VDOT

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

MARCH 2020

Noise Technical Report

State Project #: 0220-044-052, P101; UPC: 110916
Federal Project #: STP-044-2(059)

Prepared in Coordination With:

U.S. Department of Transportation
Federal Highway Administration

NOISE ANALYSIS TECHNICAL REPORT

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EXECUTIVE SUMMARY

This report describes the details of a noise impact assessment and preliminary noise abatement evaluation performed for the Martinsville Southern Connector Study in Henry County, Virginia. Information in this report is intended to support the Draft Environmental Impact Statement (EIS) that has been prepared by the Virginia Department of Transportation (VDOT), in conjunction with the Federal Highway Administration (FHWA) as the lead federal agency. The Draft EIS has been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), codified in 42 USC §4321-4347, as amended, and in accordance with FHWA regulations, found in 23 CFR §771.

The noise analysis has been conducted in accordance with FHWA noise regulations and VDOT noise policy and guidance. The FHWA regulations are set forth in Title 23 of the Code of Federal Regulations (CFR) Part 772 (23 CFR §772), Procedures for Abatement of Highway Traffic Noise and Construction Noise. VDOT's highway traffic noise impact guidance manual was updated most recently on February 20, 2018.

The purpose of the Martinsville Southern Connector Study is to enhance mobility for both local and regional traffic traveling along Route 220 between the North Carolina state line to the Route 58 Bypass near Martinsville, Virginia. The three alternatives studied in the noise assessment consist of roadways on new location in a corridor west of the existing Route 220 corridor.

The study involved monitoring of existing noise conditions and modeling of existing conditions (2018) and future design year (2040) No-Build Conditions as well as Build Alternatives predicted noise levels in the study area using the FHWA-approved computerized Traffic Noise Model (TNM). Future conditions for the Route 220 corridor in the study area have been assessed for a design year of 2040, for which any improvements that advance from the Martinsville Southern Connector Study would be assumed to address, to allow for evolution of the transportation system. Modeling accounted for the existing terrain and buildings, and for existing and proposed roadways with projected loudest-hour traffic. Noise impact was assessed for the 2040 No-Build Conditions and Build Alternatives and is summarized by alternative and type of impact in the table below (Noise Abatement Criteria (NAC), substantial increase, or both).

Summary of Traffic Noise Impacts by Alternative and Type of Impact

Alternative	2018 Existing Conditions	2040 No-Build Conditions	2040 Build Alternative			
	NAC	NAC	NAC Only	Substantial Increase Only	Both NAC & Substantial Increase	Total
A	9	14	3	17	3	17
B	11	17	4	34	2	36
C	11	17	2	24	0	26

Noise abatement was considered where noise impact was predicted to occur under the 2040 Build Alternatives. Noise abatement was evaluated to determine if it is warranted, feasible and reasonable, consistent with FHWA/VDOT noise policy and guidance. None of the evaluated noise abatement measures were found to be feasible and reasonable in the study area, largely due to the low density of residential settlement.

This report presents the results of a preliminary noise evaluation; a more detailed review would be completed during the final design. As such, noise barriers that were not considered feasible and reasonable may meet the established criteria and be recommended for construction. If so, the viewpoints of the residents and property owners benefited by the barriers would be surveyed. Majority approval is required for a barrier to receive final approval.

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

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CFR	Code of Federal Regulations
CNE	Common Noise Environment
dB(A)	decibels (A-weighted)
EIS	Environmental Impact Statement
ENTRADA	Environmental Traffic Data
EPA	United States Environmental Protection Agency
F & R	Feasible and reasonable
FHWA	Federal Highway Administration
FY	Fiscal Year
GIS	Geographic Information System
L_{eq}	Equivalent sound level
LOD	Limits of Disturbance
MPH	Miles per hour
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NF	Not feasible
NMS	Noise Monitoring Site
OFD	One Federal Decision
TNM	Traffic Noise Model
USC	United States Code
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VDOT	Virginia Department of Transportation

1. INTRODUCTION

The Virginia Department of Transportation (VDOT), in coordination with the Federal Highway Administration (FHWA) as the Federal Lead Agency and in cooperation with the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA), have prepared a Draft Environmental Impact Statement (EIS) for the Martinsville Southern Connector Study – Route 220 EIS (Martinsville Southern Connector Study) in Henry County, Virginia. This study evaluates potential transportation improvements along the U.S. Route 220 (Route 220) corridor between the North Carolina state line and U.S. Route 58 (Route 58) near the City of Martinsville (Martinsville), Virginia.

The Draft EIS and supporting technical documentation have been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), codified in 42 United States Code §4321-4347, as amended, and in accordance with FHWA regulations, found in 23 Code of Federal Regulations (CFR) §771. As part of the Draft EIS, the environmental review process has been carried out following the conditions and understanding of the *NEPA and Clean Water Act (Section 404) Merged Process for Highway Projects in Virginia* (merged process)[1]. The Martinsville Southern Connector Study also follows the One Federal Decision (OFD) process, which was enacted by Executive Order (EO) 13807: *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects* (82 FR 163)[2].

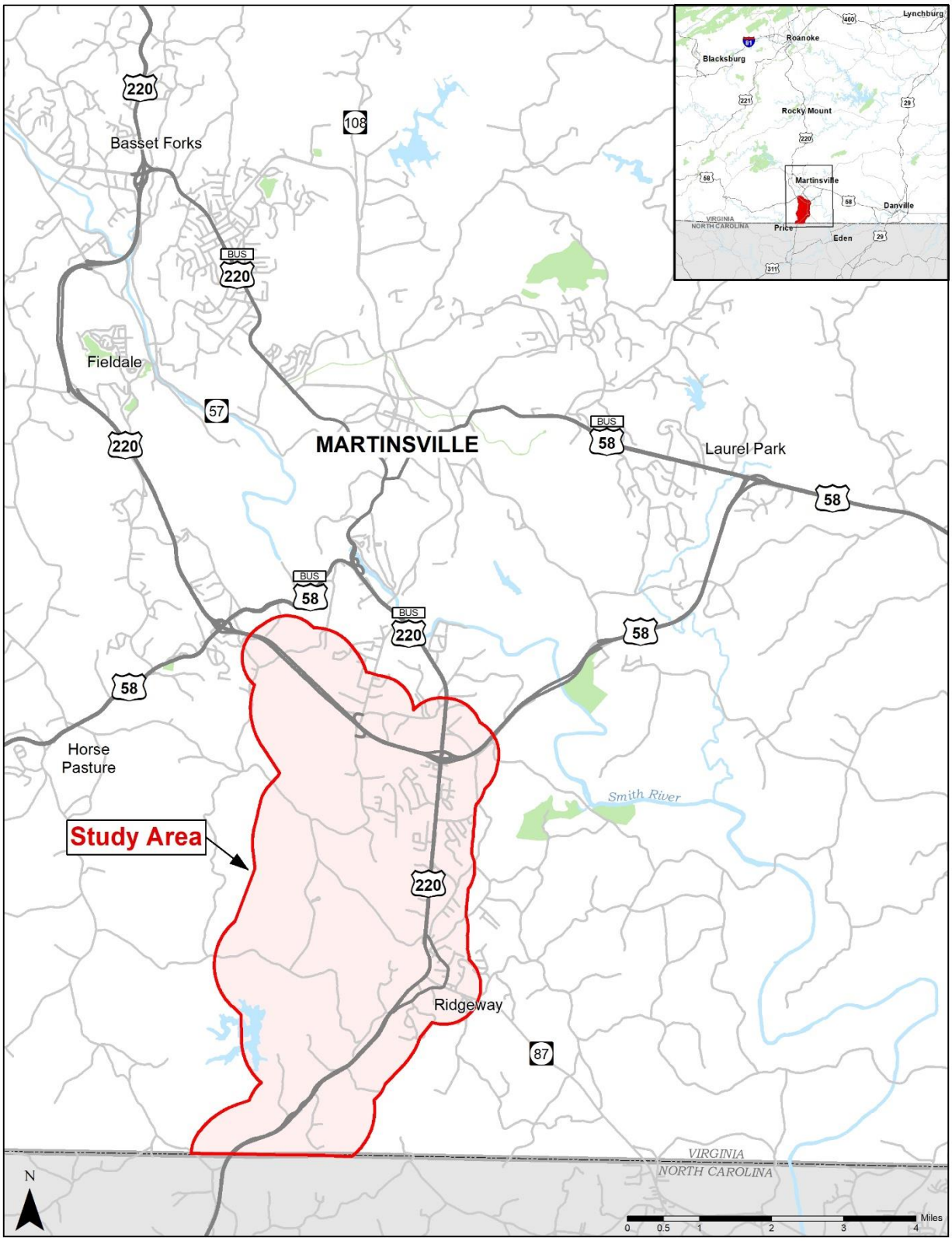
The study area for the Martinsville Southern Connector Study is located south of Martinsville in Henry County, Virginia (see **Figure 1-1**). Positioned on the southern border of Virginia, the study area is located approximately 60 miles southeast of the City of Roanoke (Roanoke) via Route 220, 30 miles west of the City of Danville via Route 58, and 40 miles north of the City of Greensboro in North Carolina via Interstate 73 and Route 220.

The study area encompasses approximately seven miles of the Route 220 corridor, between the interchange of Route 220 with the William F. Stone Highway and the North Carolina state line. Within the study area, existing Route 220 consists of a four-lane roadway, with two travel lanes in each direction. The William F. Stone Highway is signed as Route 58 to the east of its interchange with Route 220; west of the interchange, Route 220 is collocated with Route 58, as both bypass Martinsville. For the purposes of consistency in this study, portions of the William F. Stone Highway east and west of the Route 220 interchange are herein referred to as Route 58. The study area also includes the interchange of Route 58 at Route 641 (Joseph Martin Highway), approximately 1.25 miles west of Route 220. Additionally, the study area encompasses the Town of Ridgeway (Ridgeway), where Route 220 connects with Route 87 (Morehead Avenue), approximately three miles south of Route 58.

[1]Established under a memorandum of understanding between VDOT, FHWA, USACE, EPA, and the U.S. Fish and Wildlife Service (USFWS), the merged process establishes a procedure for coordinated environmental review and development of documentation in Virginia that complies with the requirements of NEPA and provides sufficient information to support Federal regulatory decision-making, including FHWA approval or permits issued by other Federal agencies.

[2]The Martinsville Southern Connector Study is following the OFD process, subsequent to receiving OFD designation by FHWA. OFD requires that major infrastructure projects have a single permitting timetable for synchronized environmental reviews and authorizations: www.permits.performance.gov/permitting-projects/us-route-58220-bypass-north-carolina-state-line-limited-access-study.

Figure 1-1: Study Area



The study area boundary for the Martinsville Southern Connector Study has been developed to assist with data collection efforts and the evaluation of alternatives retained for evaluation. The study area covers 12,873 acres and generally encompasses a one-half-mile buffer around the portion of existing Route 220, between the North Carolina state line and Route 58, and each alternative carried forward for evaluation. The study area was used in various instances during preliminary research and to establish an understanding of the potentially affected natural, cultural, and social resources that may be impacted by the improvements evaluated in the Draft EIS.

FHWA regulations for the assessment and abatement of highway traffic noise in the planning and design of federally aided highway projects are contained in 23 CFR §772. These regulations state that a Type I traffic noise impact analysis is required where through travel lanes or interchange ramps are added. This report documents the results of noise impact analysis conducted for the alternatives carried forward for detailed study. This noise analysis was conducted in accordance with FHWA noise regulations and VDOT noise policy and guidance. This report presents a summary of the roadway improvements under study, description of noise terminology, the applicable standards and criteria, an evaluation of the existing noise conditions, a description of the computations of existing and future noise levels, a prediction of future noise impact, an evaluation of potential noise abatement measures, construction noise considerations, and information for local government officials. **Appendix A** presents the list of preparers, **Appendix B** tabulates the traffic data used in the noise modeling, **Appendix C** presents predicted noise levels, **Appendix D** presents details of the noise measurement program, **Appendix E** presents the figures, and **Appendix F** presents VDOT's Warranted, Feasible and Reasonable barrier worksheets.

1.1 PURPOSE AND NEED

Working with FHWA and the Cooperating and Participating Agencies, the Purpose and Need for the study was concurred upon on November 14, 2018. The purpose of the Martinsville Southern Connector Study is to enhance mobility for both local and regional traffic traveling along Route 220 between the North Carolina state line and Route 58 near Martinsville, Virginia.

The Martinsville Southern Connector Study addresses the following needs:

- **Accommodate Regional Traffic** – current inconsistencies in access, travel speeds, and corridor composition along Route 220 inhibit mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area;
- **Accommodate Local Traffic** – numerous, uncontrolled access configurations along Route 220, combined with high through traffic movement, create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools; and
- **Address Geometric Deficiencies and Inconsistencies** – current geometric conditions along Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.

1.2 ALTERNATIVES CARRIED FORWARD FOR EVALUATION

1.2.1 Alternatives Retained

VDOT, in coordination with FHWA, the Cooperating and Participating Agencies, and the general public, initially considered a broad range of alignment options to address the established Purpose and Need of the Martinsville Southern Connector Study. A number of these alignment options were not carried forward based on their inability to meet the Purpose and Need. Other alignment options were developed into alternatives for evaluation, but were not retained based on anticipated impacts to private property. As part of the public involvement process during the development of the Draft EIS, additional alternatives were suggested for evaluation. These options were similar to the alignment options initially considered and were not carried forward for evaluation based on their inability to address the identified Purpose and Need for the study.

The alternatives carried forward for evaluation and retained for detailed study in the Draft EIS are listed below:

- No-Build Alternative;
- Alternative A – New access-controlled alignment west of existing Route 220 with a new interchange with Route 58 to the west of Route 641 (Joseph Martin Highway) and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line;
- Alternative B – New access-controlled alignment west of existing Route 220 and west of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 58 and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line; and
- Alternative C – New access-controlled alignment west of existing Route 220 and east of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 58 and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line.

These alternatives are described in the sections that follow. Additional information is included in the Draft EIS and supporting ***Alternatives Analysis Technical Report*** (VDOT, 2020a), including the process used to identify and screen alignment options, alternatives carried forward, and alternatives retained for detailed study.

Based on the detailed study of the alternatives retained for evaluation, Alternative C has been identified in the Draft EIS as the Preferred Alternative.

1.2.1.1 No-Build Alternative

In accordance with the regulations for implementing NEPA [40 CFR §1502.14(d)], the No-Build Alternative has been included for evaluation as a basis for the comparison of future conditions and impacts. The No-Build Alternative would retain the Route 220 roadway and associated intersections and interchanges in their present configuration, allowing for routine maintenance and safety upgrades.

This alternative assumes no major improvements within the study area, except for previously committed projects that are currently programmed and funded in VDOT's *Six Year Improvement Plan (SYIP) for Fiscal Year (FY) 2020-2025* (VDOT, 2019) and Henry County's *Budget for FY 2019-2020* (Henry County, 2019). As these other projects are independent of the evaluated alternatives, they are not evaluated as part of the Draft EIS and supporting documentation.

1.2.1.2 Alternative A

Alternative A would consist of a new roadway alignment that is primarily to the west of existing Route 220. Under Alternative A, access would be controlled and provided at three new interchanges. It is assumed that interchanges would be provided at both ends of the facility and one would be located along the corridor. For the purposes of the analyses in the Draft EIS and supporting documentation, it is assumed this third interchange would occur at Route 687 (Soapstone Road). The reconstructed portion of Route 220, along with the new alignment, would incorporate full access control.

Beginning at the North Carolina state line, Alternative A would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Route 689 (Reservoir Road) and Route 971 (J.B. Dalton Road). After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest crossing Patterson Branch. The alignment would then shift to the north, following a small ridge between Patterson Branch and a tributary to Marrowbone Creek, before crossing Marrowbone Creek east of Marrowbone Dam. The alignment would continue north and to the west of a large farm/open field, crossing tributaries of Marrowbone Creek. The alignment would shift eastward and cross over Route 688 (Lee Ford Camp Road), Stillhouse Run, and a floodplain. After crossing Stillhouse Run, the alignment would shift northward and continue for approximately one mile. The alignment would then continue north reaching Soapstone Road, where a new interchange would be provided, west of the intersection with Joseph Martin Highway. An interchange with Alternative A is proposed at Soapstone Road. The alignment would then turn to the northeast to cross three minor tributaries to Marrowbone Creek. The alignment continues in a northerly direction with a new interchange at Route 58, west of the interchange at Joseph Martin Highway.

1.2.1.3 Alternative B

Alternative B would consist of a new roadway alignment that is primarily to the west of existing Route 220. Under Alternative B, access would be controlled and provided at two new interchanges and a modified interchange at Route 58 and the Joseph Martin Highway. For the purpose of this study, it is assumed that new interchanges would be provided at the southern end of the facility and at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configurations would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Beginning at the North Carolina state line, Alternative B would reconstruct Route 220 for approximately one mile, where it would shift eastward before turning to the north to cross over the Norfolk Southern railroad. The wide horizontal curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed, as well as minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest prior to crossing Patterson Branch. The alignment would then gradually shift from the northwest to the northeast and cross three tributaries to Marrowbone Creek. The alignment would continue in a northeasterly direction over Lee Ford Camp Road, where it would pass to the east of the Marrowbone Plantation, shifting northwest to cross Marrowbone Creek. After crossing Marrowbone Creek, Alternative B would

continue to the northwest, crossing Magna Vista School Road south of Magna Vista High School, then paralleling Magna Vista School Road west of the high school up to a new interchange with Soapstone Road. The new interchange at Soapstone Road would require the relocation of a portion of Magna Vista School Road. From the Soapstone Road interchange, the alignment would continue to the northeast and cross two minor tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at its interchange with Route 58, requiring modifications to the existing interchange configuration to provide a more direct connection between Route 58 and the new roadway. The reconstructed portion of Route 220 at the southern end, along with the new alignment, would be an access-controlled facility.

1.2.1.4 Alternative C (Preferred Alternative)

Alternative C would consist of a new roadway alignment that is primarily to the west of existing Route 220. Alternative C was developed as a modification of the initially considered Alignment Option 4C based on agency comments, with the primary changes occurring north of Soapstone Road. Alignment Option 4C originally included an interchange between Joseph Martin Highway and Route 220; however, adequate spacing could not be provided to accommodate all movements. Therefore, the alignment was shifted to tie in at the location of the existing Joseph Martin Highway interchange. Under Alternative C, access would be controlled and provided at two new interchanges and a modified interchange at Route 220/Route 58 and Joseph Martin Highway. For the purposes of the analyses in the Draft EIS it is assumed that new interchanges would be provided at the southern end of the facility and at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configuration would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Beginning at the North Carolina state line, Alternative C would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed, and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. After crossing the railroad, the new alignment would continue northward for approximately 1.5 miles, crossing White House Road and a tributary to Marrowbone Creek. The alignment would then shift to the northeast to cross Lee Ford Camp Road. Alternative C would then shift northward and continue east of Magna Vista High School and Marrowbone Creek and parallel the Pace Airport to the east. After passing Pace airport, the alignment would shift to the northeast and cross Soapstone Road to the east of Marrowbone Creek. A new interchange with Alternative C would be constructed at Soapstone Road. North of Soapstone Road, the alignment would shift west and cross Joseph Martin Highway. The alignment would continue to the northwest and cross two tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at the existing interchange location with Route 58. This would require modifications to the existing interchange to provide a more direct connection between Route 58 and the new roadway.

1.2.2 Alternatives Not Retained

As part of the alternatives development process for the Draft EIS, the following alternatives were carried forward for evaluation, but have not been retained for detailed study in the Draft EIS, based on their anticipated impacts to private properties. However, these alternatives were evaluated to a sufficient level of detail to eliminate them from further consideration and detailed study in the Draft EIS. While this Technical Report does not include the analysis of Alternatives D and E, other technical reports, such as the ***Natural Resources Technical Report*** (VDOT, 2020d), were prepared prior to the elimination of alternatives and thus include the following two alternatives, which are summarized in the sections that follow.

- Alternative D – Reconstruct Route 220 as an access-controlled roadway, with a spur on new alignment north of Ridgeway and reconstruct the Joseph Martin interchange at Route 58; and
- Alternative E – Reconstruct Route 220 as an access-controlled roadway, consolidating access to interchanges at select locations.

These alternatives, as well as those previously described that have been retained for detailed analysis in the Draft EIS, are illustrated on **Figure 1-2**.

1.2.2.1 Alternative D

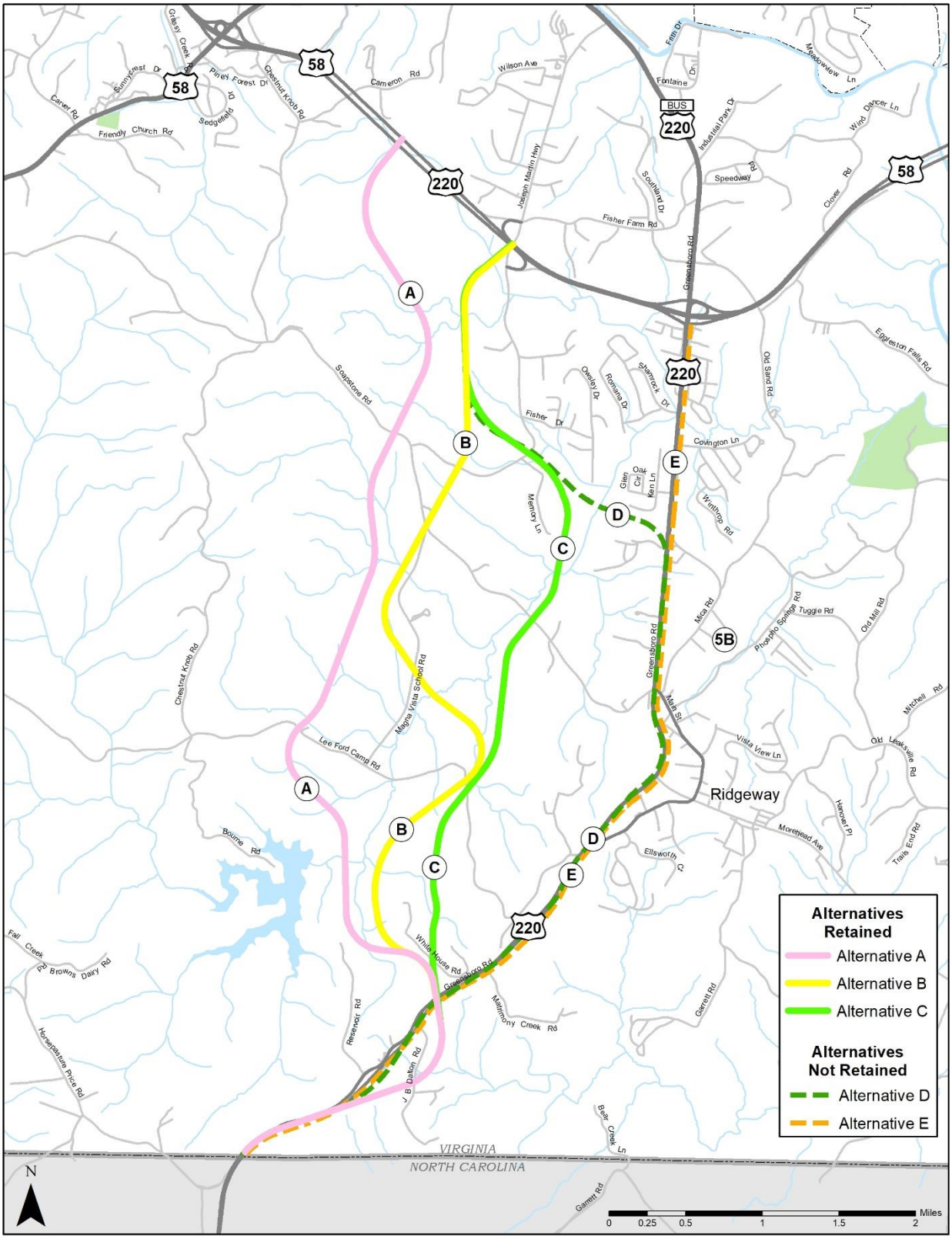
Alternative D would consist of reconstructing existing Route 220 as an access-controlled roadway for approximately 5.6 miles from the North Carolina state line where it would then divert to the west on a new access-controlled roadway just north of Water Plant Road. Under Alternative D, access would be controlled and provided at three new interchanges and a modified interchange at Route 58 and the Joseph Martin Highway. South of Water Plant Road, access to the new roadway would be made via frontage roads and new interchanges near Reservoir Road and at Morehead Avenue. A new structure providing access to Route 220 would be located at Lee Ford Camp Road/Church Street. At Water Plant Road an interchange is suggested where the new roadway branches from Route 220 to provide direct access between the new roadway and Route 220 to the north. From this interchange, the new alignment would proceed northwest, crossing Marrowbone Creek and then parallels a tributary of Marrowbone Creek to beyond Joseph Martin Highway. The alignment then shifts northward and follows the same alignments as Alternatives B and C just north of the Radial warehouse site to the tie-in location with Route 58. Modifications to the existing interchange at Route 58 and Joseph Martin Highway would be required with this alternative. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

1.2.2.2 Alternative E

Alternative E would consist of fully reconstructing existing Route 220 as an access-controlled roadway between the North Carolina state line and Route 58, removing all direct connections of existing driveways and side streets to Route 220.

Under Alternative E, access would be controlled and provided only at interchanges at various locations in the corridor. Existing residential and commercial driveways would be directed to frontage roads that parallel the roadway, ultimately connecting to Route 220 at interchanges. New interchanges to provide frontage road access to Route 220 are located at Reservoir Road and at Morehead Avenue. Structures over or under the new Route 220 roadway are included at Lee Ford Camp Road/Church Street and Soapstone Road/Main Street to provide east-west connectivity. The Route 220 interchange at Route 58 would be modified to provide direct access between the new roadway, Route 58, and Business Route 220 to the north.

Figure 1-2: Route 220 Alternative Alignment Map



2. NOISE TERMINOLOGY AND CRITERIA

2.1 REGULATIONS AND GUIDELINES

The potential noise impact of the Martinsville Southern Connector Study was assessed in accordance with FHWA and VDOT noise regulations, policy, and guidance. The FHWA regulations are set forth in 23 CFR §772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. On July 13, 2010, FHWA published revised noise regulations which became effective on July 13, 2011 (FHWA, 2010). FHWA has also published a guidance document to support the new regulations (FHWA, 2011). VDOT prepared revisions to its noise policy in accordance with FHWA's requirements and revised policy. VDOT's revised policy received approval from FHWA in 2011, and was last updated on February 20, 2018 (VDOT, 2018).

2.2 NOISE ABATEMENT CRITERIA

To assess the degree of impact of highway traffic and noise on human activity, the FHWA established Noise Abatement Criteria (NAC) for different categories of land use activity (see **Table 2-1**). The NAC are given in terms of the hourly, A-weighted, equivalent sound level in decibels (dB(A)). The A-weighted sound level is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response to noise because the sensitivity of human hearing varies with frequency. The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise.

Table 2-1: FHWA Noise Abatement Criteria

Activity Category	$L_{eq}(h)$[1]	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[2]	67 (Exterior)	Residential
C[2]	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[2]	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	-	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 (without building permits)

[1] Hourly Equivalent A-weighted Sound Level (dB(A))
[2] Includes undeveloped lands permitted for this activity category
Source: 23 CFR §772.

Most environmental noise (and the A-weighted sound level) fluctuates from moment to moment, and it is common practice to characterize the fluctuating level by a single number called the equivalent sound level (L_{eq}). The L_{eq} is the value or level of a steady, non-fluctuating sound that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, L_{eq} is typically evaluated over a one-hour period and may be denoted as $L_{eq}(h)$.

In this study, residential areas (Activity Category B), recreational areas (Activity Category C), and institutional interior spaces (Activity Category D) were evaluated for noise impact. For Categories B and C, noise impact would occur when predicted exterior noise levels, approach or exceed 67 dB(A) in terms of $L_{eq}(h)$ during the loudest hour of the day. For Category D, noise impact would occur where predicted interior sound levels approach or exceed 52 dB(A) $L_{eq}(h)$. VDOT defines the word “approach” in “approach or exceed” as within 1 dB(A). Therefore, the threshold for noise impact is where exterior noise levels are within 1 dB(A) of 67 dB(A) $L_{eq}(h)$, or 66 dB(A) for Activity Categories B and C. Likewise, noise impact occurs when interior levels are within 1 dB(A) of 52 dB(A) $L_{eq}(h)$, or 51 dB(A), for Activity Category D. Noise impact also would occur wherever Build Alternative noise causes a substantial increase over existing noise levels. VDOT defines a substantial increase as an increase of 10 dB(A) or more above existing noise levels for all noise-sensitive exterior activity categories.

2.3 METHODOLOGY

When the predicted design-year Build Alternative noise levels approach or exceed the NAC during the loudest hour of the day or cause a substantial increase in existing noise, consideration of traffic noise reduction measures is necessary. If it is found that such mitigation measures would cause adverse social, economic, or environmental effects that outweigh the benefits received, they may be dismissed from consideration. For this study, noise levels throughout the study area were determined for Existing Conditions (2018) and the design-year (2040) No-Build and Build Alternatives.

Some of the noise-sensitive land use potentially affected by the alternatives are located along major highway corridors that carry relatively high traffic volumes, such as Route 220, and Route 58. Existing noise levels for receptors along these corridors were predicted using the appropriate traffic data for the worst noise hour. Noise-sensitive land use is also located along rural two-lane roads to the west of the existing Route 220 corridor. Existing noise levels in these rural areas were based on the results of the noise monitoring program discussed in **Section 3**. The prediction methods and predicted noise levels appear in **Section 4**.

3. EXISTING NOISE ENVIRONMENT

3.1 NOISE STUDY AREA BOUNDARIES

Noise sensitive land uses in the study area include residences, places of worship with both interior and exterior activity areas, the Magna Vista High School and athletic fields, and a few cemeteries. Following VDOT and FHWA policies and procedures, the receptors used in the noise model to represent noise-sensitive land uses were grouped into Common Noise Environments (CNEs). Receptors in a given CNE are exposed to similar noise sources and levels and generally occur between secondary noise sources, such as cross-streets. Per VDOT noise-sensitive receptors within 500 feet of the study area are usually considered in the evaluation. However, for the purposes of this study, the Noise Study Area associated with each alternative extends for a distance of 1,000 feet from the centerline of the planning level Limits of Disturbance (LOD). Since the three Build Alternatives include roadway alignments on new location in areas with relatively low existing noise levels, potential noise impacts by means of a substantial increase were an anticipated outcome. The Noise Study Area was extended beyond 500 feet zone to ensure the analysis captured the extent of the substantial increase noise impact for sections of each corridor on new location.

3.2 MONITORING OF EXISTING NOISE LEVELS

Noise monitoring was conducted throughout the study area, consistent with FHWA and VDOT policy and guidance, to document existing ambient noise levels in noise-sensitive locations in the noise study area and to provide a means for the validation of the FHWA Traffic Noise Model (TNM) implementation of the study. **Appendix D** provides details of the noise measurement program including, copies of the field data sheets, site photographs, and copies of calibration certificates for the instrumentation used.

3.2.1 Short-Term Noise Monitoring for Model Validation

Noise monitoring for the purpose of model validation was conducted at seven short-term (30 minutes in duration) sites on March 26 and March 27, 2019. These measurement sites were generally located in areas with the highest noise exposures and representative of noise-sensitive properties along the exiting Route 220 and Route 58 corridors. Simultaneous traffic counts and vehicle classifications were performed for the highways in conjunction with each short-term noise measurement. The short-term measurements characterized existing noise levels in the study area but were not necessarily conducted during the loudest hour of the day. They included contributions from sources other than traffic, such as aircraft. **Figure 3-1** shows the locations of the noise measurement sites within the noise study area. The short-term noise measurement sites used for model validation are identified in **Table 3-1**.

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.

Short-term noise measurements were conducted using Larson-Davis 824 (Type I) integrating sound level meters. These sound level meters were calibrated annually at a certification laboratory, with calibrations traceable to the National Institute of Standards and Technology. During the monitoring program, the sound level meters were calibrated in the field using a handheld acoustic calibrator at the beginning and end of each measurement period.

Figure 3-1: Overview of Alternatives A, B and C, the Noise Study Area Boundaries and the Locations of Noise Monitoring Sites

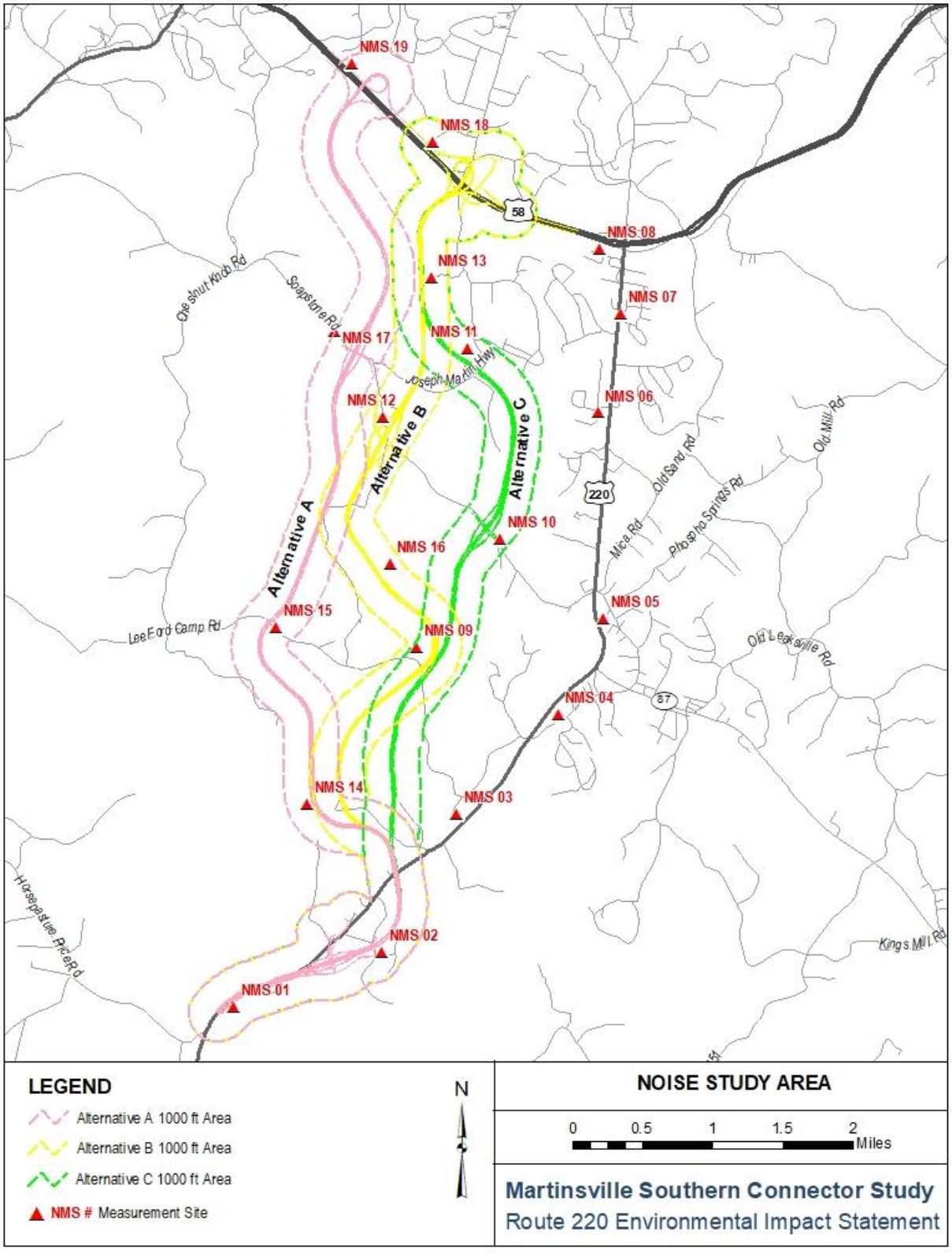


Table 3-1: Summary of Short-term Noise Monitoring Sites used for Model Validation

NMS Site No.	Address or Location	Date	Start Time[1] (hh:mm:ss)	Duration (minutes)	Total L_{eq} (dB(A))	Traffic-only L_{eq} (dB(A))
01	11885 Greensboro Road	3/27/19	16:48:58	30	51	51
04	574 Church Street	3/26/19	16:55:04	30	51	51
05	2179 Phospho Springs Road	3/26/19	15:42:00	30	58	58
06	393 Hen Lane	3/26/19	14:42:02	30	56	51
08	144 Popular Street	3/26/19	13:00:00	30	54	54
18	88 Watdill Circle	3/26/19	12:00:00	30	59	59
19	230 Winners Circle	3/26/19	10:15:00	30	61	61

[1] The start time is based on a 24-hour clock.
Source: HMMH, 2019.

