential	1	47	48	57	No
CNE B – Ball fields at Pocahontas Middle School							
B1	C	Recreational	1	58	60	66	No
B2	C	Recreational	1	62	64	66	No
B3	C	Recreational	1	67	69	66	No
B4	C	Recreational	1	60	63	66	No
B5	C	Recreational	1	58	60	66	No
B6	C	Recreational	1	56	58	66	No
B7	C	Recreational	1	54	55	64	No
B8	C	Recreational	1	55	56	65	No
B9	C	Recreational	1	56	58	66	No
B10	C	Recreational	1	54	57	64	No
B11	C	Recreational	1	53	55	63	No
B12	C	Recreational	1	53	54	63	No
B13	C	Recreational	1	52	53	62	No
B14	C	Recreational	1	53	54	63	No
B15	C	Recreational	1	52	54	62	No
B16	C	Recreational	1	51	53	61	No
B17	C	Recreational	1	51	52	61	No
B18	C	Recreational	1	51	52	61	No
B19	C	Recreational	1	50	51	60	No
B20	C	Recreational	1	50	51	60	No
B21	C	Recreational	1	52	53	62	No
B22	C	Recreational	1	50	51	60	No
CNE C – West Broad Village (WBV)							
C1	B	Residential	1	59	61	66	No
C2	B	Residential	1	52	54	62	No
C3	B	Residential	1	60	61	66	No
C4	B	Residential	1	55	56	65	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
C5	B	Residential	1	62	63	66	No
C6	B	Residential	1	55	56	65	No
C7	B	Residential	1	60	62	66	No
C8	B	Residential	1	55	56	65	No
C9	B	Residential	1	62	64	66	No
C10	B	Residential	1	53	55	63	No
C11	B	Residential	1	60	61	66	No
C12	B	Residential	1	53	54	63	No
C13	B	Residential	1	59	60	66	No
C14	B	Residential	1	54	55	64	No
C15	B	Residential	1	60	61	66	No
C16	B	Residential	1	58	59	66	No
C17	B	Residential	1	54	55	64	No
C18	B	Residential	1	47	48	57	No
C19	B	Residential	1	45	47	55	No
C20	B	Residential	1	44	46	54	No
C21	C	Pool	1	44	47	54	No
C22	B	Residential	1	66	67	66	Yes
C23	B	Residential	1	66	67	66	Yes
C24	B	Residential	1	65	67	66	Yes
C25	B	Residential	1	65	66	66	Yes
C26	B	Residential	1	65	66	66	Yes
C27	B	Residential	1	64	65	66	No
C28	B	Residential	1	64	65	66	No
C29	B	Residential	1	64	65	66	No
C30	B	Residential	1	63	64	66	No
C31	B	Residential	1	62	63	66	No
C32	B	Residential	1	61	62	66	No
C33	B	Residential	1	59	60	66	No
C34	B	Residential	1	58	61	66	No
C35	B	Residential	1	63	63	66	No
C36	B	Residential	1	64	64	66	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
C37	B	Residential	1	65	66	66	Yes
C38	C	Recreational	1	52	56	62	No
CNE D – Thamesford Way							
D1	B	Residential	1	57	58	66	No
D2	B	Residential	1	61	61	66	No
D3	B	Residential	1	62	63	66	No
D4	B	Residential	1	52	53	62	No
D5	B	Residential	1	54	55	64	No
D6	B	Residential	1	56	56	66	No
D7	B	Residential	1	67	67	66	Yes
D8	B	Residential	1	67	67	66	Yes
D9	B	Residential	1	66	67	66	Yes
D10	B	Residential	1	66	68	66	Yes
D11	B	Residential	1	67	68	66	Yes
D12	B	Residential	1	67	68	66	Yes
D13	B	Residential	1	67	68	66	Yes
D14	B	Residential	1	64	65	66	No
D15	B	Residential	1	59	63	66	No
D16	B	Residential	1	61	65	66	No
D17	B	Residential	1	59	63	66	No
D18	B	Residential	1	51	55	61	No
D19	B	Residential	1	50	54	60	No
D20	B	Residential	1	49	53	59	No
D21	B	Residential	1	49	53	59	No
D22	B	Residential	1	48	51	58	No
D23	B	Residential	1	49	51	59	No
D24	B	Residential	1	49	52	59	No
D25	B	Residential	1	50	53	60	No
D26	B	Residential	1	50	54	60	No
D27	B	Residential	1	52	55	62	No
D28	B	Residential	1	51	54	61	No
D29	B	Residential	1	53	55	63	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
D30	B	Residential	1	52	54	62	No
D31	B	Residential	1	53	54	63	No
D32	B	Residential	1	51	52	61	No
D33	B	Residential	1	51	52	61	No
D34	B	Residential	1	50	51	60	No
D35	B	Residential	1	50	50	60	No
D36	B	Residential	1	51	51	61	No
D37	B	Residential	1	51	52	61	No
D38	B	Residential	1	50	51	60	No
D39	B	Residential	1	50	51	60	No
D40	B	Residential	1	50	50	60	No
D41	B	Residential	1	51	51	61	No
D42	B	Residential	1	49	51	59	No
CNE E – Thamesford Way							
E1	B	Residential	1	58	61	66	No
E2	B	Residential	1	58	62	66	No
E3	B	Residential	1	54	58	64	No
E4	B	Residential	1	58	62	66	No
E5	B	Residential	1	66	68	66	Yes
E6	B	Residential	1	66	68	66	Yes
E7	B	Residential	1	61	64	66	No
E8	B	Residential	1	61	61	66	No
E9	B	Residential	1	60	61	66	No
E10	B	Residential	1	55	56	65	No
E11	B	Residential	1	54	55	64	No
E12	B	Residential	1	54	54	64	No
E13	B	Residential	1	54	55	64	No
E14	B	Residential	1	58	59	66	No
E15	B	Residential	1	63	64	66	No
E16	B	Residential	1	65	66	66	Yes
E17	B	Residential	1	67	68	66	Yes
E18	B	Residential	1	65	67	66	Yes

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
E19	B	Residential	1	56	59	66	No
E20	B	Residential	1	54	57	64	No
E21	B	Residential	1	51	54	61	No
E22	B	Residential	1	51	54	61	No
E23	B	Residential	1	50	51	60	No
E24	B	Residential	1	50	51	60	No
E25	B	Residential	1	50	51	60	No
E26	B	Residential	1	50	51	60	No
E27	B	Residential	1	51	52	61	No
E28	B	Residential	1	53	54	63	No
E29	B	Residential	1	56	57	66	No
E30	B	Residential	1	54	55	64	No
E31	B	Residential	1	52	55	62	No
E32	B	Residential	1	52	55	62	No
E33	B	Residential	1	52	54	62	No
E34	B	Residential	1	52	55	62	No
E35	B	Residential	1	52	55	62	No
E36	B	Residential	1	52	55	62	No
E37	B	Residential	1	52	56	62	No
E38	B	Residential	1	50	55	60	No
E39	B	Residential	1	48	52	58	No
CNE F – Rockford Drive							
F1	B	Residential	1	53	57	63	No
F2-1st	B	Residential	1	51	56	61	No
F2-2nd	B	Residential	1	55	60	65	No
F3-1st	B	Residential	1	51	55	61	No
F3-2nd	B	Residential	1	55	59	65	No
F3-3rd	B	Residential	1	57	61	66	No
F4-1st	B	Residential	1	50	55	60	No
F4-2nd	B	Residential	1	54	59	64	No
F4-3rd	B	Residential	1	56	60	66	No
F5-1st	B	Residential	1	50	54	60	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
F5-2nd	B	Residential	1	53	58	63	No
F6-1st	B	Residential	1	53	57	63	No
F6-2nd	B	Residential	1	56	61	66	No
F7-1st	B	Residential	1	52	56	62	No
F7-2nd	B	Residential	1	54	59	64	No
F7-3rd	B	Residential	1	57	61	66	No
F8-1st	B	Residential	1	51	54	61	No
F8-2nd	B	Residential	1	53	58	63	No
F9-1st	B	Residential	1	50	54	60	No
F9-2nd	B	Residential	1	53	57	63	No
F10-1st	B	Residential	1	50	54	60	No
F10-2nd	B	Residential	1	54	58	64	No
F10-3rd	B	Residential	1	56	60	66	No
F11-1st	B	Residential	1	51	55	61	No
F11-2nd	B	Residential	1	56	60	66	No
F12-1st	B	Residential	1	52	54	62	No
F12-2nd	B	Residential	1	57	60	66	No
F13-1st	B	Residential	1	52	54	62	No
F13-2nd	B	Residential	1	56	59	66	No
F13-3rd	B	Residential	1	59	61	66	No
F14-1st	B	Residential	1	51	53	61	No
F14-2nd	B	Residential	1	55	57	65	No
F15	C	Recreational	1	58	65	66	No
F16	C	Recreational	1	58	64	66	No
CNE G – Grove Gate Lane							
G1-3rd	B	Residential	1	45	48	55	No
G2-3rd	B	Residential	1	48	48	58	No
G3-3rd	B	Residential	1	46	47	56	No
G4-1st	B	Residential	1	56	58	66	No
G4-2nd	B	Residential	1	59	61	66	No
G4-3rd	B	Residential	1	60	62	66	No
G5-1st	B	Residential	1	56	59	66	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
G5-2nd	B	Residential	1	60	62	66	No
G5-3rd	B	Residential	1	61	62	66	No
G6-3rd	B	Residential	1	54	56	64	No
G7	C	Recreational	1	45	46	55	No
G8	C	Recreational	1	43	44	53	No
G9-1st	B	Residential	1	60	63	66	No
G9-2nd	B	Residential	1	63	64	66	No
G9-3rd	B	Residential	1	62	63	66	No
G10-1st	B	Residential	1	51	53	61	No
G10-2nd	B	Residential	1	55	58	65	No
G10-3rd	B	Residential	1	57	58	66	No
G11-3rd	B	Residential	1	54	56	64	No
CNE H – Ashford Lake Place							
H1-1st	B	Residential	1	59	60	66	No
H1-2nd	B	Residential	1	64	65	66	No
H2-1st	B	Residential	1	59	60	66	No
H2-2nd	B	Residential	1	64	64	66	No
H2-3rd	B	Residential	1	66	67	66	Yes
H3-1st	B	Residential	1	59	61	66	No
H3-2nd	B	Residential	1	64	64	66	No
H3-3rd	B	Residential	1	65	66	66	Yes
H4-1st	B	Residential	1	60	62	66	No
H4-2nd	B	Residential	1	65	65	66	No
H5-3rd	B	Residential	1	59	60	66	No
H6-3rd	B	Residential	1	54	54	64	No
H7-1st	B	Residential	1	59	61	66	No
H7-2nd	B	Residential	1	64	65	66	No
H8-1st	B	Residential	1	60	62	66	No
H8-2nd	B	Residential	1	65	66	66	Yes
H8-3rd	B	Residential	1	65	67	66	Yes
H9-1st	B	Residential	1	61	63	66	No
H9-2nd	B	Residential	1	65	66	66	Yes

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
H9-3rd	B	Residential	1	65	67	66	Yes
H10-1st	B	Residential	1	61	63	66	No
H10-2nd	B	Residential	1	65	66	66	Yes
H11-3rd	B	Residential	1	52	52	62	No
H12-3rd	B	Residential	1	54	55	64	No
H13-1st	B	Residential	1	55	56	65	No
H13-2nd	B	Residential	1	60	61	66	No
H13-3rd	B	Residential	1	62	63	66	No
H14-3rd	B	Residential	1	61	62	66	No
H15-1st	B	Residential	1	51	51	61	No
H15-2nd	B	Residential	1	55	57	65	No
H15-3rd	B	Residential	1	58	58	66	No
H16-1st	B	Residential	1	48	48	58	No
H16-2nd	B	Residential	1	50	52	60	No
H16-3rd	B	Residential	1	54	55	64	No
H17-3rd	B	Residential	1	53	53	63	No
H18	C	Recreational	1	49	50	59	No
H19	C	Recreational	1	50	51	60	No
H20-3rd	B	Residential	1	55	56	65	No
H21	C	Recreational	1	54	52	64	No
CNE I – Barony Crescent							
I1	C	Recreational	1	61	64	66	No
I2	C	Recreational	1	63	66	66	Yes
I3	C	Recreational	1	65	67	66	Yes
I4	C	Recreational	1	58	61	66	No
I5	D	Indoor Day Care	1	59 (34)	61 (36)	(51)	No
I6	C	Recreational	1	53	56	63	No
I7	C	Recreational	1	52	55	62	No
I8	C	Recreational	1	55	57	65	No
I9	C	Recreational	1	53	55	63	No
I10	D	Indoor Church	1	58 (33)	59 (34)	(51)	No
CNE J – South of Three Chopt Road between Church Road and Newlands Avenue							

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
J1	C	Recreational	1	54	55	64	No
J2	C	Recreational	1	51	52	61	No
J3	C	Recreational	1	51	52	61	No
J4	D	Indoor-After School Program	1	59 (34)	60 (35)	(51)	No
J5	B	Residential	2	56	58	66	No
J6	B	Residential	1	55	57	65	No
J7	B	Residential	3	55	57	65	No
J8	B	Residential	1	56	58	66	No
J9	D	Indoor Church	1	66 (41)	68 (43)	(51)	No
J10	C	Cemetery	1	62	63	66	No
J11	B	Residential	1	67	68	66	No
CNE K – North of Three Chopt Road between Cox Road and Barbara Lane							
K1	C	Cemetery	1	71	72	66	No
K2	C	Cemetery	1	71	72	66	No
K3	B	Residential	2	69	68	66	No
K4	B	Residential	2	61	62	66	No
K5	B	Residential	2	58	59	66	No
K6	B	Residential	2	56	57	66	No
K7	B	Residential	2	44	45	54	No
K8	B	Residential	3	45	46	55	No
K9	B	Residential	3	45	45	55	No
K10	B	Residential	2	51	52	61	No
K11	B	Residential	2	55	55	65	No
K12	B	Residential	2	52	52	62	No
K13	B	Residential	2	51	51	61	No
K14	B	Residential	1	55	55	65	No
K15	B	Residential	2	51	52	61	No
K16	B	Residential	2	49	51	59	No
K17	B	Residential	1	55	57	65	No
K18	B	Residential	2	52	54	62	No
K19	B	Residential	2	53	54	63	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
K20	B	Residential	1	54	55	64	No
K21	B	Residential	1	53	54	63	No
K22	B	Residential	1	52	53	62	No
K23	B	Residential	1	51	52	61	No
K24	B	Residential	1	53	56	63	No
K25	B	Residential	1	64	64	66	No
K26	C	Assisted Living Facility	1	56	57	66	No
CNE L – South of Three Chopt between Newlands Pkwy and Cedarfield Pkwy							
L1	B	Residential	1	68	70	66	No
L2	B	Residential	2	67	70	66	No
L3	B	Residential	2	66	69	66	No
L4	B	Residential	2	67	70	66	No
L5	B	Residential	2	67	70	66	No
L6	B	Residential	1	67	69	66	No
L7	B	Residential	1	68	69	66	No
L8	B	Residential	1	59	61	66	No
L9	B	Residential	1	57	58	66	No
L10	B	Residential	1	57	59	66	No
L11	B	Residential	1	56	57	66	No
L12	B	Residential	3	58	60	66	No
L13	B	Residential	2	59	61	66	No
L14	B	Residential	2	58	60	66	No
L15	B	Residential	3	59	60	66	No
L16	B	Residential	2	46	47	56	No
L17	B	Residential	3	47	49	57	No
L18	B	Residential	3	51	51	61	No
L19	B	Residential	1	52	53	62	No
CNE M – Dogwood Terrace Retirement Living							
M1-1st	B	Retirement Home	1	62	63	66	No
M1-2nd	B	Retirement Home	1	65	66	66	Yes
M1-3rd	B	Retirement Home	1	67	67	66	Yes

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
M2-1st	B	Retirement Home	1	62	63	66	No
M2-2nd	B	Retirement Home	1	66	66	66	Yes
M2-3rd	B	Retirement Home	1	67	67	66	Yes
M3-1st	B	Retirement Home	1	62	64	66	No
M3-2nd	B	Retirement Home	1	68	68	66	Yes
M3-3rd	B	Retirement Home	1	68	69	66	Yes
M4-1st	B	Retirement Home	1	63	64	66	No
M4-2nd	B	Retirement Home	1	69	69	66	Yes
M4-3rd	B	Retirement Home	1	69	69	66	Yes
M5-1st	B	Retirement Home	1	62	64	66	No
M5-2nd	B	Retirement Home	1	68	69	66	Yes
M5-3rd	B	Retirement Home	1	68	69	66	Yes
M6-1st	B	Retirement Home	1	63	65	66	No
M6-2nd	B	Retirement Home	1	68	69	66	Yes
M6-3rd	B	Retirement Home	1	68	69	66	Yes
M7-1st	B	Retirement Home	1	63	66	66	Yes
M7-2nd	B	Retirement Home	1	68	68	66	Yes
M7-3rd	B	Retirement Home	1	68	68	66	Yes
M8-1st	B	Retirement Home	1	63	66	66	Yes
M8-2nd	B	Retirement Home	1	67	68	66	Yes
M8-3rd	B	Retirement Home	1	68	68	66	Yes
M9-1st	B	Retirement Home	1	61	64	66	No
M9-2nd	B	Retirement Home	1	66	66	66	Yes
M9-3rd	B	Retirement Home	1	66	67	66	Yes
M10-1st	B	Retirement Home	1	61	64	66	No
M10-2nd	B	Retirement Home	1	65	66	66	Yes
M10-3rd	B	Retirement Home	1	66	66	66	No
M11-1st	B	Retirement Home	1	59	62	66	No
M11-2nd	B	Retirement Home	1	63	64	66	No
M11-3rd	B	Retirement Home	1	63	64	66	No
M12-1st	B	Retirement Home	1	56	59	66	No
M12-2nd	B	Retirement Home	1	60	62	66	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
M12-3rd	B	Retirement Home	1	62	62	66	No
M13-3rd	B	Retirement Home	1	58	60	66	No
M14-3rd	B	Retirement Home	1	60	59	66	No
M15-3rd	B	Retirement Home	1	54	52	64	No
M16-3rd	B	Retirement Home	1	53	51	63	No
M17-3rd	B	Retirement Home	1	61	60	66	No
M18	B	Residential	1	60	60	66	No
CNE N – South of Three Chopt between Gaskins Road and Pemberton Road							
N1	B	Residential	1	67	67	66	N1
CNE O – North of Three Chopt between Gaskins Road and Pemberton Road							
O1	B	Residential	2	48	48	58	No
O2	B	Residential	3	48	48	58	No
O3	B	Residential	2	49	49	59	No
O4	B	Residential	3	49	49	59	No
O5	B	Residential	2	49	50	59	No
O6	B	Residential	3	50	52	60	No
O7	B	Residential	2	55	55	65	No
O8	B	Residential	3	55	56	65	No
O9	B	Residential	2	55	56	65	No
O10	B	Residential	2	55	56	65	No
O11	B	Residential	2	55	56	65	No
O12	B	Residential	3	56	56	66	No
O13	B	Residential	2	60	59	66	No
O14	B	Residential	2	63	62	66	No
O15	B	Residential	3	57	56	66	No
O16	B	Residential	2	60	59	66	No
O17	B	Residential	2	65	66	66	No
O18	B	Residential	2	51	51	61	No
O19	B	Residential	3	52	52	62	No
O20	B	Residential	3	53	53	63	No
O21	B	Residential	2	54	54	64	No
O22	B	Residential	3	53	53	63	No

Receptor Number	NAC	Land Use	No. of Dwelling / Recreational Units*	Predicted Noise Levels (dBA)		Noise Abatement Criteria** (dBA)	Abatement Considered
				Existing Condition (2013)	Build Condition (2038)		
O23	B	Residential	3	52	52	62	No
O24	B	Residential	3	54	53	64	No
O25	B	Residential	3	55	55	65	No
O26	B	Residential	4	56	56	66	No
O27	B	Residential	2	60	58	66	No
O28	B	Residential	3	66	66	66	Yes
O29	B	Residential	2	68	68	66	Yes
O30	B	Residential	2	67	66	66	Yes
O31	B	Residential	2	65	65	66	No
O32	B	Residential	3	64	64	66	No
O33	B	Residential	2	57	57	66	No
O34	B	Residential	2	56	56	66	No
O35	B	Residential	2	58	58	66	No
O36	B	Residential	2	58	58	66	No
O37	B	Residential	2	57	57	66	No
O38	B	Residential	4	54	54	64	No
O39	B	Residential	6	52	52	62	No
O40	C	Pool	1	55	55	65	No
CNE P – South of Three Chopt between Wickford Road and Gaskins Road							
P1	B	Residential	1	71	71	66	No
P2	B	Residential	1	67	68	66	No
P3	B	Residential	1	69	71	66	No
*	Dwelling Units may refer to residential and/or recreational units						
**	Criteria based on NAC or substantial increase, whichever is lower						
	Indicates noise impact (NAC Only)						

7. Noise Abatement

Noise Abatement Determination is a three-phased approach. The first phase of the process is to determine if highway traffic noise abatement consideration is warranted for the affected communities and/or affected receptors. The warranted criterion specifically pertains to traffic noise impacted receptors, defined in ***Section 4.2.*** Since predicted noise levels for the future design year (2038) build condition either approach or exceed the NAC and/or meet the substantial increase criterion, therefore per VDOT's State Noise Abatement Policy, noise abatement considerations are warranted for these impacted noise sensitive areas. Determining that noise abatement is warranted is the first phase (***Phase 1***) of the three phased noise abatement criteria. ***Phases 2 and 3*** addresses the feasibility and reasonableness, respectively, of the noise abatement measures being considered, which is discussed in ***Sections 7.2 and 7.3***. Following the completion of all three phases, a determination can be made regarding the feasibility and reasonableness of the noise abatement options.

7.1 Abatement Measures Evaluation

VDOT guidelines recommend a variety of mitigation 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 mitigation, additional mitigation measures exist which have the potential to provide considerable noise reductions, under certain circumstances. Mitigation measures considered for this project include:

- Traffic Control Measures
- Alteration of Horizontal and Vertical Alignments
- Acoustical Insulation of Public-Use and Non-Profit Facilities
- Acquisition of Buffer Land
- Construction of Earth Berms;
- Construction of Noise Barriers;

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 will 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 will result in only a 2 dBA decrease in noise level, which would not effectively reduce all impacts.

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 horizontal alignment for this project is predicated on utilizing the existing pavement and alignment as much as possible and limiting the acquisition of right-of-way and impacts to properties. Shifting of the road from receptors on one side of the road would affect receptors on the other side and create alignment issues as well as additional right-of-way acquisitions.

Vertical alignment changes would eliminate the utilization of existing pavement and cause total roadway reconstruction.

Insulation: 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 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 difficult to meet 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. As a general practice, noise barriers are most effective when placed at a relatively high point between the roadway and the impacted noise sensitive land use. To achieve the greatest benefit from a potential noise barrier, the goal of the barrier should focus on breaking the line-of-sight (to the greatest degree possible) from the roadway to the receptor. In roadway fill conditions, where the highway is above the natural grade, noise barriers are typically most effective when placed on the edge of the roadway shoulder or on top of the fill slope. In roadway cut conditions, where the roadway is located below the natural grade, barriers are typically most effective when placed at the top of the cut slope. Engineering and safety issues have the potential to alter these typical barrier locations.