The short-term data collection procedure involved measurement of one-second L_{eq}s over a period of 30 minutes. Continuous logging of events was conducted during the monitoring, so that intervals that included events that were not traffic-related could be excluded from the evaluation. For each 30-minute period, a "Total L_{eq}" (includes non-contaminated sound level contributions from every 1-second interval) and a "Traffic-only L_{eq}" (excludes those intervals that contained noise events unrelated to roadway noise) were determined. By comparing the two totals, the significance of non-traffic events (such as aircraft operations) to the overall noise level can be determined for the measurement period.

The measured noise levels used for model validation appear in **Table 3-1** as L_{eq}. As described above, the L_{eq} is a sound-energy average of the fluctuating sound level (in A-weighted decibels, dB(A)) measured over a specified period of time. **Table 3-1** also provides the monitoring site address, as well as the date, start time, and the duration of each measurement. As shown in **Table 3-1**, the Total L_{eq} ranged from 51 dB(A) at 11885 Greensboro Road and 574 Church Street (Noise Monitoring Site (NMS)-01 and NMS-04, respectively) to 61 dB(A) at 230 Winners Circle (NMS-19). Except for NMS-06, the values of the Traffic-only L_{eq} were the same as the measured Total L_{eq}s at each measurement site. At NMS-06, trucks were moving in the parking lot of the Grace Baptist Church and their contribution is included in the value of the Total L_{eq}. Since the noise from the trucks in the parking lot was not associated with traffic on Route 220, the periods containing noise from these sources were excluded in the calculation of the Traffic-only L_{eq}.

Other sources of noise in the existing environment included, but were not limited to aircraft overflights, local traffic, power equipment (e.g. lawn mowers, chain saws), biogenic sounds (e.g. birds, dogs), distant train horn, wind chimes, wind in the trees, and other human-related activity. **Appendix D** provides details of the data acquired during the noise measurement program, including noise monitor output, site sketches, photographs, noise level data with site summary results, and traffic counts with hourly totals. The locations of the measurement sites are shown on the overview map in **Figure 3-1**.

3.2.2 Short-Term Noise Monitoring to Estimate Existing Noise Levels

Noise monitoring for the purpose of estimating existing noise levels was conducted at eight short-term (30 minutes in duration) sites on March 27, 2019. These measurement sites were generally located at noise-sensitive land use along rural two-lane roads that were to the west of the existing Route 220 corridor and south of the existing Route 58 corridor. Since these sites were generally a few thousand feet away from either corridor, traffic on either Route 220 or Route 58 did not contribute to the measured noise levels at these sites.

During the short-term measurements, traffic volumes on the rural roads were very low – no more than 30 vehicles were observed in a 30-minute period at these sites. Ambient noise in these areas

was predominately from residential activity (e.g. birds, planes overhead, and occasional traffic on local roads).

Table 3-2 provides a summary of the short-term sites that were used to estimate existing noise levels in areas to the west of the existing Route 220 corridor. Sound levels in the Subset L_{eq} column were used, because they excluded uncharacteristic events such as dogs barking nearby and unusually loud or close vehicles. **Figure 3-1** shows the locations of the measurement sites described in **Table 3-2**. **Appendix D** includes additional details about the short-term sites to estimate existing noise levels, including field data sheets and site photographs.

Table 3-2: Summary of Short-term Noise Monitoring Sites to Document Existing Noise Levels

NMS Site No.	Address or Location	Date	Start Time[1] (hh:mm:ss)	Duration (minutes)	Total L_{eq} (dB(A))	Subset[2] L_{eq} (dB(A))
02	67 Caroline Place	3/27/19	15:18:01	30	54	49
09	1826 Lee Ford Camp Road	3/27/19	12:11:00	30	48	44
10	105 Red Fox Road	3/27/19	13:10:01	30	49	49
12	4355 Soapstone Road	3/27/19	12:21:02	30	49	49
13	215 Ravenswood Lane	3/27/19	9:47:00	30	43	43
14	705 Reservoir Road	3/27/19	15:47:00	30	39	39
16	701 Magna Vista School Rd	3/27/19	13:09:00	30	41	41
17	3591 Soapstone Road	3/27/19	9:30:02	30	52	52

[1] The start time is based on a 24-hour clock.
[2] Subset L_{eq} excludes uncharacteristic events, such as dogs barking nearby and vehicles uncharacteristically loud or close.
Source: HMMH, 2019.

3.2.3 Long-Term Noise Monitoring

Long-term noise monitoring (24-hours in duration) was conducted at four sites – two of the sites were located along the existing Route 220 corridor (NMS-03, NMS-07) and two were located to the west of the Route 220 corridor in areas where the proposed project would be on new location (NMS-11, NMS-15). The objectives of the long-term noise measurements were to document existing noise levels within the study area and to assist with the loudest hour determination. Unfortunately, the data for the two sites in the new location corridors were contaminated by excessive wind and were not usable.

Table 3-3 provides a summary of the two long-term noise monitoring sites in the Route 220 corridor. Audible noise sources at these sites included traffic on Route 220, birds, dogs, and distant roadway and rail traffic. The long-term noise measurement data collected at Sites NMS-03 and NMS-07 demonstrate that the loudest hours of the day generally occurred during the morning period from 7 AM to 12 PM. **Appendix D** includes additional details about the long-term sites, including field data sheets and site photographs. **Figure 1** in **Appendix E** provides hourly weather observations from the Piedmont Triad International Airport and **Figure 2** in **Appendix E** provides charts of hourly noise levels from the noise monitors and.

Table 3-3: Summary of Long-term Noise Measurement Sites

NMS Site No.	Address or Location	Start Date	Start Time[1] (hh:mm)	Range of Hourly L_{eq} (dB(A))	Sources
03	123 Lily Road	3/27/19	11:27	49-58	Railroad, traffic on Rte. 220, birds, dogs
07	47 Wilde Street	3/26/19	08:47	60-69	Traffic on Rte. 220, birds, traffic at interchange

[1] The start time is based on a 24-hour clock.
Source: HMMH, 2019.

3.3 UNDEVELOPED LANDS AND PERMITTED DEVELOPMENTS

Highway traffic noise analyses are (and would be) performed for developed lands as well as undeveloped lands if they are considered to be 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 Highway Noise Guidance Manual* (VDOT, 2018), 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 study. VDOT considers the Date of Public Knowledge as the date that the final NEPA document approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after this date.

At the time of this study, the only permitted land use within the study area is the new Commonwealth Crossing Business Centre at the southern limits of Route 220, which is a planned industrial park of over 700 acres. The industrial park would consist of four lots and access to the site is predicted to be from Horsepasture Price Road in North Carolina. The first lot, currently under construction, would be the site of a 280,000 square foot manufacturing operation and anticipates creating over 200 new jobs (Henry County, 2018). There are no detailed plans yet, and no indication that noise-sensitive exterior land uses would be included in this development. Therefore, no noise analysis was conducted for the development.

3.4 MODELED EXISTING NOISE LEVELS

For calculation of loudest-hour noise levels throughout the study area in the TNM noise-prediction computer model, many additional receptor locations were added to the measurement sites to provide a comprehensive basis of comparison for the analysis of noise impacts from the existing and future project conditions. Using the appropriate loudest-hour traffic data, existing and future traffic noise levels were predicted for the measurement sites and the additional receptor locations. The computation methods and predicted noise levels are presented in the next section of this report.

4. FUTURE NOISE ENVIRONMENT

This section provides an overview of the noise prediction model, the model validation effort, a discussion of the traffic data used as input to the model and presents the results of the noise model as ranges of traffic noise levels by CNE. **Appendix B** provides the detailed traffic data in tabular format. **Appendix C** provides tables of predicted noise levels by receptor for each of the three Build Alternatives, compared to the Existing and No-Build levels.

4.1 NOISE PREDICTION MODEL

All traffic noise computations for this study were conducted using the latest version of the FHWA TNM, version 2.5. TNM incorporates state-of-the-art sound emissions and sound propagation algorithms, based on well-established theory or on accepted international standards (FHWA, 1998). The acoustical algorithms contained within the FHWA TNM have been validated with respect to carefully conducted noise measurement programs and show excellent agreement in most cases for sites with and without noise barriers (US DOT and Volpe, 2004).

Available engineering plans, aerial photography, topographic contours and building information were used to create a three-dimensional model in the TNM of the geometry of the existing and future design roadway configurations, including the surrounding terrain and buildings. The noise modeling also accounted for such factors as propagation over different types of ground (acoustically soft and hard ground), elevated roadway sections, significant shielding effects from local terrain and structures, distance from the road, traffic speed, and hourly traffic volumes including percentage of medium and heavy trucks. To fully characterize existing and future noise levels at all noise-sensitive land uses in the study area, over 6600 noise prediction receptors were added to the measurement sites in the modeling. TNM runs are available upon request.

The Norfolk Southern railroad is located parallel to Route 220 over much of its southern and central segments. The Norfolk Southern railroad supports freight rail service between the cities of Roanoke, Virginia and Greensboro, North Carolina. North of Morehead Road in Ridgeway, the railroad crosses under Route 220 and continues east of the roadway for the northern part of the study area. The frequency of rail traffic was determined by examining the results of the long-term noise monitor at Site NMS-03. By analyzing the sound level time histories and listening to audio recordings, rail traffic was found to be relatively intermittent, and not necessarily during the loudest hour of the day. As a result, rail traffic was not modeled as a noise source within the study area. The significance of rail noise along the southern section of the Route 220 corridor would be reevaluated during the detailed noise study conducted during the detailed design phase and would be included in that analysis if deemed appropriate.

4.2 NOISE MODEL VALIDATION

According to FHWA and VDOT noise policy and guidance, the accuracy of the noise prediction model must be verified on a project-by-project basis. The noise model validation process compares existing noise levels monitored in the field with predicted noise levels from the FHWA TNM using the traffic conditions during the monitoring period as input to the model. The purpose of the noise model validation is to evaluate the success of the model in representing the important acoustical characteristics of the study area. This is determined by examining the overall trend of the differences between measured and predicted noise levels at each measurement site. Individual site to site differences may vary significantly, depending on factors that may affect either the measured noise level or the predicted noise level at a given site. Examples of factors that affect noise levels are provided below:

- Factors affecting measured noise levels include: atmospheric conditions (upwind, neutral or downwind conditions), shielding by structures that are difficult to model, and/or the presence of loud vehicle pass-bys during the measurement.
- Factors affecting predicted noise levels include: the level of detail in modeling terrain features and locating receptors, as well as the degree to which ground zones, tree zones, and sparse rows of buildings are incorporated into the model.

FHWA and VDOT consider the noise model to be validated when measured noise levels are within +/- 3 dB(A) of predicted noise levels for existing conditions.

FHWA discourages the calibration of a noise model through the use of adjustment factors within the noise model to match measured and predicted levels. FHWA recognizes that many factors are present both in the measurement of noise and in the development of a model that can lead to variability. Differences between measured and predicted levels that are outside the accepted accuracy of the model are likely due to unusual circumstances during the measurements, or to insufficient detail or inaccurate assumptions in the model. Only after a thorough examination of the measurement conditions and the modeling assumptions has been completed, should the highway noise analyst consider the use of adjustment factors in the model. FHWA recognizes that in some cases, it may not be possible to identify a specific reason for not validating a specific measurement site. Any such cases are to be documented in the noise study report.

Table 4-1 presents a site-by-site comparison of measured noise levels and the corresponding TNM-predicted noise levels. The differences between measured and predicted noise levels fall within three dB(A) at each site. The average difference between calculated noise levels and monitored noise levels was +2.2 dB(A) (over all seven sites), which generally shows excellent agreement between monitored and modeled sound levels and suggests confidence in the modeling assumptions.

Table 4-1: Summary of Noise Model Validation

NMS Site No.	Address or Location	Measured Traffic-only L_{eq} (dB(A))	TNM-Predicted L_{eq} (dB(A))	Predicted minus Measured (dB(A))
01	11885 Greensboro Road	50.5	52.2	+1.7
04	574 Church Street	50.9	53.7	+2.8
05	2179 Phospho Springs Road	58.4	61.1	+2.7
06	393 Hen Lane	51.4	53.0	+1.6
08	144 Popular Street	53.5	56.1	+2.6
18	88 Watdill Circle	58.8	61.5	+2.7
19	230 Winners Circle	60.6	60.3	-0.3
Average Difference (Predicted minus Measured)				+2.2
Standard Deviation of Differences (Predicted minus Measured)				0.6

Source: HMMH, 2019.

Appendix D provides the normalized traffic count data that were collected simultaneously with the noise monitoring data and subsequently used as input to the FHWA TNM for model validation.

4.3 TRAFFIC DATA FOR FUTURE NOISE PREDICTION

The traffic data used in the noise analysis must produce sound levels representative of the worst noise hour in the future design year, per FHWA and VDOT policy. A determination of the loudest hour of the day was conducted, consistent with VDOT's current methodology.

Traffic data for the period from 6 AM to 10 PM was provided in VDOT's Environmental Traffic Data (ENTRADA) spreadsheets for different sections of Route 220 and for Route 58. First, a reference noise level for each vehicle type was calculated with FHWA TNM 2.5 using a simple roadway and interrupted speeds at a representative distance of 200 feet. Then, hourly L_{eq}s were calculated with the latest version of HMMH's loudest-hour spreadsheet, which adjusts each vehicle reference noise level by the hourly traffic volumes and speeds from the ENTRADA spreadsheets. The loudest hour spreadsheet yields a representative noise level for the hours from 6 AM to 10 PM, for each section of Route 220, under Existing Conditions and each Build Alternative.

In all cases, the loudest hour of the day was identified as the hour starting at 10 AM due to the large percentage of trucks in the traffic flow (25 to 30 percent). Normally, an additional step would be taken to identify the traffic conditions for the worst noise hour. Based on the output of the spreadsheet, the traffic conditions for the two loudest hours would then be used as input to FHWA TNM 2.5 and traffic noise levels would be calculated at representative sites for each alternative throughout the study area. Then, the calculated sound levels for the two loudest hours would be compared to determine the traffic conditions for the worst noise hour. For this study, however, it was determined that this additional step was not required as the hour starting at 10 AM was consistently identified as the loudest for all of the existing and future scenarios to be evaluated. **Appendix C** provides the loudest-hour traffic data for the roadways used in the TNM for this study.

4.4 PRESENTATION OF RESULTS

The study area includes mostly residential land use and development, as well as some recreational and institutional land use.

To fully characterize existing and future noise levels at all noise-sensitive land uses in the study area, more than 200 additional noise prediction receptors were incorporated into the modeling analysis of the Noise Study Area for each Build Alternative. Each of these receptors represented exterior noise-sensitive land use or the interiors of institutional land uses such as schools and places of worship.

All noise levels were predicted using the A-weighted equivalent sound level, or L_{eq}, in dB(A). Loudest-hour noise levels were predicted for the Existing 2018 and the design-year 2040 No-Build and Build Alternatives. Noise levels at all noise study area receptors were predicted explicitly from the traffic data that were provided for Alternatives A, B and C.

Table 4-2**4-2** through **Table** present ranges of the predicted sound levels at noise-sensitive receptors within each CNE for Alternatives, A, B and C, respectively. These tables also provide a description of the land use and location of each CNE, as well as the FHWA Activity Categories within each CNE. Areas that do not have noise-sensitive land uses are not identified with CNE boundaries; such land use is Activity Category E, F, or G, that is commercial with no exterior activity areas, industrial, or undeveloped, respectively. Predicted interior sound levels are shown for Category D institutional land use. Since all of the noise-sensitive facilities that fall under Category D within the study area have air conditioning and masonry construction, an outside-to-inside noise reduction value of 25 dB(A) is used to determine the interior sound levels from the exterior sound levels predicted by TNM. **Appendix C** provides tables of predicted noise levels at

all of the noise-sensitive receptors for each Build Alternative. The locations of the receptors are shown in **Figures 3, 4,** and **5** in **Appendix E**.

Figures 3 through **5** provide location maps for the CNEs, noise-sensitive receptors, build contours, and the locations of noise barriers that were evaluated. The Build Alternative 66 dB(A), L_{eq} noise contours show the noise impact zone for NAC categories B and C. Each receptor is shown in **Figures 3** through **5** with a color-coded dot that indicates the status of that receptor according to its 2040 Build noise level, both with and without a noise barrier. The color code and corresponding receptor status are as follows:

- Light blue – impacted (without noise barrier) and 5 or 6 dB(A) of insertion loss (noise reduction) (with noise barrier);
- Dark blue – impacted (without noise barrier) and 7 dB(A) or more of insertion loss (with noise barrier);
- Red – impacted (without noise barrier) and not benefited, i.e. less than 5 dB(A) of insertion loss (with noise barrier);
- Green – not impacted (without noise barrier) and benefited (with noise barrier);
- Yellow – not impacted (without noise barrier) or benefited (with noise barrier); and
- Gray – potential property acquisition.

4.4.1 Predicted traffic noise levels with Alternative A

Existing year traffic noise levels along Alternative A range from the 37 dB(A) to 67 dB(A). As noted in the Purpose and Need Chapter of the Draft EIS, traffic volumes in the study area are generally expected to increase by 10 to 30 percent by the year 2040, based on the travel demand model developed for this study, with the greatest percentage increase seen in the southern section of Route 220. As a result, future traffic noise levels with the 2040 No-Build Alternative are predicted to increase by 1 to 2 dB(A) over existing noise levels along the southern section of the Route 220 corridor. With 2040 Build Alternative A, future traffic noise levels are predicted to range from 46 to 63 dB(A) L_{eq}. At the southern end of the corridor, there are many homes near the existing Route 220 that are exposed to the highest noise levels and noise impact without the study (i.e. for the 2018 Existing Conditions and the 2040 No-Build Alternative). Under this Alternative, some of these aforementioned properties would potentially be acquired to construct the alternative, but also would not be impacted under all three future Build Alternatives.

In areas to the west of the existing Route 220 corridor, where the proposed Bypass would be on new location with Alternative A, existing year and future design year No-Build noise levels for were based on the short-term noise measurement data summarized in **Table 3-2**. Under 2040 Alternative A, noise levels are predicted to increase by more than 10 dB(A) at many locations.

Table 4-2 provides ranges of predicted worst noise hour noise levels by CNE for Alternative A. **Figure 3** shows the locations of noise-sensitive receptors, CNEs, and noise barriers evaluated for Alternative A. **Table C-1** in **Appendix C** provides the predicted traffic noise levels for each noise-sensitive receptor evaluated for Alternative A.

Table 4-2: Ranges of Predicted Loudest Hour Noise Levels by CNE – Alternative A

CNE	Area Land Use and Description	FHWA Activity Category	Range of Exterior & Interior Hourly L_{eq} (dB(A))*		
			Existing (Alt A.)	No-Build (Alt. A)	Build (Alt. A)
AA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	51 – 67	53 - 69	56 - 63
AB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and	B and C	55 – 67	56 - 69	46 - 63

	residences west of the Bypass Interchange & existing Rte. 220				
AC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	46 – 66	46 - 67	53 - 63‡
AD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	41 – 50	41 - 50	46 - 63‡
AE	Residences on the east side of the Bypass along White House Rd	B	41 – 61	41 - 63	52 - 67‡
AF	Residences on the west side of the Bypass along Reservoir Rd	B	39 – 41	39 - 41	52 - 59‡
AG	Residences on the east side of the Bypass along Lee Ford Camp Rd	B	51 – 51	51 - 51	61 - 67‡
AH	Residences on the west side of the Bypass along Lee Ford Camp Rd	B	51 – 51	51 - 51	54 - 64‡
AI	Residences on the east side of the Bypass along Soapstone Rd	B	48 – 48	48 - 48	48 - 50
AJ	Residences on the west side of the Bypass along Soapstone Rd	B	49 – 51	49 - 51	46 - 46
AK	Residences on the east side of the Bypass between Rte. 58 and Soapstone Rd	B	41 – 44	41 - 44	54 - 66‡
AL	Residence to the west of the Bypass interchange at Bypass Rte. 58	B	58 – 58	59 - 59	58 - 58
AM	Residence to the north of the Bypass interchange at Bypass Rte. 58	B	62 – 62	63 - 63	62 - 62

* Red text indicates noise levels that approach or exceed the FHWA NAC for Activity Categories B and C.
‡ Indicates noise impact due to a substantial increase of 2040 Build noise levels over 2018 Existing noise levels.
Source: HMMH, 2019.

4.4.2 Predicted Traffic Noise Levels with Alternative B

Under Existing Conditions, traffic noise levels range from the low 40s dB(A) to the high 60s dB(A) along the southern section of the Route 220 corridor south of White House Road (CNEs BA, BB and BC) under Existing Conditions. Future traffic noise levels with the 2040 No-Build Alternative are predicted to increase by 1 to 2 dB(A) over existing noise levels along the southern section of the Route 220 corridor. With 2040 Alternative B, future traffic noise levels are predicted to range from 45 to 63 dB(A) L_{eq}. At the southern end of the corridor, there are many homes near the existing Route 220 that are exposed to the highest noise levels and noise impact without the study (i.e. for the 2018 Existing Conditions and the 2040 No-Build Alternative). Due to a shift in the roadway alignment and needed construction, some of these properties potentially would be acquired and others would remain, but not be impacted under all three future Build alternatives.

In areas to the west of the existing Route 220 corridor, where the proposed Bypass would be on new location with Alternative B, noise levels for both the Existing Conditions and the 2040 No-Build Alternative were based on the short-term noise measurement data summarized in **Table 3-2**. With 2040 Alternative B, noise levels are predicted to increase by more than 10 dB(A) at many locations.

Table 4-3 provides ranges of predicted worst noise hour noise levels by CNE for Alternative B. **Figure 4** in **Appendix E** shows the locations of noise-sensitive receptors, CNEs, and noise barriers evaluated for Alternative B. **Table C-2** in **Appendix C** provides the predicted traffic noise levels for each noise-sensitive receptor evaluated for Alternative B.

Table 4-3: Ranges of Predicted Loudest Hour Noise Levels by CNE – Alternative B

CNE	Area Land Use and Description	FHWA Activity Category	Range of Exterior & Interior Hourly L_{eq} (dB(A))*		
			Existing (Alt. B)	No-Build (Alt. B)	Build (Alt. B)
BA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	51 - 67	53 - 69	57 - 63
BB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and residences west of the Bypass Interchange & existing Rte. 220	B and C	55 - 67	56 - 69	45 - 63
BC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	46 - 66	46 - 67	53 - 63‡
BD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	41 - 50	41 - 50	46 - 63‡
BE	Residences on the east side of the Bypass along White House Rd	B	37 - 61	37 - 63	51 - 66‡
BF	Residences on the west side of the Bypass along Lee Ford Camp Rd	B	43 - 47	43 - 47	53 - 57‡
BG	Residence on the east side of the Bypass on Lee Ford Camp Rd Magna Vista High School building and athletic fields	B, C and D	17 - 42	17 - 42	28 - 60‡
BH	Residences on the east side of the Bypass along Soapstone Rd	B	44 - 49	44 - 49	53 - 57‡
BI	Residences on the west side of the Bypass along Soapstone Rd and Joseph Martin Rd	B	48 - 52	48 - 52	55 - 64‡
BJ	Residences on the east side of the Bypass along Ravenswood Lane and Church at Mercy Crossing building, playground and basketball court	B, C and D	20 - 50	20 - 50	33 - 66‡
BK	Residences to east of interchange at Bypass 58 on Trinity Ter, Oxford Dr, Fisher Farm Rd & Willow Creek Dr	B	43 - 66	43 - 67	46 - 66
BL	Martinsville Church of Truth and Residences to north of interchange at Bypass 58 on Fisher Farm Rd, Ebony Dr, and Joseph Martin Hwy	B, C and D	27 - 62	27 - 63	34 - 63
BM	Residences to west of interchange at Bypass 58 off Joseph Martin Hwy	B	55 - 67	56 - 68	57 - 66

* Red text indicates impact noise levels
‡ Indicates noise impact due to a substantial increase of 2040 Build noise levels over 2018 Existing noise levels.
Source: HMMH, 2019.

4.4.3 Predicted Noise Levels with Alternative C

Under Existing Conditions, traffic noise levels range from the low 40s dB(A) to the high 60s dB(A) along the southern section of the Route 220 corridor south of White House Road (CNEs CA, CB and CC) under Existing Conditions. Future traffic noise levels with the 2040 No-Build Alternative are predicted to increase by 1 to 2 dB(A) over existing noise levels along the southern section of the Route 220 corridor. With 2040 Alternative C, future traffic noise levels are predicted to range from 45 to 63 dB(A) L_{eq}. At the southern end of the corridor, there are many homes near the existing Route 220 that are exposed to the highest noise levels and noise impact without the study (i.e. for the 2018 Existing Conditions and the 2040 No-Build Alternative). Due to a shift in the

roadway alignment and needed construction, some of these properties potentially would be acquired and others would remain, but not be impacted under all three future Build Alternatives.

In areas to the west of the existing Route 220 corridor, where the proposed Bypass would be on new location with Alternative C, noise levels for both the Existing Conditions and the 2040 No-Build Alternative were based on the short-term noise measurement data summarized in **Table 3-2**. With 2040 Alternative C, noise levels are predicted to increase by more than 10 dB(A) at many locations.

Table 4-4 Table provides ranges of predicted worst noise hour noise levels by CNE for Alternative C. **Figure 5** in **Appendix E** shows the locations of noise-sensitive receptors, CNEs, and noise barriers evaluated for Alternative C. **Table C-3** in **Appendix C** provides the predicted traffic noise levels for each noise-sensitive receptor evaluated for Alternative C.

Table 4-4: Ranges of Predicted Loudest Hour Noise Levels by CNE – Alternative C

CNE	Area Land Use and Description	FHWA Activity Category	Range of Exterior & Interior Hourly L_{eq} (dB(A))*		
			Existing (Alt. C)	No-Build (Alt. C)	Build (Alt. C)
CA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	51 - 67	53 - 69	56 - 63
CB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and residences west of the Bypass Interchange & existing Rte. 220	B and C	55 - 67	56 - 69	45 - 63
CC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	46 - 66	46 - 67	53 - 62‡
CD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	41 - 50	41 - 50	46 - 62‡
CE	Residences east of Bypass along White House Rd	B	46 - 61	46 - 63	48 - 61‡
CF	Residences west of Bypass along White House Rd	B	37 - 47	37 - 47	50 - 62‡
CG	Residences east of Bypass along Lee Ford Camp Rd	B	46 - 46	46 - 46	45 - 48
CH	Residences east of Bypass along Soapstone Rd	B	46 - 49	46 - 49	48 - 61‡
CI	Residences west of Bypass on Memory Ln	B	41 - 46	41 - 46	51 - 54‡
CJ	Residences east of Bypass on Joseph Martin Hwy, Fisher Dr, Beckford Way, Farmingdale Dr	B	43 - 50	43 - 50	48 - 57
CK	Residences on the east side of the Bypass on Ravenswood Ln and Church at Mercy Crossing building, playground & basketball court	B, C and D	20 - 50	20 - 50	33 - 65‡
CL	Residences to east of interchange at Bypass 58 on Trinity Ter, Oxford Dr, Fisher Farm Rd & Willow Creek Dr	B	43 - 66	43 - 67	47 - 66
CM	Martinsville Church of Truth and Residences to north of interchange at Bypass 58 on Fisher Farm Rd, Ebony Dr, and Joseph Martin Hwy	B, C and D	27 - 62	27 - 63	33 - 63

CNE	Area Land Use and Description	FHWA Activity Category	Range of Exterior & Interior Hourly L_{eq} (dB(A))*		
			Existing (Alt. C)	No-Build (Alt. C)	Build (Alt. C)
CN	Residences to west of interchange at Bypass 58 off Joseph Martin Hwy	B	55 - 67	56 - 68	57 - 66

* Red text indicates impact noise levels
‡ Indicates noise impact due to a substantial increase of 2040 Build noise levels over 2018 Existing noise levels.
Source: HMMH, 2019.

5. NOISE IMPACT ASSESSMENT

The potential noise impact of the Build Alternatives was assessed according to FHWA and VDOT noise assessment guidelines, described in detail in **Section 2**. In summary, noise impact would occur wherever noise levels are predicted to approach within one decibel or exceed 67 dB(A) L_{eq} at noise-sensitive land uses in Activity Categories B (residential) and C (recreational). For Activity Category D (noise-sensitive institutional) land uses such as schools and church buildings, noise impact would occur where predicted interior noise levels due to the approach or exceed 52 dB(A) L_{eq} during the loudest hour of the day. Noise impact also would occur wherever Build Alternative noise levels cause a substantial increase over existing noise levels—an increase of 10 dB or more is considered substantial by VDOT for all noise-sensitive exterior activity categories.

Table 5-1 Table presents a summary of the predicted noise impact for the Existing Conditions (2018) and 2040 No-Build and Build Alternatives. In this table, the impacts are summarized by Alternative and by FHWA land use activity categories.

Table 5-1: Noise Impact Summary by Activity Category

Corridor / Build Alt.	Scenario	Number of Impacted Units by Activity Category			
		Residences (Category B)	Recreation/ Parks (Category C)	Institutional Interior (Category D)	Total
A	2018 Existing	9	0	0	9
	2040 No-Build	14	0	0	14
	2040 Build	17	0	0	17
B	2018 Existing	11	0	0	11
	2040 No-Build	17	0	0	17
	2040 Build	24	12	0	36
C	2018 Existing	11	0	0	11
	2040 No-Build	17	0	0	17
	2040 Build	23	3	0	26

Source: HMMH, 2019.

Table 5-1 summarizes the total number of predicted noise impacts by Build Alternative by impact type. The “NAC” type of impact tallies the number of receptors for which the relevant NAC is predicted to be approached or exceeded, excluding receptors where a substantial increase would occur. The “Substantial Increase” impact type includes all exterior receptors where impact due to a substantial increase is predicted, excluding receptors with levels that approach or exceed the applicable NAC. The “Both NAC and Substantial Increase” type of impact shows the number of receptors where both a NAC and Substantial Increase impact is predicted to occur. “Total” impact indicates the total number of receptors where noise impact is predicted to occur, whether it is NAC impact or impact due to Substantial Increase.

As shown in **Table 5-2**Table, many of the predicted noise impacts along each respective alternative alignment are due to a substantial increase of Build Alternative noise levels over existing noise levels. Nearly all of the receptors with an impact due to a substantial increase are located adjacent to proposed project roadways that are on new location. The number of receptors exposed to levels that approach or exceed the relevant NAC along each respective alternative alignment would decrease as a result of the project. This is because most of the receptors exposed to levels that approach or exceed the NAC under the Existing Conditions or the 2040 No-Build Alternative are located fairly close to existing highways – predominantly the existing Route 220. However, each Build Alternative would potentially acquire many of these impacted receptors located close to Route 220 near the southern terminus where the proposed alternative would connect to Route 220. Other receptors that would not be acquired by the Build Alternatives

would be located at relatively greater distances from existing roadways and exposed to lower noise levels.

Table 5-2: Type of Noise Impact by Corridor/Build Alternative

Corridor / Build Alt.	2018 Existing	2040 No-Build	2040 Build Alternative			
	NAC	NAC	NAC Only	Substantial Increase Only	Both NAC & Substantial Increase	Total
A	9	14	0	14	3	17
B	11	17	2	32	2	36
C	11	17	2	24	0	26

Source: HMMH, 2019.

Table 5-3, **Table 5-4**, and **Table 5-5** present the noise impact results by CNE for Alternatives A, B, and C, respectively.

Table 5-3: Noise Impact Summary by CNE – Alternative A

CNE	Area Land Use and Description	FHWA Activity Category	Number of Dwellings, Recreational Units and Institutions Impacted by Noise		
			Existing	No-Build	Alt. A
AA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	1	1	0
AB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and residences west of the Bypass Interchange & existing Rte. 220	B and C	7	9	0
AC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	1	4	2
AD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	0	0	5
AE	Residences on the east side of the Bypass along White House Rd	B	0	0	3
AF	Residences on the west side of the Bypass along Reservoir Rd	B	0	0	3
AG	Residences on the east side of the Bypass along Lee Ford Camp Rd	B	0	0	1
AH	Residences on the west side of the Bypass along Lee Ford Camp Rd	B	0	0	1
AI	Residences on the east side of the Bypass along Soapstone Rd	B	0	0	0
AJ	Residences on the west side of the Bypass along Soapstone Rd	B	0	0	0
AK	Residences on the east side of the Bypass between Rte. 58 and Soapstone Rd	B	0	0	2
AL	Residence to the west of the Bypass interchange at Bypass Rte. 58	B	0	0	0
AM	Residence to the north of the Bypass interchange at Bypass Rte. 58	B	0	0	0
Total			**9**	**14**	**17**

Source: HMMH, 2019.

Table 5-4: Noise Impact Summary by CNE – Alternative B

CNE	Area Land Use and Description	FHWA Activity Category	Number of Dwellings, Recreational Units and Institutions Impacted by Noise		
			Existing	No-Build	Alt. B
BA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	1	1	0
BB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and residences west of the Bypass Interchange & existing Rte. 220	B and C	7	9	0
BC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	1	4	2
BD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	0	0	5
BE	Residences on the east side of the Bypass along White House Rd	B	0	0	5
BF	Residences on the west side of the Bypass along Lee Ford Camp Rd	B	0	0	2
BG	Residence on the east side of the Bypass on Lee Ford Camp Rd and Magna Vista High School building and athletic fields	B, C and D	0	0	10
BH	Residences on the east side of the Bypass along Soapstone Rd	B	0	0	1
BI	Residences on the west side of the Bypass along Soapstone Rd and Joseph Martin Rd	B	0	0	3
BJ	Residences on the west side of the Bypass along Ravenswood Lane and Church at Mercy Crossing building, playground and basketball court	B, C and D	0	0	6
BK	Residences to east of interchange at Bypass 58 on Trinity Ter, Oxford Dr, Fisher Farm Rd & Willow Creek Dr	B	1	1	1
BL	Martinsville Church of Truth and Residences to north of interchange at Bypass 58 on Fisher Farm Rd and Joseph Martin Hwy	B, C and D	0	0	0
BM	Residences to west of interchange at Bypass 58 off Joseph Martin Hwy	B	1	2	1
Total			**11**	**17**	**36**

Source: HMMH, 2019.