The effectiveness of a noise barrier is measured by examining the barrier's capability to reduce future noise levels. Noise reduction is measured by comparing design year pre- and post-barrier noise levels. This difference between unabated and abated noise levels is known as insertion loss (IL). The following discussion presents potential mitigation measures for each of the impacted noise sensitive land uses.

Additionally, the Noise Policy Code of Virginia (HB 2577, as amended by HB 2025) states: *Requires that 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 sound 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.* Consideration will be given to these measures during the final design stage, where feasible. The response from project management is included in ***Appendix D.***

According to VDOT guidelines, potential mitigation measures for warranted receptors must also be assessed for feasibility and reasonableness.

7.2 Feasibility Criterion 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.

- Noise barriers must reduce design year noise levels by 5 dBA (or more) for fifty percent (50%) (or more) of impacted receptors;
- The determination that it is possible to design and construct the noise abatement measure, based on factors such as safety, barrier height, topography, drainage, utilities, maintenance access, and general access to adjacent properties.

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

7.3 Reasonableness Criterion for Noise Barriers

All receptors that meet the feasibility criterion must progress to the "reasonableness" phase. ***Phase 3*** of the noise abatement criteria requires that all of the following conditions be considered.

- Noise Reduction Design Goals
- Cost-effectiveness Value
- The Viewpoints of the Benefited Receptors

- **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).

- **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 dBA 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 preformed 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.

- **The 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.

7.4 Noise Abatement Summary

A total of 68 sites representing 50 residences, one school ball field, two day care playground areas, one cemetery, and 22 sites at a retirement home are predicted to be impacted by traffic noise under the future design year (2038) build condition, due to levels approaching or exceeding the Noise Abatement Criteria (NAC). Noise abatement measures were evaluated where future noise impacts were predicted to occur. However, noise barriers were not considered for receptors in CNE B, CNE K, CNE L, CNE N and CNE P for the following reasons.

- Sites in CNE B represent ball fields at the Pocahontas Middle School. No barrier was evaluated at this location because the County was not in favor of a noise barrier at this location due to safety concerns. Communications with the County regarding this decision are located in Appendix G.
- Sites in CNE K, CNE L, CNE N and CNE P have direct access to Three Chopt Road which prohibits the construction of a feasible noise barrier.
- The impacted residential site in CNE K is adjacent to the cemetery. To reduce the effect of flanking noise at this site, the barrier would need to extend to the cemetery. However, this is not feasible since there is an access requirement at the cemetery. Flanking noise refers to the noise component that diffracts around the ends of a noise barrier. FHWA recommends that barriers should extend beyond impacted receivers by as much as four-times the distance from the road to the receiver to offset the effects of flanking noise.

Seven noise barrier systems were evaluated for areas predicted to be impacted by traffic noise under the future design year build condition. All seven noise barrier systems were found to be both feasible and reasonable in accordance with VDOT's State Noise Abatement Policy. A barrier unit cost of $31 per square feet was used to calculate the noise barrier's cost.

NOTE: The corridor consists of noise sensitive sites on both sides of the roadway. To minimize the effect of reflection noise by the proposed barriers, a reflection analysis may need to be performed during the final design of the project. Or, in the absence of a reflections analysis, absorptive barriers can be recommended.

The barrier locations are shown on the graphics located in Appendix A. A barrier summary table of the evaluated barriers is shown in ***Table 5***. Details of the insertion losses associated with these evaluated barriers are listed in ***Table 6***. Warranted, Feasible, and Reasonable Worksheets were completed for the evaluated barriers are included in Appendix E.

Barrier 1

Barrier 1 is located within CNE C and extends along Three Chopt Road westbound lane. The barrier is designed to benefit the impacted sites located on the second story balconies at WBV (C22 to C26 and C37). The total barrier length would be 635 feet. The barrier has a uniform of height of 14 feet, resulting in a total surface area of 8,887 Square Feet (SF). The barrier provides a noise reduction of 4-13 dBA. The barrier would benefit all six impacted sites (C22 to C26 and C37). The barrier benefits an additional nine non-impacted sites (C27 to C33, C35 and C36). The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 100% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 592 Square Foot per Benefitted Receptor (SF/BR). This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier System 1 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 14 feet height, the barrier breaks the line of sight at all noise sensitive receptors.

Barrier System 2

Barrier System 2 is located within CNE D and extends along Three Chopt Road eastbound lane. The barrier is designed to benefit the impacted sites D7 to D13. The barrier consists of two separate barriers, Barrier 2A and Barrier 2B. The total barrier length would be 1,119 feet. The barrier has a uniform of height of 12 feet, resulting in a total surface area of 13,439 SF. The barrier provides a noise reduction of 1-12 dBA. The barrier would benefit six of the seven impacted sites (D7 to D11, and D13). The barrier cannot be extended further to benefit impacted site D12 due to the proposed permanent drainage easement in the area. The barrier benefits an additional three non-impacted sites (D14 to D16). The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 86% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 1,493 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier System 2 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 12 feet height, only part of the Barrier System (Barrier 2A) breaks the line of sight. Increasing the barrier height to break the line of sight for Barrier 2B would result in the barrier system exceeding the reasonable criterion. Since this is a preliminary analysis, and two feet barrier increments were used, the barrier would be optimized during final design stage.

Barrier 3

Barrier 3 is located within CNE E and extends along Three Chopt Road eastbound lane. The barrier is designed to benefit the impacted sites E5 and E6. The barrier was studied as an independent Barrier, and not a barrier system, since it is not interdependent with Barrier 4. The presence or absence of Barrier 3 does not affect the noise reductions for sites Benefitted by Barrier 4 and vice versa. The total barrier length would be 532 feet. The barrier has a uniform

of height of 12 feet, resulting in a total surface area of 6,387 SF. The barrier provides a noise reduction of 1-12 dBA. The barrier would benefit the two impacted sites. The barrier benefits an additional two non-impacted sites (E7 and E8). The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 100% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 1,597 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier 3 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 12 feet height, only part of the Barrier System (Barrier 2A) breaks the line of sight. Increasing the barrier height to break the line of sight for Barrier 2B would result in the barrier system exceeding the reasonable criterion. Since this is a preliminary analysis, and two feet barrier increments were used for the barrier analysis, the barrier would be optimized during final design stage.

Barrier System 4

Barrier System 4 is located within CNE E and CNE I and extends along Three Chopt Road eastbound lane. The barrier is designed to benefit the impacted sites E16 to E18, I2 and I3. The barrier consists of two separate barriers, Barrier 4A and Barrier 4B. The gap in the barrier was necessitated by the proposed permanent drainage easement around station 146+00. The total barrier length would be 974 feet. The barrier has a uniform of height of 14 feet, resulting in a total surface area of 13,629 SF. The barrier provides a noise reduction of 0-14 dBA. The barrier would benefit all five impacted sites. The barrier benefits an additional five non-impacted sites (E19, E20, E22, I1 and I4). The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 100% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 1,363 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier System 4 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 14 feet height, only part of the Barrier System (Barrier 4B) breaks the line of sight. Increasing the barrier height by 4 feet to break the line of sight for Barrier 4A did not change the results significantly. Since this is a preliminary analysis, and two feet barrier increments were used, the barrier would be optimized during final design stage.

Barrier 5

Barrier 5 is located within CNE H and extends along Three Chopt Road westbound lane. The barrier is designed to benefit the impacted sites located on the second and third story balconies at the apartments (H2, H3, and H8-H10). The total barrier length would be 754 feet. The barrier has a uniform of height of 20 feet, resulting in a total surface area of 486 SF. The barrier provides a noise reduction of 0-12 dBA. The barrier would benefit the all seven impacted sites. The barrier benefits additional 24 non-impacted sites (H1 to H4, H7 to H10, H13, and H15 to H18). The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 100% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it

results in a ratio 486 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier 5 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 20 feet height, the barrier breaks the line of site for the majority of the impacted sites. In addition, since part of Barrier 5 is parallel to Barrier 4, a parallel barrier analysis may be required during the final design stage of the project. Or, in the absence of a parallel barrier analysis, absorptive barriers can be recommended.

Barrier System 6

Barrier System 6 is located within CNE M and extends along Three Chopt Road westbound lane. The barrier is designed to benefit the impacted sites located mostly on the second and third story balconies at the Dogwood Terrace Retirement Living (M1 to M10). The barrier consists of two separate barriers, Barrier 6A and Barrier 6B. The total barrier length would be 386 feet. The barrier has a uniform of height of 20 feet, resulting in a total surface area of 7,725 SF. The barrier provides a noise reduction of 2-10 dBA. The barrier would benefit 14 of the 22 impacted sites. The barrier benefits an additional three non-impacted sites. The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 64% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 454 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier System 6 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 20 feet height, only part of the Barrier System (Barrier 6A) breaks the line of sight. Increasing the barrier height by 4 feet to break the line of sight for Barrier 4A did not change the results significantly. There was a difference of less than a decibel in the noise reduction. Since this is a preliminary analysis, and two feet barrier increments were used, the barrier would be optimized during final design stage.

Barrier System 7

Barrier System 7 is located within CNE O and extends along Three Chopt Road westbound lane. The barrier is designed to benefit the impacted sites O17 and O28 to O30. The barrier consists of two separate barriers, Barrier 7A and Barrier 7B. The total barrier length would be 825 feet. The barrier has a uniform of height of 14 feet, resulting in a total surface area of 11,551 SF. The barrier provides a noise reduction of 0-11 dBA. The barrier would benefit all four impacted sites representing nine residential units. The barrier benefits an additional non-impacted site, representing two residential units. The barrier is considered feasible since it provides at least 5 dBA of noise reduction to 100% (greater than 50%) of the impacted sites. The barrier is also considered reasonable since it results in a ratio 1,050 SF/BR. This barrier meets the 7 dBA design goal since it provides noise reduction of at least 7 dBA or great to more than one impacted site. Barrier System 7 is considered feasible and reasonable in accordance with VDOT's State Noise Abatement Policy.

NOTE: At the 14feet height, the barrier system breaks the line of site for all impacted receptors.

Table 5: Evaluated Noise Barrier Parameters

Barrier	Insertion Loss (IL)	Height (Range) (ft)	Total Length (ft)	Total Area (SF)	Benefitted	Area/Benefitted	Cost ($31/ft^2)
Barrier 1	4-13	14	635	8,887	15	592	$275,497
Barrier System 2	1-12	12	1,119	13,439	9	1,493	$416,609
Barrier 3	1-12	12	532	6,387	4	1,597	$197,997
Barrier System 4	0-14	14	974	13,629	10	1,363	$422,499
Barrier 5	0-12	20	754	15,073	31	486	$467,263
Barrier System 6	2-10	20	386	7,725	18	454	$239,475
Barrier System 7	0-11	14	825	11,551	11	1,050	$358,081

Table 6: Noise Barrier Insertion Loss

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
Barrier 1 Summary				
C22	1	67	57	11
C23	1	67	56	11
C24	1	67	55	12
C25	1	66	55	12
C26	1	66	54	12
C27	1	65	54	12
C28	1	65	54	11
C29	1	65	53	12
C30	1	64	52	12
C31	1	63	51	12
C32	1	62	51	11
C33	1	60	51	9
C34	1	61	56	4
C35	1	63	52	11
C36	1	64	52	12
C37	1	66	53	13
Barrier System 2 Summary				
D4	1	53	52	1

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
D5	1	55	53	3
D6	1	56	54	2
D7	1	67	58	9
D8	1	67	55	12
D9	1	67	55	12
D10	1	68	56	12
D11	1	68	60	9
D12	1	68	65	3
D13	1	68	62	6
D14	1	65	55	10
D15	1	63	55	8
D16	1	65	58	8
D17	1	63	60	3
D18	1	55	54	1
D19	1	54	52	2
D20	1	53	51	2
D21	1	53	51	2
D22	1	51	49	2
D23	1	51	49	2
D24	1	52	49	3
D25	1	53	50	3
D26	1	54	51	3
D27	1	55	52	3
D28	1	54	51	2
D29	1	55	54	2
D30	1	54	53	2
D31	1	54	53	1
D32	1	52	51	2
D33	1	52	49	2
D34	1	51	49	2
D35	1	50	48	3
D36	1	51	50	1
D37	1	52	50	2
D38	1	51	49	2

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
D39	1	51	48	2
D40	1	50	48	2
D41	1	51	50	1
D42	1	51	49	1
Barrier 3 Summary				
E3	1	58	57	1
E4	1	62	60	2
E5	1	68	58	11
E6	1	68	56	12
E7	1	64	55	9
E8	1	61	55	6
E9	1	61	57	4
E10	1	56	55	1
E11	1	55	54	1
E12	1	54	54	1
E13	1	55	54	1
E14	1	59	58	1
E15	1	64	63	1
E29	1	57	56	1
E30	1	55	53	2
E31	1	55	53	2
E32	1	55	54	1
Barrier System 4 Summary				
I1	1	64	55	9
I2	1	66	57	9
I3	1	67	58	9
I4	1	61	55	6
I5	1	61	58	4
I6	1	56	53	3
I7	1	55	52	3
I8	1	57	55	2
I9	1	55	54	1
E11	1	55	54	1

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
E12	1	54	53	2
E13	1	55	53	2
E14	1	59	56	3
E15	1	64	63	1
E16	1	66	60	6
E17	1	68	55	14
E18	1	67	54	13
E19	1	59	51	8
E20	1	57	51	6
E21	1	54	50	4
E22	1	54	49	5
E23	1	51	49	2
E24	1	51	49	2
E25	1	51	50	1
E26	1	51	50	1
E27	1	52	51	1
E28	1	54	54	0
Barrier 5 Summary				
H1-1st	1	60	52	8
H1-2nd	1	65	58	7
H2-1st	1	60	51	9
H2-2nd	1	64	57	8
H2-3rd	1	67	58	8
H3-1st	1	61	51	10
H3-2nd	1	64	56	8
H3-3rd	1	66	58	9
H4-1st	1	62	51	11
H4-2nd	1	65	56	9
H5-3rd	1	60	60	0
H6-3rd	1	54	54	1
H7-1st	1	61	49	12
H7-2nd	1	65	52	13
H8-1st	1	62	51	11
H8-2nd	1	66	53	13

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
H8-3rd	1	67	56	10
H9-1st	1	63	53	10
H9-2nd	1	66	54	12
H9-3rd	1	67	57	10
H10-1st	1	63	54	9
H10-2nd	1	66	56	11
H11-3rd	1	52	51	1
H12-3rd	1	55	54	1
H13-1st	1	56	47	9
H13-2nd	1	61	51	10
H13-3rd	1	63	51	12
H14-3rd	1	62	60	2
H15-1st	1	51	44	7
H15-2nd	1	57	46	10
H15-3rd	1	58	48	10
H16-1st	1	48	44	5
H16-2nd	1	52	46	5
H16-3rd	1	55	48	6
H17-3rd	1	53	49	5
H18	1	50	45	5
H19	1	51	47	4
H20-3rd	1	56	53	3
H21	1	52	52	1
Barrier System 6 Summary				
M1-1st	1	63	61	2
M1-2nd	1	66	62	4
M1-3rd	1	67	63	4
M2-1st	1	63	60	3
M2-2nd	1	66	62	5
M2-3rd	1	67	63	5
M3-1st	1	64	59	4
M3-2nd	1	68	61	6
M3-3rd	1	69	62	6
M4-1st	1	64	57	7

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
M4-2nd	1	69	60	10
M4-3rd	1	69	61	8
M5-1st	1	64	57	7
M5-2nd	1	69	59	10
M5-3rd	1	69	61	8
M6-1st	1	65	59	6
M6-2nd	1	69	61	8
M6-3rd	1	69	62	7
M7-1st	1	66	61	5
M7-2nd	1	68	63	6
M7-3rd	1	68	63	5
M8-1st	1	66	62	4
M8-2nd	1	68	63	5
M8-3rd	1	68	64	4
M9-1st	1	64	60	4
M9-2nd	1	66	62	4
M9-3rd	1	67	62	4
M10-1st	1	64	60	4
M10-2nd	1	66	62	4
M10-3rd	1	66	62	4
M11-1st	1	62	59	4
M11-2nd	1	64	61	4
M11-3rd	1	64	61	3
M12-1st	1	59	57	3
M12-2nd	1	62	59	3
M12-3rd	1	62	60	3
Barrier System 7 Summary				
O12	3	56	56	0
O13	2	59	59	0
O14	2	64	62	2
O15	3	56	53	3
O16	2	59	56	3
O17	2	66	61	5
O27	2	58	56	3

Receptor Number	No. of Dwelling / Recreational Units*	Predicted Future Design Build Noise Levels (2038 – NO Barrier)(dBA)	Predicted Future Design Build Noise Levels (2038 – with Existing Barrier 10) (dBA)	Insertion Loss (IL)** (dBA)
O28	3	66	60	5
O29	2	68	57	11
O30	2	66	58	8
O31	2	65	58	7
O32	3	64	60	4
O33	2	57	57	0
O34	2	56	56	0
O35	2	58	58	0
O36	2	58	58	0
O37	2	57	57	0
O38	4	54	53	0
O39	6	52	52	0
O40	1	55	53	1
*	Dwelling Units may refer to residential and/or recreational units			
**	Insertion Loss (IL) Sound Levels May be Different Due to Rounding			
	Indicates noise impact (NAC Only)			
	Indicates at least a 5dB benefit			

8. Construction Noise Considerations

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.

9. Public Involvement Process

9.1 Public Involvement Efforts

For noise barriers that are determined to be feasible and reasonable, the affected public will be given an opportunity to decide whether they are in favor of construction of the noise barrier. A final determination as to the construction of barriers will be made after the public hearing process. As part of the final design noise analysis, for barriers that are determined to be feasible and reasonable, input from the impacted property owners and renters must be obtained through citizen surveys via certified mail. Of the votes tallied, 50% or more must be in favor of a proposed noise barrier in order for that barrier to be considered further. Upon completion of the citizen survey, the VDOT Noise Abatement staff will make recommendations to the Chief Engineer for approval. Approved barriers will be incorporated into the road project plans. A technical memorandum, or noise barrier survey addendum report, will be prepared after the voting process has finished, which documents the voting results and summary of public comments of the noise barrier public survey process. This report is then submitted to the FHWA.

9.2 Information for Local Government Officials

Noise-Compatible Land-Use Planning

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 ***Appendix A.*** 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 it. A link to this brochure on FHWA's website is provided: 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 significant 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

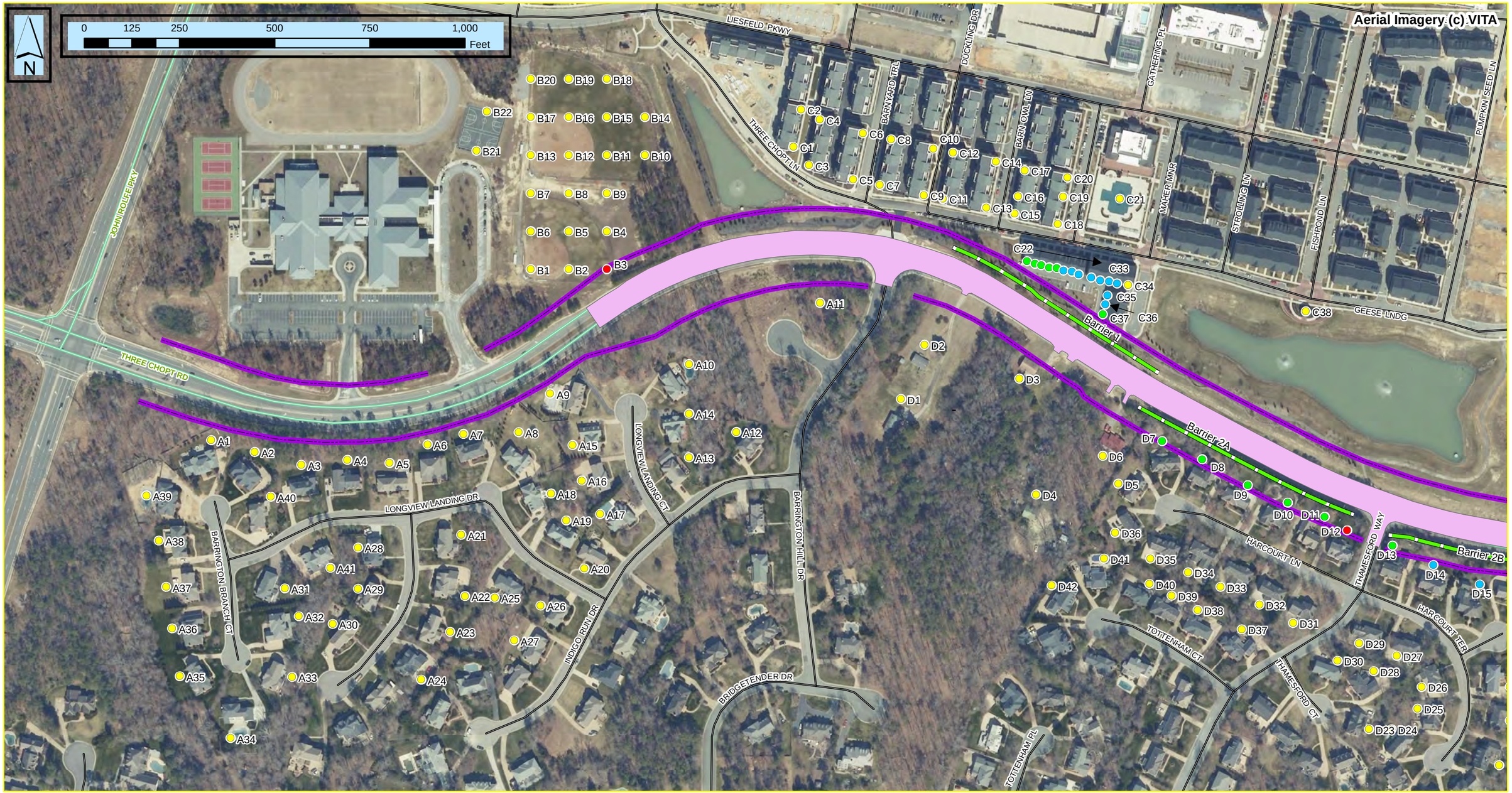
Noise Impact Zones in Undeveloped Land along the Study Corridor

Also required under the revised 2011 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. Then, the distances from the edge of the roadway to the Noise Abatement Criteria sound levels are determined through interpolation. Distances vary in the project corridor due to changes in traffic volumes, or terrain features. Any noise sensitive sites within these zones should be considered noise impacted if no barrier is present to reduce sound levels. The graphics in ***Appendix A*** show the predicted 66 dB contours for the project.

VDOT's Noise Abatement Program

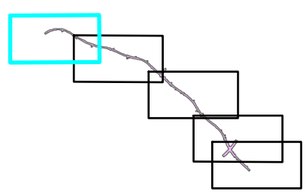
Information on VDOT's noise abatement program is available on VDOT's Website, at: http://www.virginiadot.org/projects/pr-noise-walls-about.asp . The site provides information on VDOT's noise program and policies, noise walls, and a downloadable noise wall brochure.