Table 5-5: Noise Impact Summary by CNE – Alternative C

CNE	Area Land Use and Description	FHWA Activity Category	Number of Dwellings, Recreational Units and Institutions Impacted by Noise		
			Existing	No-Build	Alt. C
CA	Residences on the east side of Rte. 220 between the state line and the Bypass interchange	B	1	1	0
CB	Cemeteries on the west side of Rte. 220 south of the Bypass interchange and residences west of the Bypass Interchange & existing Rte. 220	B and C	7	9	0
CC	Single-family homes on the west side of Rte. 220 along J B Dalton Rd	B	1	4	1
CD	Single-family homes on the east side of Rte. 220 from the Bypass interchange to existing Rte. 220	B	0	0	4
CE	Residences east of Bypass along White House Rd	B	0	0	1
CF	Residences west of Bypass along White House Rd	B	0	0	6
CG	Residences east of Bypass along Lee Ford Camp Rd	B	0	0	0
CH	Residences east of Bypass along Soapstone Rd	B	0	0	1
CI	Residences west of Bypass on Memory Ln	B	0	0	5
CJ	Residences east of Bypass on Joseph Martin Hwy, Fisher Dr, Beckford Way, Farmingdale Dr	B	0	0	0
CK	Residences on the west side of the on Ravenswood Ln and Church at Mercy Crossing building, playground & basketball court	B, C and D	0	0	6
CL	Residences to east of interchange at Bypass 58 on Trinity Ter, Oxford Dr, Fisher Farm Rd & Willow Creek Dr	B	1	1	1
CM	Martinsville Church of Truth and Residences to north of interchange at Bypass 58 on Fisher Farm Rd, Ebony Dr, and Joseph Martin Hwy	B, C and D	0	0	0
CN	Residences to west of interchange at Bypass 58 off Joseph Martin Hwy	B	1	2	1
Total			**11**	**17**	**26**

Source: HMMH, 2019.

5.1 SECTION 4(F) AND HISTORIC PROPERTIES EVALUATION

Section 4(f) refers to a provision of the Department of Transportation Act (DOT Act) of 1966 that prohibited FHWA and other DOT agencies from approving the use of certain environmental resources such as, historical sites, and publicly-owned lands for highway projects unless "there is no prudent and feasible alternative" and actions are taken to minimize harm to those properties. Use includes "constructive use," which impacts a 4(f) resource such that the protected activities, features, and attributes would be substantially impaired, even if it does not involve physical use of the property.

Noise can be a Section 4(f) constructive use issue if predicted noise levels from a project in proximity to a Section 4(f) resource interfere with the use and enjoyment of a noise-sensitive facility or exterior activity associated with that resource. Examples of noise-sensitive activities that may invoke Section 4(f) protection include:

- hearing performances at an outdoor amphitheater,
- sleeping in the sleeping area of a campground,
- enjoyment of a historic site where a quiet setting is a generally recognized feature or attribute of the site's significance,
- enjoyment of an urban park where serenity and quiet are significant attributes, or
- viewing wildlife in an area of a wildlife and waterfowl refuge intended for such viewing.

When these types of facilities and activities are present adjacent to a project, it is important that these facilities and activities be modeled so that FHWA can determine whether or not a Section 4(f) constructive use is going to occur because of noise increases on the project.

Noise-sensitive Section 4(f) resources are evaluated under the appropriate Noise Abatement Criteria activity category in 23 CFR 772 (usually Activity Category C). In order for FHWA to begin considering whether or not a highway traffic noise increase may constitute a constructive use under Section 4(f), there must be:

- a future highway traffic noise level that approaches or exceeds 67 dB(A), or
- existing noise levels which approach or exceed 67 dB(A) and a predicted increase with the future Build Alternative greater than 3 dB(A) or more above the predicted No-Build Alternative noise level.

Table 5-6 shows that the only potential noise-sensitive Section 4(f) resources in the study area are the Magna Vista High School athletic fields, which are Activity Category C exterior uses. Only Alternative B would potentially impact the fields. Predicted future noise levels for Alternative B have been modeled at those portions of the athletic fields that are closest to the roadways within the study area, as shown in **Figure 4 (Sheet 9 of 15)**. **Table 5-6** shows the predicted future noise levels for each of the modeled receptors on the athletic fields. The highest predicted noise level at the baseball field is 60 dB(A) L_{eq} with Alternative B. Since neither of the criteria shown in the preceding bulleted list are met at the athletic fields, the study would not produce a constructive use noise impact any Section 4(f) resources.

The noise impact zone (defined by the extent of Build Alternative noise levels that are 66 dB(A), or more) with each build alternative typically ranges up to 185 feet to 250 feet from the centerline of a proposed design corridor, and is shown with noise contours in **Figures 3, 4,** and **5**.

Table 5-6: Potential Traffic Noise Impacts at Section 4(f) Resources

CNE	Site No.	Description / Address	Applicable Alternatives	2040 Build L_{eq} (dB(A))	Type of Impact
Public Parks and Recreation Areas					
BG	R-714	Magna Vista High Sch. athletic fields	B	60	None
BG	R-715	Magna Vista High Sch. athletic fields	B	59	None
BG	R-716	Magna Vista High Sch. athletic fields	B	58	None
BG	R-717	Magna Vista High Sch. athletic fields	B	58	None
BG	R-718	Magna Vista High Sch. athletic fields	B	57	None
BG	R-719	Magna Vista High Sch. athletic fields	B	56	None
BG	R-720	Magna Vista High Sch. athletic fields	B	56	None
BG	R-721	Magna Vista High Sch. athletic fields	B	55	None
BG	R-722	Magna Vista High Sch. athletic fields	B	55	None

Source: HMMH, 2019

6. NOISE ABATEMENT MEASURES

FHWA has identified certain noise abatement measures that may be incorporated in projects to reduce traffic noise impact. In general, mitigation measures can include alternative measures (traffic management, the alteration of horizontal and vertical alignment, and low-noise pavement), in addition to the construction of noise barriers.

6.1 ALTERNATIVE NOISE ABATEMENT DETERMINATION

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 that have the potential to provide considerable noise reductions under certain circumstances. Mitigation measures considered for this project include:

- Traffic management 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 management measures normally considered for noise abatement include reduced speeds and truck restrictions. Reduced speeds would not be an effective noise mitigation measure alone since a substantial decrease in speed is necessary to provide a significant noise reduction. Typically, a 10-mph reduction in speed would result in only a 2 dB(A) decrease in noise level, which is not considered a sufficient level of attenuation to be considered feasible. Further, a 2 dB(A) change in noise level is not considered to be generally perceptible. Restricting truck usage on any of the proposed Build Alternatives is not practical since one of the primary purposes of these facilities is to accommodate trucks.

A significant alteration of the horizontal alignment of the study area corridors would be necessary to make such a measure effective in reducing noise, since a doubling of distance to the highway is usually needed to affect a 5-dB(A) reduction. However, such shifts would create undesirable impacts by increasing right of way acquisitions and relocations. Alteration of the vertical alignment would have very limited benefit, given the significant distances to most impacted properties. The substantial terrain variation throughout the study area also limits the practicality of significant vertical alignment shifts.

Acoustical Insulation of public-use and non-profit facilities applies only to public and institutional use buildings. Since no public use or institutional structures are predicted to have interior noise levels exceeding FHWA's interior NAC, this noise abatement option would not be applied.

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

Berms are considered a more attractive alternative to noise walls where there is sufficient land and fill available for them. Berms would have limited application in the study corridors due to the significant terrain variation, and the increased footprint that berms would require, which would result in costly additional right of way acquisition and tree clearing. The feasibility of berms in any areas with available unimproved property adjacent to the project may be reevaluated during the detailed noise study during final design.

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 would be given to these measures during the final design stage, where feasible"* (see **Appendix G**).

6.2 NOISE BARRIERS

The only remaining abatement measure for consideration is the construction of noise barriers. The feasibility of noise barriers is evaluated for locations where noise impact is predicted to occur under the Build Alternatives. Where the construction of noise barriers is found to be physically practical, barrier noise reduction is estimated based on roadway, barrier, and receptor geometry as described below.

To be constructed, any noise barriers identified in this document must satisfy VDOT's feasibility and reasonableness criteria. Therefore, the noise barrier design parameters and cost identified in this document are preliminary and should not be considered final. A final decision on the feasibility and reasonableness of noise barriers would be made during final design when the project design is developed and traffic updated. If a noise barrier is determined to be feasible and reasonable, the affected public would be given an opportunity to decide whether they are in favor of construction of the noise barrier. VDOT's formal policies for involving the public in noise abatement decisions are described in their *Highway Traffic Noise Impact Guidance Manual*, in *Section 7.3.10.1 Viewpoints of the benefited receptors*, *Section 12.3 Affected Receptors/Community*, and *Section 12.4 Voting Procedures*.

6.2.1 Feasibility and Reasonableness

FHWA and VDOT require that noise barriers be both feasible and reasonable to be recommended for construction.

To be feasible, a barrier must be effective, that is it must reduce noise levels at noise sensitive locations by at least 5 dB(A), thereby benefiting the property. VDOT requires that at least 50 percent of the impacted receptors receive 5 dB(A) or more of insertion loss from the proposed barrier for it to be feasible.

A second feasibility criterion is that it must be possible to design and construct the barrier. Factors that enter into constructability include safety, barrier height, topography, drainage, utilities, maintenance of the barrier, and access to adjacent properties. VDOT has a maximum allowable height of 30 feet for noise barriers.

Barrier reasonableness is based on three factors: cost-effectiveness, ability to achieve VDOT's insertion loss design goal, and views of the benefited receptors. To be cost-effective, a barrier cannot require more than 1,600 square feet per benefited receptor. VDOT's maximum barrier height of 30 feet figures into the assessment of benefited receptors. Where multi-family housing includes balconies at elevations above 30 feet, these receptors are not assessed and included in the determination of a barrier's feasibility or reasonableness.

The second reasonableness criterion is VDOT's noise reduction design goal of 7 dB(A). For the barrier to be considered reasonable, this goal must be achieved for at least one of the impacted receptors.

The third reasonableness criterion relates to the views of the owners and residents of the potentially benefited properties. A majority of the benefited receptors must favor the barrier for it to be considered reasonable to construct. Community views would be surveyed in the detailed design phase.

6.2.2 Details of Potential Noise Barriers

The noise barrier analysis conducted for the Draft EIS evaluated barriers in 5-foot height increments. Where proposed barriers were evaluated in fill sections, panel heights from 15 feet to 30 feet (VDOT's maximum barrier height) were evaluated. For structure mounted barrier segments (on bridge or elevated structure), panel heights from 10 feet to 25 feet were evaluated. This processing approach does not allow for fine-tuning of reasonableness via the surface area per benefited receptor factor with as many barrier heights as would be evaluated during the final design noise analysis. As a result, this analysis gives initial impressions of the potential cost-effectiveness of barriers for each CNE with each Build Alternative but cannot and should not be construed as definitive findings about the eventual reasonableness of any of the noise barriers evaluated. As mentioned earlier, all noise-sensitive areas adjacent to the design corridor would be reevaluated for noise abatement in a much more detailed manner during the detailed design phase, following this NEPA environmental documentation process.

Table 6-1 Table 6-1 provides a summary of the noise barriers that were evaluated in this study. Largely due to the relatively low density of housing in this rural study area, no noise barriers were found to be both feasible and reasonable per VDOT's criteria. Additional details of the noise barrier are provided in narratives following the table. Each noise barrier is also shown as a solid line in **Figures 3** through **5** for Alternatives A through C, respectively. The color of the line (on the figures) indicates whether the proposed barriers were determined to be feasible and not reasonable (red) or not feasible (blue).

The potential barriers evaluated and shown in the graphics have not been intentionally placed outside of VDOT right of way. While the need for right of way to construct some barriers as part of the study is not anticipated, it also cannot be precluded in the future, given the limited information available for this noise analysis. Final placement of barriers and determination of additional right of way needed would occur during the detailed design phase. In some cases, the potential barriers shown on the graphic indicate designs with significant length that do not meet either reasonableness criteria in order to demonstrate that the situation cannot yield a reasonable barrier but still provide the maximum amount of noise reduction for impacted receptors. Preliminary decisions regarding both recommended and non-recommended noise barriers may change between the environmental document and final design as a result of potential changes in the transportation improvement project design, design year traffic, or the level of detail contained in the project design at the time of this preliminary study.

Table 6-1: Summary of Potential Noise Barriers

Barrier ID	Build Alts.	Noise Reduction		Dimensions and Cost				Number of Recreational and Residential Units					Barrier Status
		Range (dB(A))	Avg. (dB(A))	Length (feet)	Height (feet)	Surface Area (sq-ft)	Cost at $42/ sq-ft	Total Impacted	Impacted and Benefited	Non-Impacted and Benefited	Total Benefited	Surface Area per Benefited Receptor	
1	A,B	5-9	6	2,379	30	71,444	3,000,648	3	3	10	13	5,496	F & NR
	C	5-8	6	2,379	30	71,444	3,000,648	3	3	7	10	7,144	F & NR
2	A,B	5-7	7	1,583	20	31,652	1,329,384	2	2	1	3	10,551	F & NR
	C	7	7	1,583	20	31,652	1,329,384	1	1	2	3	10,551	F & NR
3[2]	A,B,C	5-8	6	1,384	25	34,612	1,453,704	1	1	0	1	34,612	F & NR
4	A	5-13	8	2.497	25	62,442	2,622,564	3	3	0	3	20,814	F & NR
5	A	5-8	7	3,350	25	83,738	3,516,996	3	3	0	3	27,913	F & NR
6	A	< 5	N/A	590	20	11,803	495,726	2	0	0	0	N/A	NF
7	A	5	5	520	20	10,401	436,842	1	1	0	1	10,401	F & NR
8[2]	A	5-8	6	1,384	25	34,612	1,453,704	1	1	0	1	34,612	F & NR
9[2]	A	5-8	6	1,384	25	34,612	1,453,704	1	1	0	1	34,612	F & NR
10	B	5-12	8	4,515	20	90,344	3,794,448	4	4	0	4	18,069	F & NR
11	B	5	5	3,564	25	89,150	3,744,300	1	1	0	1	89,150	F & NR
12[2]	B	5-8	6	1,384	25	34,612	1,453,704	1	1	0	1	34,612	F & NR
13	B	5-6	5	2,233	30	66,989	2,344,608	9	5	0	5	11,165	F & NR
14	B	5	5	1,798	25	44,945	1,887,690	1	1	0	1	44,945	F & NR
15	B	5-9	8	2,848	30	85,503	3,591,126	3	3	0	3	28,501	F & NR
16	B	5-8	6	3,698	25	92,540	3,886,680	3	3	0	3	30,847	F & NR
17	B,C	< 5	N/A	2,307	30	69,205	2,906,610	3	0	0	0	N/A	NF
18	B,C	7	7	1,148	15	17,189	721,938	1	1	0	1	17,189	F & NR
19[2]	C	5-8	6	1,384	25	34,612	1,453,704	1	1	0	1	34,612	F & NR
20	C	5-9	7	4,021	20	80,424	3,377,808	6	6	0	6	13,404	F & NR
21	C	5	5	1,509	25	37,706	1,583652	1	1	0	1	37,706	F& NR
22	C	5-9	6	2.699	20	53,931	566,276	5	3	1	4	13,483	F & NR
23	C	5-8	7	3,454	25	86,321	3,625,482	3	3	0	3	28,774	F & NR
24	B,C	5-12	8	1,774	30	53,196	2,234,232	1	1	12	13	4,092	F & NR

[1] Barrier Status: “F & NR” = feasible and not reasonable; “NF” = not feasible; “F & R” = feasible and reasonable.
[2] VDOT individual-isolated receptor methodology used and based upon Barrier 12 analysis.

Source: HMMH, 2019.

Per the VDOT guidance manual, to properly attenuate noise at a single impacted receptor, several noise sensitive sites must be evaluated to ensure the extent of the outdoor use area is benefited. Barriers for a single impacted receptor that are found to be feasible and reasonable should use the following methodology:

1. Place a boundary around the extent of the outdoor use area (associated with the single impacted receptor).

2. Additional noise sensitive sites are then placed at the opposite ends of both boundaries.

3. Extend the boundary limits of the of the outdoor use area to the proposed roadway, perpendicular to the roadway. The distance in-between the two extended limits creates a rough barrier length which should provide some attenuation to the impacted receptor however may not consider flanking noise. In order to address the flanking noise considerations in a similar manner to recommendations stated in the FHWA report, "*FHWA Highway Noise Barrier Design Handbook*," the evaluated barrier was extended in each direction by the same distance the noise sensitive site is located from the roadway. This method is based on FHWA's 4:1 ratio for the minimum distance between the noise sensitive site and the end of the barrier, though this method is closer to a 2:1 ratio.

4. A final noise sensitive site is placed at the boundary extent in the middle of the barrier (assuming that the barrier was extended equally in both directions). These noise sensitive sites would predict the attenuation of the barrier at the future design year single receptor impact. This method ensures that the evaluated barrier is long enough to adequately address the impacted area.

VDOT guidance also suggests that one single isolated impacted receptor in a study area may be evaluated in the way described above, and the results of that analysis may be applied to all of the single isolated receptors in the study area. Barrier 12 in CNE BG was chosen for such an analysis, due to its relatively close proximity to the proposed Alternative B alignment. **Table 6-1** shows the results for the analysis of Barrier 12, with those results also shown for the other the single isolated receptors and barriers in the study area. Those barrier IDs are shown with note 2, referencing the methodology and Barrier 12.

Appendix F presents VDOT's Warranted, Feasible and Reasonable worksheets for each noise barrier that was evaluated in this study.

Barrier 1 is a potential barrier system covering the southern portions of CNEs AD (Alternative A), CNE BD (Alternative B), and CNE CD (Alternative C), which are located southeast of the existing Route 220 and just east of JB Dalton Road. These CNEs contain single-family residences. With Alternative A, shown in **Figure 3, Sheet 3**, and Alternative B, shown in **Figure 4, Sheet 3**, four impacted receptors would be benefited with 7 to 9 dB(A) of noise reduction, while with Alternative C, shown in **Figure 5, Sheet 3**, three impacted receptors would be benefited with 6 to 8 dB(A) of noise reduction. Alternatives A and B would also benefit nine non-impacted receptors with 5 to 6 dB(A) of noise reduction, while Alternative C would benefit seven non-impacted receptors with 5 to 6 dB(A) of noise reduction. This barrier system would consist of two segments; one just south and inside of the new Route 220 on-ramp to shield noise from the highway, and one to the north, perpendicular to the new southern portion of JB Dalton Road. The barrier would be 2,379 feet in length and maintain a 30-foot height with a total surface area of 71,444 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor for Alternatives A and B is 5,496, and 7,144 for Alternative C, therefore all three scenarios exceed VDOT's maximum value of 1,600.

Barrier 2 is a potential barrier for CNE AC with Alternative A, CNE BC with Alternative B, and CNE CC with Alternative C, which are located just east of the existing Route 220 off of JB Dalton Road. These CNEs contain single-family residences. With Alternative A, shown in **Figure 3, Sheet 3**, and Alternative B, shown in **Figure 4, Sheet 3**, two impacted receptors would be benefited with 7 dB(A) of noise reduction as well as one non-impacted receptor, benefited with 6 dB(A) of noise reduction. With Alternative C, shown in **Figure 5, Sheet 3**, one impacted receptor would be benefited with 7 dB(A) of noise reduction, and two non-impacted receptors would be benefited with 6 to 7 dB(A) of noise reduction. As shown in the figures, this barrier would run along the southbound side of Route 220, parallel to the new northern portion of JB Dalton Road. Barrier 2 would be 1,583 feet in length and maintain a 20-foot height with a total surface area of 31,652 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 10,551, surpassing the maximum value of 1,600.

Barrier 3 would benefit an individual isolated single-family residence located west of the existing Route 220 and south of the propose bypass at the southern extent of the study area. This single isolated receptor would be impacted under all three Alternatives, and is shown as follows: Alternative A, CNE AD, **Figure 3, Sheets 3 and 4**; Alternative B, CNE BD, **Figure 4, Sheets 3 and 4**; and Alternative C, CNE CD, **Figure 5, Sheets 3 and 4**. Per VDOT guidance for single isolated impacted receptors, analysis of Barrier 12 was completed for another single receptor in CNE BG. That analysis determined that no barrier would be feasible or reasonable in this study area for single isolated impacted receptors.

Barrier 4 is a potential barrier for CNE AE with Alternative A, located west of the existing Route 220, in a rural area just south of the existing White House Road. This CNE contains single-family residences. As shown in **Figure 3, Sheets 4 and 5**, three impacted receptors would be benefited with 5 to 13 dB(A) of noise reduction. The barrier would be 2,497 feet in length and maintain a 25-foot height with a total surface area of 62,442 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 20,814, exceeding VDOT's maximum value of 1,600.

Barrier 5 is a potential barrier for CNE AF with Alternative A, located west of the existing Route 220 and just north of Reservoir Road. This CNE contains single-family residences. As shown in **Figure 3, Sheet 5**, three impacted receptors would be benefited with 5 to 8 dB(A) of noise reduction. The barrier would be 3,350 feet in length and maintain a 25-foot height with a total surface area of 83,738 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 27,913, surpassing the maximum value of 1,600.

Barrier 6 is a potential barrier system for CNE AG with Alternative A, located east of the proposed Bypass and along the north side of Lee Ford Camp Rd. This CNE contains single-family residences. As shown in **Figure 3, Sheets 7 or 8**, the barrier system would consist of two segments: one on the north side of Lee Ford Camp Road and the other on the south side. The barrier system would be 590 feet in length and maintain a height of 20 feet with a total surface area of 11,803 square feet. This barrier system is not feasible since it does not meet the 5-dB(A) acoustical feasibility goal.

Barrier 7 is a potential barrier system for CNE AF with Alternative A, located west of the proposed Bypass under Alternative A and along the north side of Lee Ford Camp Road. This CNE contains single-family residences. As shown in **Figure 3, Sheet 8**, the barrier system would consist of two segments: one on the north side of Lee Ford Camp Road and one on the south side. The barrier would benefit one impacted receptor. The barrier system would be 520 feet in length and maintain a height of 20 feet with a total surface area of 10,401 square feet. This barrier system is feasible

but not reasonable, since it does not meet the 7 dB(A) noise reduction goal, nor does it meet the square-foot per benefited receptor criterion of 1,600.

Barrier 8 would benefit an individual isolated single-family residence located in CNE AK, shown in **Figure 3, Sheet 12**. Per VDOT guidance for single isolated impacted receptors, analysis of Barrier 12 was completed for another single receptor in CNE BG. That analysis determined that no barrier would be feasible or reasonable in this study area for single isolated impacted receptors.

Barrier 9 would benefit another isolated single-family residence in CNE AK, shown in **Figure 3, Sheet 14**. Per VDOT guidance for single isolated impacted receptors, analysis of Barrier 12 was completed for another single receptor in CNE BG. That analysis determined that no barrier would be feasible or reasonable in this study area for single isolated impacted receptors.

Barrier 10 is a potential barrier system for CNE BE with Alternative B, located on White House Road and north of Greensboro Road east of Alternative B. This CNE contains single-family residences. As shown in **Figure 4, Sheets 4, 5, and 6**, five impacted receptors would be benefited by 5 to 12 dB(A) of noise reduction. The barrier would be 4,515 feet in length and maintain a height of 20 feet with a total surface area of 90,344 square feet. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 18,069, exceeding VDOT's maximum value of 1,600.

Barrier 11 is a potential barrier system to benefit single-family homes in CNE BF with Alternative B, located north of Lee Ford Camp Road and east of Magna Vista School Road and west of the proposed Bypass with Alternative B. As shown in **Figure 4, Sheet 7**, one impacted receptor would be benefited with 5 dB(A) of noise reduction, while one impacted receptor would not be benefited by the barrier. Barrier 11 would be 3,564 feet in length and maintain a height of 25 feet with a total surface area of 89,150 square feet. This barrier system is feasible but not reasonable, since it does not meet the 7 dB(A) noise reduction goal, nor does it meet the square-foot per benefited receptor criterion of 1,600.

Barrier 12 would benefit an impacted isolated single-family residence located in the Southern portion of CNE BG, shown in **Figure 4, Sheet 8**. Per VDOT guidance for single isolated impacted receptors, analysis of Barrier 12 was completed. The analysis determined that Barrier 12 would not be feasible or reasonable. This analysis served to show that no barrier would be feasible or reasonable in this study area for single isolated impacted receptors.

Barrier 13 is a potential barrier system for CNE BG with Alternative B, which is located east of Magna Vista Road and Alternative B build road interchange, and represents the Magna Vista High School complex and contains a school building (Category D), athletic fields (Category C), and a residence (Category B). As shown in **Figure 4, Sheet 9**, the system would benefit five of the nine impacted recreational receptors with 5 to 6 dB(A) of noise reduction. The barrier would be 2,233 feet in length and maintain a 25-foot height with a total surface area of 55,824 square feet. The barrier is feasible, but not reasonable, since it would not meet the 7 dB(A) noise reduction goal and the surface area per benefited receptor is 11,165, surpassing the maximum value of 1,600.

Barrier 14 is a potential barrier system for CNE BH with Alternative B, located east of the Soapstone Road bridge and the proposed Bypass with Alternative B interchange, which contains single-family residences. As shown in **Figure 4, Sheet 11**, the barrier system would consist of two segments: one along the northbound lanes north of the Soapstone Road bridge and the other extending from the on-ramp to the proposed northbound Bypass. The single impacted receptor would be benefited with 5 dB(A) of noise reduction. The barrier would be 1,798 feet in length and maintain a 25-foot height with a total surface area of 44,945 square feet. This barrier system is feasible but not reasonable, since it does not meet the 7 dB(A) noise reduction goal, nor does it meet the square-foot per benefited receptor criterion of 1,600.

Barrier 15 is a potential barrier system for CNE BI with Alternative B, located west of the proposed interchange at Soapstone Road. CNE BI contains single-family residences. As shown in **Figure 4, Sheet 11**, the barrier system would consist of two segments: one extending along the southbound lanes north of the interchange to the off-ramp and one along the southbound lanes south of the off-ramp to Soapstone Road. The three impacted receptors would be benefited with 2 to 9 dB(A) of noise reduction. The barrier would be 2,848 feet in length and maintain a 30-foot height with a total surface area of 85,503 square feet. This barrier system is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 28,501, exceeding VDOT's maximum value of 1,600.

Barrier 16 is a potential barrier covering the southern extent of CNE BJ with Alternatives B, located west of Joseph Martin Highway and South of Route 58 near Ravenswood Lane. This portion of CNE BJ contains several single-family homes in a rural setting. As shown in **Figure 4, Sheets 12 and 13**, three impacted receptors would be benefited with 5 to 9 dB(A) of noise reduction. The barrier would be 3,698 feet in length and maintain a 25-foot height with a total surface area of 92,540 square feet. This barrier system is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 30,847, surpassing the maximum value of 1,600.

Barrier 17 is a potential barrier covering the northern portion of CNEs BJ and CK with Alternatives B and C. This barrier would be located south of Route 58 and to the west of Joseph Martin Highway and east of the proposed Alternatives. These CNEs contain residential land use, as well as the Church at Mercy Crossing building (Activity Category D) and outdoor recreational play areas (Activity Category C). As shown in **Figure 4, Sheet 13**, and **Figure 5, Sheet 12** the barrier is unable to provide the minimum noise reduction for acoustical feasibility at the three impacted receptors. The barrier would be 2,307 feet in length and maintain a 30-foot height with a total surface area of 69,205 square feet. This barrier system is not feasible, since it does not meet the 5-dB(A) feasibility goal – even with a barrier at VDOT's maximum permissible height.

Barrier 18 is a potential barrier for CNEs BM and CN with Alternatives B and C. The barrier would be located southwest of the proposed Alternatives and Route 58. This CNE contains a few single-family homes in a rural setting. As shown in **Figure 4, Sheet 14**, and **Figure 5, Sheet 13,** one impacted receptor would be benefited with 7 dB(A) of noise reduction. The barrier would be 1,148 feet in length and maintain a 15-foot height with a total surface area of 17,189 square feet. This barrier system is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 17,189, exceeding VDOT's maximum value of 1,600.

Barrier 19 would benefit an individual isolated single-family residence located in CNE CE, and shown in **Figure 5, Sheet 4**. Per VDOT guidance for single isolated impacted receptors, analysis of Barrier 12 was completed for another single receptor in CNE BG. That analysis determined that no barrier would be feasible or reasonable in this study area for single isolated impacted receptors.

Barrier 20 is a potential noise barrier for CNE CF with Alternative C. The barrier would be located west of the southern extent of the existing Route 220. This CNE is set in a rural area with several single-family homes. As shown in **Figure 5, Sheets 4 and 5**, six impacted receptors would be benefited with 5 to 9 dB(A) of noise reduction. The barrier would be 4,021 feet in length and maintain a 20-foot height with a total surface area of 80,424 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 13,404, surpassing the maximum value of 1,600.

Barrier 21 is a potential noise barrier for CNE CH with Alternative C, which is located west of the central section of the existing Route 220 and east of Magna Vista High School. This CNE is set

in a rural area with several single-family homes. As shown in **Figure 5, Sheet 8**, one impacted receptor would be benefited with 5 dB(A) of noise reduction. The barrier would be 1,509 feet in length and maintain a 25-foot height with a total surface area of 37,706 square feet. This barrier system is feasible, but not reasonable since it does not meet the 7 dB(A) noise reduction goal, nor does it meet the 1,600 square-foot per benefited receptor criterion.

Barrier 22 is a potential noise barrier for CNE CI with Alternative C. The barrier would be located to the east of Memory Lane in Ridgeway. This CNE is set in a rural area with a group of single-family homes and one isolated home to the south. As shown in **Figure 5, Sheet 9**, three impacted and one non-impacted receptor would be benefited with 5 to 9 dB(A) of noise reduction. Two impacted receptors would receive no acoustical benefit with this barrier. Barrier 22 would be 2,699 feet in length and maintain a 30-foot height with a total surface area of 80,896 square feet. This barrier system is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 20,224, exceeding VDOT's maximum value of 1,600.

Barrier 23 is a potential noise barrier covering the southern extent of CNE CK with Alternative C. The barrier would be located west of Joseph Martin Highway and South of Route 58 near Ravenswood Lane. This portion of CNE CK contains several single-family homes in a rural area. As shown in **Figure 5, Sheets 11 and 12**, three impacted receptors would be benefited with 5 to 9 dB(A) of noise reduction. The barrier would be 3,454 feet in length and maintain a 30-foot height with a total surface area of 103,586 square feet. This barrier is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 34,529, surpassing the maximum value of 1,600.

Barrier 24 is a potential noise barrier for CNEs BK and CL. The noise barrier would be located in the Trinity Terrace neighborhood, which contains single-family residences north east of the proposed interchange at Route 58 with Alternatives B and C. As shown in **Figure 4 Sheet 15** and **Figure 5 Sheet 14**, one impacted receptor and 12 non-impacted receptors would be benefited with 5 to 12 dB(A) of noise reduction. The barrier would be 1,774 in length and maintain a 30-foot height with a total surface area of 53,196 square feet. This barrier system is feasible, but not reasonable. Although the barrier would meet the 7 dB(A) noise reduction goal, the surface area per benefited receptor is 4,092 exceeding VDOT's maximum value of 1,600.

7. CONSTRUCTION NOISE CONSIDERATION

Construction noise provisions are contained in Section 107.16(b)3 Noise of the 2016 *VDOT Road and Bridge Specifications* (VDOT, 2016). 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 dB(A). 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.
- The Department may monitor construction-related noise. If construction noise levels exceed 80 dB(A) 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.
- The Department may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 P.M. and 6 A.M. 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.

8. INFORMATION FOR LOCAL GOVERNMENT OFFICIALS

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 information on noise-compatible land-use planning, noise impact zones in undeveloped land in the highway project corridor and federal participation in Type II projects (noise abatement only). This section of the report provides that information, as well as information about VDOT's noise abatement program.

8.1 NOISE-COMPATIBLE LAND-USE PLANNING

Section 9.0 of VDOT's 2011 noise policy and guidance manual outlines VDOT's approach to communication with local officials and provides 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

8.2 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 predicted at various distances from the edge of the project roadways in the undeveloped areas of the study area. Then, the distances from the edge of the roadway to the NAC sound levels are determined through interpolation. Distances may vary in the project corridor due to changes in traffic volumes, or terrain features. Any noise sensitive sites within these zones should be considered impacted by noise if no barrier is present to reduce sound levels.

The noise impact zone for residential and recreational land use (defined by the extent of project noise levels that are 66 dB(A), or more) for each Alternative ranges up to 185 feet to 250 feet from the centerline of a proposed design corridor.

Noise level contours are lines of equal noise exposure that typically parallel roadway alignments and are often useful to local officials in undeveloped corridors. Highway traffic noise is considered a linear noise source and sound levels can drop considerably over distance. The degree that sound levels decrease can vary based on a number of different factors including objects that shield the roadway noise, terrain features and ground cover type (e.g. grass, pavement or water). Through conscious planning efforts and noise contour information, municipal officials may restrict future development inside the noise impact zone (i.e., the area within the 66 dB(A) noise contour). The noise impact zone would be evaluated and refined after the selection of the preferred alternative, during the final design stage.

8.3 VDOT'S NOISE ABATEMENT PROGRAM

Information on VDOT's noise program is provided in "Highway Traffic Noise Impact Analysis Guidance Manual (Version 8)," updated February 20, 2018. This document is available from VDOT's Noise Abatement Section, Virginia Department of Transportation, 1401 E. Broad St., Richmond, VA 23219.

9. REFERENCES

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APPENDIX A

LIST OF PREPARERS/REVIEWERS

This appendix lists the preparers and reviewers of the Noise Analysis Technical Report.

All of the following individuals are employees of HMMH.

- Christopher Bajdek, Project Manager – traffic data processing, documentation
- Hayden Jubera – noise measurements, noise modeling, impact assessment, barrier analysis, and documentation
- Emma Butterfield – noise measurements, noise modeling, impact assessment, barrier analysis, and documentation
- Dillon Tannler – noise modeling, impact assessment, barrier analysis, and documentation
- Michael Hamilton – GIS support
- Christopher Menge, Principal-in-charge – quality assurance, technical advice

TNM Certification of HMMH's Principal-in-Charge, Christopher Menge, is on file in VDOT's offices.

The following individual is an employee of Whitman, Requardt, & Associates, LLP.

- Josh Kozlowski – Reviewer

APPENDIX B

TRAFFIC DATA USED IN THE NOISE ANALYSIS

This appendix provides the loudest-hour roadway traffic volumes and speeds used in the noise modeling for the 2018 Existing Conditions (**Table B-1**), as well as the 2040 No-Build Alternative (**Table B-2**) and the three Build Alternatives (**Tables B-3 to B-5**).

Table B-1 Traffic for the Worst Noise Hour for 2018 Existing Conditions: 10:00 AM

Segment	Direction	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Speed (mph)
220From_North_Carolina_Border_To_Proposed_Rte_220/ Bypass_Interchange_(south_of_Reservior_Rd)	NB	234	10	87	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	NB	234	10	87	53
220From_Morehead_Ave_(Ridgeway_87)_To_ Soapstone_Rd _(Rte_687)	NB	306	13	114	51
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	NB	353	16	131	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	NB	497	22	184	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_ Trinity_Terrace)	EB	332	15	123	70
220From_North_Carolina_Border_To_Proposed_Rte_220/ Bypass_Interchange_ (south_of_ Reservior_Rd)	SB	233	13	90	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	SB	233	13	90	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd _(Rte_687)	SB	305	17	118	51
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	SB	352	19	136	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	SB	495	27	192	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_ Trinity_Terrace)	WB	330	18	128	70

Table B-2 Traffic for the Worst Noise Hour with the 2040 No-Build Alternative: 10:00 A.M.

Segment	Direction	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Speed (mph)
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	NB	338	15	125	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	NB	338	15	125	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	NB	420	18	156	51
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	NB	459	20	170	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	NB	626	27	232	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	EB	393	17	146	70
220From_North_Carolina_Border_To_Proposed_Rte_220/ Bypass_Interchange_(south_of_Reservior_Rd)	SB	336	19	130	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	SB	336	19	130	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	SB	418	23	162	51
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	SB	457	25	177	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	SB	624	34	242	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	WB	391	22	152	70
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	SB	219	12	85	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	SB	385	21	149	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	WB	258	14	100	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	SB	223	12	86	71

Table B-3 Traffic for the Worst Noise Hour with 2040 Alternative A

Segment	Direction	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Speed (mph)
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	NB	338	15	125	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	NB	114	5	42	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	NB	196	9	73	51
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	NB	220	10	82	51
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	NB	387	17	143	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	EB	259	11	96	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	NB	224	10	83	71
BypFrom_Soapstone_Rd_(Rte_687)_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	NB	240	11	89	71
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	SB	336	19	130	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	SB	113	6	44	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	SB	195	11	76	51

Table B-4: Traffic for the Worst Noise Hour with 2040 Alternative B: 10:00 A.M.