Appendix A



Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation

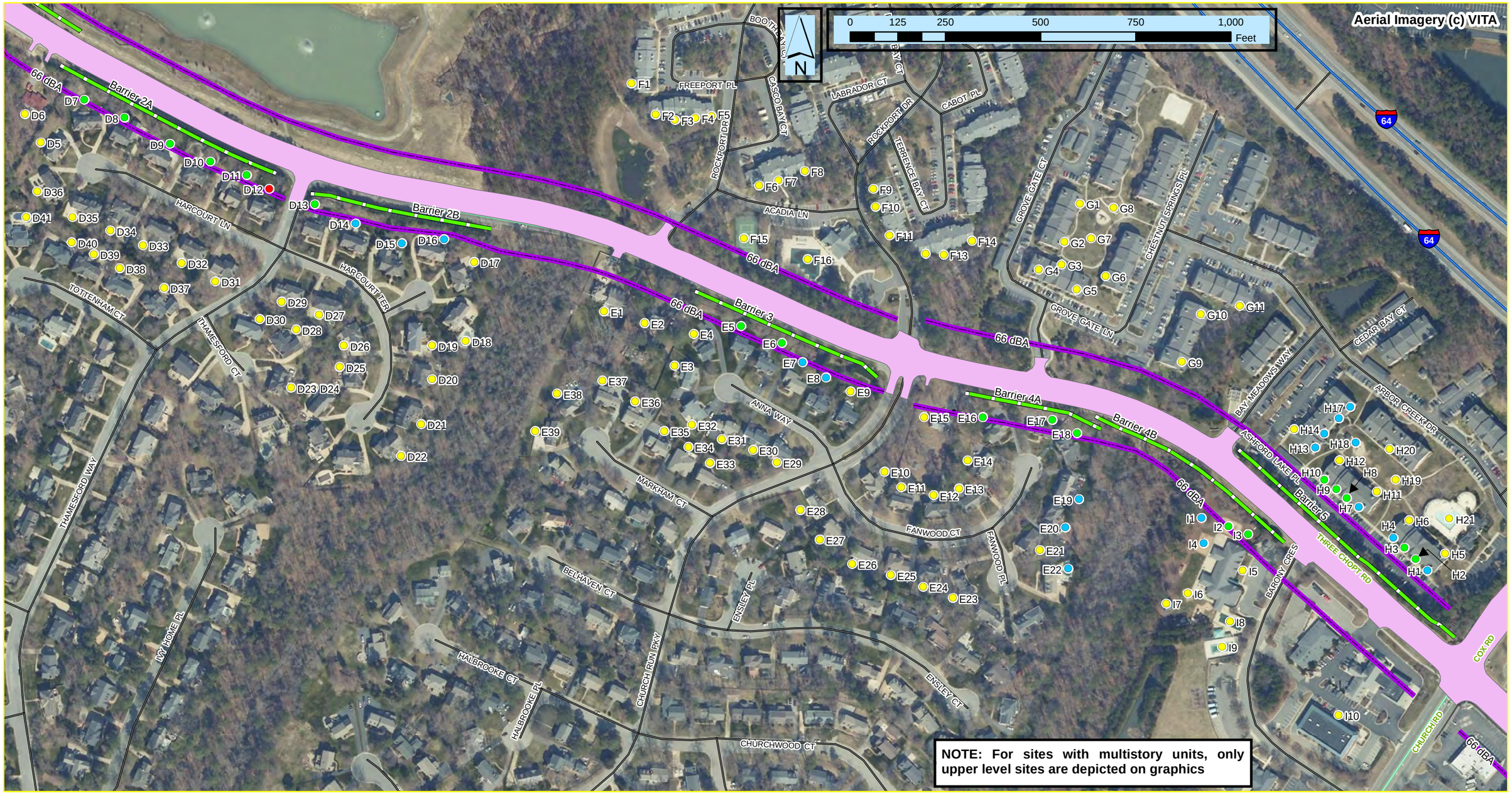


- Impacted and Benefitted
- Impacted and Not Benefiited
- Not Impacted and Benefitted
- Not Impacted and Not Benefitted
- 66 dBA Noise Contour
- Evaluated Barrier-Feasible and Reasonable
- Project Area

Three Chopt Road - Widening

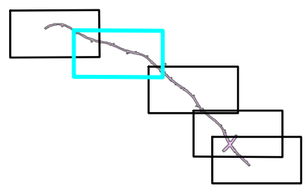
Henrico County

Appendix A1
Detailed Summary Results



Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation

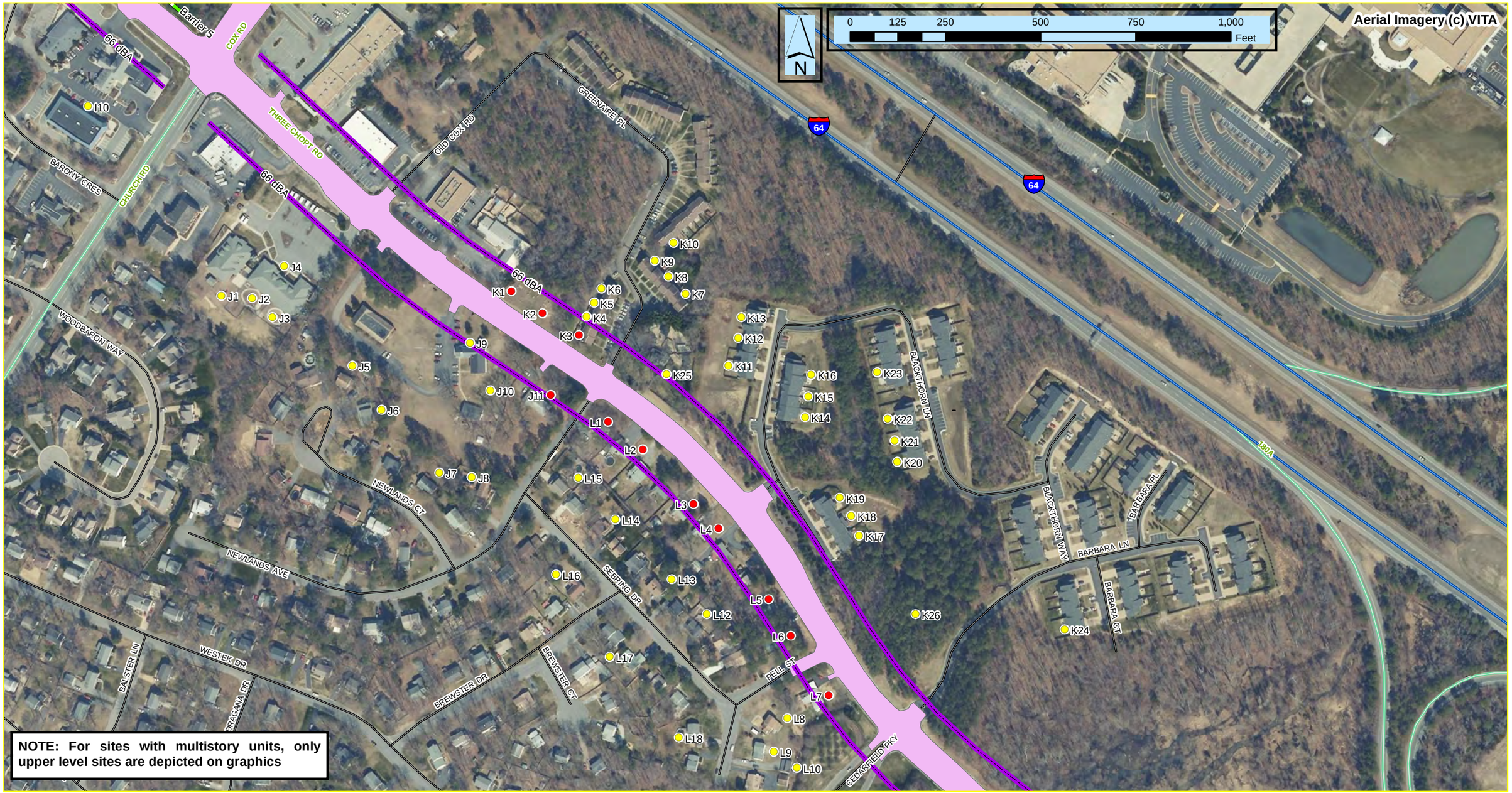


- Impacted and Benefitted
- Impacted and Not Benefiited
- Not Impacted and Benefitted
- Not Impacted and Not Benefitted
- 66 dBA Noise Contour
- Evaluated Barrier-Feasible and Reasonable
- Project Area

Three Chopt Road - Widening

Henrico County

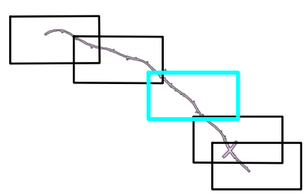
Appendix A2
Detailed Summary Results



NOTE: For sites with multistory units, only upper level sites are depicted on graphics

Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation

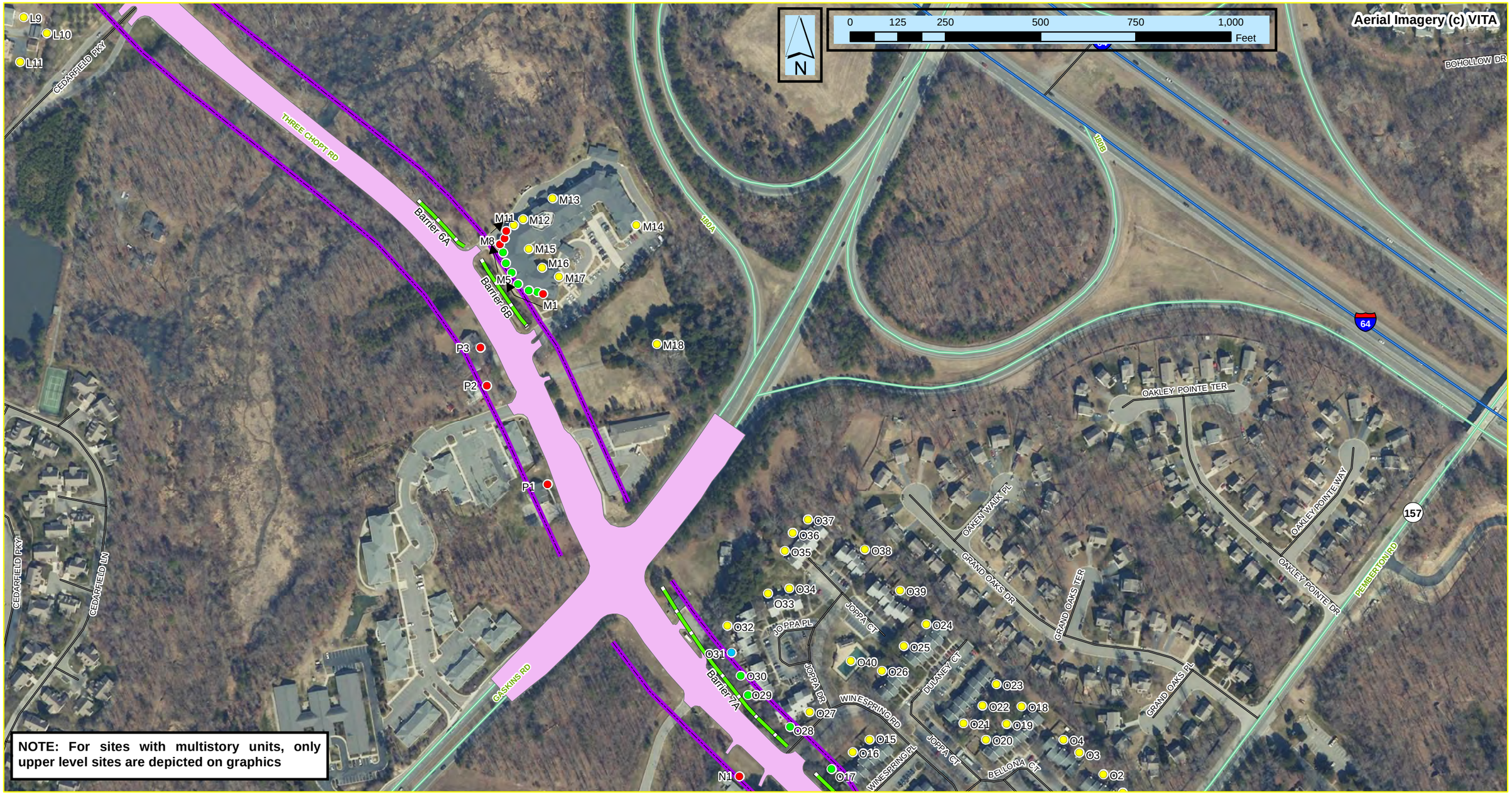


- Impacted and Benefitted
- Impacted and Not Benefiited
- Not Impacted and Benefitted
- Not Impacted and Not Benefitted
- 66 dBA Noise Contour
- Evaluated Barrier-Feasible and Reasonable
- Project Area