Segment	Direction	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Speed (mph)
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	NB	338	15	125	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	NB	155	7	57	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	NB	236	10	87	50
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	NB	281	12	104	50
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	NB	432	19	160	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	EB	285	12	106	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	NB	222	10	82	71
BypFrom_Soapstone_Rd_(Rte_687)_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	NB	251	11	93	71
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	SB	336	19	130	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	SB	154	9	60	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	SB	235	13	91	50
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	SB	280	15	108	50
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	SB	430	24	167	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	WB	283	16	110	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	SB	221	12	86	71
BypFrom_Soapstone_Rd_(Rte_687)_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	SB	250	14	97	71

Table B-5: Traffic for the Worst Noise Hour with 2040 Alternative C: 10:00 A.M.

Segment	Direction	Autos (vph)	Medium Trucks (vph)	Heavy Trucks (vph)	Speed (mph)
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	NB	338	15	125	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	NB	155	7	57	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	NB	236	10	87	50
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	NB	281	12	104	50
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	NB	432	19	160	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	EB	285	12	106	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	NB	222	10	82	71
BypFrom_Soapstone_Rd_(Rte_687)_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	NB	251	11	93	71
220From_North_Carolina_Border_To_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)	SB	336	19	130	53
220From_Proposed_Rte_220/Bypass_Interchange_(south_of_Reservior_Rd)_To_Morehead_Ave_(Ridgeway_87)	SB	154	9	60	53
220From_Morehead_Ave_(Ridgeway_87)_To_Soapstone_Rd_(Rte_687)	SB	235	13	91	50
220From_Soapstone_Rd_(Rte_687)_To_Water_Plant_Rd	SB	280	15	108	50
220From_Water_Plant_Rd_To_Rte_58/Rte_220_Interchange	SB	430	24	167	45
58From_Rte_58/Rte_220_Interchange_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	WB	283	16	110	71
BypFrom_Proposed_Rte_220/Bypass_Interchange_To_Soapstone_Rd_(Rte_687)	SB	221	12	86	71
BypFrom_Soapstone_Rd_(Rte_687)_To_Proposed_Route_58/Bypass_Interchange_(near_Trinity_Terrace)	SB	250	14	97	71

APPENDIX C

TABLES OF PREDICTED NOISE LEVELS

Table C-1: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative A

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-003	11955 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	PA	Res.	67	**67**	**69**	**PA**	NA	NA
R-004	11935 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	59	61	62	NA	NA
R-005	11885 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	58	60	63	NA	NA
R-006	11875 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	57	59	61	NA	NA
R-007	11965 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	54	55	57	NA	NA
R-008	11793 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	PA	Res.	67	59	60	**PA**	NA	NA
R-009	11695 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	55	57	59	NA	NA
R-010	11387 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	----	Res.	67	51	53	56	NA	NA
R-011	11361 GREENSBORO RD Ridgeway, VA 24148	AA	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-012	0 Unassigned Ridgeway, VA 24148	AB	1	C	----	Rec.	67	61	62	63	NA	NA
R-013	0 RESERVOIR RD Ridgeway, VA 24148	AB	1	C	----	Rec.	67	60	61	57	NA	NA
R-014	11000 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	64	**66**	55	NA	NA
R-015	10978 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-016	100 CABIN HILL DR Ridgeway, VA 24148	AB	1	B	----	Res.	67	60	62	55	NA	NA
R-017	101 CABIN HILL DR Ridgeway, VA 24148	AB	1	B	----	Res.	67	61	62	56	NA	NA
R-018	60 CABIN HILL DR Ridgeway, VA 24148	AB	1	B	----	Res.	67	61	63	55	NA	NA
R-019	58 CABIN HILL DR Ridgeway, VA 24148	AB	1	B	----	Res.	67	59	60	52	NA	NA
R-020	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**66**	**67**	49	NA	NA
R-021	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	57	58	46	NA	NA
R-022	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**67**	**69**	51	NA	NA
R-023	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	59	60	47	NA	NA
R-024	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	56	58	48	NA	NA
R-025	10790 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	55	56	48	NA	NA
R-026	10582 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**66**	**67**	53	NA	NA
R-027	10606 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	60	62	55	NA	NA
R-028	10564 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**67**	**68**	54	NA	NA
R-029	10514 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	65	**66**	58	NA	NA
R-030	10486 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**67**	**68**	59	NA	NA
R-031	10482 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**67**	**69**	61	NA	NA
R-032	10464 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	----	Res.	67	**67**	**69**	61	NA	NA
R-033	11175 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-034	0 GREENSBORO RD Ridgeway, VA 24148	AB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-035	103 DALTON CIR Ridgeway, VA 24148	AB	1	B	PA	Res.	67	59	61	**PA**	NA	NA
R-036	61 DALTON CIR Ridgeway, VA 24148	AB	1	B	PA	Res.	67	62	64	**PA**	NA	NA
R-037	347 J B DALTON RD Ridgeway, VA 24148	AC	1	B	PA	Res.	67	48	50	**PA**	NA	NA
R-038	232 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	55	56	59	55	4
R-039	231 J B DALTON RD Ridgeway, VA 24148	AC	1	B	Sub'l Inc	Res.	67	51	53	**63**	55	**7**
R-040	232 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	56	57	58	55	3
R-041	10731 GREENSBORO RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	**66**	**67**	55	52	2
R-042	200 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	57	58	57	54	3
R-043	181 J B DALTON RD Ridgeway, VA 24148	AC	1	B	Sub'l Inc	Res.	67	52	54	**62**	55	**7**
R-044	156 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	58	60	58	54	4
R-045	139 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	54	56	61	55	**6**
R-046	146 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	58	60	56	54	3
R-047	110 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	59	61	56	54	2

Table C-1: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative A

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-048	10613 GREENSBORO RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	65	**67**	53	51	2
R-049	58 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	61	63	54	52	2
R-050	29 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	63	65	55	54	2
R-051	57 J B DALTON RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	59	61	56	54	2
R-052	10441 GREENSBORO RD Ridgeway, VA 24148	AC	1	B	----	Res.	67	65	**66**	60	NA	NA
R-053	0 GREENSBORO RD Ridgeway, VA 24148	AC	1	B	PA	Res.	67	65	**66**	**PA**	NA	NA
R-054	10293 GREENSBORO RD Ridgeway, VA 24148	AD	1	B	Sub'l Inc	Res.	67	48	50	**58**	53	**5**
R-055	47 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	----	Res.	67	61	63	60	NA	NA
R-056	0 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	----	Res.	67	51	52	58	51	**8**
R-057	62 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	----	Res.	67	56	58	52	NA	NA
R-648	230 WINNERS CIR Martinsville, VA 24112	AM	1	B	----	Res.	67	62	63	62	NA	NA
R-662	0 CAMERON RD Martinsville, VA 24112	AL	1	B	----	Res.	67	58	59	58	NA	NA
R-667	103 DALTON CIR Ridgeway, VA 24148	AD	1	B	----	Res.	67	41	41	46	42	4
R-668	575 J B DALTON RD Ridgeway, VA 24148	AD	1	B	Sub'l Inc	Res.	67	47	47	**57**	50	**7**
R-669	507 J B DALTON RD Ridgeway, VA 24148	AD	1	B	Sub'l Inc	Res.	67	47	47	**58**	49	**9**
R-670	30 SEEBROOK DR OFF CAROLINA PLACE Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	48	43	**5**
R-671	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	49	43	**5**
R-672	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	45	45	50	44	**6**
R-673	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	50	44	**6**
R-674	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	45	45	50	44	**5**
R-675	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	50	45	**5**
R-676	0 SEEBROOK DR Ridgeway, VA 24148	AD	0	B	----	Res.	67	46	46	50	45	**5**
R-677	0 SEEBROOK DR Ridgeway, VA 24148	AD	0	B	----	Res.	67	46	46	49	45	**5**
R-678	0 SEEBROOK DR Ridgeway, VA 24148	AD	0	B	----	Res.	67	46	46	50	45	**5**
R-679	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	50	45	4
R-680	0 SEEBROOK DR Ridgeway, VA 24148	AD	1	B	----	Res.	67	46	46	50	46	4
R-681	150 CAROLINA PL Ridgeway, VA 24148	AD	1	B	----	Res.	67	47	47	53	50	3
R-682	184 CAROLINA PL Ridgeway, VA 24148	AD	1	B	----	Res.	67	47	47	54	50	4
R-683	67 CAROLINA PL Ridgeway, VA 24148	AD	1	B	Sub'l Inc	Res.	67	50	50	**63**	54	**9**
R-684	111 CAROLINA PL Ridgeway, VA 24148	AD	1	B	Sub'l Inc	Res.	67	50	50	**62**	55	**7**
R-685	427 J B DALTON RD Ridgeway, VA 24148	AC	1	B	PA	Res.	67	50	50	**PA**	NA	NA
R-686	393 J B DALTON RD Ridgeway, VA 24148	AC	1	B	PA	Res.	67	49	49	**PA**	NA	NA
R-687	265 J B DALTON RD Ridgeway, VA 24148	AC	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-688	321 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	Both	Res.	67	47	47	**67**	53	**13**
R-689	351 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-690	495 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	Sub'l Inc	Res.	67	43	43	**59**	53	**6**
R-691	525 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	Sub'l Inc	Res.	67	43	43	**59**	54	**5**
R-692	521 WHITE HOUSE RD Ridgeway, VA 24148	AE	1	B	PA	Res.	67	41	41	**PA**	NA	NA
R-693	705 RESERVOIR RD Ridgeway, VA 24148	AF	1	B	Sub'l Inc	Res.	67	41	41	**59**	53	**6**
R-694	701 RESERVOIR RD Ridgeway, VA 24148	AF	1	B	Sub'l Inc	Res.	67	40	40	**52**	47	**5**
R-695	713 RESERVOIR RD Ridgeway, VA 24148	AF	1	B	Sub'l Inc	Res.	67	39	39	**58**	53	**5**
R-696	2960 LEE FORD CAMP RD Ridgeway, VA 24148	AG	1	B	Both	Res.	67	51	51	**67**	63	4
R-697	2960 LEE FORD CAMP RD Ridgeway, VA 24148	AG	1	B	----	Res.	67	51	51	61	60	2
R-698	0 LEE FORD CAMP RD Ridgeway, VA 24148	AH	1	B	PA	Res.	67	51	51	**PA**	NA	NA

Table C-1: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative A

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-699	3038 LEE FORD CAMP RD Ridgeway, VA 24148	AH	1	B	Sub'l Inc	Res.	67	51	51	**64**	60	**5**
R-700	3110 LEE FORD CAMP RD Ridgeway, VA 24148	AH	1	B	----	Res.	67	51	51	54	55	1
R-701	4106 SOAPSTONE RD Ridgeway, VA 24148	AI	1	B	----	Res.	67	48	48	48	NA	NA
R-702	4012 SOAPSTONE RD Ridgeway, VA 24148	AI	1	B	----	Res.	67	48	48	50	NA	NA
R-703	3996 SOAPSTONE RD Ridgeway, VA 24148	AI	1	B	PA	Res.	67	48	48	**PA**	NA	NA
R-704	3745 SOAPSTONE RD Martinsville, VA 24112	AJ	1	B	PA	Res.	67	49	49	**PA**	NA	NA
R-705	0 SOAPSTONE RD Martinsville, VA 24112	AJ	1	B	----	Res.	67	51	51	46	NA	NA
R-706	205 RAVENSWOOD LN Martinsville, VA 24112	AK	1	B	Sub'l Inc	Res.	67	41	41	**54**	49	**5**
R-707	0 Unassigned Martinsville, VA 24112	AK	1	B	Both	Res.	67	44	44	**66**	61	**5**

* Cat. Refers to FHWA Activity Category.
** Type of Impact: "----" = No Impact, "NAC" = Build Leq approaches or exceed the FHWA NAC, "Sub'l Inc" = substantial increase, "Both" = both NAC and substantial increase, "PA" = potential property acquisition as a result of the project.
*** Land Use: "Res."= Residential, "Rec." = Recreational, "Mon." = Noise Monitoring Site, "Com." = Commercial, "Int." = Interior Institutional.
**** Red numbers indicate noise impact due to NAC or Substantial Increase in existing noise levels. Some subtractions may appear to be incorrect due to rounding of decibels. 0 or NA indicates receptors not behind barriers, or set back and not impacted where benefits were not determined.
‡ "PA" = potential property acquisition as a result of the project.

Source: HMMH, 2019.

Table C-2: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative B

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-003	11955 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	PA	Res.	67	**67**	**69**	**PA**	NA	NA
R-004	11935 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	59	61	62	NA	NA
R-005	11885 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	58	60	63	NA	NA
R-006	11875 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	57	59	61	NA	NA
R-007	11965 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	54	55	57	NA	NA
R-008	11793 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	PA	Res.	67	59	60	**PA**	NA	NA
R-009	11695 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	55	57	60	NA	NA
R-010	11387 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	----	Res.	67	51	53	57	NA	NA
R-011	11361 GREENSBORO RD Ridgeway, VA 24148	BA	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-012	0 Unassigned Ridgeway, VA 24148	BB	1	C	----	Rec.	67	61	62	63	NA	NA
R-013	0 RESERVOIR RD Ridgeway, VA 24148	BB	1	C	----	Rec.	67	60	61	57	NA	NA
R-014	11000 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	64	**66**	55	NA	NA
R-015	10978 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-016	100 CABIN HILL DR Ridgeway, VA 24148	BB	1	B	----	Res.	67	60	62	55	NA	NA
R-017	101 CABIN HILL DR Ridgeway, VA 24148	BB	1	B	----	Res.	67	61	62	56	NA	NA
R-018	60 CABIN HILL DR Ridgeway, VA 24148	BB	1	B	----	Res.	67	61	63	55	NA	NA
R-019	58 CABIN HILL DR Ridgeway, VA 24148	BB	1	B	----	Res.	67	59	60	52	NA	NA
R-020	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**66**	**67**	49	NA	NA
R-021	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	57	58	45	NA	NA
R-022	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**67**	**69**	51	NA	NA
R-023	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	59	60	48	NA	NA
R-024	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	56	58	48	NA	NA
R-025	10790 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	55	56	49	NA	NA
R-026	10582 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**66**	**67**	53	NA	NA
R-027	10606 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	60	62	56	NA	NA
R-028	10564 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**67**	**68**	54	NA	NA
R-029	10514 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	65	**66**	58	NA	NA
R-030	10486 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**67**	**68**	59	NA	NA
R-031	10482 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**67**	**69**	61	NA	NA
R-032	10464 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	----	Res.	67	**67**	**69**	61	NA	NA
R-033	11175 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-034	0 GREENSBORO RD Ridgeway, VA 24148	BB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-035	103 DALTON CIR Ridgeway, VA 24148	BB	1	B	PA	Res.	67	59	61	**PA**	NA	NA
R-036	61 DALTON CIR Ridgeway, VA 24148	BB	1	B	PA	Res.	67	62	64	**PA**	NA	NA
R-037	347 J B DALTON RD Ridgeway, VA 24148	BC	1	B	PA	Res.	67	48	50	**PA**	NA	NA
R-038	232 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	55	56	59	55	4
R-039	231 J B DALTON RD Ridgeway, VA 24148	BC	1	B	Sub'l Inc	Res.	67	51	53	**63**	55	**7**
R-040	232 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	56	57	58	55	3
R-041	10731 GREENSBORO RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	**66**	**67**	55	52	2
R-042	200 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	57	58	57	54	3
R-043	181 J B DALTON RD Ridgeway, VA 24148	BC	1	B	Sub'l Inc	Res.	67	52	54	**62**	55	**7**
R-044	156 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	58	60	58	54	4
R-045	139 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	54	56	61	55	**6**

Table C-2: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative B

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-046	146 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	58	60	56	54	3
R-047	110 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	59	61	56	54	2
R-048	10613 GREENSBORO RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	65	**67**	53	51	2
R-049	58 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	61	63	54	52	2
R-050	29 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	63	65	55	54	2
R-051	57 J B DALTON RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	59	61	56	54	2
R-052	10441 GREENSBORO RD Ridgeway, VA 24148	BC	1	B	----	Res.	67	65	**66**	60	NA	NA
R-053	0 GREENSBORO RD Ridgeway, VA 24148	BC	1	B	PA	Res.	67	65	**66**	**PA**	NA	NA
R-054	10293 GREENSBORO RD Ridgeway, VA 24148	BD	1	B	Sub'l Inc	Res.	67	48	50	58	0	**5**
R-055	47 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	----	Res.	67	61	63	60	NA	NA
R-056	0 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	----	Res.	67	51	52	58	NA	NA
R-057	62 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	----	Res.	67	56	58	54	NA	NA
R-605	277 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	55	56	54	51	3
R-606	289 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	56	56	55	52	3
R-607	327 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	55	55	58	53	4
R-608	325 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	56	57	58	53	**5**
R-609	324 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	57	58	58	53	**5**
R-610	310 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	56	56	57	52	4
R-611	300 OXFORD DR Martinsville, VA 24112	BK	1	B	----	Res.	67	55	56	55	52	4
R-612	251 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	54	55	55	51	4
R-613	361 TRINITY TER Martinsville, VA 24112	BK	1	B	NAC	Res.	67	**66**	**67**	**66**	54	**12**
R-614	361 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	64	64	63	54	**9**
R-615	339 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	62	63	62	53	**9**
R-616	322 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	60	61	59	48	**11**
R-617	322 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	60	61	60	50	**10**
R-618	279 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	59	60	60	52	**7**
R-619	270 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	57	58	57	48	**9**
R-620	269 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	57	57	57	50	**7**
R-621	243 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	54	55	54	47	**8**
R-622	221 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	53	54	53	47	**7**
R-623	193 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	54	54	53	48	**5**
R-624	164 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	51	52	52	47	4
R-625	146 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	50	51	52	49	3
R-626	1903 JOSEPH MARTIN HWY Martinsville, VA 24112	BJ	1	B	----	Res.	67	50	50	53	54	1
R-627	Martinsville, VA 24112	BM	1	B	PA	Res.	67	55	56	**PA**	NA	NA
R-628	1718 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	PA	Res.	67	57	58	**PA**	NA	NA
R-629	0 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	PA	Res.	67	60	61	**PA**	NA	NA
R-630	1750 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	NAC	Res.	67	**67**	**68**	**66**	59	**7**
R-631	0 Unassigned Martinsville, VA 24112	BM	1	B	----	Res.	67	59	60	60	57	2
R-632	1750 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	----	Res.	67	65	**66**	64	61	3
R-633	1760 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	----	Res.	67	57	58	57	NA	NA
R-634	1760 JOSEPH MARTIN HWY Martinsville, VA 24112	BM	1	B	----	Res.	67	57	57	57	NA	NA
R-635	1405 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	PA	Res.	67	51	52	**PA**	NA	NA

Table C-2: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative B

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-636	1420 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	58	58	63	NA	NA
R-637	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	55	56	60	NA	NA
R-638	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	C	----	Rec.	67	55	56	59	NA	NA
R-639	45 WATDILL CIR Martinsville, VA 24112	BL	1	B	----	Res.	67	50	51	55	NA	NA
R-640	237 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	51	51	54	NA	NA
R-641	162 WATDILL CIR Martinsville, VA 24112	BL	1	B	----	Res.	67	62	63	63	NA	NA
R-642	122 WATDILL CIR Martinsville, VA 24112	BL	1	B	----	Res.	67	53	54	58	NA	NA
R-643	88 WATDILL CIR Martinsville, VA 24112	BL	1	B	----	Res.	67	52	53	56	NA	NA
R-644	273 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	52	53	55	NA	NA
R-645	291 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	51	52	55	NA	NA
R-646	321 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	53	54	57	NA	NA
R-647	313 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	55	NA	NA
R-667	103 DALTON CIR Ridgeway, VA 24148	BD	1	B	----	Res.	67	41	41	46	42	4
R-668	575 J B DALTON RD Ridgeway, VA 24148	BD	1	B	Sub'l Inc	Res.	67	47	47	57	50	**7**
R-669	507 J B DALTON RD Ridgeway, VA 24148	BD	1	B	Sub'l Inc	Res.	67	47	47	58	49	**9**
R-670	30 SEEBROOK DR OFF CAROLINA PLACE Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	48	43	**5**
R-671	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	49	43	**5**
R-672	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	45	45	50	44	**6**
R-673	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	44	**6**
R-674	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	45	45	50	44	**5**
R-675	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	45	**5**
R-676	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	45	**5**
R-677	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	49	45	**5**
R-678	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	45	**5**
R-679	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	45	4
R-680	0 SEEBROOK DR Ridgeway, VA 24148	BD	1	B	----	Res.	67	46	46	50	46	4
R-681	150 CAROLINA PL Ridgeway, VA 24148	BD	1	B	----	Res.	67	47	47	53	50	3
R-682	184 CAROLINA PL Ridgeway, VA 24148	BD	1	B	----	Res.	67	47	47	54	50	4
R-683	67 CAROLINA PL Ridgeway, VA 24148	BD	1	B	Sub'l Inc	Res.	67	50	50	63	54	**9**
R-684	111 CAROLINA PL Ridgeway, VA 24148	BD	1	B	Sub'l Inc	Res.	67	50	50	62	55	**7**
R-685	427 J B DALTON RD Ridgeway, VA 24148	BD	1	B	PA	Res.	67	50	50	**PA**	NA	NA
R-686	393 J B DALTON RD Ridgeway, VA 24148	BD	1	B	PA	Res.	67	49	49	**PA**	NA	NA
R-687	265 J B DALTON RD Ridgeway, VA 24148	BC	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-688	321 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	Both	Res.	67	47	47	**66**	54	**12**
R-689	351 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-690	495 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	Sub'l Inc	Res.	67	43	43	59	50	**9**
R-691	525 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	Sub'l Inc	Res.	67	43	43	60	51	**9**
R-692	521 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	PA	Res.	67	41	41	**PA**	NA	NA
R-706	205 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	PA	Res.	67	41	41	**PA**	NA	NA
R-708	623 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	Sub'l Inc	Res.	67	37	37	51	46	**6**
R-709	756 WHITE HOUSE RD Ridgeway, VA 24148	BE	1	B	Sub'l Inc	Res.	67	37	37	54	50	**5**
R-710	1830 LEE FORD CAMP RD Ridgeway, VA 24148	BF	1	B	----	Res.	67	47	47	53	50	3
R-711	1826 LEE FORD CAMP RD Ridgeway, VA 24148	BF	1	B	Sub'l Inc	Res.	67	45	45	54	51	4

Table C-2: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative B

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-712	1826 LEE FORD CAMP RD Ridgeway, VA 24148	BF	1	B	Sub'l Inc	Res.	67	43	43	57	51	**5**
R-713	1826 LEE FORD CAMP RD Ridgeway, VA 24148	BG	1	B	Sub'l Inc	Res.	67	42	42	60	55	**5**
R-714	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	60	54	**6**
R-715	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	59	54	**6**
R-716	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	58	54	**5**
R-717	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	58	52	**6**
R-718	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	57	53	4
R-719	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	56	53	4
R-720	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	56	51	**5**
R-721	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	55	52	3
R-722	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	C	Sub'l Inc	Rec.	67	42	42	55	52	3
R-723	701 MAGNA VISTA SCHOOL RD Ridgeway, VA 24148	BG	1	D	----	Int.	52	17	17	28	NA	NA
R-724	144 TURFMAN DR Martinsville, VA 24112	BH	1	B	PA	Res.	67	49	49	**PA**	NA	NA
R-725	4615 SOAPSTONE RD Martinsville, VA 24112	BH	1	B	----	Res.	67	48	48	56	55	2
R-726	4641 SOAPSTONE RD Martinsville, VA 24112	BH	1	B	----	Res.	67	48	48	54	54	1
R-727	4759 SOAPSTONE RD Martinsville, VA 24112	BH	1	B	----	Res.	67	48	48	53	53	1
R-728	4385 SOAPSTONE RD Martinsville, VA 24112	BI	1	B	PA	Res.	67	48	48	**PA**	NA	NA
R-729	97 TURFMAN DR Martinsville, VA 24112	BI	1	B	Sub'l Inc	Res.	67	49	49	64	55	**9**
R-730	4355 SOAPSTONE RD Martinsville, VA 24112	BI	1	B	Sub'l Inc	Res.	67	49	49	61	54	**7**
R-731	4577 SOAPSTONE RD Martinsville, VA 24112	BH	1	B	Sub'l Inc	Res.	67	44	44	57	52	**5**
R-732	3637 JOSEPH MARTIN HWY Martinsville, VA 24112	BI	1	B	Sub'l Inc	Res.	67	49	49	64	57	**6**
R-733	3681 JOSEPH MARTIN HWY Martinsville, VA 24112	BI	1	B	----	Res.	67	52	52	59	57	3
R-734	3749 JOSEPH MARTIN HWY Martinsville, VA 24112	BI	1	B	----	Res.	67	49	49	56	53	4
R-735	3749 JOSEPH MARTIN HWY Martinsville, VA 24112	BI	1	B	----	Res.	67	52	52	55	55	2
R-736	145 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	Sub'l Inc	Res.	67	45	45	56	50	**6**
R-737	215 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	Sub'l Inc	Res.	67	43	43	59	53	**5**
R-738	165 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	----	Res.	67	45	45	53	52	2
R-739	225 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	Both	Res.	67	43	43	**66**	58	**8**
R-740	70 RAVENSWOOD LN Martinsville, VA 24112	BJ	1	B	----	Res.	67	46	46	53	52	2
R-741	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	BJ	1	C	Sub'l Inc	Rec.	67	44	44	58	55	3
R-742	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	BJ	1	C	Sub'l Inc	Rec.	67	44	44	58	56	2
R-743	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	BJ	1	C	Sub'l Inc	Rec.	67	44	44	58	55	3
R-744	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	BJ	1	D	----	Int.	52	20	20	33	56	2
R-846	149 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	53	53	53	NA	NA
R-847	131 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	51	51	54	NA	NA
R-848	111 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	51	51	53	NA	NA
R-849	106 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	49	49	53	NA	NA
R-850	91 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	50	50	53	NA	NA
R-851	92 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	48	48	52	NA	NA
R-852	42 WILLOW CREEK DR Martinsville, VA 24112	BK	1	B	----	Res.	67	49	49	52	NA	NA
R-853	71 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	49	49	53	NA	NA
R-854	72 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	48	48	52	NA	NA

Table C-2: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative B

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-855	47 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	49	49	53	NA	NA
R-856	52 TRINITY TER Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	52	NA	NA
R-857	1153 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	48	48	50	NA	NA
R-858	1163 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	48	48	51	NA	NA
R-859	1221 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	52	NA	NA
R-860	1239 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	52	NA	NA
R-861	1259 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	52	NA	NA
R-862	1285 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	46	46	52	NA	NA
R-863	1138 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	46	46	49	NA	NA
R-864	1160 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	50	NA	NA
R-865	1164 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	46	46	49	NA	NA
R-866	1200 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	47	47	51	NA	NA
R-867	1230 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	45	45	49	NA	NA
R-868	1250 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	46	46	51	NA	NA
R-869	1270 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	46	46	51	NA	NA
R-870	1280 FISHER FARM RD Martinsville, VA 24112	BK	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-871	1284 FISHER FARM RD Martinsville, VA 24112	BK	1	B	----	Res.	67	43	43	46	NA	NA
R-872	1310 FISHER FARM RD Martinsville, VA 24112	BK	1	B	PA	Res.	67	47	47	**PA**	NA	NA
R-873	1330 FISHER FARM RD Martinsville, VA 24112	BK	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-874	1346 FISHER FARM RD Martinsville, VA 24112	BL	1	B	PA	Res.	67	45	45	**PA**	NA	NA
R-875	1346 FISHER FARM RD Martinsville, VA 24112	BL	1	B	PA	Res.	67	44	44	**PA**	NA	NA
R-876	1390 FISHER FARM RD Martinsville, VA 24112	BL	1	B	PA	Res.	67	43	43	**PA**	NA	NA
R-877	1414 FISHER FARM RD Martinsville, VA 24112	BL	1	B	----	Res.	67	47	47	54	NA	NA
R-878	1377 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	53	53	58	NA	NA
R-879	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	D	----	Int.	52	27	27	34	NA	NA
R-880	1358 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	57	NA	NA
R-881	1325 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	48	48	52	NA	NA
R-882	1325 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	49	49	53	NA	NA
R-883	1323 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	53	53	54	NA	NA
R-884	1336 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	56	NA	NA
R-885	1318 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	53	53	55	NA	NA
R-886	1302 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	50	50	54	NA	NA
R-887	1283 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	53	NA	NA
R-888	1274 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	53	NA	NA
R-889	1252 JOSEPH MARTIN HWY Martinsville, VA 24112	BL	1	B	----	Res.	67	52	52	52	NA	NA
R-890	18 ARMSTRONG CT Martinsville, VA 24112	BL	1	B	----	Res.	67	47	47	53	NA	NA
R-891	95 EBONY DR Martinsville, VA 24112	BL	1	B	----	Res.	67	46	46	54	NA	NA

* Cat. Refers to FHWA Activity Category.
** Type of Impact: "----" = No Impact, "NAC" = Build Leq approaches or exceed the FHWA NAC, "Sub'l Inc" = substantial increase, "Both" = both NAC and substantial increase, "PA" = potential property acquisition as a result of the project.
*** Land Use: "Res."= Residential, "Rec." = Recreational, "Mon." = Noise Monitoring Site, "Com." = Commercial, "Int." = Interior Institutional.
**** Red numbers indicate noise impact due to NAC or Substantial Increase in existing noise levels. Some subtractions may appear to be incorrect due to rounding of decibels. 0 or NA indicates receptors not behind barriers, or set back and not impacted where benefits were not determined.
‡ "PA" = potential property acquisition as a result of the project. Source: HMMH, 2019

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-003	11955 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	PA	Res.	67	**67**	**69**	**PA**	NA	NA
R-004	11935 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	59	61	62	NA	NA
R-005	11885 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	58	60	63	NA	NA
R-006	11875 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	57	59	61	NA	NA
R-007	11965 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	54	55	57	NA	NA
R-008	11793 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	PA	Res.	67	59	60	**PA**	NA	NA
R-009	11695 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	55	57	59	NA	NA
R-010	11387 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	----	Res.	67	51	53	56	NA	NA
R-011	11361 GREENSBORO RD Ridgeway, VA 24148	CA	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-012	0 Unassigned Ridgeway, VA 24148	CB	1	C	----	Rec.	67	61	62	63	NA	NA
R-013	0 RESERVOIR RD Ridgeway, VA 24148	CB	1	C	----	Rec.	67	60	61	57	NA	NA
R-014	11000 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	64	**66**	54	NA	NA
R-015	10978 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	PA	Res.	67	64	65	**PA**	NA	NA
R-016	100 CABIN HILL DR Ridgeway, VA 24148	CB	1	B	----	Res.	67	60	62	55	NA	NA
R-017	101 CABIN HILL DR Ridgeway, VA 24148	CB	1	B	----	Res.	67	61	62	55	NA	NA
R-018	60 CABIN HILL DR Ridgeway, VA 24148	CB	1	B	----	Res.	67	61	63	55	NA	NA
R-019	58 CABIN HILL DR Ridgeway, VA 24148	CB	1	B	----	Res.	67	59	60	51	NA	NA
R-020	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**66**	**67**	49	NA	NA
R-021	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	57	58	45	NA	NA
R-022	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**67**	**69**	51	NA	NA
R-023	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	59	60	48	NA	NA
R-024	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	56	58	47	NA	NA
R-025	10790 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	55	56	48	NA	NA
R-026	10582 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**66**	**67**	52	NA	NA
R-027	10606 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	60	62	55	NA	NA
R-028	10564 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**67**	**68**	53	NA	NA
R-029	10514 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	65	**66**	57	NA	NA
R-030	10486 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**67**	**68**	58	NA	NA
R-031	10482 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**67**	**69**	59	NA	NA
R-032	10464 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	----	Res.	67	**67**	**69**	60	NA	NA
R-033	11175 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-034	0 GREENSBORO RD Ridgeway, VA 24148	CB	1	B	PA	Res.	67	61	62	**PA**	NA	NA
R-035	103 DALTON CIR Ridgeway, VA 24148	CB	1	B	PA	Res.	67	59	61	**PA**	NA	NA
R-036	61 DALTON CIR Ridgeway, VA 24148	CB	1	B	PA	Res.	67	62	64	**PA**	NA	NA
R-037	347 J B DALTON RD Ridgeway, VA 24148	CC	1	B	PA	Res.	67	48	50	**PA**	NA	NA
R-038	232 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	55	56	59	55	4
R-039	231 J B DALTON RD Ridgeway, VA 24148	CC	1	B	Sub'l Inc	Res.	67	51	53	62	55	**7**
R-040	232 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	56	57	57	55	3
R-041	10731 GREENSBORO RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	**66**	**67**	54	52	2
R-042	200 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	57	58	57	54	3
R-043	181 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	52	54	61	55	**7**
R-044	156 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	58	60	57	54	4

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-045	139 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	54	56	60	55	**6**
R-046	146 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	58	60	56	54	3
R-047	110 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	59	61	55	54	2
R-048	10613 GREENSBORO RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	65	**67**	53	51	2
R-049	58 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	61	63	54	52	2
R-050	29 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	63	65	55	54	2
R-051	57 J B DALTON RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	59	61	56	54	2
R-052	10441 GREENSBORO RD Ridgeway, VA 24148	CC	1	B	----	Res.	67	65	**66**	60	NA	NA
R-053	0 GREENSBORO RD Ridgeway, VA 24148	CC	1	B	PA	Res.	67	65	**66**	**PA**	NA	NA
R-054	10293 GREENSBORO RD Ridgeway, VA 24148	CD	1	B	Sub'l Inc	Res.	67	48	50	58	53	**5**
R-055	47 WHITE HOUSE RD Ridgeway, VA 24148	CE	1	B	----	Res.	67	61	63	60	NA	NA
R-056	0 WHITE HOUSE RD Ridgeway, VA 24148	CE	1	B	Sub'l Inc	Res.	67	51	52	61	57	**5**
R-057	62 WHITE HOUSE RD Ridgeway, VA 24148	CE	1	B	----	Res.	67	56	58	52	NA	NA
R-058	129 GLENBRIER DR Ridgeway, VA 24148	CE	1	B	----	Res.	67	50	52	48	NA	NA
R-064	130 GLENBRIER DR Ridgeway, VA 24148	CE	1	B	----	Res.	67	51	53	53	NA	NA
R-605	277 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	55	56	55	51	3
R-606	289 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	56	56	55	52	3
R-607	327 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	55	55	58	53	4
R-608	325 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	56	57	58	53	**5**
R-609	324 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	57	58	58	53	**5**
R-610	310 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	56	56	57	52	4
R-611	300 OXFORD DR Martinsville, VA 24112	CL	1	B	----	Res.	67	55	56	56	52	4
R-612	251 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	54	55	55	51	4
R-613	361 TRINITY TER Martinsville, VA 24112	CL	1	B	NAC	Res.	67	**66**	**67**	**66**	54	**12**
R-614	361 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	64	64	63	54	**9**
R-615	339 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	62	63	62	53	**9**
R-616	322 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	60	61	59	48	**11**
R-617	322 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	60	61	60	50	**10**
R-618	279 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	59	60	60	52	**7**
R-619	270 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	57	58	57	48	**9**
R-620	269 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	57	57	57	50	**7**
R-621	243 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	54	55	54	47	**8**
R-622	221 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	53	54	54	47	**7**
R-623	193 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	54	54	54	48	**5**
R-624	164 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	51	52	54	47	4
R-625	146 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	50	51	54	49	3
R-626	1903 JOSEPH MARTIN HWY Martinsville, VA 24112	CK	1	B	----	Res.	67	50	50	53	54	1
R-627	Martinsville, VA 24112	CN	1	B	PA	Res.	67	55	56	**PA**	NA	NA
R-628	1718 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	PA	Res.	67	57	58	**PA**	NA	NA
R-629	0 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	PA	Res.	67	60	61	**PA**	NA	NA
R-630	1750 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	NAC	Res.	67	**67**	**68**	**66**	59	**7**
R-631	0 Unassigned Martinsville, VA 24112	CN	1	B	----	Res.	67	59	60	59	57	2

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-632	1750 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	----	Res.	67	65	**66**	64	61	3
R-633	1760 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	----	Res.	67	57	58	57	NA	NA
R-634	1760 JOSEPH MARTIN HWY Martinsville, VA 24112	CN	1	B	----	Res.	67	57	57	57	NA	NA
R-635	1405 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	PA	Res.	67	51	52	**PA**	NA	NA
R-636	1420 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	58	58	61	NA	NA
R-637	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	55	56	59	NA	NA
R-638	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	C	----	Rec.	67	55	56	58	NA	NA
R-639	45 WATDILL CIR Martinsville, VA 24112	CM	1	B	----	Res.	67	50	51	54	NA	NA
R-640	237 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	51	51	54	NA	NA
R-641	162 WATDILL CIR Martinsville, VA 24112	CM	1	B	----	Res.	67	62	63	63	NA	NA
R-642	122 WATDILL CIR Martinsville, VA 24112	CM	1	B	----	Res.	67	53	54	58	NA	NA
R-643	88 WATDILL CIR Martinsville, VA 24112	CM	1	B	----	Res.	67	52	53	56	NA	NA
R-644	273 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	52	53	55	NA	NA
R-645	291 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	51	52	55	NA	NA
R-646	321 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	53	54	57	NA	NA
R-647	313 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	55	NA	NA
R-667	103 DALTON CIR Ridgeway, VA 24148	CD	1	B	----	Res.	67	41	41	46	42	4
R-668	575 J B DALTON RD Ridgeway, VA 24148	CD	1	B	----	Res.	67	47	47	56	50	**7**
R-669	507 J B DALTON RD Ridgeway, VA 24148	CD	1	B	Sub'l Inc	Res.	67	47	47	57	49	**8**
R-670	30 SEEBROOK DR OFF CAROLINA PLACE Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	48	43	**5**
R-671	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	43	**5**
R-672	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	45	45	49	44	**5**
R-673	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	44	**5**
R-674	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	45	45	49	45	**5**
R-675	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	45	4
R-676	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	50	45	**5**
R-677	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	45	4
R-678	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	45	4
R-679	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	45	4
R-680	0 SEEBROOK DR Ridgeway, VA 24148	CD	1	B	----	Res.	67	46	46	49	46	4
R-681	150 CAROLINA PL Ridgeway, VA 24148	CD	1	B	----	Res.	67	47	47	52	49	3
R-682	184 CAROLINA PL Ridgeway, VA 24148	CD	1	B	----	Res.	67	47	47	53	49	4
R-683	67 CAROLINA PL Ridgeway, VA 24148	CD	1	B	Sub'l Inc	Res.	67	50	50	62	54	**8**
R-684	111 CAROLINA PL Ridgeway, VA 24148	CD	1	B	Sub'l Inc	Res.	67	50	50	61	55	**6**
R-685	427 J B DALTON RD Ridgeway, VA 24148	CD	1	B	PA	Res.	67	50	50	**PA**	NA	NA
R-686	393 J B DALTON RD Ridgeway, VA 24148	CD	1	B	PA	Res.	67	49	49	**PA**	NA	NA
R-687	265 J B DALTON RD Ridgeway, VA 24148	CC	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-688	321 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	47	47	62	53	**9**
R-689	351 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	46	46	60	53	**7**
R-690	495 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	43	43	53	48	**6**
R-706	205 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	PA	Res.	67	41	41	**PA**	NA	NA
R-708	623 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	37	37	54	46	**8**
R-709	756 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	37	37	50	45	**5**

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-736	145 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	Sub'l Inc	Res.	67	45	45	55	50	**6**
R-737	215 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	Sub'l Inc	Res.	67	43	43	58	52	**6**
R-738	165 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	----	Res.	67	45	45	53	51	2
R-739	225 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	Sub'l Inc	Res.	67	43	43	65	56	**9**
R-740	70 RAVENSWOOD LN Martinsville, VA 24112	CK	1	B	----	Res.	67	46	46	52	52	1
R-741	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	CK	1	C	Sub'l Inc	Rec.	67	44	44	58	55	3
R-742	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	CK	1	C	Sub'l Inc	Rec.	67	44	44	63	56	2
R-743	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	CK	1	C	Sub'l Inc	Rec.	67	44	44	58	55	3
R-744	1978 JOSEPH MARTIN HWY Martinsville, VA 24112	CK	1	D	----	Int.	52	20	20	33	56	2
R-745	245 GLENBRIER DR Ridgeway, VA 24148	CE	1	B	----	Res.	67	46	46	55	NA	NA
R-746	516 WHITE HOUSE RD Ridgeway, VA 24148	CF	1	B	Sub'l Inc	Res.	67	38	38	56	48	**7**
R-747	1253 LEE FORD CAMP RD Ridgeway, VA 24148	CG	1	B	----	Res.	67	46	46	45	NA	NA
R-748	1419 LEE FORD CAMP RD Ridgeway, VA 24148	CG	1	B	----	Res.	67	46	46	48	NA	NA
R-749	5742 SOAPSTONE RD Ridgeway, VA 24148	CH	1	B	----	Res.	67	49	49	53	52	2
R-750	105 RED FOX RD Ridgeway, VA 24148	CH	1	B	PA	Res.	67	49	49	PA	NA	NA
R-751	5727 SOAPSTONE RD Ridgeway, VA 24148	CH	1	B	----	Res.	67	47	47	48	50	1
R-752	105 RED FOX RD Ridgeway, VA 24148	CH	1	B	Sub'l Inc	Res.	67	46	46	61	56	**5**
R-753	0 MEMORY LN Martinsville, VA 24112	CI	1	B	----	Res.	67	42	42	51	NA	NA
R-754	445 MEMORY LN Martinsville, VA 24112	CI	1	B	Sub'l Inc	Res.	67	41	41	54	49	**6**
R-755	431 MEMORY LN Martinsville, VA 24112	CI	1	B	Sub'l Inc	Res.	67	41	41	54	48	**5**
R-756	426 MEMORY LN Martinsville, VA 24112	CI	1	B	Sub'l Inc	Res.	67	41	41	51	48	4
R-757	415 MEMORY LN Martinsville, VA 24112	CI	1	B	Sub'l Inc	Res.	67	41	41	53	48	**5**
R-758	371 MEMORY LN Martinsville, VA 24112	CI	1	B	Sub'l Inc	Res.	67	42	42	53	49	4
R-759	392 MEMORY LN Martinsville, VA 24112	CI	1	B	----	Res.	67	42	42	51	42	**9**
R-760	290 FARMINGDALE DR Martinsville, VA 24112	CJ	1	B	----	Res.	67	43	43	48	NA	NA
R-761	252 FARMINGDALE DR Martinsville, VA 24112	CJ	1	B	----	Res.	67	43	43	48	NA	NA
R-762	149 MEMORY LN Martinsville, VA 24112	CI	1	B	PA	Res.	67	45	45	PA	NA	NA
R-763	127 MEMORY LN Martinsville, VA 24112	CI	1	B	PA	Res.	67	46	46	PA	NA	NA
R-764	177 BECKFORD WAY Martinsville, VA 24112	CJ	1	B	----	Res.	67	43	43	48	NA	NA
R-765	195 BECKFORD WAY Martinsville, VA 24112	CJ	1	B	----	Res.	67	43	43	48	NA	NA
R-766	199 BECKFORD WAY Martinsville, VA 24112	CJ	1	B	----	Res.	67	44	44	48	NA	NA
R-767	246 FISHER DR Martinsville, VA 24112	CJ	1	B	----	Res.	67	45	45	49	NA	NA
R-768	2959 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	49	49	57	NA	NA
R-769	2949 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	49	49	55	63	NA	NA
R-770	100 FISHER DR Martinsville, VA 24112	CJ	1	B	----	Res.	67	47	47	51	NA	NA
R-771	2856 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	49	49	49	NA	NA
R-772	2834 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	50	50	50	NA	NA
R-773	2826 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	50	50	49	NA	NA
R-774	2808 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	47	47	51	NA	NA
R-775	2730 JOSEPH MARTIN HWY Martinsville, VA 24112	CJ	1	B	----	Res.	67	49	49	52	NA	NA
R-846	149 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	53	53	55	NA	NA
R-847	131 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	51	51	55	NA	NA

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL
R-848	111 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	51	51	55	NA	NA
R-849	106 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	49	49	54	NA	NA
R-850	91 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	50	50	54	NA	NA
R-851	92 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	48	48	53	NA	NA
R-852	42 WILLOW CREEK DR Martinsville, VA 24112	CL	1	B	----	Res.	67	49	49	52	NA	NA
R-853	71 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	49	49	54	NA	NA
R-854	72 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	48	48	52	NA	NA
R-855	47 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	49	49	53	NA	NA
R-856	52 TRINITY TER Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	53	NA	NA
R-857	1153 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	48	48	51	NA	NA
R-858	1163 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	48	48	52	NA	NA
R-859	1221 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	52	NA	NA
R-860	1239 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	52	NA	NA
R-861	1259 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	52	NA	NA
R-862	1285 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	46	46	52	NA	NA
R-863	1138 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	46	46	50	NA	NA
R-864	1160 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	50	NA	NA
R-865	1164 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	46	46	49	NA	NA
R-866	1200 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	47	47	51	NA	NA
R-867	1230 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	45	45	49	NA	NA
R-868	1250 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	46	46	51	NA	NA
R-869	1270 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	46	46	52	NA	NA
R-870	1280 FISHER FARM RD Martinsville, VA 24112	CL	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-871	1284 FISHER FARM RD Martinsville, VA 24112	CL	1	B	----	Res.	67	43	43	47	NA	NA
R-873	1330 FISHER FARM RD Martinsville, VA 24112	CL	1	B	PA	Res.	67	46	46	**PA**	NA	NA
R-874	1346 FISHER FARM RD Martinsville, VA 24112	CL	1	B	PA	Res.	67	45	45	**PA**	NA	NA
R-875	1346 FISHER FARM RD Martinsville, VA 24112	CM	1	B	PA	Res.	67	44	44	**PA**	NA	NA
R-876	1390 FISHER FARM RD Martinsville, VA 24112	CM	1	B	PA	Res.	67	43	43	**PA**	NA	NA
R-877	1414 FISHER FARM RD Martinsville, VA 24112	CM	1	B	----	Res.	67	47	47	54	NA	NA
R-878	1377 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	53	53	57	NA	NA
R-879	1376 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	D	----	Int.	52	27	27	33	NA	NA
R-880	1358 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	56	NA	NA
R-881	1325 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	48	48	51	NA	NA
R-882	1325 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	49	49	52	NA	NA
R-883	1323 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	53	53	53	NA	NA
R-884	1336 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	55	NA	NA
R-885	1318 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	53	53	54	NA	NA
R-886	1302 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	50	50	53	NA	NA
R-887	1283 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	52	NA	NA
R-888	1274 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	52	NA	NA
R-889	1252 JOSEPH MARTIN HWY Martinsville, VA 24112	CM	1	B	----	Res.	67	52	52	51	NA	NA
R-890	18 ARMSTRONG CT Martinsville, VA 24112	CM	1	B	----	Res.	67	47	47	53	NA	NA
R-891	95 EBONY DR Martinsville, VA 24112	CM	1	B	----	Res.	67	46	46	54	NA	NA

Table C-3: Predicted Existing (2018) and Design Year (2040) Noise Levels with Alternative C

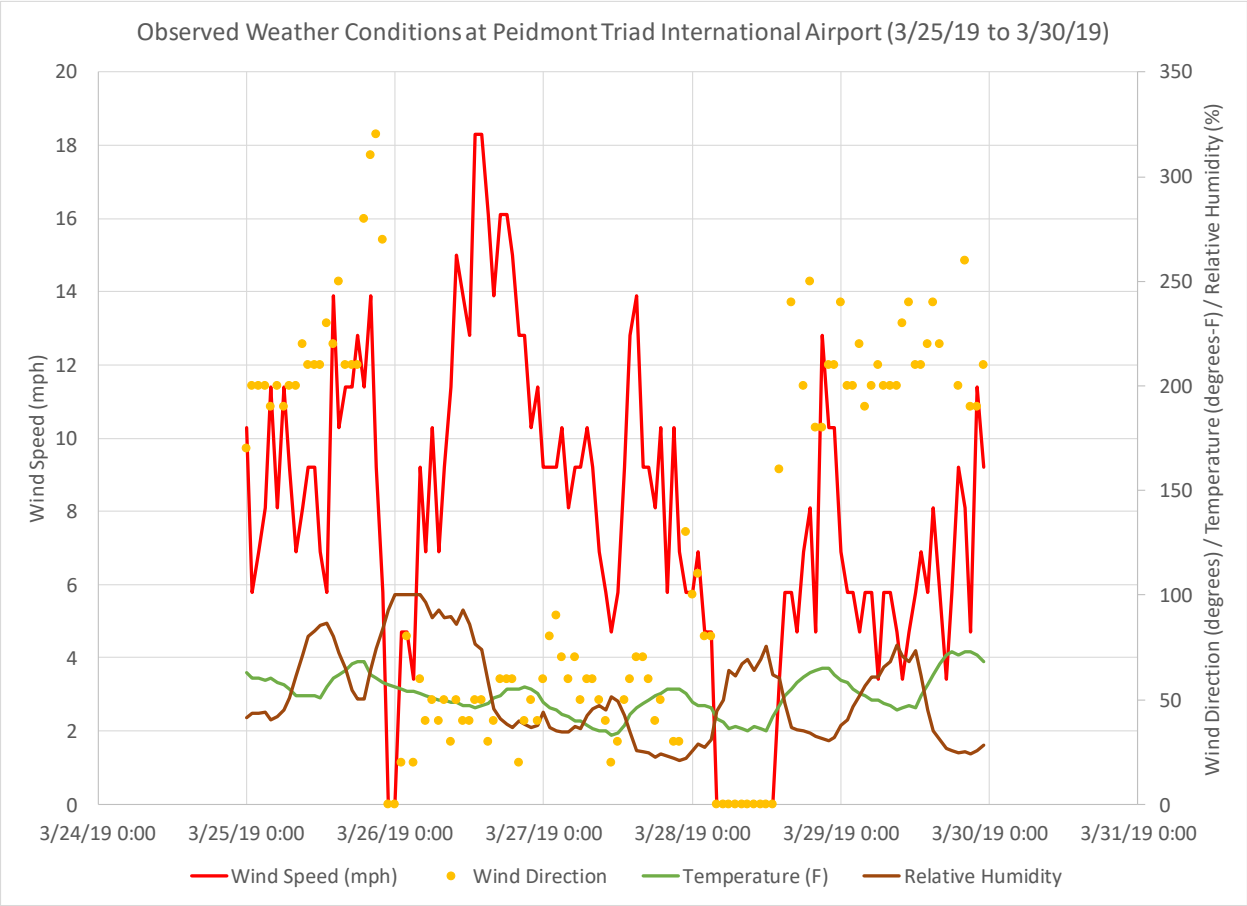
Site ID	Address	CNE	Units	Cat.*	Type of Impact**	Land Use***	NAC Imp. Crit.	Loudest-Hour Leq (dBA)****				
								2018 Existing	2040 No Build	2040 Build‡		
										No-Barrier	With-Barrier	IL

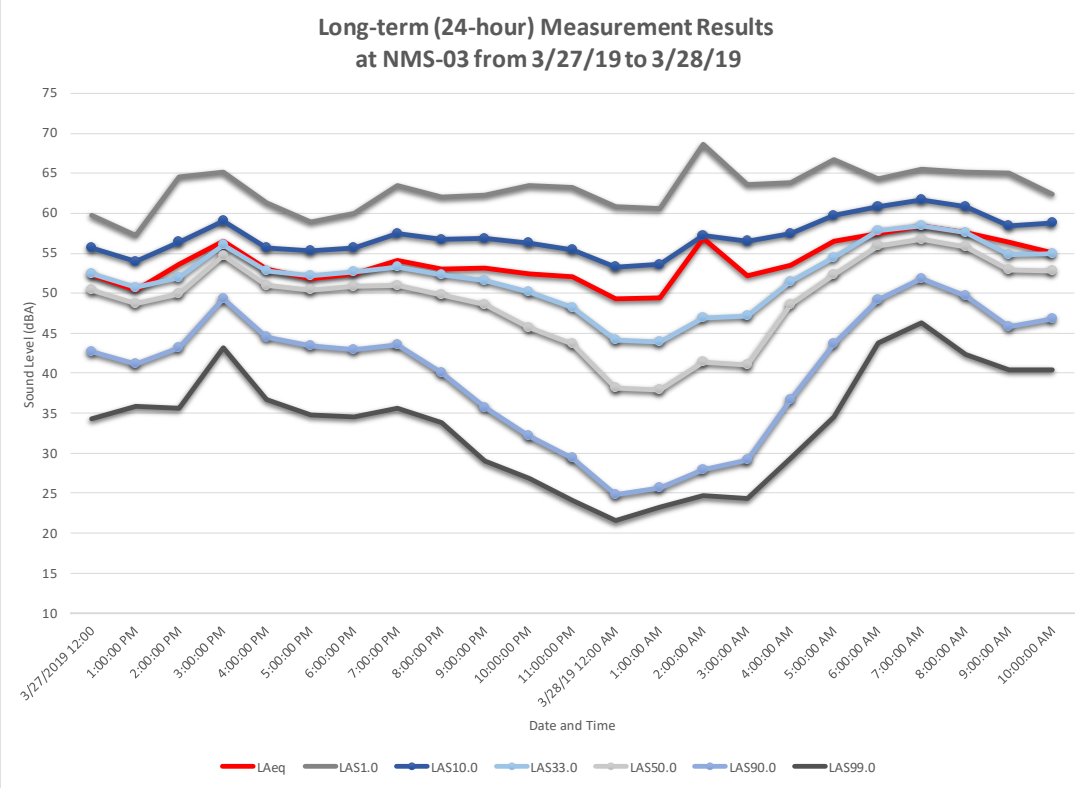
* Cat. Refers to FHWA Activity Category.
** Type of Impact: "----" = No Impact, "NAC" = Build Leq approaches or exceed the FHWA NAC, "Sub'l Inc" = substantial increase, "Both" = both NAC and substantial increase, "PA" = potential property acquisition as a result of the project.
*** Land Use: "Res."= Residential, "Rec." = Recreational, "Mon." = Noise Monitoring Site, "Com." = Commercial, "Int." = Interior Institutional.
**** Red numbers indicate noise impact due to NAC or Substantial Increase in existing noise levels. Some subtractions may appear to be incorrect due to rounding of decibels. 0 or NA indicates receptors not behind barriers, or set back and not impacted where benefits were not determined.
‡ "PA" = potential property acquisition as a result of the project.

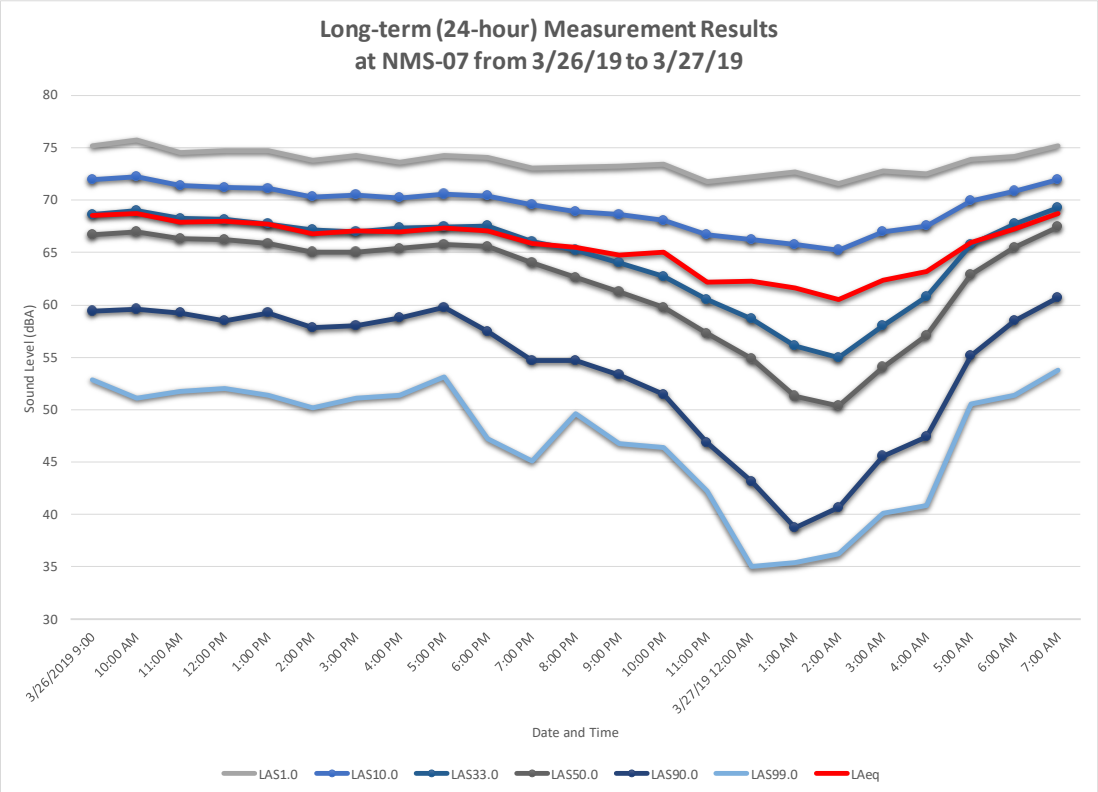
Source: HMMH, 2019.

APPENDIX D

DETAILS OF THE NOISE MEASUREMENT PROGRAM


Observed Weather Conditions at Peidmont Triad International Airport (3/25/19 to 3/30/19)
Wind Speed (mph)
Wind Direction (degrees-F) / Temperature (degrees-F) / Relative Humidity (%)
0
2
4
6
8
10
12
14
16
18
20
0
50
100
150
200
250
300
350
3/24/19 0:00
3/25/19 0:00
3/26/19 0:00
3/27/19 0:00
3/28/19 0:00
3/29/19 0:00
3/30/19 0:00
3/31/19 0:00
Wind Speed (mph)
Wind Direction
Temperature (F)
Relative Humidity


Long-term (24-hour) Measurement Results
at NMS-03 from 3/27/19 to 3/28/19
Sound Level (dBA)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
3/27/2019 12:00
1:00:00 PM
2:00:00 PM
3:00:00 PM
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
8:00:00 PM
9:00:00 PM
10:00:00 PM
11:00:00 PM
3/28/19 12:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
Date and Time
LAeq
LAS1.0
LAS10.0
LAS33.0
LAS50.0
LAS90.0
LAS99.0


Long-term (24-hour) Measurement Results
at NMS-07 from 3/26/19 to 3/27/19
Sound Level (dBA)
80
75
70
65
60
55
50
45
40
35
30
3/26/2019 9:00
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
3/27/19 12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
Date and Time
LAS1.0
LAS10.0
LAS33.0
LAS50.0
LAS90.0
LAS99.0
LAeq

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS-01 (Validation)

ADDRESS: 11885 Greensboro Rd

OWNER:

DESCRIPTION: residential off of Rt. 220 NB

NOISE SOURCES: Rt 220 traffic, birds, leaves

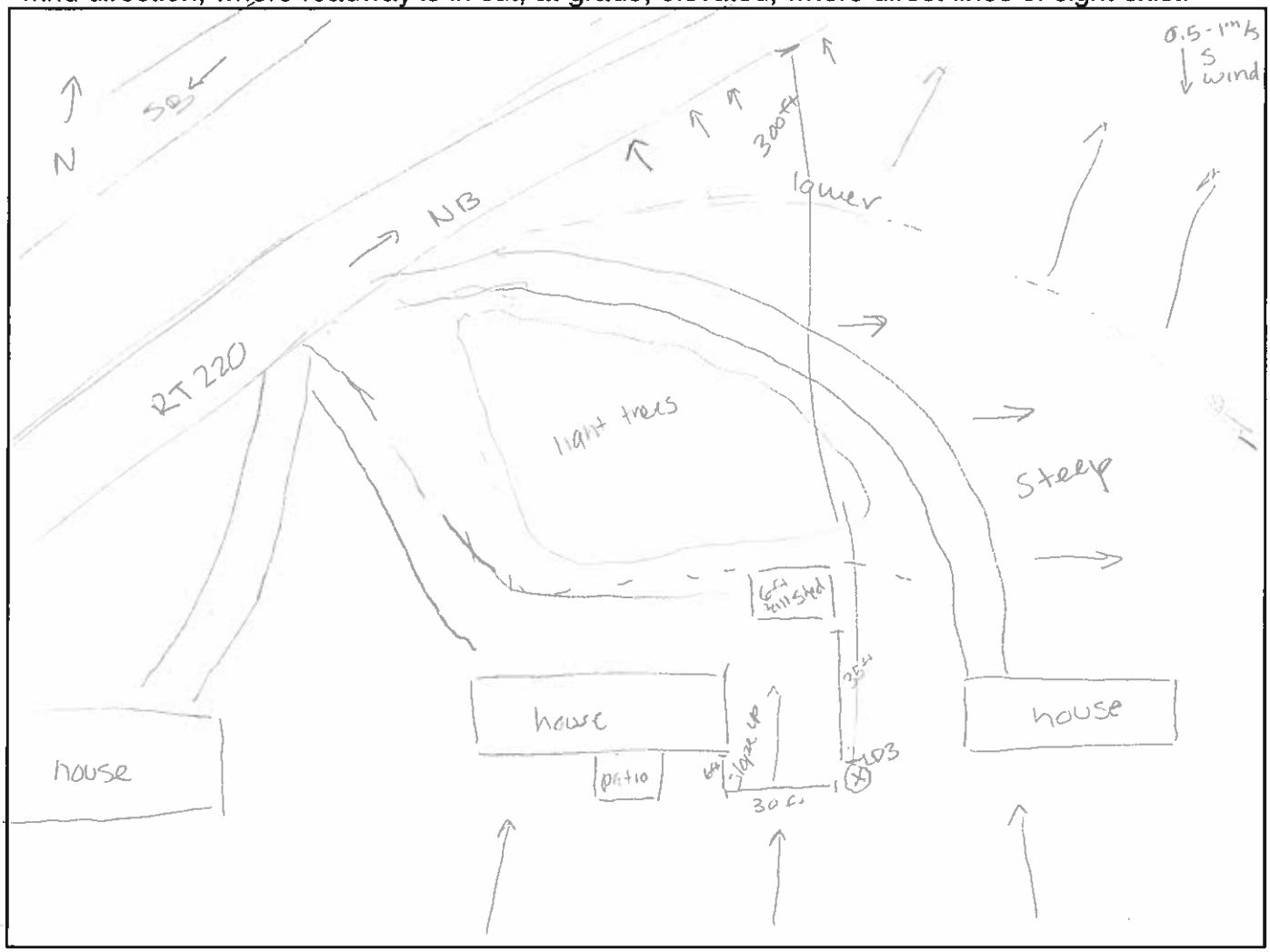
NOISE MONITOR: LD 824 # 3 → File 005 S/N: —

MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 60°F WEATHER CONDITIONS: Sunny 0.5-1 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: 36 32 35 N 79 54 31 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

Data File #005

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-01 (Validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 11885 greensboro rd DATE: 3/27

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	4:49 PM	48.3						113.9
2	50	48.4						
3	51	46.3						
4	52	55.3						
5	53	55.3						neighbors car leaving
6	54	48.9						
7	55	50.7						
8	56	50.6						
9	57	49.6						
10	58	52.5						
11	59	49.5						
12	5:00	51.9						
13	01	47.8						
14	02	52.4						
15	03	51.7						wind chimes
16	04	46.4						
17	05	48.8						
18	06	50.4						
19	07	50.0						
20	08	48.6						
21	09	47.4						
22	10	49.5	\					
23	11	48.7						
24	12	46.9						
25	13	49.7						
26	14	52.9						
27	15	50.4						car door
28	16	46.5						
29	17	49.2						
30	18	49.5						

Cal check @ 113.9

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Ridgway, VA
MEASUREMENT SITE NO.: NMS-01
ADDRESS/DESCRIPTION: 11885 Greensboro Rd (US 220) Ridgeway, VA

START TIME: 4:49 PM
END TIME: 5:19 PM
DATE: 3/27/19
PERSONNEL: HTJ/EIB

ROADWAY: US 220

	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 5 minutes **Start Time: 4:49 PM**		
Automobiles	23	
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)	1	
Average speed (mph)	56, 57, 64, 63, 65, 67, 60	
Second Sample: 5 minutes **Start Time: 4:54 PM**		
Automobiles		24
Medium Trucks (6 Tires)		0
Heavy Trucks (>6 Tires)		5
Average speed (mph)		58, 60, 62, 63, 58, 53, 61
Third Sample: 5 minutes **Start Time: 5:00 PM**		
Automobiles	28	
Medium Trucks (6 Tires)	0	
Heavy Trucks (>6 Tires)	5	
Average speed (mph)	58, 63, 58, 60, 63, 67, 58, 61	
Fourth Sample: 5 minutes **Start Time: 5:05 PM**		
Automobiles		28
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		4
Average speed (mph)		55, 56, 59, 57, 61, 65, 59


NMS-01

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway VA MEASUREMENT SITE NO.: NMS-02 (Ambient)

ADDRESS: 607 caroline place

OWNER:

DESCRIPTION: rural road

NOISE SOURCES: dog, RT220, local road traffic

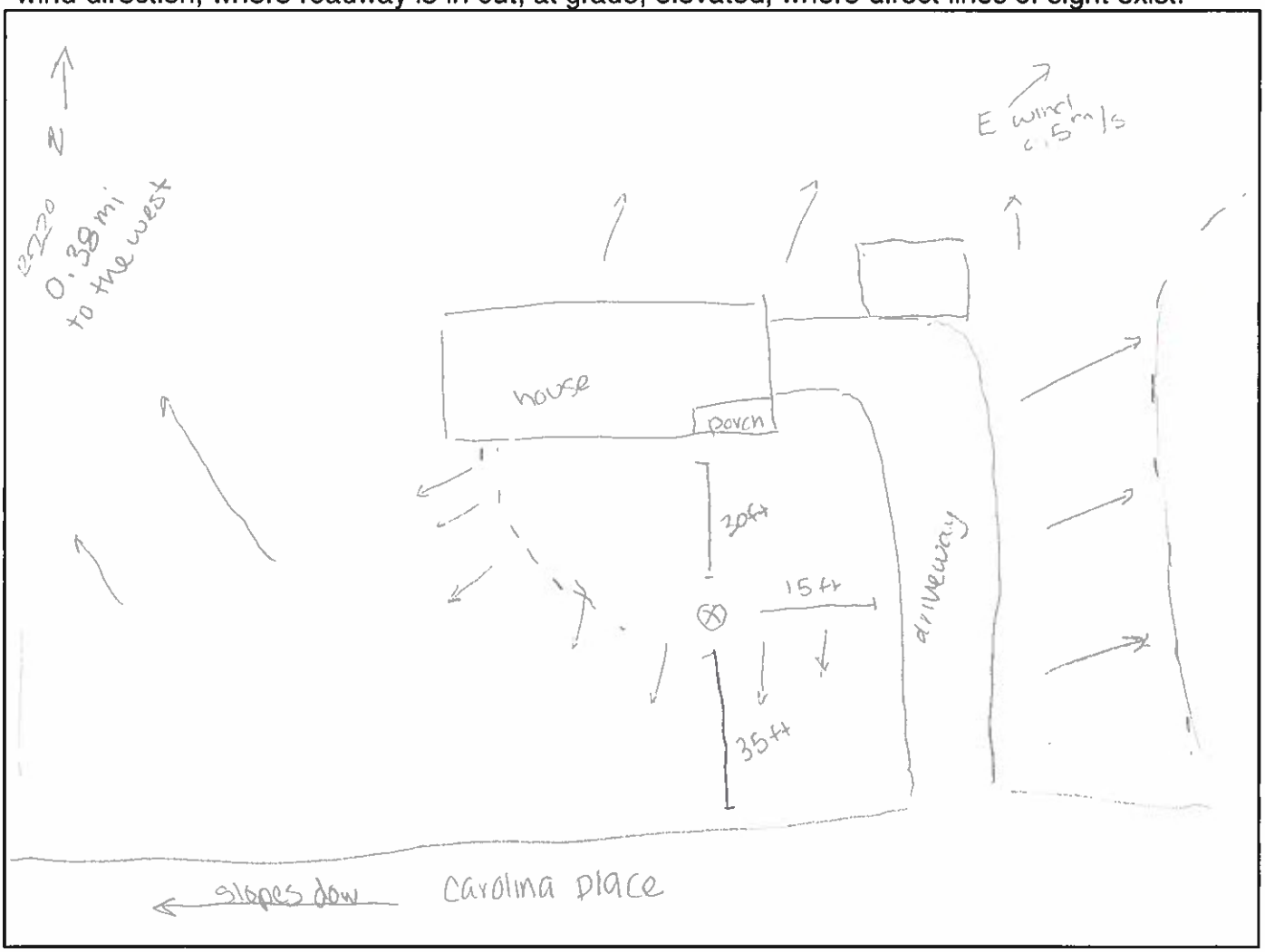
NOISE MONITOR: LD 824 #3 File #004 S/N: —

MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 61°F WEATHER CONDITIONS: 0.5 m/s winds sunny

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: _____

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #004

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-02 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 67 DATE: 3/27

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	3:18	40.5						dogs barking distant 114.0
2	19	39.0						
3	20	40.0						
4	21	35.4						
5	22	35.7						
6	23	39.0						
7	24	43.7						
8	25	40.4		1				
9	26	54.7						
10	27	62.5	X					plane
11	28	54.6						
12	29	38.5						
13	30	40.3						
14	31	44.9						
15	32	45.3						plane
16	33	66.3	X					↑
17	34	44.8	X					low plane overhead
18	35	40.4						
19	36	49.9						
20	37	41.1						
21	38	37.5						
22	39	37.7						
23	40	39.0						
24	41	39.6						
25	47	43.2						owner talking
26	43	45.2						
27	44	43.3						
28	45	45.3						
29	46	37.9						
30	47	45.1						114.0

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

added extra seconds for the plane circling around

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-02

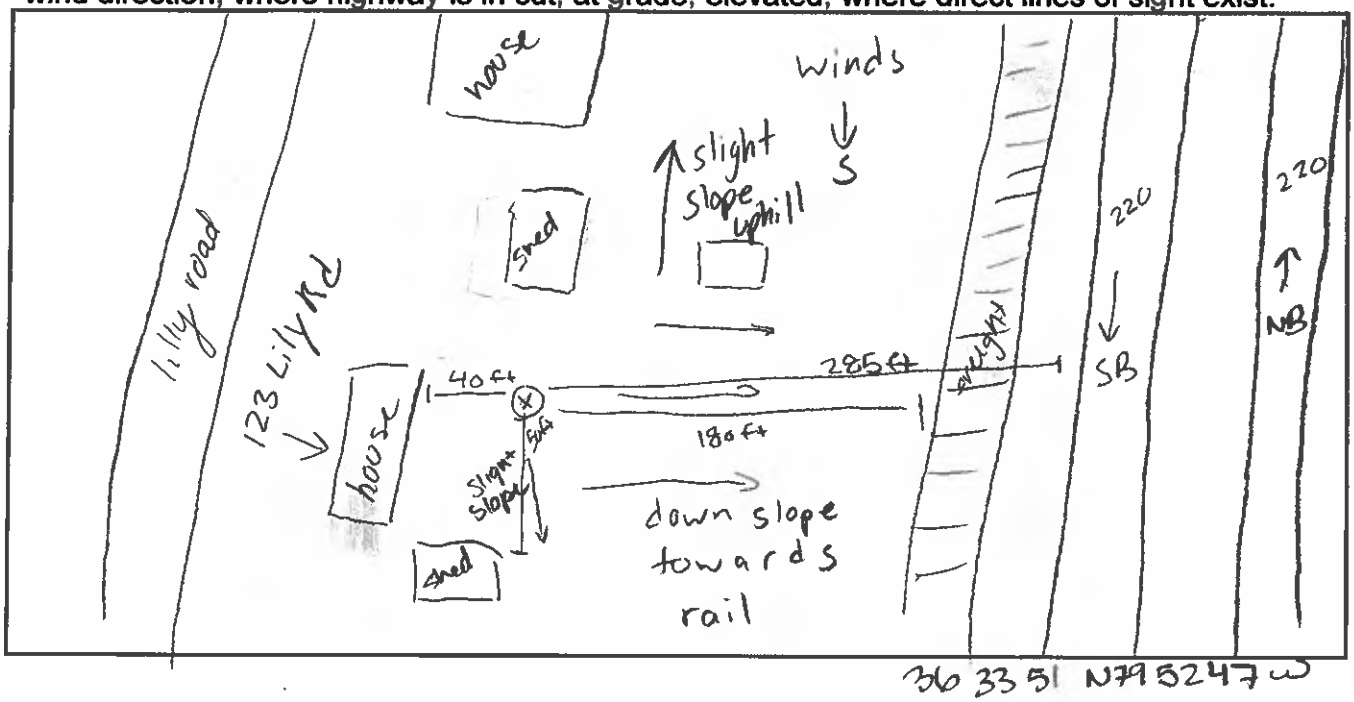
PROJECT: Martinsville US220/5
JOB NO.: _____

LONG TERM NOISE MONITORING SITE LOG

ASSESSMENT AREA ID: Ridgeway, VA MEASUREMENT SITE NO.: NMS-03
ADDRESS: 123 Lily Rd
OWNER: _____
DESCRIPTION: Residential, along ~~SB~~ US 220, Freight rail runs parallel to 220,
NOISE SOURCES: 220, Freight Trains, Birds, Dogs

NOISE MONITOR: B&K #2 S/N: _____
MICROPHONE: _____ S/N: _____
CALIBRATOR: _____ S/N: _____
START DATE: 3/27/19 END DATE: _____
START TIME: 11:28 AM END TIME: _____
SYNCH W/HOURS? _____
METRICS STORED: _____
EXCEEDENCE THRESHOLD: _____ EXCEEDENCE DURATION: _____
AVERAGE TEMP. (°F): 49-50°F WEATHER CONDITIONS: Sunny, 0.5-1m/s wind

SITE SKETCH: Show highway, homes, local roads, reference distances, arrows for North & wind direction, where highway is in cut, at grade, elevated, where direct lines of sight exist.