Three Chopt Road - Widening

Henrico County

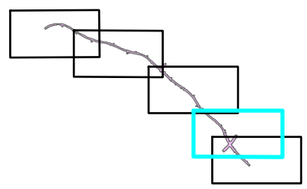
Appendix A3
Detailed Summary Results



NOTE: For sites with multistory units, only upper level sites are depicted on graphics

Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation

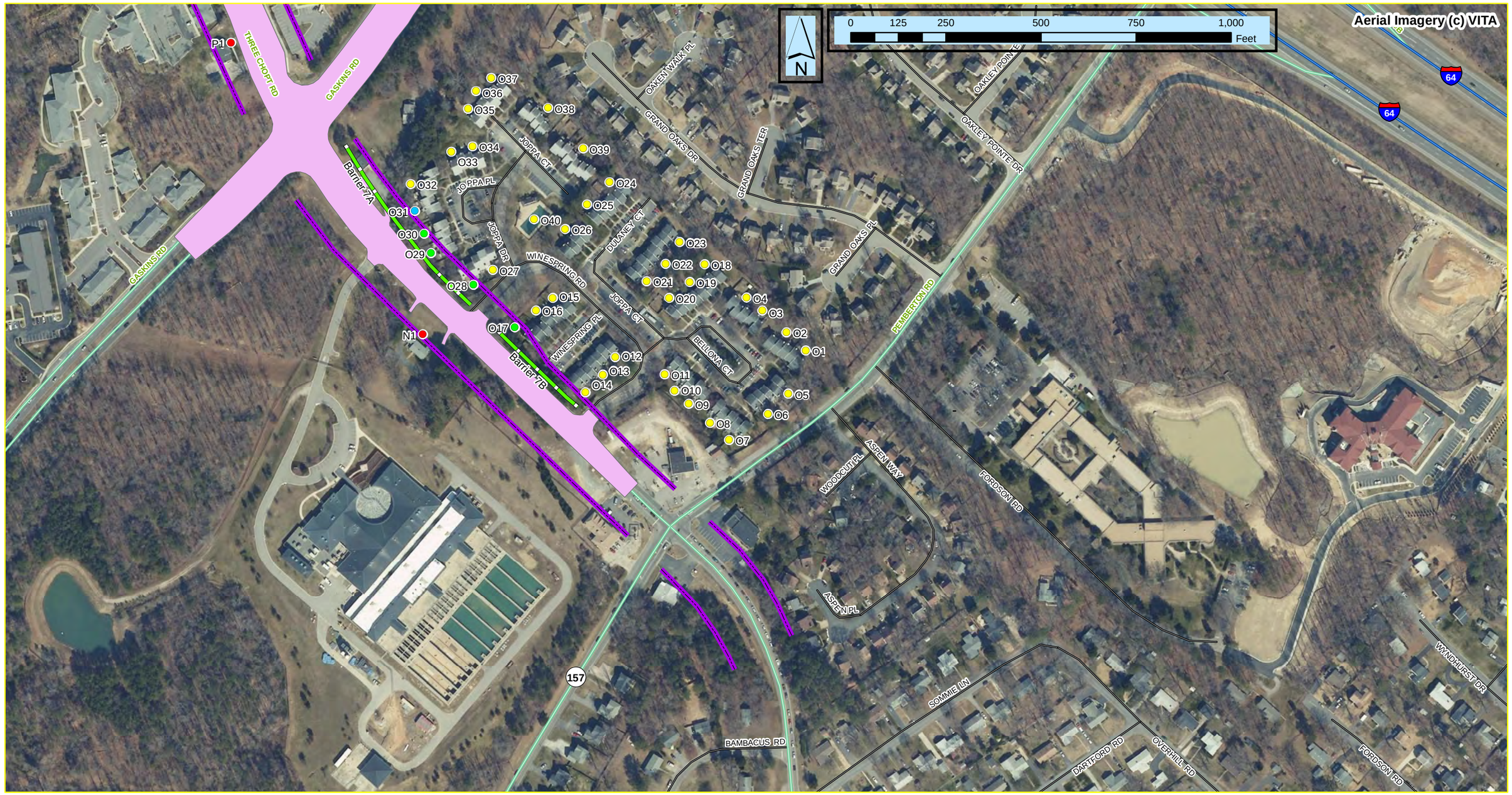


- Impacted and Benefitted
- Impacted and Not Benefiited
- Not Impacted and Benefitted
- Not Impacted and Not Benefitted
- 66 dBA Noise Contour
- Evaluated Barrier-Feasible and Reasonable
- Project Area

Three Chopt Road - Widening

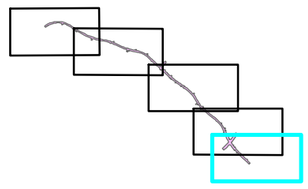
Henrico County

Appendix A4
Detailed Summary Results



Three Chopt Road - Widening
State Project: 9999-043-188, P101
UPC: 50528

Virginia Department of Transportation



- Impacted and Benefitted
- Impacted and Not Benefiited
- Not Impacted and Benefitted
- Not Impacted and Not Benefitted
- 66 dBA Noise Contour
- Evaluated Barrier-Feasible and Reasonable
- Project Area

Three Chopt Road - Widening

Henrico County

Appendix A5
Detailed Summary Results

Appendix B

5PM

Design Year Build 2038

Link 1	**John Rolfe Pkwy**				
	NB			SB	
Autos	525	48	Autos	583	47
Medium	5	48	Medium	5	47
Heavy	11	48	Heavy	12	47

Link 2	**Barrington Hill**				
	NB			SB	
Autos	57	32	Autos	18	32
Medium	0	0	Medium	0	0
Heavy	0	0	Heavy	0	0

Link 3	**3 Chopt**				
	NB			SB	
Autos	575	51	Autos	855	51
Medium	6	51	Medium	9	51
Heavy	12	51	Heavy	18	51

Link 4	**Thamesford Way**				
	NB			SB	
Autos	34	32	Autos	30	32
Medium	0	0	Medium	0	0
Heavy	1	32	Heavy	0	32

Link 5	**3 Chopt**				
	NB			SB	
Autos	575	51	Autos	855	51
Medium	5	51	Medium	9	51
Heavy	12	51	Heavy	18	51

Link 6	**Churh Run Pkwy**				
	NB			SB	
Autos	58	32	Autos	87	32
Medium	0	0	Medium	0	0
Heavy	0	0	Heavy	1	32

Link 7	**3 Chopt**				
	NB			SB	
Autos	575	51	Autos	855	51
Medium	6	51	Medium	9	51
Heavy	12	51	Heavy	18	51

Link 8	**Church rd**				
	NB			SB	
Autos	182	48	Autos	421	47
Medium	2	48	Medium	4	47
Heavy	4	48	Heavy	3	47

Link 9	**Cox rd**				
	NB			SB	
Autos	309	43	Autos	806	40
Medium	1	43	Medium	3	40
Heavy	2	43	Heavy	5	40

Link 10	**3 Chopt**				
	NB			SB	
Autos	575	52	Autos	855	51
Medium	6	52	Medium	9	51
Heavy	12	52	Heavy	18	51

Link 11	**3 Chopt**				
	NB			SB	
Autos	914	50	Autos	1101	50
Medium	9	50	Medium	11	50
Heavy	19	50	Heavy	23	50

Link 12	**Gaskins**				
	NB			SB	
Autos	894	47	Autos	1644	45
Medium	3	47	Medium	6	45
Heavy	6	47	Heavy	11	45

Link 13	**Gaskins**				
	NB			SB	
Autos	1087	46	Autos	1930	45
Medium	4	46	Medium	6	45
Heavy	7	46	Heavy	13	45

Link 14	**3 Chopt**				
	NB			SB	
Autos	734	47	Autos	668	47
Medium	8	47	Medium	7	47
Heavy	15	47	Heavy	14	47

John Rolfe Pkwy-North of 3 Chopt					
	EB			WB	
Autos	525	48	Autos	583	47
Medium	5	48	Medium	6	47
Heavy	11	48	Heavy	12	47

3 Chopt-west of John Rolfe

	EB			WB	
Autos	575	40	Autos	855	39
Medium	6	40	Medium	9	39
Heavy	12	40	Heavy	18	39

5PM

Exist 2038

Link 1	**John Rolfe Pkwy**				
	NB			SB	
Autos	438	48	Autos	486	48
Medium	5	48	Medium	5	48
Heavy	9	48	Heavy	10	48

Link 1	**Barrington Hill**				
	NB			SB	
Autos	57	32	Autos	18	32
Medium	0	0	Medium	0	0
Heavy	0	0	Heavy	0	0

Link 1	**3 Chopt**				
	NB			SB	
Autos	487	51	Autos	723	50
Medium	5	51	Medium	7	50
Heavy	10	51	Heavy	15	50

Link 4	**Thamesford Way**				
	NB			SB	
Autos	34	32	Autos	30	32
Medium	0	0	Medium	0	0
Heavy	1	32	Heavy	0	0

Link 5	**3 Chopt**				
	NB			SB	
Autos	487	51	Autos	723	50
Medium	5	51	Medium	7	50
Heavy	10	51	Heavy	15	50

Link 6	**Churh Run Pkwy**				
	NB			SB	
Autos	58	32	Autos	87	32
Medium	0	0	Medium	0	0
Heavy	0	0	Heavy	1	32

Link 7	**3 Chopt**				
	NB			SB	
Autos	487	51	Autos	723	50
Medium	5	51	Medium	7	50
Heavy	10	51	Heavy	15	50

Link 8	**Church rd**				
	NB			SB	
Autos	161	48	Autos	374	47
Medium	2	48	Medium	4	47
Heavy	3	48	Heavy	8	47

Link 9	**Cox rd**				
	NB			SB	
Autos	273	44	Autos	711	41
Medium	1	44	Medium	2	41
Heavy	2	44	Heavy	5	41

Link 10	**3 Chopt**				
	NB			SB	
Autos	487	51	Autos	723	50
Medium	5	51	Medium	7	50
Heavy	10	51	Heavy	15	50

Link 11	**3 Chopt**				
	NB			SB	
Autos	812	50	Autos	978	50
Medium	8	50	Medium	10	50
Heavy	17	50	Heavy	20	50

Link 12	**Gaskins**				
	NB			SB	
Autos	797	47	Autos	1466	45
Medium	3	47	Medium	5	45
Heavy	5	47	Heavy	10	45

Link 13	**Gaskins**				
	NB			SB	
Autos	964	47	Autos	1710	45
Medium	3	47	Medium	6	45
Heavy	6	47	Heavy	12	45