NMS-03

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS - 04 (validation)

ADDRESS: 574 Church St

OWNER:

DESCRIPTION: residental, uphill from RT 220

NOISE SOURCES: dogs 220 traffic, chickens

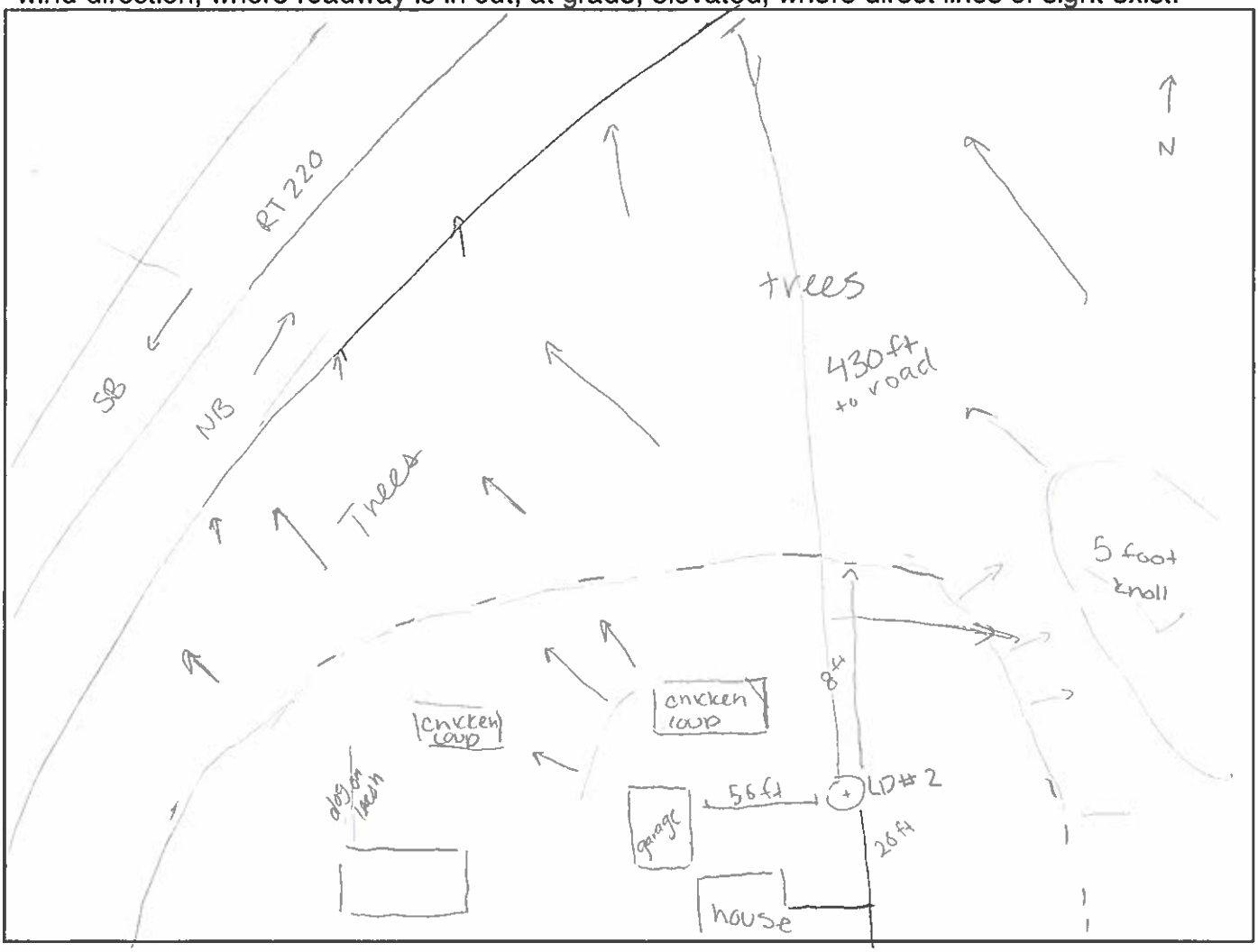
NOISE MONITOR: LD 824 #2 – File #006 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 65 - 66°F WEATHER CONDITIONS: sunny 0-1 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: 36 34 26 W 79 52 3 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #006

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-04 (Validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 574 Church St DATE: 3/26

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	4:55	50.2						cal 114
2	56	50.0						
3	57	48.9						
4	58	51.2						saw 1-2 seconds
5	59	50.1						
6	5:00	50.3						
7	5:01	50.5						
8	5:02	50.5						crickets 5 sec
9	5:03	51.4						
10	5:04	49.3						dog barking
11	5:05	51.7						
12	06	50.9						
13	07	49.6						
14	08	49.2						
15	09	51.8						
16	10	50.2						
17	11	52.6						
18	12	52.8						
19	13	52.6						
20	14	50.4						
21	15	49.4						dog barking distant
22	16	50.2						
23	17	50.0						
24	18	50.1						
25	19	49.5						
26	20	49.7						
27	21	54.2						
28	22	52.9						
29	23	49.8						chainsaw + tools distant
30	24	50.1	X					↓

most of the minute cal 113.9

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Ridgeway, VA
MEASUREMENT SITE NO.: NMS-04
ADDRESS/DESCRIPTION: Residential 574 Church St

START TIME: 4:55 PM
END TIME: 5:25 PM
DATE: 3/26/19
PERSONNEL: HTJ/EIB

ROADWAY: US 220

	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 5 minutes, **Start Time:** 4:55 PM		
Automobiles	27	
Medium Trucks (6 Tires)	0	
Heavy Trucks (>6 Tires)	2	
Average speed (mph)	63, 58, 57, 54, 63, 61	
Second Sample: 5 minutes, **Start Time:** 5:00 PM		
Automobiles		38
Medium Trucks (6 Tires)		2
Heavy Trucks (>6 Tires)		5
Average speed (mph)		55, 53, 48, 52, 56
Third Sample: 5 minutes, **Start Time:** 5:06 PM		
Automobiles	27	
Medium Trucks (6 Tires)	1	
Heavy Trucks (>6 Tires)	9	
Average speed (mph)	58, 60, 59, 59, 57	
Fourth Sample: 5 minutes, **Start Time:** 5:11 PM		
Automobiles		55
Medium Trucks (6 Tires)		1
Heavy Trucks (>6 Tires)		6
Average speed (mph)		56, 55, 57, 54, 60,

Church St for 5 min — NB: 58 — SB

HARRIS MILLER MILLER & HANSON INC.

NB		SB	
A	IIII IIII IIII	A	IIII
MT		MT	
HT		HT	

NB Speeds: 35, 45, 39, 40
SB Speeds: 40, 45, 44


NMS-04

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway VA MEASUREMENT SITE NO.: NMS-05 (validation)

ADDRESS: 2179 Phospho Springs Road

OWNER:

DESCRIPTION: Residental near RT 220 + main st

NOISE SOURCES: traffic - RT 220, birds

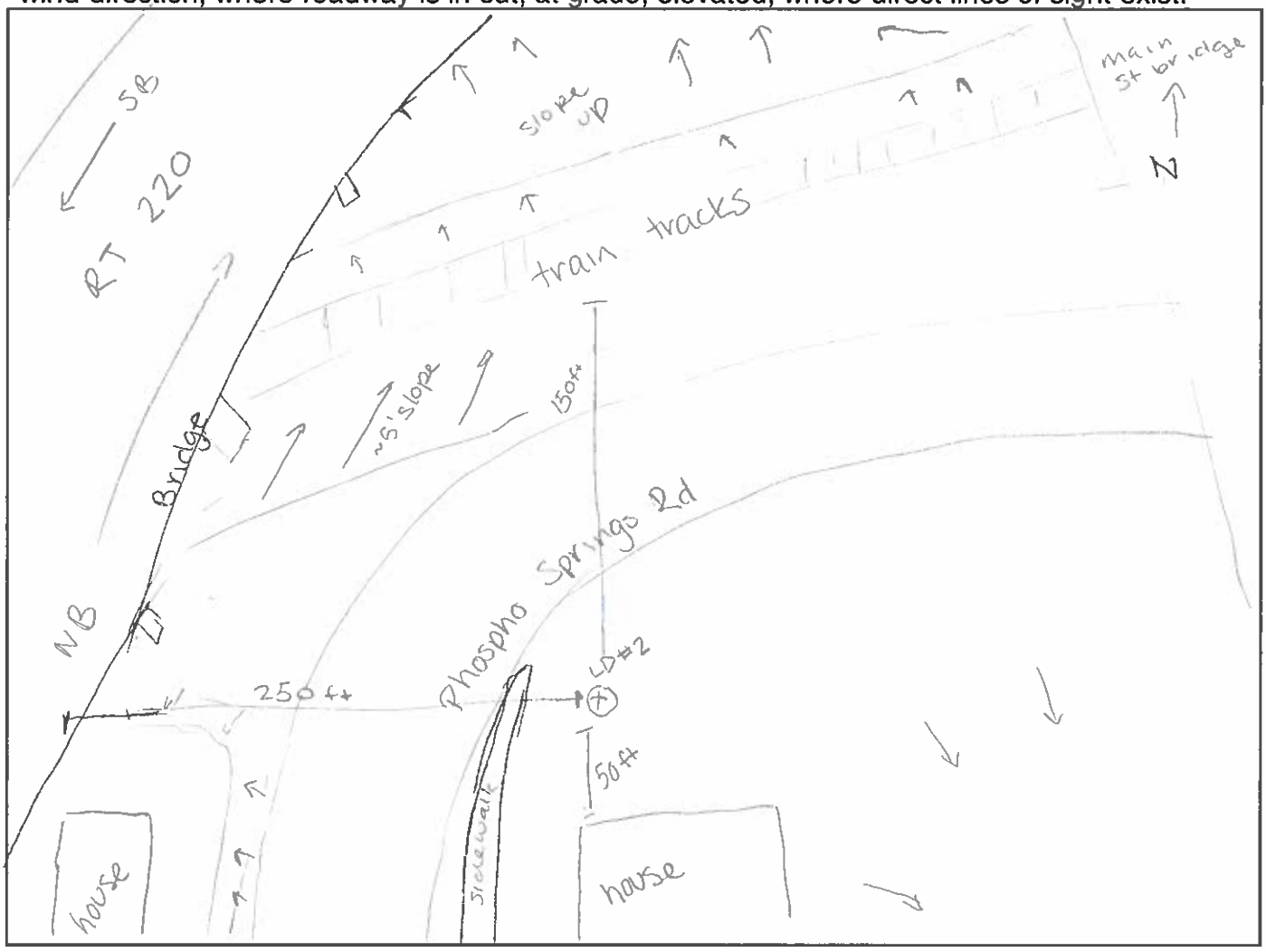
NOISE MONITOR: LD 824 ~~#1~~ #2 - File #005 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 61 - 62°F WEATHER CONDITIONS: sunny, 1-2 m/s winds

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: 36 35 13 N 79 51 47 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #005

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS 05 (validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: Phospho Springs Rd 2179 DATE: 3/26/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	3:42	55.4						calib 114.1
2	43	51.3						
3	44	56.0						
4	45	55.3						
5	46	57.1		1				
6	47	55.9						
7	48	52.9		11				
8	49	52.0						
9	50	56.0						
10	51	56.7		11				
11	52	53.0		1				
12	53	57.1		1				
13	54	57.4		11				birds
14	55	54.2						
15	56	55.2						
16	57	57.2						
17	58	60.0		1				dog barking 2 seconds
18	59	58.5		111				dog barking, squeaky car pass by
19	4:00	56.9						
20	01	63.7						
21	02	67.9						large truck
22	03	55.6						
23	04	57.7						
24	05	56.3						wind chimes most of minute
25	06	59.4						
26	07	54.3						
27	08	54.5		1				
28	09	60.5		1				
29	10	55.3						
30	11	54.7		11				114.3

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Ridgeway, VA
MEASUREMENT SITE NO.: NMS - 05
ADDRESS/DESCRIPTION: End of Phospho Springs Rd

START TIME: 3:42 pm
END TIME: 4:12 pm
DATE: 3/26/19
PERSONNEL: HTJ/EIB

ROADWAY: US 220

	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 5 minutes **Start Time:** 3:42 pm (NB) at 3:48 pm (SB)		
Automobiles	58	41
Medium Trucks (6 Tires)	4	2
Heavy Trucks (>6 Tires)	6	2
Average speed (mph)	59, 61, 56, 51, 54	45, 48, 50, 44,
Second Sample: 5 minutes **Start Time:** 3:54 pm (NB) at 4:01 pm (SB)		
Automobiles	51	38
Medium Trucks (6 Tires)	2	3
Heavy Trucks (>6 Tires)	11	15
Average speed (mph)		

	Main St NB	SB
Third Sample: 5 minutes **Start Time:** 4:08		
Automobiles	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 = 29	𝍸 𝍸 𝍸 = 14
Medium Trucks (6 Tires)	1	1
Heavy Trucks (>6 Tires)		
Average speed (mph)	35, 38, 36, 37	
Fourth Sample: _____ minutes **Start Time:** _____		
Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		


NMS-05

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS-06 (Validation)

ADDRESS: 393 Hen Lane

OWNER:

DESCRIPTION: Residential, along SB US 220

NOISE SOURCES: US 220 Traffic, Birds, Tree service Trucks in Church yard

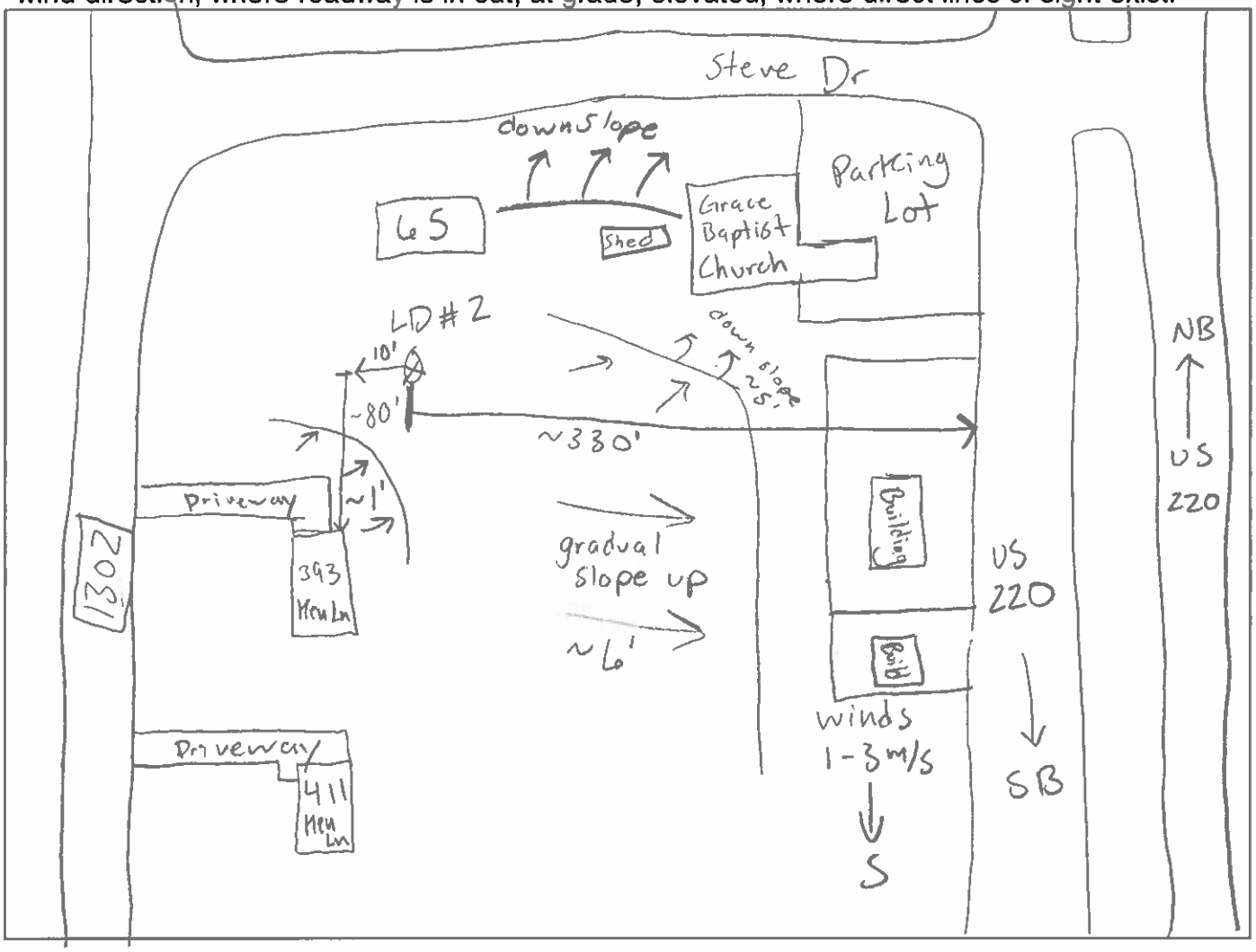
NOISE MONITOR: LD 824 #2 – File #004 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 61-62°F WEATHER CONDITIONS: Partly cloudy/sunny, calm (1-1.3 m/s), up to 3 m/s gusts

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES:

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #004

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-06 (Validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 393 Hen Lane DATE: 3/26/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	2:42pm	47.4						Cal check @ 114.0
2	43	47.5						
3	44	45.3						
4	45	49.1						
5	46	50.9						
6	47	49.5						
7	48	47.3						
8	49	48.8						
9	50	54.8	X					Tree Service Trucks
10	51	59.4	x	✓				Trucks moving/parking
11	52	50.1	✓					
12	53	60.4	x					
13	54	59.6	✓					
14	55	68.6	X					
15	56	53.4						
16	57	49.5						
17	58	51.5						
18	59	44.7						
19	3:00pm	46.3						
20	01	47.9						
21	02	47.0						
22	03	45.6						
23	04	46.5						
24	05	48.9						
25	06	50.0						
26	07	49.0						
27	08	48.0						
28	09	47.5						
29	10	47.8						
30	11	48.8						Cal check @

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Ridgeway, VA
MEASUREMENT SITE NO.: NMS-06
ADDRESS/DESCRIPTION: 393 Ken Lane

START TIME: 2:42
END TIME: 3:12
DATE: 3/26/19
PERSONNEL: HTJ/EIB

ROADWAY: US-220

	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 5 minutes **Start Time: 2:42**		
Automobiles	59	40
Medium Trucks (6 Tires)	1	4
Heavy Trucks (>6 Tires)	9	2
Average speed (mph)		27, 28, 34, 26
Second Sample: 5 minutes **Start Time: 2:52**		
Automobiles	63	43
Medium Trucks (6 Tires)	5	3
Heavy Trucks (>6 Tires)	6	8
Average speed (mph)	38, 42, 35, 28	32, 30, 37
Third Sample: 5 minutes **Start Time: 3:03**		
Automobiles	45	56
Medium Trucks (6 Tires)	2	2
Heavy Trucks (>6 Tires)	5	5
Average speed (mph)	30, 29, 31, 36	31, 30
Fourth Sample: ____ minutes **Start Time: ____**		
Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		

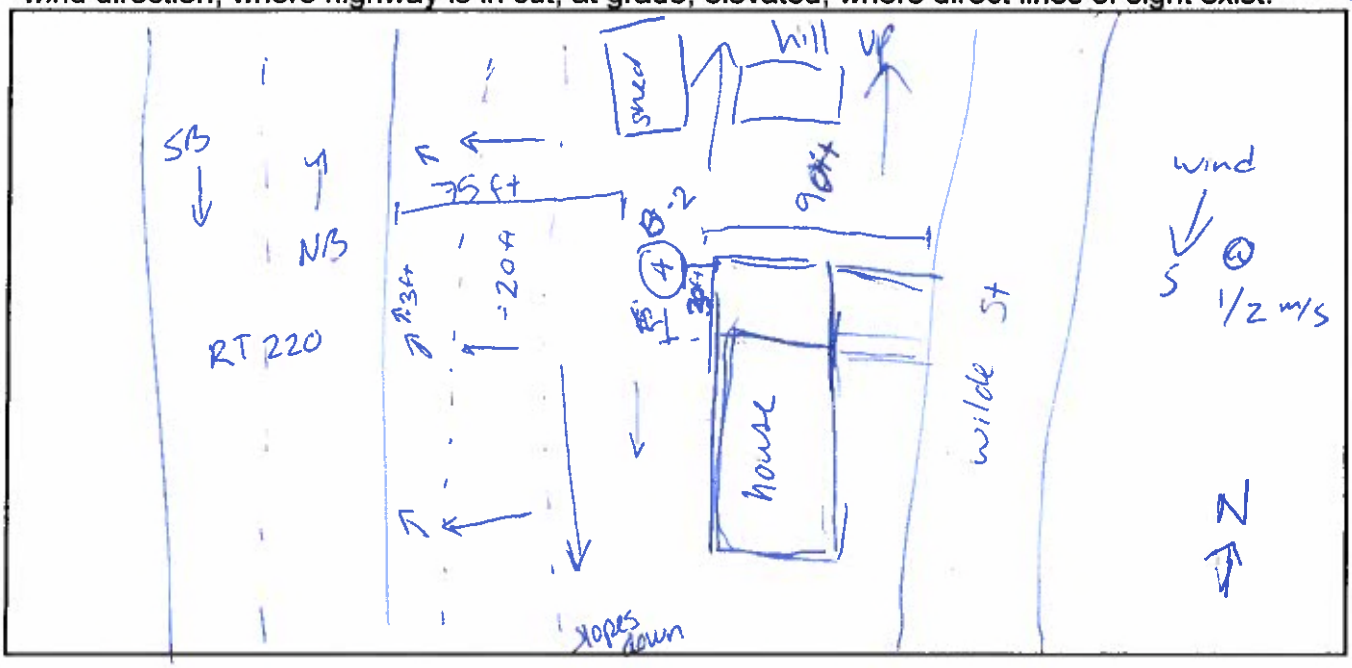

NMS-06

PROJECT: Martinsville US 220/58
JOB NO.:

LONG TERM NOISE MONITORING SITE LOG

ASSESSMENT AREA ID: NMS 07 MEASUREMENT SITE NO.: LT
ADDRESS: 47 Wilde St
OWNER:
DESCRIPTION: Residential, backed up to US 220(NB), close to interchange, at top of steep hill
NOISE SOURCES: US 220, birds, possible children, traffic entering from 58 interchange
NOISE MONITOR: Bk #2 S/N:
MICROPHONE: S/N:
CALIBRATOR: S/N:
START DATE: 3/26/19 END DATE: 3/27/19
START TIME: 8:47 AM END TIME: 8:50 AM
SYNCH W/HOURS?
METRICS STORED:
EXCEEDENCE THRESHOLD: EXCEEDENCE DURATION:
AVERAGE TEMP. (°F): 46°F WEATHER CONDITIONS: 1-2 m/s south, cloudy, light drizzle

SITE SKETCH: Show highway, homes, local roads, reference distances, arrows for North & wind direction, where highway is in cut, at grade, elevated, where direct lines of sight exist.




NMS-07

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Martinsville, VA MEASUREMENT SITE NO.: NMS-08 (validation)

ADDRESS: 144 Poplar St

OWNER:

DESCRIPTION: Residential, along 58 EB, west of 220/58 interchange (Exit to US220)

NOISE SOURCES: US 220/58, wind chimes, birds, prop planes, frogs

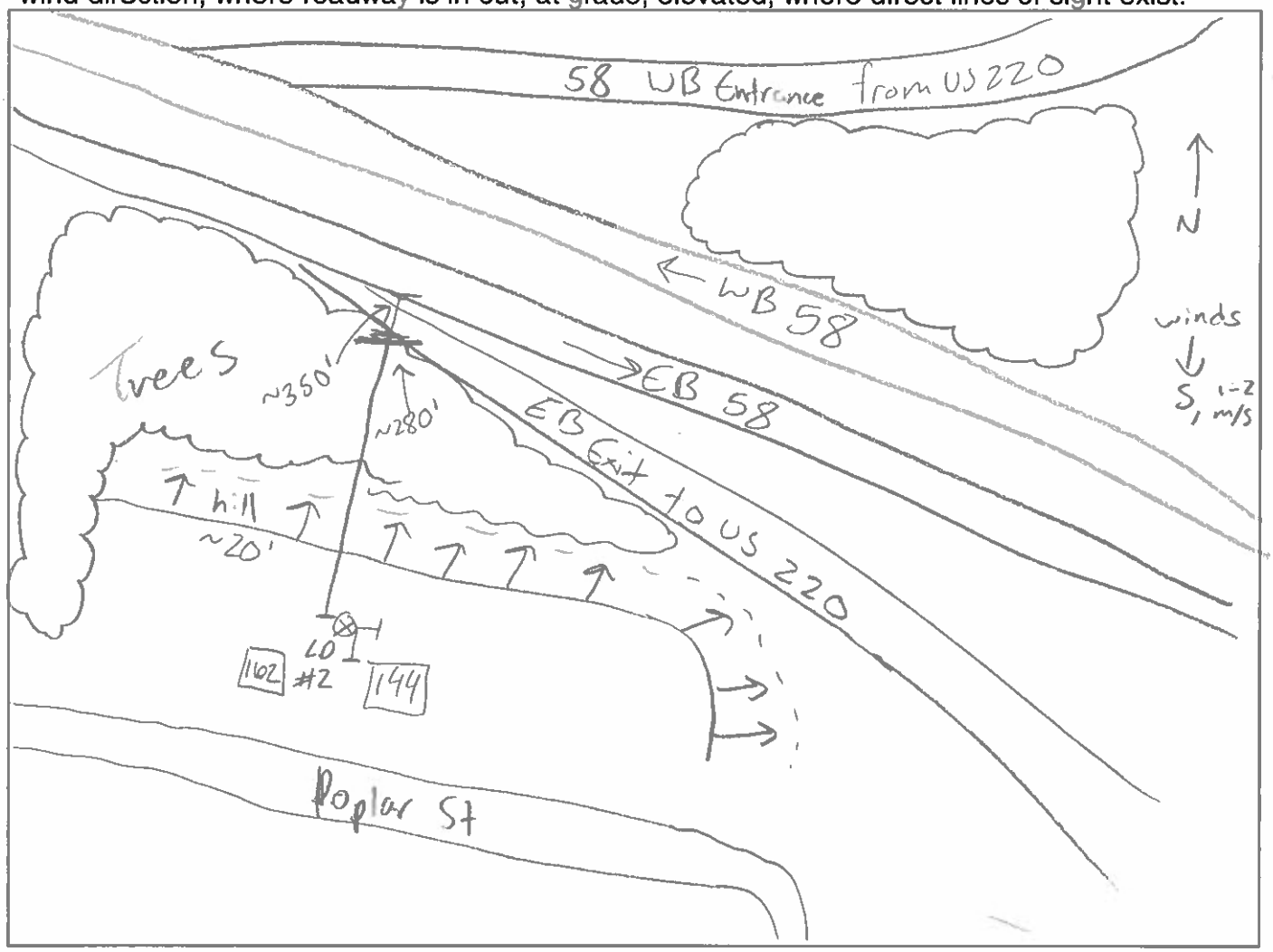
NOISE MONITOR: LD 824 ~~#1~~ #2 — File #003 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 65-67°F WEATHER CONDITIONS: cloudy, 1-2 m/s winds,

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES:

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #003

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-08 (validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 144 Poplar St DATE: 3/26/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	1:00 PM	52.3						Cal check @ 113.9
2	01	54.7						
3	02	51.4						
4	03	51.2						
5	04	54.7						
6	05	50.2						
7	06	50.7						
8	07	57.6	X					Car Pulled into 162 Driveway
9	08	55.2	✓					light conversation w/ neighbor
10	09	53.3						
11	10	49.6						
12	11	52.8						
13	12	47.7						
14	13	52.4						
15	14	53.9						
16	15	55.7						
17	16	58.4						
18	17	49.9						
19	18	52.5						
20	19	53.6						
21	20	53.8						
22	21	53.6						
23	22	51.3						
24	23	48.6						
25	24	54.9						
26	25	54.2						
27	26	54.4						
28	27	47.8						
29	28	51.4						
30	29	57.5						Cal check @ 114.1

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Martinsville, VA
MEASUREMENT SITE NO.: NMS-8
ADDRESS/DESCRIPTION: 144 Popular St

START TIME: 1:00 PM
END TIME:
DATE: 3/26
PERSONNEL: HTJ/EIB

ROADWAY: RT 58

	DIRECTION 1: EB	DIRECTION 2: WB
First Sample: 5 minutes, **Start Time:** 1:00		1:05
Automobiles	26	19
Medium Trucks (6 Tires)	0	4
Heavy Trucks (>6 Tires)	8	5
Average speed (mph)	67 from driving	63 from driving
Second Sample: 5 minutes, **Start Time:** 1:13	RT 220 SB	NB 1:18
Automobiles	35	41
Medium Trucks (6 Tires)	1	5
Heavy Trucks (>6 Tires)	5	10
Average speed (mph)	31, 23, 27, 46	26, 49, 32, 30
Third Sample: 5 minutes, **Start Time:** 1:13	ramp RT 58 EB to 220	
Automobiles	𝍸 𝍸 𝍸	
Medium Trucks (6 Tires)	1	
Heavy Trucks (>6 Tires)	𝍸 𝍸	
Average speed (mph)	26, 18	
Fourth Sample: 5 minutes, **Start Time:** 1:25		
Automobiles	11	
Medium Trucks (6 Tires)	0	
Heavy Trucks (>6 Tires)	11	
Average speed (mph)	36 from driving	


NMS-08

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway VA MEASUREMENT SITE NO.: NMS-09 (Ambient)

ADDRESS: 1826 Lee Ford Camp Rd

OWNER:

DESCRIPTION: very rural, open land, minimal traffic, near alternative 4B, 4C

NOISE SOURCES: dog barking near house, distant traffic RT 220

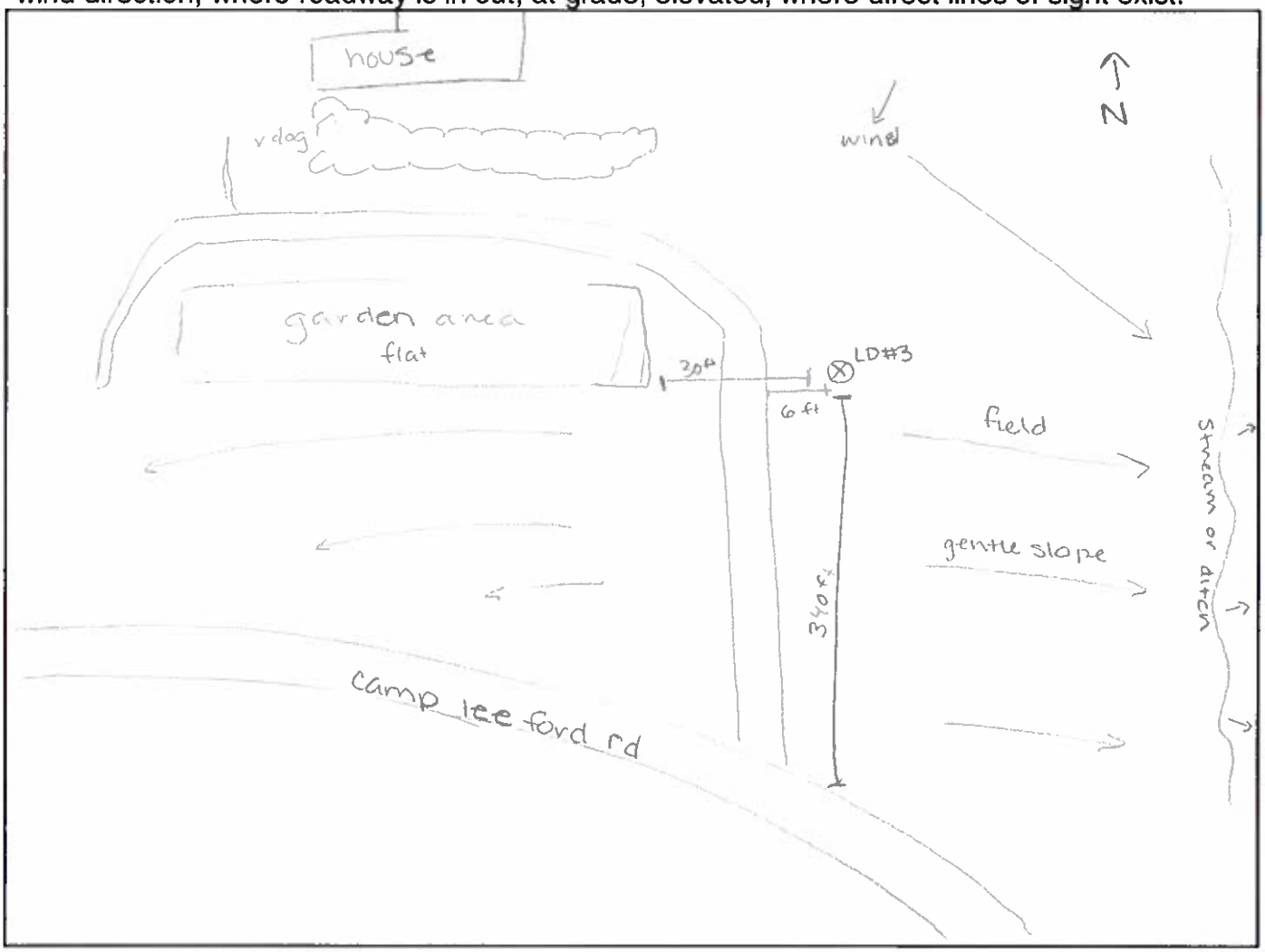
NOISE MONITOR: LD 824 #3 - File # 002 S/N: —

MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 55° F WEATHER CONDITIONS: wind 1.5 – 2 m/s, gusts around 3 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: 36 34 50 N 79 53 11 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #002

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-09 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 1826 leeford camp Rd DATE: 3127

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	12:11	43.1						dog barking
2	12	36.3						
3	13	39.6						
4	14	38.9						
5	15	35.5						
6	16	39.3		1				
7	17	35.8						
8	18	38.9						
9	19	43.0						
10	20	36.8						
11	21	36.3						
12	22	37.4						
13	23	38.4						wind gust
14	24	38.8						
15	25	36.4						
16	26	37.5						
17	27	41.2		11				dog barking
18	28	54.2	X	11				↑
19	29	58.4	X					car in driveway, talking
20	30	43.7						dog barking
21	31	49.1						
22	32	51.2						dog barking
23	33	49.6						
24	34	47.1						
25	35	44.6						
26	36	49.2						dogs barking
27	37	47.3						dog howl
28	38	50.5	X					
29	39	47.5						
30	40	47.4						

Cal check 113.9

cal check 113.8

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-09

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS-10 (Ambient)

ADDRESS: 105 Red Fox Rd

OWNER:

DESCRIPTION: Abandoned Residential home, along Alternative 4C

NOISE SOURCES: Soapstone Rd Traffic, Birds, Planes (Distant), Distant traffic

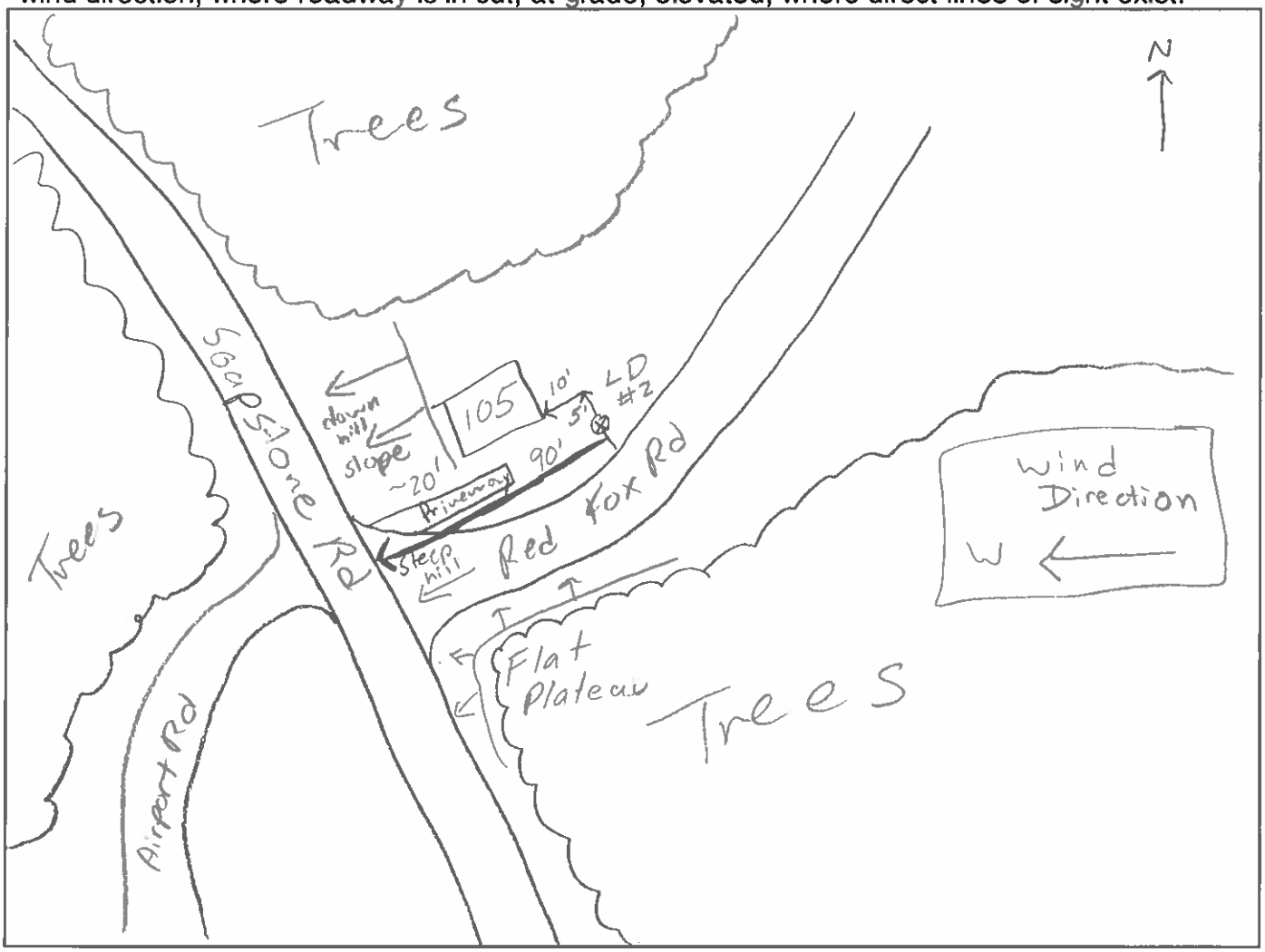
NOISE MONITOR: LD 824 #2 - File #009 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 52-55°F WEATHER CONDITIONS: Sunny, Breezy (2-4 m/s), gusts up to 5 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES:

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #009

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-10 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 105 Red Fox Rd DATE: 3/27/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	1:10pm	49.2		1				Some kind of
2	11	50.9		1				Distant lawn
3	12	39.8						mower or helicopter
4	13	46.1		1				
5	14	48.1		11				
6	15	50.0						
7	16	40.5						
8	17	40.3						
9	18	47.7						
10	19	48.6		1				
11	20	47.1		11				
12	21	42.9		1				
13	22	41.2						
14	23	53.6		11				
15	24	46.7						
16	25	43.8						
17	26	52.2		11				
18	27	42.6						
19	28	51.5		111				
20	29	39.5						
21	30	51.0		1				
22	31	49.5		1				
23	32	41.7						
24	33	42.2						
25	34	47.0		1				
26	35	47.3		1				
27	36	52.9						
28	37	56.1		1111		1		
29	38	46.1		1				
30	39	41.0						

Cal check @ 113.8

Cal check @ 113.8

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-10

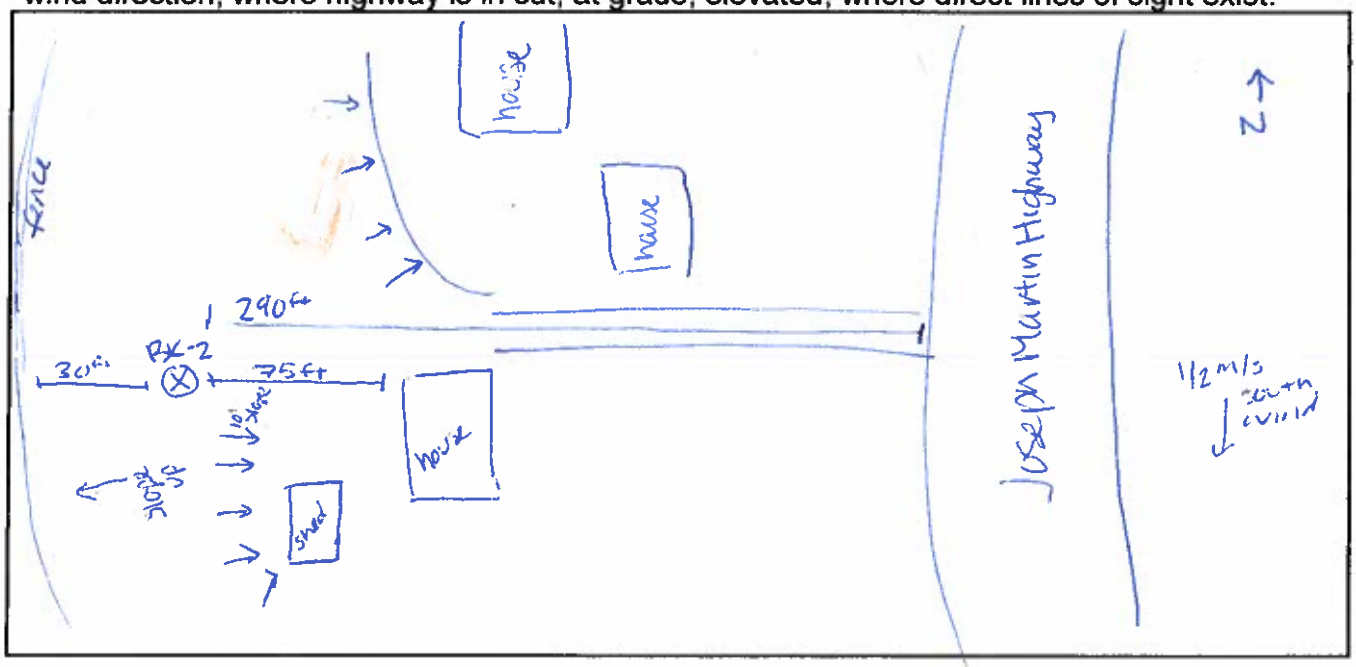
PROJECT: Martinsville us220/58
JOB NO.: _____

LONG TERM NOISE MONITORING SITE LOG

ASSESSMENT AREA ID: NMS - 11 MEASUREMENT SITE NO.: _____
ADDRESS: 28856 Joseph Martin Highway
OWNER: _____
DESCRIPTION: backyard of house, residential, rural, along future alignment 4C + 4D
NOISE SOURCES: traffic distant 220 + 58, birds

NOISE MONITOR: BK - 1 S/N: _____
MICROPHONE: _____ S/N: _____
CALIBRATOR: _____ S/N: _____
START DATE: 3/26/19 END DATE: 3/27/19
START TIME: 9:32 AM END TIME: 10:15 AM
SYNCH W/HOURS? _____ final cal : 0.09
METRICS STORED: _____
EXCEEDENCE THRESHOLD: _____ EXCEEDENCE DURATION: _____
AVERAGE TEMP. (°F): 48°F WEATHER CONDITIONS: 1-2 m/s, cloudy

SITE SKETCH: Show highway, homes, local roads, reference distances, arrows for North & wind direction, where highway is in cut, at grade, elevated, where direct lines of sight exist.




NMS-11

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS - 12 (Ambient)

ADDRESS: 4355 Soapstone Rd

OWNER:

DESCRIPTION: Residential, Rural, Along Alternative 4B

NOISE SOURCES: Soapstone Rd traffic, Birds, People talking faintly, planes

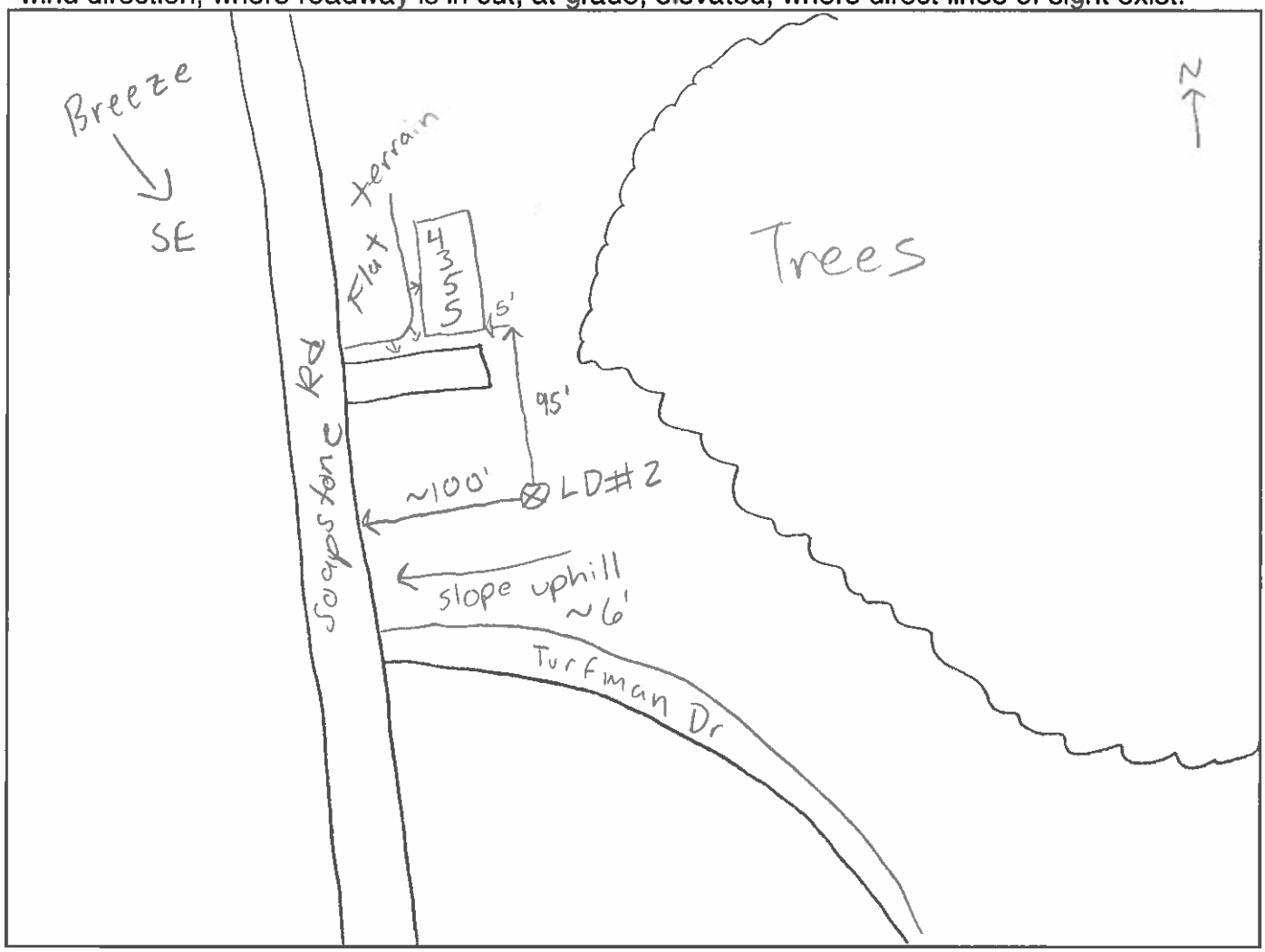
NOISE MONITOR: LD 824 #2 — File #008 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 57-58°F WEATHER CONDITIONS: Sunny, light breeze (0-0.5 m/s)

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES:

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #008

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-12 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 4355 Soapstone Rd DATE: 3/27/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	12:21	49.4		I				
2	22	49.3						
3	23	50.5		II				
4	24	45.4						
5	25	54.1	X					Car leaving driveway ↓ ↓
6	26	56.2	X	III				
7	27	50.6		I				
8	28	55.2		III		I		
9	29	44.7						
10	30	50.4						
11	31	44.7						
12	32	45.4						
13	33	40.6						
14	34	38.6						
15	35	50.8		II				
16	36	50.6		II				
17	37	38.5						
18	38	52.7		III				
19	39	35.1						
20	40	35.5						
21	41	44.2		II				
22	42	46.8						
23	43	50.0		III				
24	44	44.5						
25	45	35.5						
26	46	49.7		II				
27	47	48.4		II				
28	48	37.6						
29	49	48.5		II				
30	50	46.0		I				

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-12

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Martinsville, VA MEASUREMENT SITE NO.: MMS-13 (Ambient)

ADDRESS: 215 ravenswood lane

OWNER:

DESCRIPTION: rural residential, near proposed 4D, 4C, 4B

NOISE SOURCES: distant RT 58, birds, AC or heating unit at house

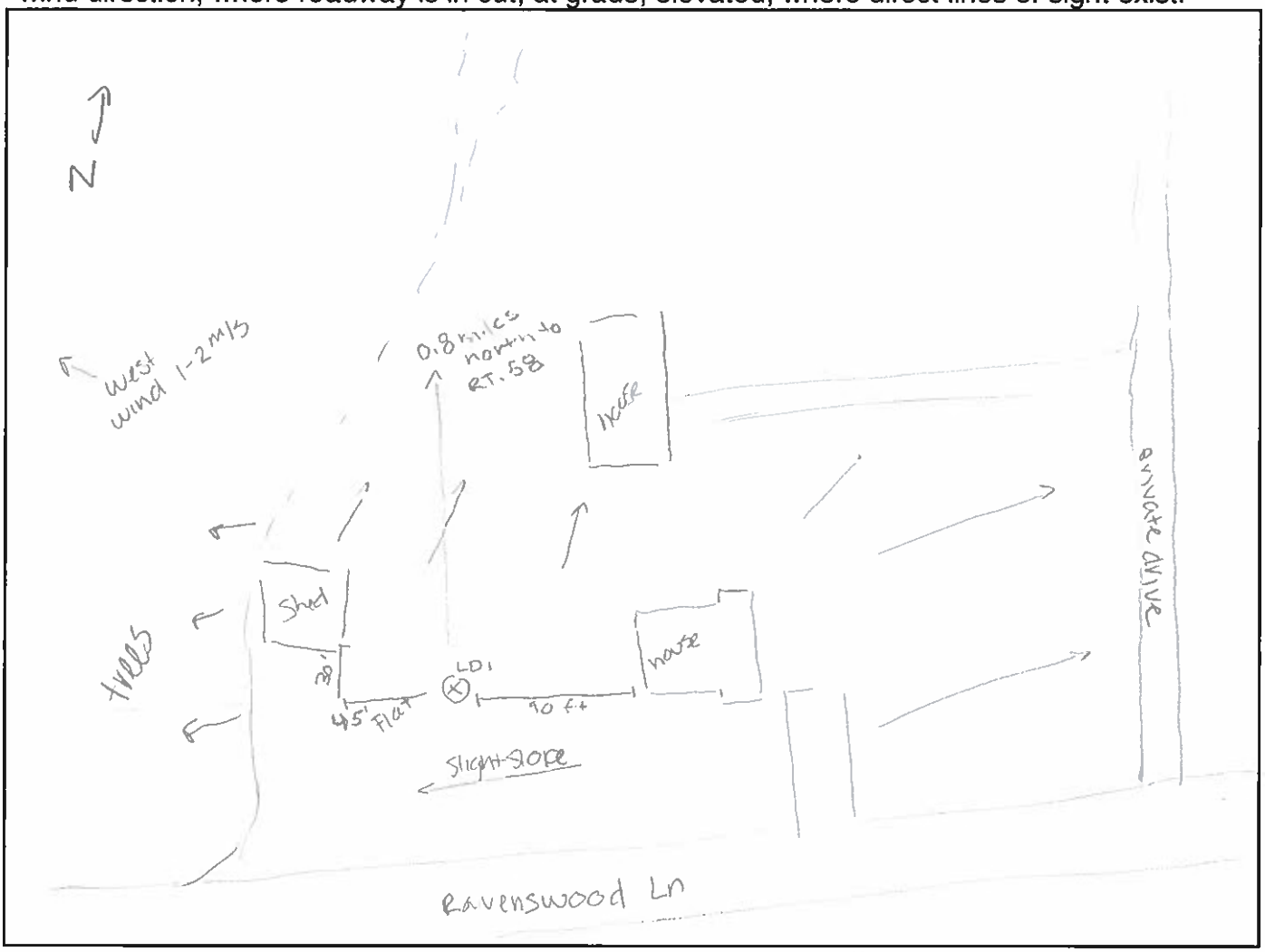
NOISE MONITOR: LD 824 #3 – File #001 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 48 - 49°F WEATHER CONDITIONS: Sunny 1-2 m/s, some gusts at 3 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES: 36 37 16 N, -79 52 59 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #001

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS 13 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 215 Ravenswood Lane DATE: 3/27/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	9:47 AM	40.1						calibrated 114.0
2	48	41.1						
3	49	41.5						
4	50	40.5						
5	51	41.1						
6	52	42.0						
7	53	40.5		1				
8	54	39.9						
9	55	40.9						
10	56	41.8						
11	57	45.8						
12	58	40.8						
13	59	41.4						
14	10:00	43.6						
15	01	43.6						heating or AC unit at house
16	02	43.9						
17	03	45.3						
18	04	45.5						
19	05	43.6						
20	06	44.8						
21	07	44.1						
22	08	44.2						
23	09	43.5						
24	10	43.8						
25	11	43.8						
26	12	43.2						
27	13	41.8						
28	14	42.5						
29	15	40.8						
30	16	42.5						113.9

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-13

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS-14 (Ambient)

ADDRESS: 705 Reservoir Rd

OWNER:

DESCRIPTION: Residential, large rural property along Alternative 4A

NOISE SOURCES:

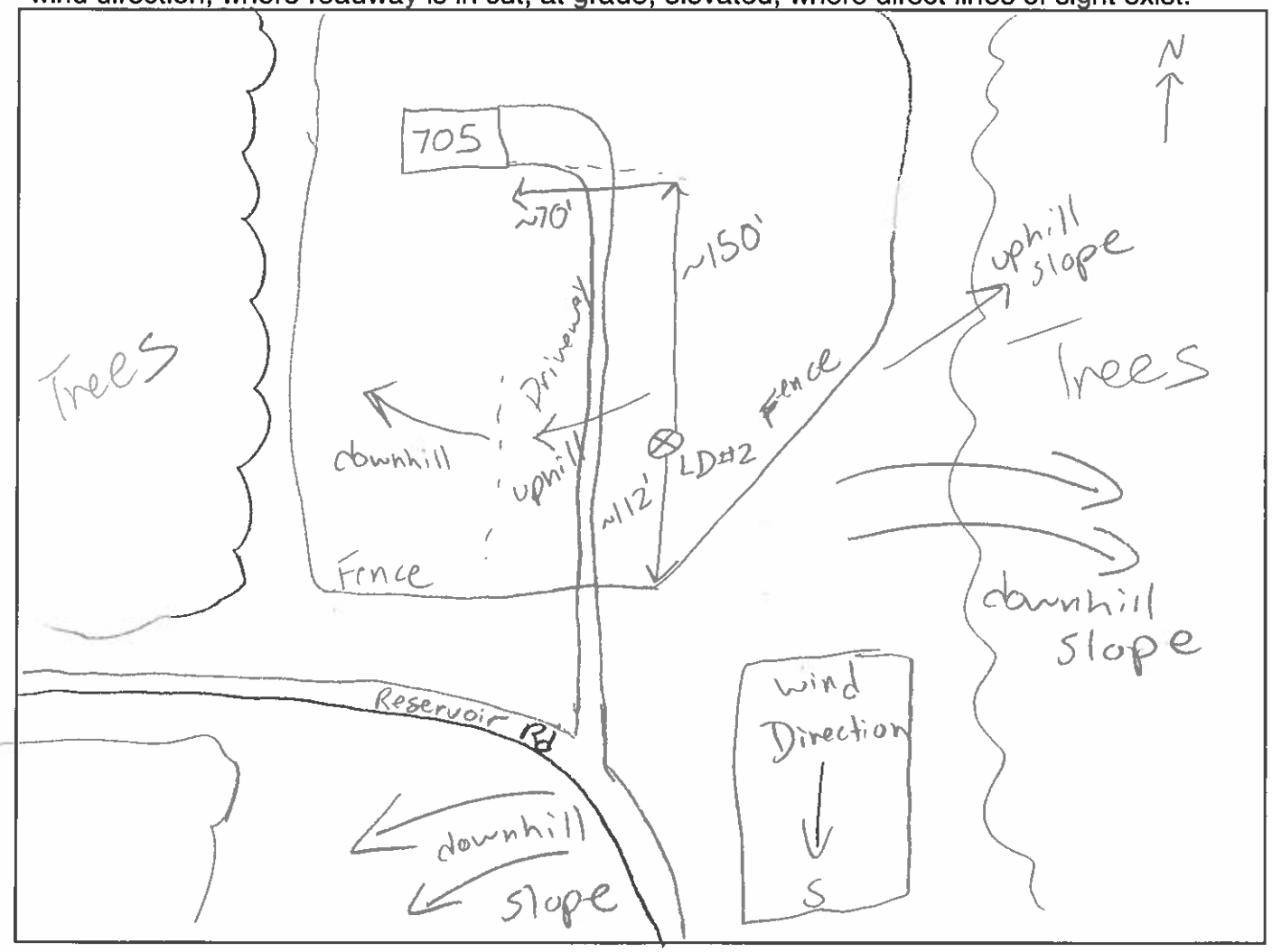
NOISE MONITOR: LD 824 # 2 - File #011 S/N:

MICROPHONE: skip file #010 S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 54°F WEATHER CONDITIONS: Sunny, 1-2 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: _____

SHORT-TERM NOISE MEASUREMENT DATA SHEET

Data File #11 *skip #10

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-14 - (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 705 Reservoir Rd DATE: 3/27/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	3:47pm	36.2						
2	48	34.9						
3	49	36.1						
4	50	35.0						
5	51	36.7						Distant Train Horn
6	52	36.0						
7	53	44.2						Closer Horn
8	54	36.7						
9	55	39.1						
10	56	40.8						
11	57	44.1						
12	58	38.6						
13	59	34.8						
14	4:00pm	34.7						
15	01	37.2						
16	02	38.0						
17	03	35.9						
18	04	35.1						
19	05	39.2						
20	06	36.2						
21	07	35.5						
22	08	39.7						
23	09	36.6						
24	10	42.4						Plane (Distant)
25	11	41.2						
26	12	39.7						
27	13	37.1						
28	14	36.3						
29	15	36.0						
30	16	36.6						

Cal Check @ 113.9

Cal check @ 113.6

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-14

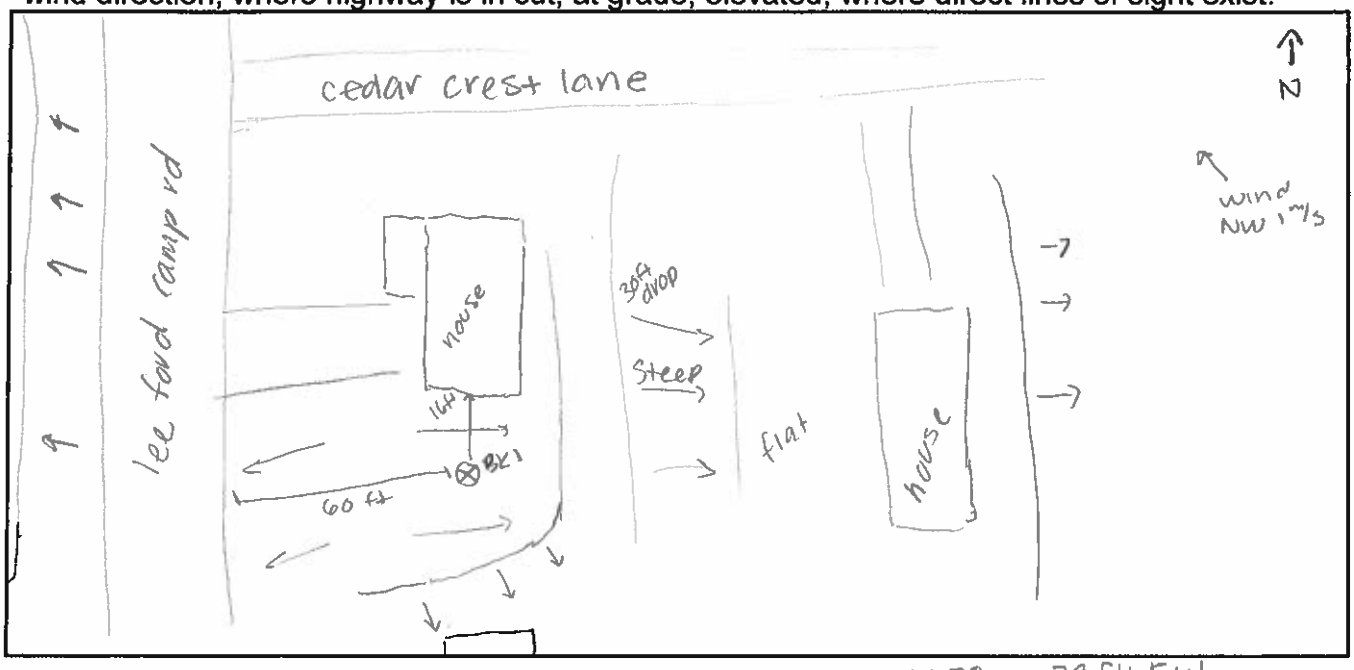
PROJECT: Martinsville, VA
JOB NO.: _____

LONG TERM NOISE MONITORING SITE LOG

ASSESSMENT AREA ID: Ridgeway, VA MEASUREMENT SITE NO.: NMS-15
ADDRESS: 2960 Lee Ford Camp Rd
OWNER: _____
DESCRIPTION: Residential, Rural, very quiet
NOISE SOURCES: Birds, Lee Ford Camp Rd Traffic

NOISE MONITOR:	BK #1	S/N:	
MICROPHONE:	—	S/N:	
CALIBRATOR:	—	S/N:	
START DATE:	3/27	END DATE:	
START TIME:	10:56	END TIME:	
SYNCH W/HOURS?			
METRICS STORED:			
EXCEEDENCE THRESHOLD:		EXCEEDENCE DURATION:	
AVERAGE TEMP. (°F):	48-49°F	WEATHER CONDITIONS:	Sunny NW 1 m/s wind

SITE SKETCH: Show highway, homes, local roads, reference distances, arrows for North & wind direction, where highway is in cut, at grade, elevated, where direct lines of sight exist.



36 34 58 N, 79 54 15 W


NMS-15

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Ridgeway, VA MEASUREMENT SITE NO.: NMS-16 (Ambient)

ADDRESS: 701 Magna Vista School Rd

OWNER:

DESCRIPTION: Magna Vista School Baseballfield 1st base. School is on Spring break

NOISE SOURCES: birds,

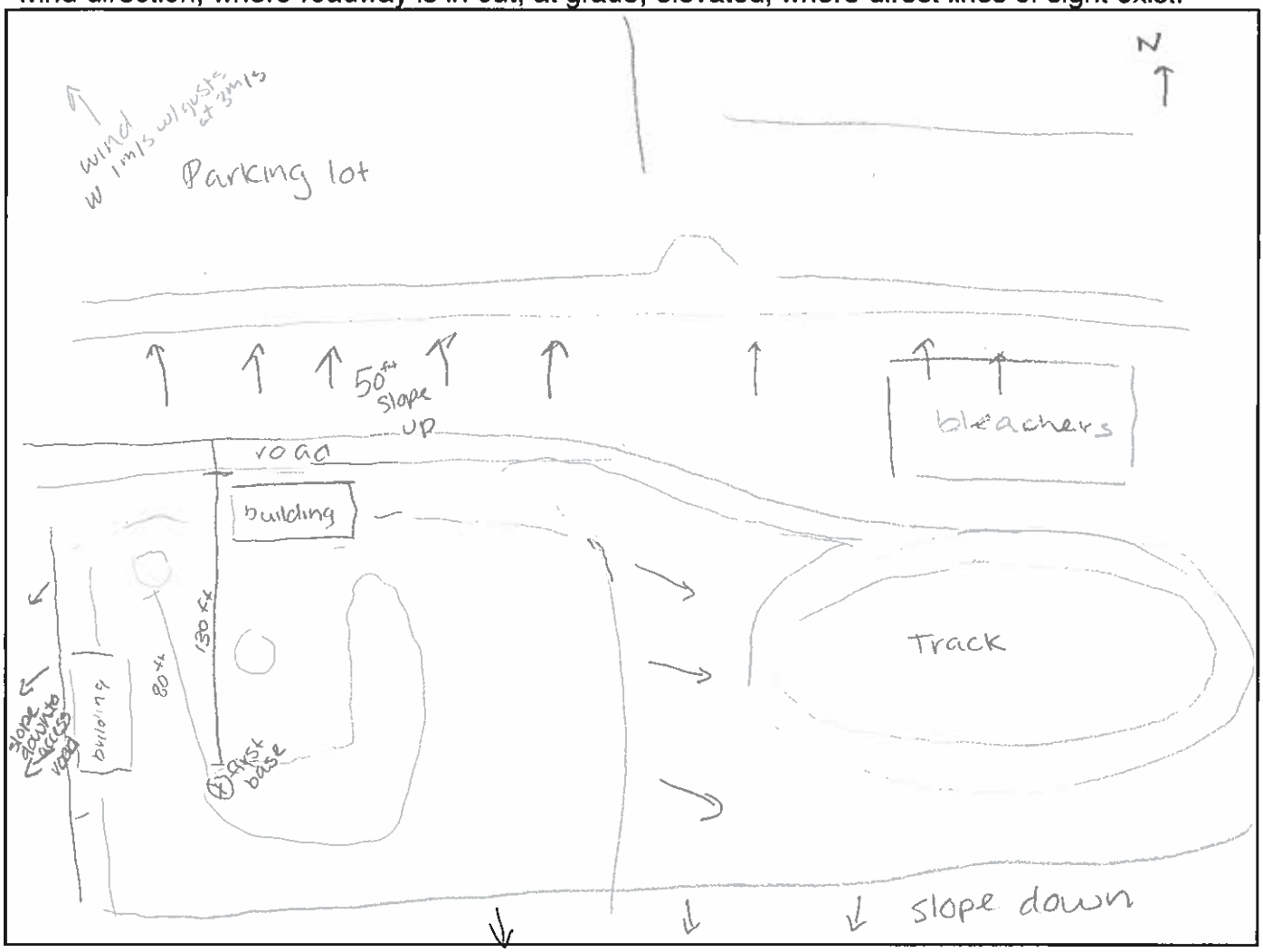
NOISE MONITOR: LD 824 #3 - File #003 S/N: —

MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 54-55°F WEATHER CONDITIONS: sunny, 0.5-1 m/s w/ gusts @ 3 m/s

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: 36 35 21 N 79 53 22 W

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #003

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-16 (Ambient) - school - baseball PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 701 Magna Vista School rd DATE: 3/27

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	1:09	37.7						114.2
2	10	36.5						
3	11	37.5						
4	12	39.8						
5	13	37.5						
6	14	37.4						
7	15	37.1						
8	16	35.5						
9	17	36.9						bell
10	18	37.7						
11	19	40.3						
12	20	38.5						
13	21	38.3						
14	22	39.2						
15	23	37.6						
16	24	36.7						
17	25	41.8						
18	26	39.6						
19	27	37.9						
20	28	39.6						
21	29	47.2						wind gust @ 3.3 m/s
22	30	47.3						
23	31	47.5						
24	32	36.6						
25	33	44.0						
26	34	37.7						
27	35	48.0						wind
28	36	39.0						
29	37	39.6						
30	38	38.6						113.9

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-16

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Martinsville, VA MEASUREMENT SITE NO.: NMS-17 (Ambient)

ADDRESS: 3591 Soapstone Rd

OWNER:

DESCRIPTION: Residential, Rural,

NOISE SOURCES: Soapstone Rd, Dog Barking, Birds

NOISE MONITOR: LD 824 #2 - File #007 S/N: —

MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 45°F WEATHER CONDITIONS: Sunny, no wind,

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.