Link 14	**3 Chopt**				
	NB			SB	
Autos	685	47	Autos	623	47
Medium	7	47	Medium	6	47
Heavy	14	47	Heavy	13	47

John Rolfe Pkwy-North of 3 Chopt					
	EB			WB	
Autos	438	48	Autos	486	48
Medium	5	48	Medium	5	48
Heavy	9	48	Heavy	10	48

3 Chopt-west of John Rolfe

EB			WB		
Autos	487	40	Autos	723	39
Medium	5	40	Medium	7	39
Heavy	10	40	Heavy	15	39

Appendix C

State Project:9999-043-188, P101 (UPC 50528)
Three Chopt Road

Site # ST1 **Description:** Barrington Hill Drive
Meter # LD 824
Done by Muchenje & Kohler

Monitoring Data:

Date	08/13/14
Start Time	10:05 AM
End time	10:20 AM
Duration	15 minutes
Peak/OffPeak	
Leq.	**53.0 dBA**

Calibration Data:

Begin Check	113.9 dBA
End Check	

Atmospheric Data

Wind Speed	Calm
Temp	80 deg
Humidity	52%
Weather Conditions	Sunny

Traffic Counts:

Roadway	3Chopt WB		3Chopt EB		Local	
Cars	55		54		9	
MT	2		1		4	
HT	1		0		0	
Speed	45mph		45mph		25mph	

Site Data: **Pavement Type:**

Plan View:

North Arrow: N

Profile View:

Monitoring Notes:

Time	Comment
10:05	
10:06	
10:07	
10:08	Local vehicle
10:09	
10:10	
10:11	
10:12	
10:13	
10:14	
10:15	
10:16	
10:17	
10:18	
10:19	
10:20	
	Faint constructuion noise in the background
	Crickets and cicadas in the background

State Project: 9999-043-188, P101 (UPC 50528)
Three Chopt Road

Site # ST2 **Description:** Fanwood Ct
Meter # LD 824
Done by Muchenje & Kohler

Monitoring Data:

Date	08/13/14
Start Time	10:35 AM
End time	10:45 AM
Duration	10 minutes
Peak/OffPeak	
Leq.	**53.5 dBA**

Calibration Data:

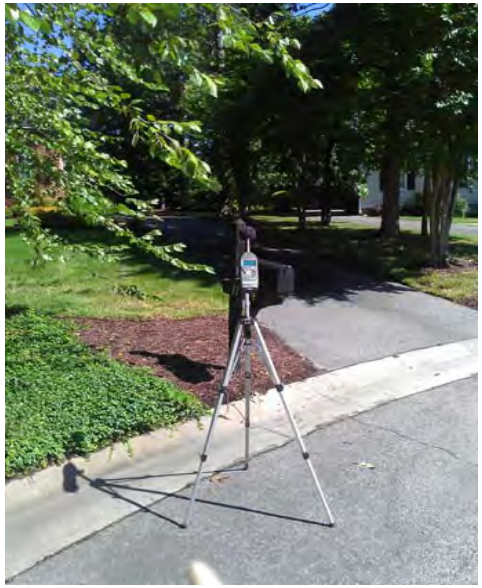
Begin Check	113.9 dBA
End Check	

Atmospheric Data

Wind Speed	Calm
Temp	80 deg
Humidity	52%
Weather Conditions	Sunny

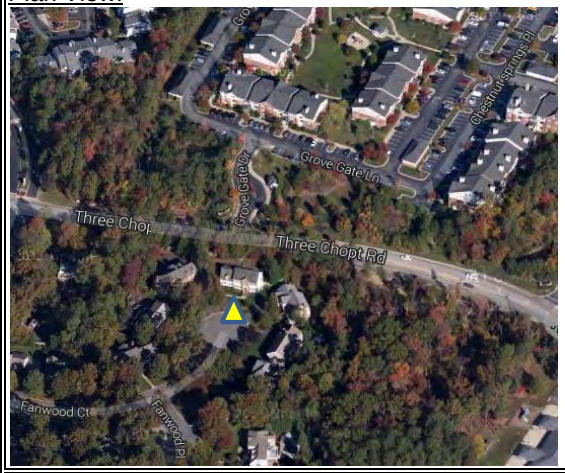
Traffic Counts:

Roadway	3Chopt WB		3Chopt EB		Local	
Cars	41		39			
MT	2		1			
HT	1		0			
Speed	45mph		45mph			



Site Data: **Pavement Type:**

Plan View:



North Arrow: N

Profile View:

Monitoring Notes:

Time	Comment
10:35	
10:36	Local vehicle
10:37	
10:38	
10:39	
10:40	
10:41	mower turned on
10:42	
10:43	
10:44	
10:45	
	Crickets and cicadas in the background
	Mower turned on, this time for a lengthy time. Had to
	terminate the monitoring exercise prematurely (5 minutes early).
	Therefore, instead of the planed 15 min of monitoring, we were
	only able to monitor for 10 min.

State Project: 9999-043-188, P101 (UPC 50528)
Three Chopt

Site # ST3 **Description:** Newlands Ave
Meter # LD 824
Done by Muchenje & Kohler

Monitoring Data:

Date	08/13/14
Start Time	11:00 AM
End time	11:15 AM
Duration	15 minutes
Peak/OffPeak	
Leq.	**55.3dBA**

Calibration Data:

Begin Check	113.9 dBA
End Check	

Atmospheric Data

Wind Speed	Calm
Temp	80 deg
Humidity	52%
Weather Conditions	Sunny

Traffic Counts:

Roadway	3Chopt WB		3Chopt EB		Local	
Cars	96		99		2	
MT	3		2		0	
HT	0		0		0	
Speed	45mph		45mph		25mph	

Site Data: **Pavement Type:**

Plan View:

North Arrow: N

Profile View:

Monitoring Notes:

Time	Comment
11:00	
11:01	
11:02	
11:03	
11:04	
11:05	
11:06	
11:07	
11:08	
11:09	
11:10	
11:11	
11:12	
11:13	2 local vehicles
11:14	
11:15	
	I64 can be heard in the background, cicadas in the background
	people on the adjucent road working and conversing, dogs barking

Appendix D

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219-2000

Gregory A. Whirley
Commissioner

August 27, 2013

MEMORANDUM

TO: Michele Piccolomini, Project Manager

FROM: Fang Yang, Noise Abatement Engineer

SUBJECT: UPC 50528

The 2009 General Assembly passed Chapter 120 (HB 2577, as amended by HB2025), which amends the Code of Virginia by adding in Article 15 of Chapter 1 of Title 33.1 a section numbered 33.1-223.2:21, relating to highway noise abatement.

House Bill 2025 States: Requires that 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 sound 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.

In an effort to honor the intent of HB 2025 we are asking for your input (per Chapter VI of Materials Division's Manual of Instruction and Section 2B-3 Determination of Roadway Design of the VDOT Road Design manual (pages 2B-5 and 2B-6)). As part of the Noise Technical Report and technical files, we are seeking your professional opinion by providing comments for the project noted above. Please distribute this memorandum to the appropriate District staff and combine all responses into one response.

Should you have any questions, please contact me at (804) 371-6768. Thank you for your time and consideration regarding this request.

Comment: Is noise reducing design feasible in lieu of construction of noise walls or sound barriers? For example, the roadway alignment can be shifted away from noise sensitive receptors or the roadway can be placed in deep cut.

Response: The horizontal alignment for this project is predicated on utilizing the existing pavement and alignment as much as possible and limiting the acquisition of right-of-way and impacts to properties. Shifting of the road from receptors on one side of the road would affect receptors on the other side and create alignment issues as well as additional right-of-way acquisitions. Vertical alignment changes would eliminate the utilization of existing pavement and cause total roadway reconstruction. (Rob Tieman, P.E., Henrico County Capital Projects Manager)

Comment: Can the project support the use of low noise pavement in lieu of construction of noise walls or sound barriers? (Materials Division to address)

Response: The Virginia Department of Transportation is not authorized by the Federal Highway Administration to use "quiet pavement" at this time as a form of noise mitigation. Upon completion of the Quiet Pavement Pilot Program and approval from FHWA, the use of "quiet pavement" will be given additional consideration. (LJ Muchenje, C.O. Environmental)

Comment: Can landscaping be utilized to act as a visual screen if visual screening is required?

Response: No visual screening is required or is possible without additional right-of-way and or easement acquisitions. (Rob Tieman, P.E., Henrico County Capital Projects Manager)

Appendix E

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier 1
Community Name and/or CNE#	CNE C
Noise Abatement Category(s)	B
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	6
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	6
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	100%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
a.	Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	8,887 SF
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	9
d.	Total number of benefited receptors.	15
e.	Surface Area per benefited receptor unit. (ft^2/BR)	592 SF/BR
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
a.	Length of the proposed noise barrier. (ft)	635 ft
b.	Height range of the proposed noise barrier. (ft)	14-14 ft
c.	Average height of the proposed noise barrier. (ft)	14 ft
d.	Cost per square foot. ($/$ft^2$)	$31.0
e.	Total Barrier Cost ($)	$275,497
f.	Barrier Material	
3	**Community Desires Related to the Barrier**	
	Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier System 2
Community Name and/or CNE#	CNE D
Noise Abatement Category(s)	B
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	7
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	6
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	86%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
	a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	13,439 SF
	b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6
	c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	3
	d. Total number of benefited receptors.	9
	e. Surface Area per benefited receptor unit. (ft^2/BR)	1,493 SF/BR
	f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
	g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
	a. Length of the proposed noise barrier. (ft)	1,119 ft
	b. Height range of the proposed noise barrier. (ft)	12-12 ft
	c. Average height of the proposed noise barrier. (ft)	12 ft
	d. Cost per square foot. ($/$ft^2$)	$31.0
	e. Total Barrier Cost ($)	$416,609
	f. Barrier Material	
3	**Community Desires Related to the Barrier** Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier 3
Community Name and/or CNE#	CNE E
Noise Abatement Category(s)	B
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	2
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	2
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	100%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
a.	Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	6,387 SF
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	2
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	2
d.	Total number of benefited receptors.	4
e.	Surface Area per benefited receptor unit. (ft^2/BR)	1,597 SF/BR
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
a.	Length of the proposed noise barrier. (ft)	532 ft
b.	Height range of the proposed noise barrier. (ft)	12-12 ft
c.	Average height of the proposed noise barrier. (ft)	12 ft
d.	Cost per square foot. ($/$ft^2$)	$31.0
e.	Total Barrier Cost ($)	$197,997
f.	Barrier Material	
3	**Community Desires Related to the Barrier** Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier System 4
Community Name and/or CNE#	CNE I and CNE E
Noise Abatement Category(s)	B and C
Design phase:	Preliminary design

Warranted

1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

Feasibility

1	Impacted receptor units	
a.	Number of impacted receptor units:	5
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	5
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	100%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
a.	Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	13,629 SF
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	5
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	5
d.	Total number of benefited receptors.	10
e.	Surface Area per benefited receptor unit. (ft^2/BR)	1,363 SF/BR
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
a.	Length of the proposed noise barrier. (ft)	974 ft
b.	Height range of the proposed noise barrier. (ft)	14-14 ft
c.	Average height of the proposed noise barrier. (ft)	14 ft
d.	Cost per square foot. ($/$ft^2$)	$31.0
e.	Total Barrier Cost ($)	$422,499
f.	Barrier Material	
3	**Community Desires Related to the Barrier**	
	Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier 5
Community Name and/or CNE#	CNE H
Noise Abatement Category(s)	B
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	7
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	7
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	100%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
a.	Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	15,073 SF
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	7
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	24
d.	Total number of benefited receptors.	31
e.	Surface Area per benefited receptor unit. (ft^2/BR)	486 SF/BR
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
a.	Length of the proposed noise barrier. (ft)	974 ft
b.	Height range of the proposed noise barrier. (ft)	14-14 ft
c.	Average height of the proposed noise barrier. (ft)	14 ft
d.	Cost per square foot. ($/$ft^2$)	$31.0
e.	Total Barrier Cost ($)	$467,263
f.	Barrier Material	
3	**Community Desires Related to the Barrier** Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier System 6
Community Name and/or CNE#	CNE M
Noise Abatement Category(s)	C
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	22
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	14
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	64%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
	a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	7,725 SF
	b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	14
	c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	3
	d. Total number of benefited receptors.	17
	e. Surface Area per benefited receptor unit. (ft^2/BR)	454 SF/BR
	f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
	g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
	a. Length of the proposed noise barrier. (ft)	386 ft
	b. Height range of the proposed noise barrier. (ft)	20-20 ft
	c. Average height of the proposed noise barrier. (ft)	20 ft
	d. Cost per square foot. ($/$ft^2$)	$31.0
	e. Total Barrier Cost ($)	$239,475
	f. Barrier Material	
3	**Community Desires Related to the Barrier**	
	Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	17-Sep-14
Project No. and UPC:	UPC 50528
County:	Henrico
District:	Richmond
Barrier System ID:	Barrier System 7
Community Name and/or CNE#	CNE O
Noise Abatement Category(s)	B
Design phase:	Preliminary design

	Warranted	
1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	N/A
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

	Feasibility	
1	Impacted receptor units	
a.	Number of impacted receptor units:	9
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	9
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	100%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	No
4	Will placement of the noise barrier conflict with existing utility locations?	No

	Reasonableness	
1	**Surface Area (Square foot)-Benefit Factors**	
a.	Surface Area (Total square foot) of the proposed noise barrier. (ft^2)	11,551 SF
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	9
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	2
d.	Total number of benefited receptors.	11
e.	Surface Area per benefited receptor unit. (ft^2/BR)	1,050 SF/BR
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes
2	**Additional Noise Barrier Details**	
a.	Length of the proposed noise barrier. (ft)	825 ft
b.	Height range of the proposed noise barrier. (ft)	14-14 ft
c.	Average height of the proposed noise barrier. (ft)	14 ft
d.	Cost per square foot. ($/$ft^2$)	$31.0
e.	Total Barrier Cost ($)	$358,081
f.	Barrier Material	
3	**Community Desires Related to the Barrier**	
	Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to “decision” block and answer “no” to reasonableness question. As the reason for this decision, state that “The majority of the impacted receptor unit owners do not desire the barrier.”	

Decision	
Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

Appendix F

List of Preparers / Reviewers

Lovejoy Muchenje, P.E.
VDOT Noise Abatement Engineer
Education: B.S. Mechanical Engineering
Professional Experience: 7 Years
Role: Noise Monitoring, Noise Analysis, Report Preparation

Joshua D. Kozlowski
VDOT Noise Abatement Specialist
Education: B.S. Geophysics
Professional Experience: 13 Years
Role: Technical Analysis Reviewer

Paul Kohler
VDOT Noise Abatement Section Manager
Education: B.S. Terrestrial Ecology
Professional Experience: 21 Years
Role: Technical Analysis Reviewer

Appendix G

From:	Greulich, Anthony
To:	Muchenje, Lovejoy "LJ" P.E. (VDOT)
Subject:	RE: UPC 50528_undeveloped lands with an approved building permit
Date:	Monday, August 11, 2014 2:14:53 PM
Attachments:	RE Three Chopt Noise Study.msg

LJ,

I did a similar study back in Sept of 2013. See attached email. Is this sufficient for what you're looking for now or do you need something else?

Thks/Rgds
Tony
804-501-5290

From: Muchenje, Lovejoy 'LJ' P.E. (VDOT) [mailto:Lovejoy.Muchenje@VDOT.Virginia.gov]
Sent: Friday, August 08, 2014 7:33 AM
To: Strauss, James
Subject: RE: UPC 50528_undeveloped lands with an approved building permit

Jim-

Below are the project limits

Project Limit--From: BARRINGTON HILL DRIVE
Project Limit--To: GASKINS ROAD

Thanks,

LJ Muchenje, P.E.
(804)371-6768

****Please note: The Virginia Department of Transportation has recently updated the State Noise Abatement Policy and created a Guidance Manual (July 14, 2014). The policy and manual can be located at the following address: http://www.virginiadot.org/projects/pr-noise-walls-about.asp****

From: Strauss, James [mailto:str03@henrico.us]
Sent: Thursday, August 07, 2014 2:13 PM
To: Muchenje, Lovejoy 'LJ' P.E. (VDOT)
Subject: RE: UPC 50528_undeveloped lands with an approved building permit

LJ:

Could you define the project corridor again please?

Jlim

From: Muchenje, Lovejoy 'LJ' P.E. (VDOT) [mailto:Lovejoy.Muchenje@VDOT.Virginia.gov]
Sent: Thursday, August 07, 2014 1:23 PM

To: Strauss, James
Cc: Piccolomini, Michele (VDOT)
Subject: UPC 50528_undeveloped lands with an approved building permit

Jim-I got your email.

As discussed, I am performing the noise study for the above project. Would you assist me in answering the below questions-

• Are there undeveloped lands with an approved building permits **within the project corridor**. Per the current noise policy these lands would need to be included as part of the noise study.

Your timely response would be greatly appreciated.

Thanks,

LJ Muchenje, P.E.
(804)371-6768

****Please note: The Virginia Department of Transportation has recently updated the State Noise Abatement Policy and created a Guidance Manual (July 14, 2014). The policy and manual can be located at the following address: http://www.virginiadot.org/projects/pr-noise-walls-about.asp****

From: Strauss, James [mailto:str03@henrico.us]
Sent: Thursday, August 07, 2014 1:07 PM
To: Muchenje, Lovejoy 'LJ' P.E. (VDOT)
Subject: Hello

Let's see if this works!
Jim

James P. Strauss, PLA
Principal Planner
Henrico County Planning Department
P.O. Box 90775, Henrico, VA 23273
(804) 501-5227
(804) 501-4379 (f)
str03@co.henrico.va.us

lovejoy.muchenje@vdot.virginia.gov

From: Greulich, Anthony
To: Leininger, Richard
Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study
Attachments: BLD2013-00180.pdf
POD-032-06 PC Approved Layout.pdf

Richard,

The permit on 5, BLD2013-01080 has not been approved yet so the attached layout of the site may change.

The permits on 14, BLD2013-00070, 71 and 72 have also not been approved yet. However, they are for a POD so I've attached the approved layout that the Planning Commission approved. We don't have the construction plans scanned yet, but the layout is roughly the same.

Thks/Rgds
Tony

From: Leininger, Richard [mailto:Richard.Leininger@aecom.com]
Sent: Friday, September 20, 2013 5:00 PM
To: Greulich, Anthony
Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study

Tony,
From this information it appears there is a house planned for map reference 5 and three buildings for map reference 14. Does this mean there is a currently active building permit for these structures? If there is, we will need to see the POD that shows the location of the buildings so our Noise Study can address that. Would we be able to obtain those POD's? A scan e-mailed to me of the sheet that shows the building situated on the lot would be all we need if that is possible.

Thank you for all of your help with this.

Richard Leininger, P.E.
Roadway Dept. Manager
Transportation
D 804.515.8469
richard.leininger@aecom.com

AECOM
4840 Cox Road, Glen Allen, Virginia 23060
T 804.515.8300 F 804.515.8308
www.aecom.com

From: Greulich, Anthony [mailto:gre31@co.henrico.va.us]
Sent: Friday, September 20, 2013 4:38 PM
To: Leininger, Richard

Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study

Richard,

See attached.

Thks/Rgds
Tony

From: Leininger, Richard [mailto:Richard.Leininger@aecom.com]
Sent: Thursday, September 19, 2013 1:27 PM
To: Greulich, Anthony
Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study

Not only frontage. The parcel could back up to Three Chopt Road, but not be fronted on it. Any undeveloped parcel that is adjacent to Three Chopt Road right-of-way is what we are looking for.

Richard Leininger, P.E.
Roadway Dept. Manager
Transportation
D 804.515.8469
richard.leininger@aecom.com

AECOM
4840 Cox Road, Glen Allen, Virginia 23060
T 804.515.8300 F 804.515.8308
www.aecom.com

From: Greulich, Anthony [mailto:gre31@co.henrico.va.us]
Sent: Thursday, September 19, 2013 12:35 PM
To: Leininger, Richard
Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study

Richard,

We've currently only looking at properties that have frontage on Three Chopt Road. Is this ok?

Thks/Rgds
Tony

From: Leininger, Richard [mailto:Richard.Leininger@aecom.com]
Sent: Wednesday, September 18, 2013 4:00 PM
To: Greulich, Anthony
Cc: Tieman, Robert
Subject: RE: Three Chopt Noise Study

Anthony,
You are correct, West Broad Village is already developed and has been taken into account for the study. We only need confirmation of undeveloped parcels that have building permits for future development.

Richard Leininger, P.E.
Roadway Dept. Manager
Transportation
D 804.515.8469
richard.leininger@aecom.com

AECOM
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T 804.515.8300 F 804.515.8308
www.aecom.com

From: Greulich, Anthony [mailto:gre31@co.henrico.va.us]
Sent: Wednesday, September 18, 2013 3:29 PM
To: Leininger, Richard
Subject: Three Chopt Noise Study

Hi Richard,

I am working with Leslie News on responding to your request for information related to your Three Chopt Noise Study. I have a question about your scope of work, specifically "Would you please verify that there are no active building permits in this corridor on undeveloped land? " An example is West Broad Village. It is within your scope, and there are numerous building permits in it, but this is land that is already developed so I'm guessing it would NOT be part of your study.

Please confirm that we're only looking for land that is currently undeveloped i.e. not cleared, still wooded and is proposed with a building permit, to be developed shortly.

Thks
Tony

Anthony R. Greulich
County Planner III – Plan Review Expeditor
Development Review & Design Division
Henrico County Planning Department
P.O. Box 90775
Henrico, VA 23273-0775
T) 804-501-5290
F) 804-501-4379
gre31@co.henrico.va.us

From:	Kohler, Paul (VDOT)
To:	Muchenje, Lovejoy "LJ" P.E. (VDOT)
Subject:	Fwd: Three Chopt Noise Study - Pocahontas Middle School
Date:	Thursday, September 11, 2014 3:59:19 PM

Thanks,
Paul Kohler

Sent from my iPhone

Begin forwarded message:

> **From:** "Yob, Steven" <yob@henrico.us>
> **Date:** September 11, 2014 at 3:09:15 PM EDT
> **To:** "Kohler, Paul (VDOT) (Paul.Kohler@VDOT.Virginia.gov)" <Paul.Kohler@VDOT.Virginia.gov>
> **Cc:** "Tieman, Robert" <tie@henrico.us>, "Eure, Todd" <eur@henrico.us>
> **Subject: Three Chopt Noise Study - Pocahontas Middle School**
>
> Dear Mr. Kohler:
>
> I am writing to confirm that the county does not want a noise wall in front of the Pocahontas Middle School. The school was identified by the noise study as a receptor which would warrant a noise wall.
>
> Our determination is based on the safety and security of our students. Public safety and emergency considerations require a clear view from the street of our campuses and a noise wall would impede this view and hinder efforts to police the school grounds and provide emergency services.
>
> Thank you very much for your assistance and support with this matter. Please call me if you have any questions.
>
> Steven J. Yob, P.E.
> Director | Department of Public Works
> P.O. Box 90775 | Henrico County, Virginia 23272-0775
> Email: Steven.Yob@Henrico.us
> O: (804) 501 4390 C: (804) 349 2298