PHOTOS: _____ GPS COORDINATES: _____

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #007

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-17 (Ambient) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: 3591 Soapstone Rd DATE: 3/27/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	9:30AM	37.7						Cal Check @ 114.1
2	31	45.9	x					Dog Barking
3	32	39.1						
4	33	55.0		1				
5	34	41.7						
6	35	48.8						
7	36	52.0		1				Dog Barking
8	37	53.0		11				
9	38	54.7		1				
10	39	51.5						
11	40	57.5		11				
12	41	39.3						
13	42	37.4						
14	43	39.8						
15	44	51.9		11				
16	45	57.1		11				
17	46	37.9						
18	47	50.7		1				
19	48	40.8						
20	49	47.5						
21	50	47.3		1				
22	51	39.1						
23	52	42.2	✓					Dog Barking
24	53	45.2	✓					↓ ↓ ↓
25	54	54.9		11				
26	55	36.7						
27	56	39.0						
28	57	56.3		11				Distant Prop Plane
29	58	51.3		1				Cal Check @ 113.8
30	59	58.8		11				

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<


NMS-17

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

3/26

ASSESSMENT AREA: _____ MEASUREMENT SITE NO.: NMS-18 (Validation)

ADDRESS: Watdill Circle

OWNER: _____

DESCRIPTION: residential near RT 58

NOISE SOURCES: RT 58 traffic, dogs, birds

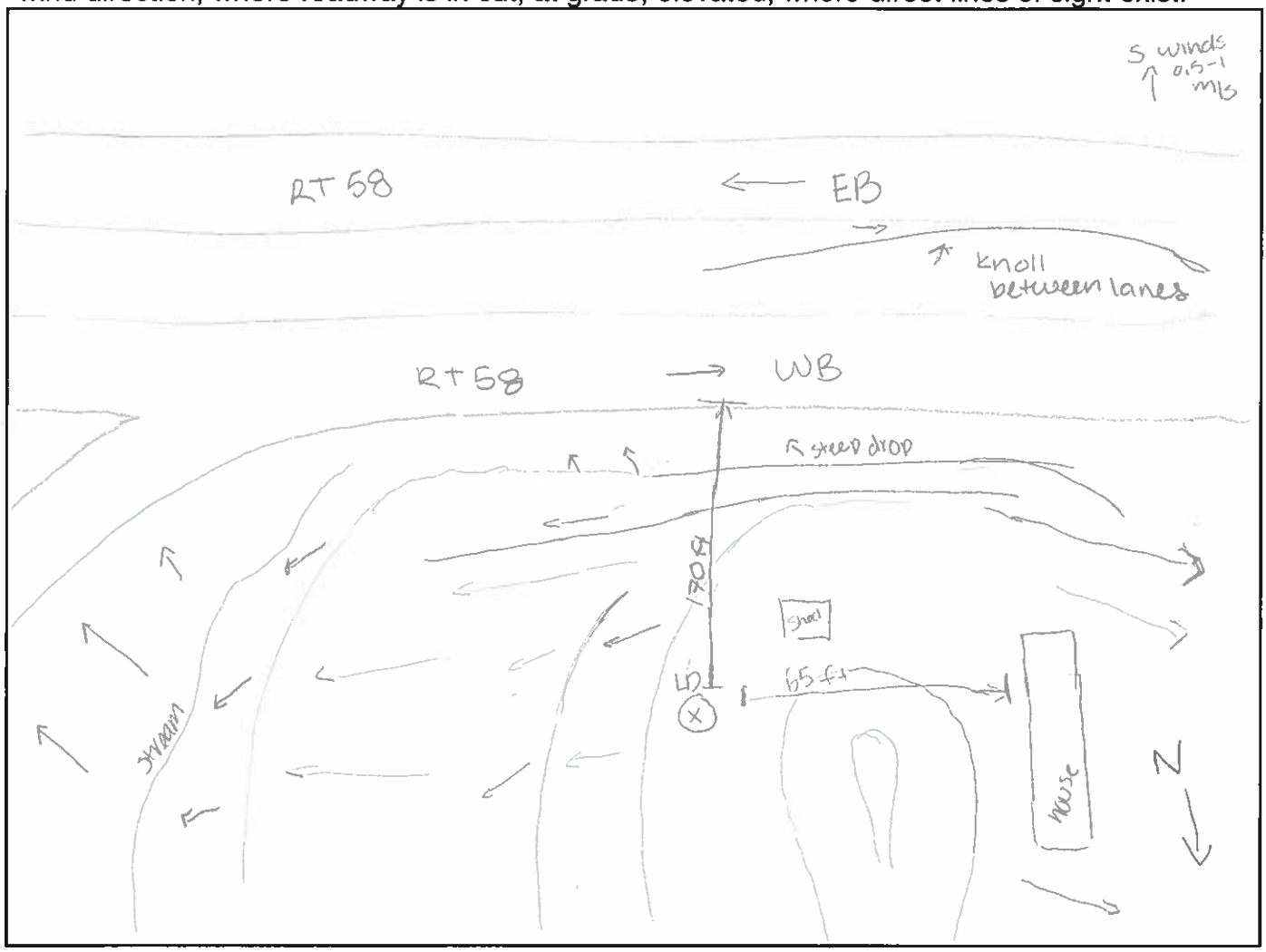
NOISE MONITOR: LD 824 #2 - File #002 S/N: _____

MICROPHONE: _____ S/N: _____

CALIBRATOR: _____ S/N: _____

TEMP. RANGE (°F): 53-54°F WEATHER CONDITIONS: partly cloudy

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: _____ GPS COORDINATES: _____

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #002

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS-18 (validation)

ADDRESS/DESCRIPTION: Westdale circle

PERSONNEL: HTJ/EIB

DATE: 3/26

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	12:00	54.1						Cal check 114
2	01	60.3						
3	02	53.4						
4	03	58.8						dog bark 1-3 secs
5	04	57.4						
6	05	58.7						
7	06	58.1	✓					birds chirping
8	07	63.3						
9	08	56.0						
10	09	59.4						
11	10	57.8						
12	11	61.5						
13	12	53.8						
14	13	55.8						
15	14	64.1	✓					dogs barking 12:14:12
16	15	58.7						few seconds dogs barking 12:15:32
17	16	60.5						
18	17	57.2						
19	18	56.6						dogs barking 10-15 seconds
20	19	54.9						
21	20	57.0						
22	21	59.6						
23	22	54.0						
24	23	59.7						
25	24	59.2						
26	25	58.1						
27	26	60.8						
28	27	57.5						
29	28	58.3						
30	29	57.0						

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: Martinsville, VA
MEASUREMENT SITE NO.: NMS-18
ADDRESS/DESCRIPTION: 88 Watdill cir end of road

START TIME: 12:00 pm
END TIME: 12:30 pm
DATE: 3/26/19
PERSONNEL: HTJ/EIB

ROADWAY: Rte 58

	DIRECTION 1: EB	DIRECTION 2: WB
First Sample: 5 minutes/each direction **Start Time:** 12:00 pm 12:06 PM		
Automobiles	24	26
Medium Trucks (6 Tires)	3	2
Heavy Trucks (>6 Tires)	13	11
Average speed (mph)	65 (from driving corridor)	63, 65, 67, 63, 66
Second Sample: 5 minutes/each direction **Start Time:** 12:12 pm + 12:18 pm		
Automobiles	33	33
Medium Trucks (6 Tires)	1	3
Heavy Trucks (>6 Tires)	6	14
Average speed (mph)	65 (from driving corridor)	56, 60, 62,
Third Sample: 30 minutes **Start Time:** 12:00 pm Rte 58 WB Entrance Ramp		
Automobiles		~~THH THH~~ IIII
Medium Trucks (6 Tires)		11
Heavy Trucks (>6 Tires)		11
Average speed (mph)		45, 37, 43, 40, 39
Fourth Sample: ____ minutes **Start Time:**		
Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		


NMS-18

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Martinsville, VA MEASUREMENT SITE NO.: NMS-19 (validation)

ADDRESS: 230 Winners Circle

OWNER:

DESCRIPTION:

NOISE SOURCES: US 58, very distant train horns

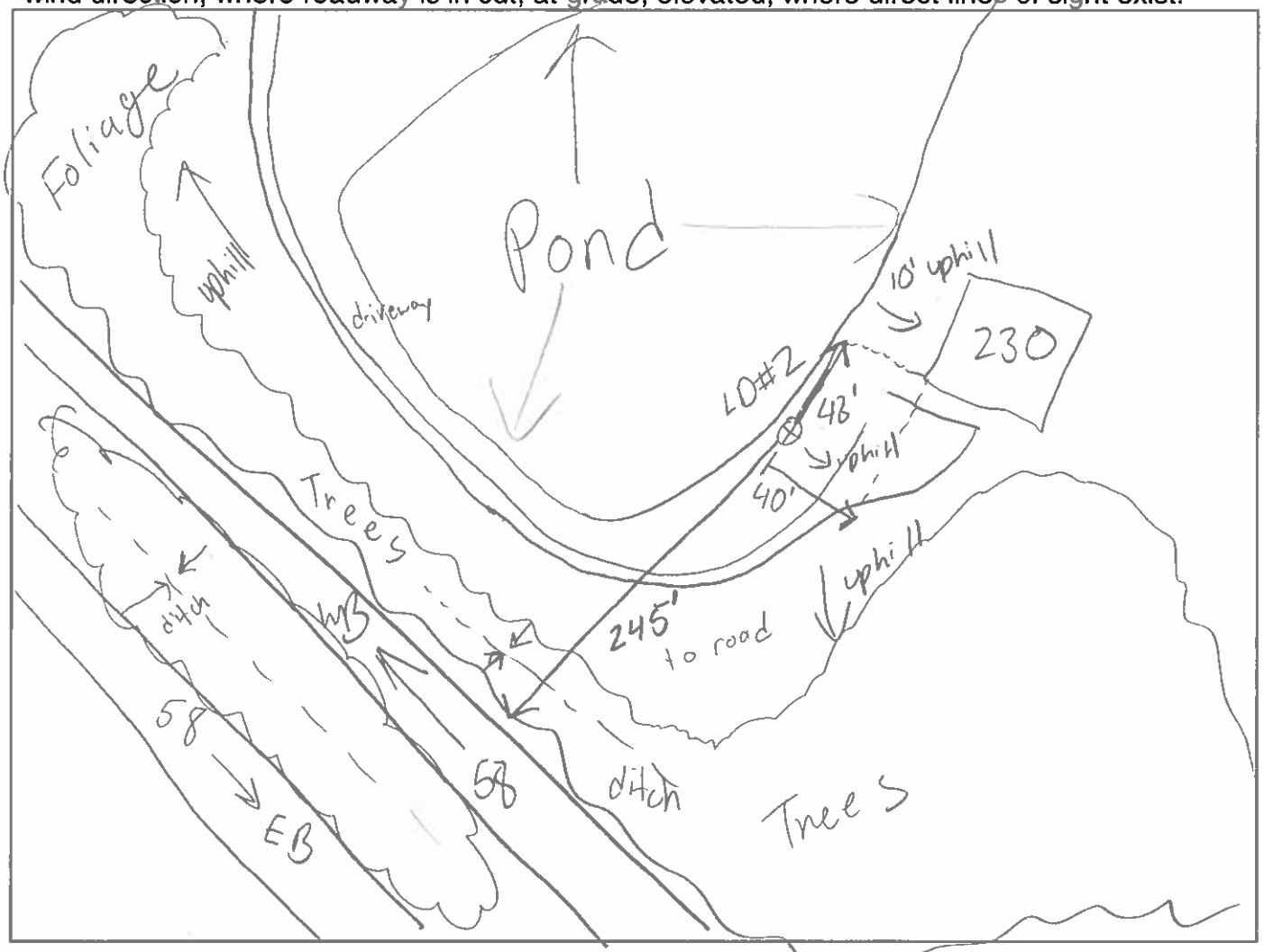
NOISE MONITOR: LD 824 #2 – File#001 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 45 - 46 °F WEATHER CONDITIONS: 60% humidity, 1.3m/s breeze

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



PHOTOS: GPS COORDINATES:

SHORT-TERM NOISE MEASUREMENT DATA SHEET

File #601

PROJECT: Martinsville US 220 EIS

JOB NO.: 308870.001

MEASUREMENT SITE NO.: NMS 19 ST-(validation) PERSONNEL: HTJ/EIB

ADDRESS/DESCRIPTION: Residential, along WB 58 DATE: 3/26/19

#	30 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	10:15 AM	63.9						change cal @ 114.0
2	16	61.6						
3	17	56.7						
4	18	54.9						
5	19	61.7						
6	20	61.7						
7	21	60.5						
8	22	54.5						
9	23	53.4						
10	24	59.6						
11	25	63.1						
12	26	57.2						
13	27	60.0						
14	28	59.4						
15	29	58.6						
16	30	57.8						
17	31	65.5						loud truck
18	32	57.9						
19	33	63.7						
20	34	63.0						
21	35	60.1						very distant train horn
22	36	58.3						
23	37	61.6						
24	38	59.0						
25	39	64.0						
26	40	60.8						
27	41	52.9						
28	42	56.5						
29	43	59.2						
30	44	57.9						Check cal @ 113.9

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: Martinsville US 220 EIS
JOB NO.: 308870.001

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: _____
MEASUREMENT SITE NO.: NMS-19
ADDRESS/DESCRIPTION: 106 winners circle ridgeway VA

START TIME: 10:15
END TIME: 10:45
DATE: 3/26/19
PERSONNEL: HTJ/EIB

ROADWAY: RT 58

	DIRECTION 1: WB	DIRECTION 2: EB
First Sample: 5 minutes **Start Time: 10:15**		
Automobiles	35	
Medium Trucks (6 Tires)	4	
Heavy Trucks (>6 Tires)	8	
Average speed (mph)	59, 62, 49, 50	
Second Sample: 5 minutes **Start Time: 10:20**		
Automobiles		30
Medium Trucks (6 Tires)		4
Heavy Trucks (>6 Tires)		5
Average speed (mph)		55, 56, 60, 63
Third Sample: 5 minutes **Start Time: 10:25**		start @ 10:31
Automobiles	30	22
Medium Trucks (6 Tires)	3	0
Heavy Trucks (>6 Tires)	6	10
Average speed (mph)		
Fourth Sample: 5 minutes **Start Time: 10:36**		
Automobiles	16	23
Medium Trucks (6 Tires)	5	1
Heavy Trucks (>6 Tires)	12	3
Average speed (mph)		


NMS-19

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42320

Instrument: **Sound Level Meter**
Model: **2270**
Manufacturer: **Brüel and Kjær**
Serial number: **3011799**
Tested with: **Microphone 4189 s/n 2578554**
4189 s/n 2008916
Preamplifier ZC0032 s/n 6175
ZC0032 s/n 28326
Type (class): **1**
Customer: **Harris Miller Miller & Hanson Inc.**
Tel/Fax: **781-229-0707 x3119 / 781-229-7939**

Date Calibrated: **2/12/2019** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard

Address: **77 South Bedford Street**
Burlington, MA 01803

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 30, 2018	Scantek, Inc./ NVLAP	Jul 30, 2019
DS-360-SRS	Function Generator	61646	Sep 7, 2018	ACR Env./ A2LA	Sep 7, 2020
34401A-Agilent Technologies	Digital Voltmeter	MY47022043	Sep 17, 2018	ACR Env./ A2LA	Sep 17, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 11, 2018	Scantek, Inc./ NVLAP	Nov 11, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.4	100.77	46.1

Calibrated by:	Jeremy Gotwalt	Authorized signatory:	Steven E. Marshall
Signature	Jeremy Gotwalt	Signature	Steven E. Marshall
Date	2/12/19	Date	2/14/2019

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42293

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/7/2019**	*Cal Due:*
Model:	**4231**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**2579290**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	**__Yes _X_ No**
Barometer s/n:			
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**77 South Bedford Street, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**		

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2018	Scantek, Inc./ NVLAP	Oct 31, 2019
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 1, 2018	ACR Env. / A2LA	Oct 1, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
140-Norsonic	Real Time Analyzer	1406423	Nov 3, 2018	Scantek / NVLAP	Nov 3, 2019
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 11, 2018	Scantek, Inc. / NVLAP	Nov 11, 2019
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/7/2019	Date	2/12/2019

Document stored as: Z:\Calibration Lab\Cal 2019\BNK4231_2579290_M1.doc

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42323

Instrument: **Sound Level Meter**
Model: **2270**
Manufacturer: **Brüel and Kjær**
Serial number: **3011812**
Tested with: **Microphone 4189 s/n 2578555**
4189 s/n 2009039
Preamplifier ZC0032 s/n 6182
ZC0032 s/n 28389
Type (class): **1**
Customer: **Harris Miller Miller & Hanson Inc.**
Tel/Fax: **781-229-0707 x3119 / 781-229-7939**

Date Calibrated: **2/12/2019** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard

Address: **77 South Bedford Street**
Burlington, MA 01803

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 30, 2018	Scantek, Inc./ NVLAP	Jul 30, 2019
DS-360-SRS	Function Generator	61646	Sep 7, 2018	ACR Env./ A2LA	Sep 7, 2020
34401A-Agilent Technologies	Digital Voltmeter	MY47022043	Sep 17, 2018	ACR Env./ A2LA	Sep 17, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 11, 2018	Scantek, Inc./ NVLAP	Nov 11, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.5	100.18	48.3

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	2/12/19	Date	2/14/2019

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42294

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/8/2019**	*Cal Due:*
Model:	**4231**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**2579291**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	__Yes _X_ No
Barometer s/n:			
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**77 South Bedford Street, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**		

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2018	Scantek, Inc./ NVLAP	Oct 31, 2019
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 1, 2018	ACR Env. / A2LA	Oct 1, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
140-Norsonic	Real Time Analyzer	1406423	Nov 3, 2018	Scantek / NVLAP	Nov 3, 2019
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 11, 2018	Scantek, Inc. / NVLAP	Nov 11, 2019
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/8/2019	Date	2/12/2019

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42280

Instrument:	**Sound Level Meter**
Model:	**824**
Manufacturer:	**Larson Davis**
Serial number:	**A3048**
Tested with:	**Mic. 40AQ s/n 33136 & 40AE s/n 15592 Preamp. PRM902 s/n 4477 & s/n 5787**
Type (class):	**1**
Customer:	**Harris Miller Miller & Hanson Inc.**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**

Date Calibrated: **2/11/2019** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard
Address: **77 South Bedford Street, Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2018	Scantek, Inc./ NVLAP	Oct 31, 2019
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 1, 2018	ACR Env. / A2LA	Oct 1, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 11, 2018	Scantek, Inc./ NVLAP	Nov 11, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.5	101.08	37.9

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/11/2019	Date	2/14/2019

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.42290

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/7/2019**	*Cal Due:*
Model:	**CAL200**	*Status:*	**Received** / **Sent**
Manufacturer:	**Larson Davis**	*In tolerance:*	X / X
Serial number:	**9045**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	**__Yes _X_ No**
Barometer s/n:			
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**77 South Bedford Street, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**		

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2018	Scantek, Inc./ NVLAP	Oct 31, 2019
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 1, 2018	ACR Env. / A2LA	Oct 1, 2019
HM30-Thommen	Meteo Station	1040170/39633	Nov 13, 2018	ACR Env./ A2LA	Nov 13, 2019
140-Norsonic	Real Time Analyzer	1406423	Nov 3, 2018	Scantek / NVLAP	Nov 3, 2019
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 11, 2018	Scantek, Inc. / NVLAP	Nov 11, 2019
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/7/2019	Date	2/12/2019

Document stored as: Z:\Calibration Lab\Cal 2019\LDCAL200_9045_M1.doc

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.41534

Instrument:	**Sound Level Meter**
Model:	**824**
Manufacturer:	**Larson Davis**
Serial number:	**A3975**
Tested with:	**Microphone 40AQ s/n 38123** **Preamplifier PRM902 s/n 5790**
Type (class):	**1**
Customer:	**Harris Miller Miller & Hanson Inc.**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**

Date Calibrated: **10/5/2018** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **77 South Bedford Street, Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.7	100.49	54.9

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	10/5/2018	Date	10/6/2018

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.41535

Instrument: **Microphone**
Model: **40AQ**
Manufacturer: **GRAS**
Serial number: **38123**
Composed of:

Date Calibrated: **10/5/2018** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	**X**	**X**
Out of tolerance:		
See comments:		

Contains non-accredited tests: __**Yes** _**X**_ **No**

Customer: **Harris Miller Miller & Hanson Inc.** *Address:* **77 South Bedford Street,**
Tel/Fax: **781-229-0707 x3119/781-229-7939** **Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019
4180-Brüel&Kjær	Microphone	2246115	Oct 24, 2017	DANAK / DPLA	Oct 24, 2019

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	10/5/2018	Date	10/5/2018

Document stored as: Z:\Calibration Lab\Mic 2018\GRAS40AQ_38123_M2.doc

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.40275

Instrument:	**Microphone Unit**	*Date Calibrated:*	**3/13/2018** *Cal Due:*
Model:	**40AE-PRM902**	*Status:*	**Received** / **Sent**
Manufacturer:	**GRAS**	*In tolerance:*	X / X
Serial number:	**30422-5787**	*Out of tolerance:*	
Composed of:	**Microphone 40AE s/n 30422**	*See comments:*	
	Preamplifier PRM902 s/n 5787	*Contains non-accredited tests:*	__Yes _X_ No
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**77 South Bedford Street,**
Tel/Fax:	**781-229-0707 x3119/781-229-7939**		**Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019
4180-Brüel&Kjær	Microphone	2246115	Oct 24, 2017	DANAK / DPLA	Oct 24, 2019

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	3/13/2018	Date	3/15/2018

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.40276

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **3/12/2018**	*Cal Due:*
Model:	**CAL200**	*Status:*	**Received** / **Sent**
Manufacturer:	**Larson Davis**	*In tolerance:*	**X** / **X**
Serial number:	**9179**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	**X**
Barometer type:		*Contains non-accredited tests:*	**__Yes _X_ No**
Barometer s/n:			
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**77 South Bedford Street, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3119 / 781-229-7939**		

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
140-Norsonic	Real Time Analyzer	1406423	Oct 31, 2017	Scantek / NVLAP	Oct 31, 2018
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 10, 2017	Scantek, Inc. / NVLAP	Nov 10, 2018
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

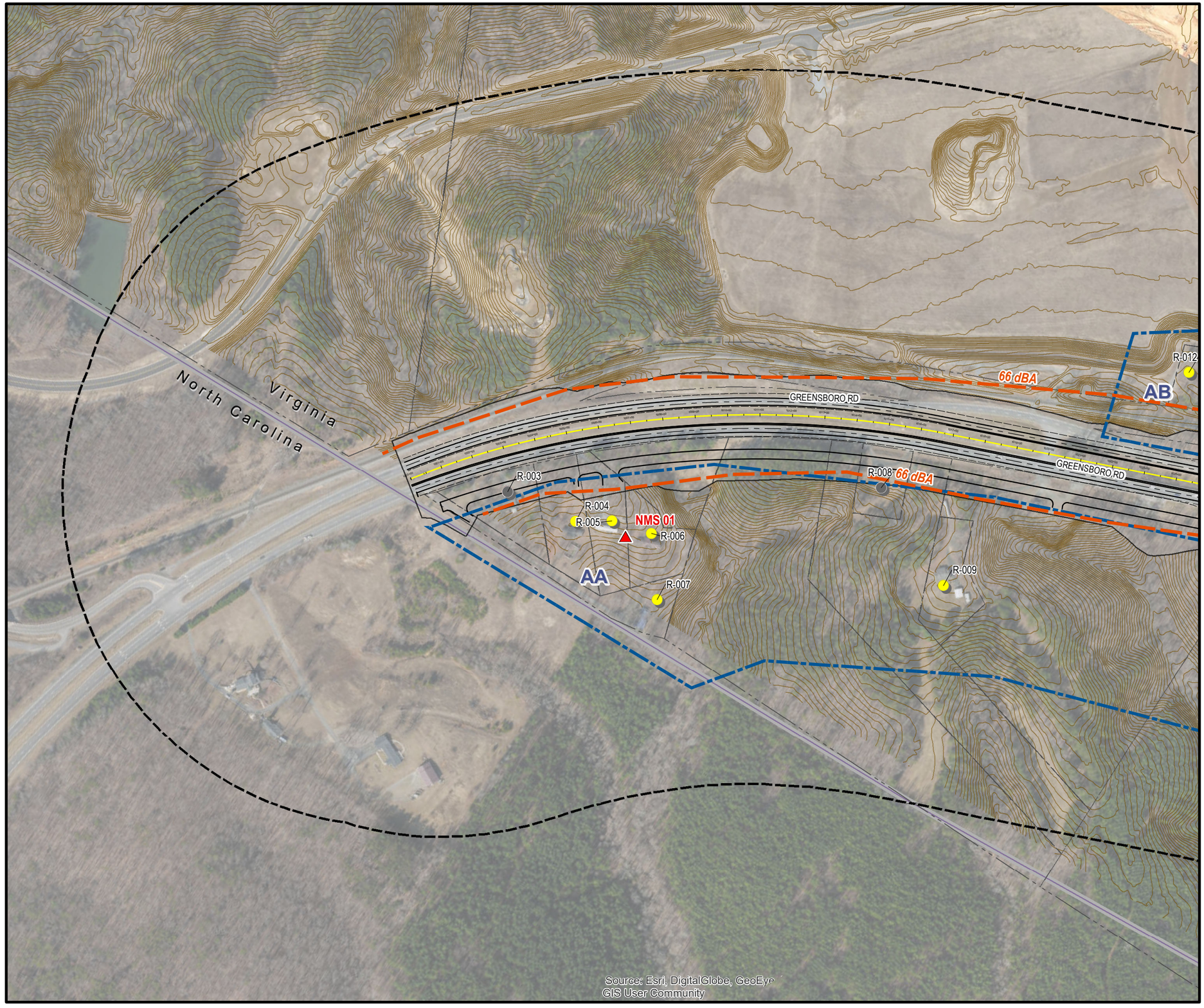
Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	3/12/2018	Date	3/15/2018

APPENDIX E

FIGURES

FIGURE 3 - ALTERNATIVE A

Location Map for Common Noise Environments, Receptors,
Build Contours, and Barriers



VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition

▲ NMS # Measurement Site

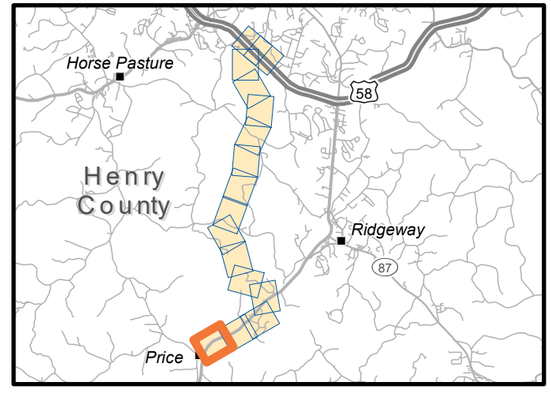
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 1 of 16

0 300 600 Feet



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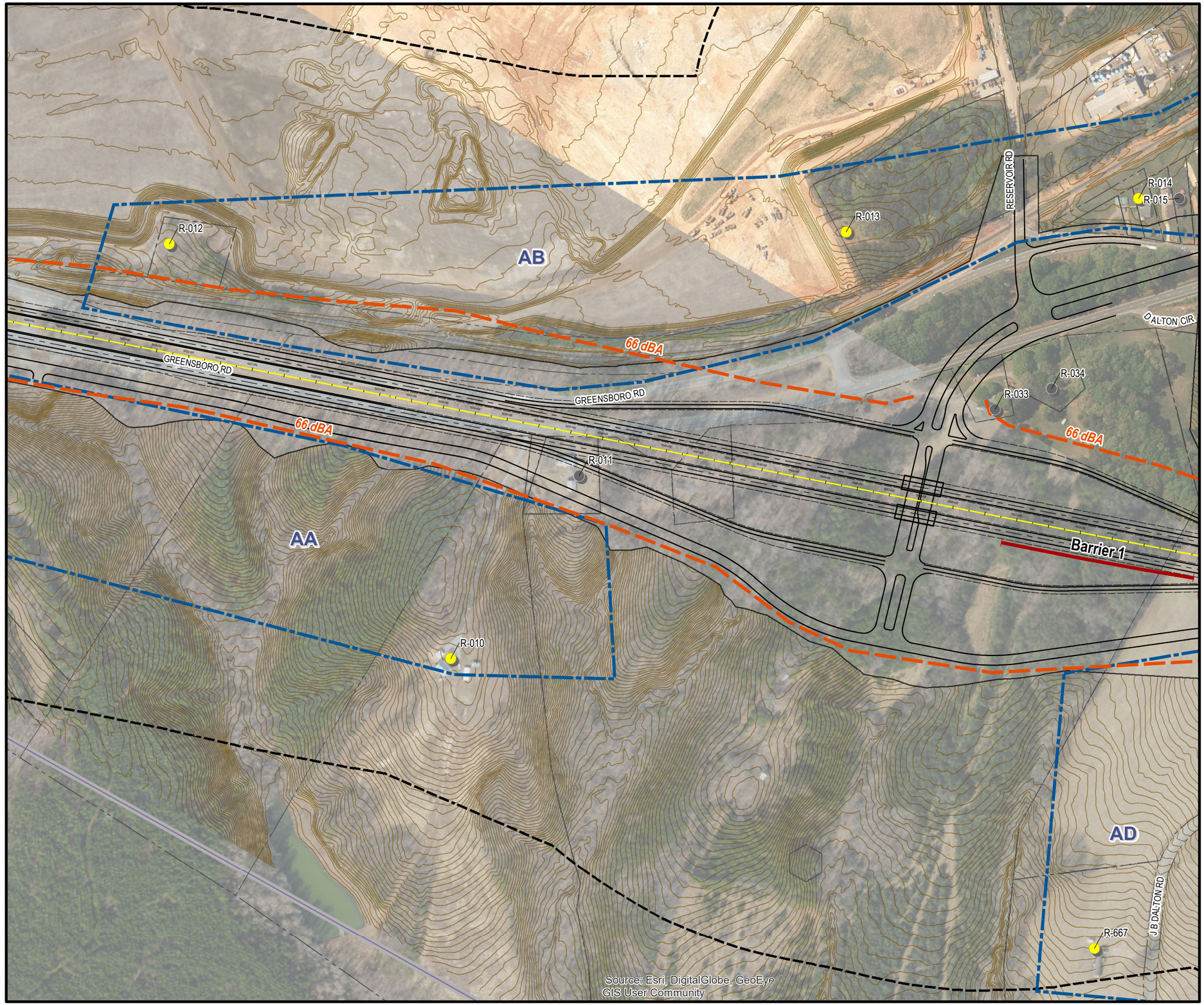


VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition

▲ NMS # Measurement Site

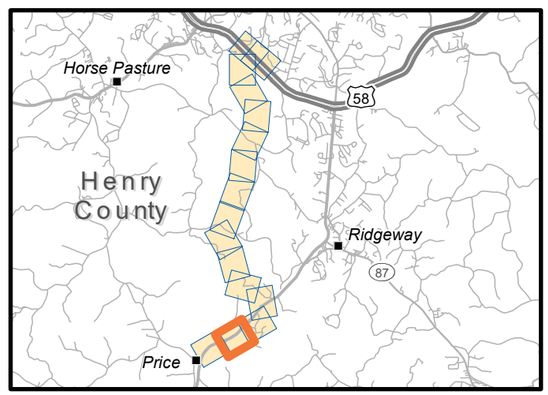
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 2 of 16

0 300 600 Feet



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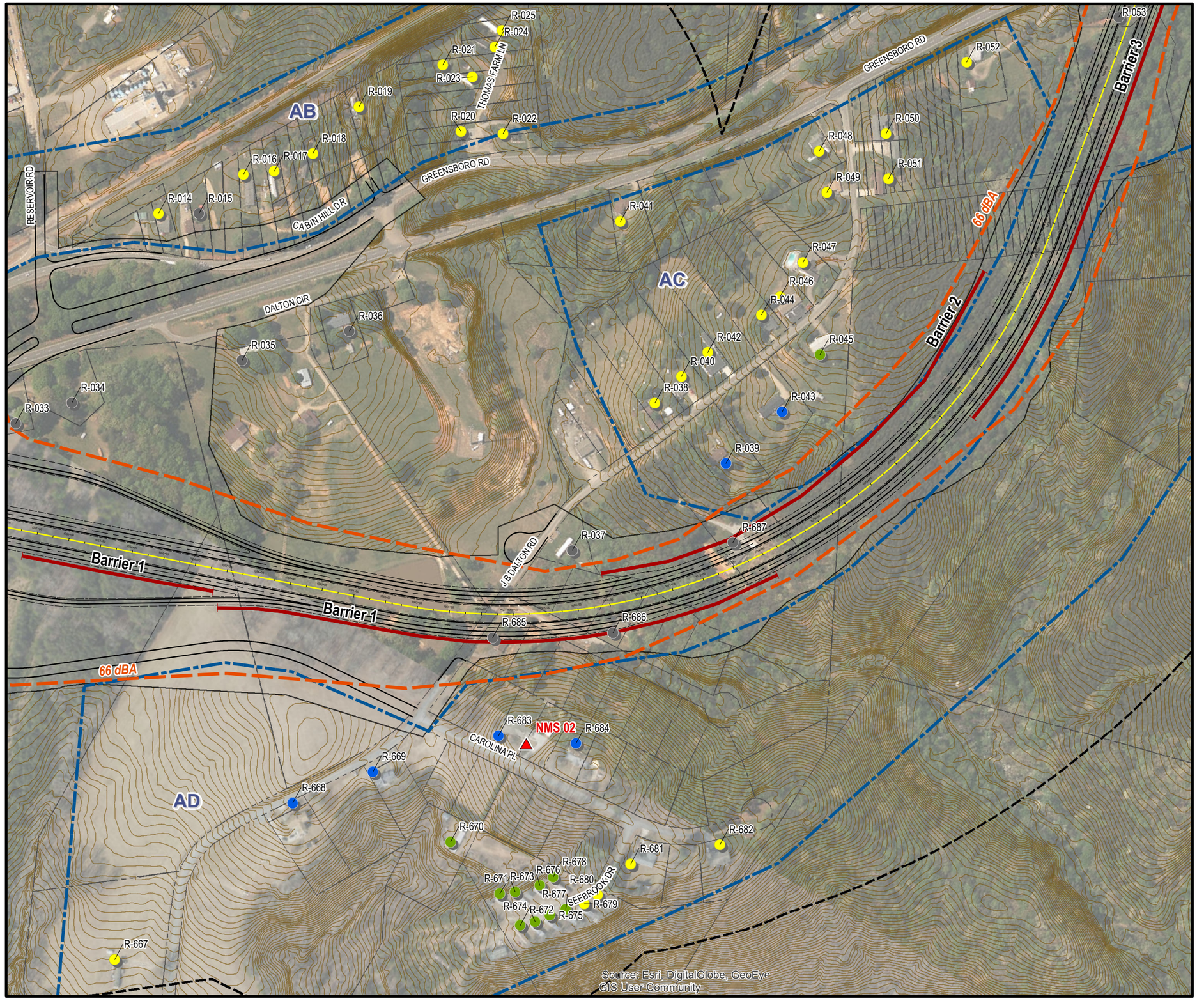


VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition

▲ NMS # Measurement Site

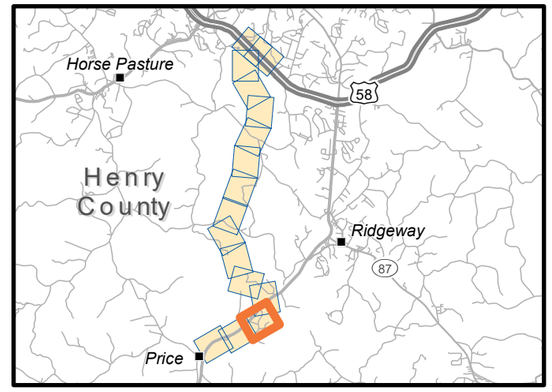
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 3 of 16

0 300 600 Feet



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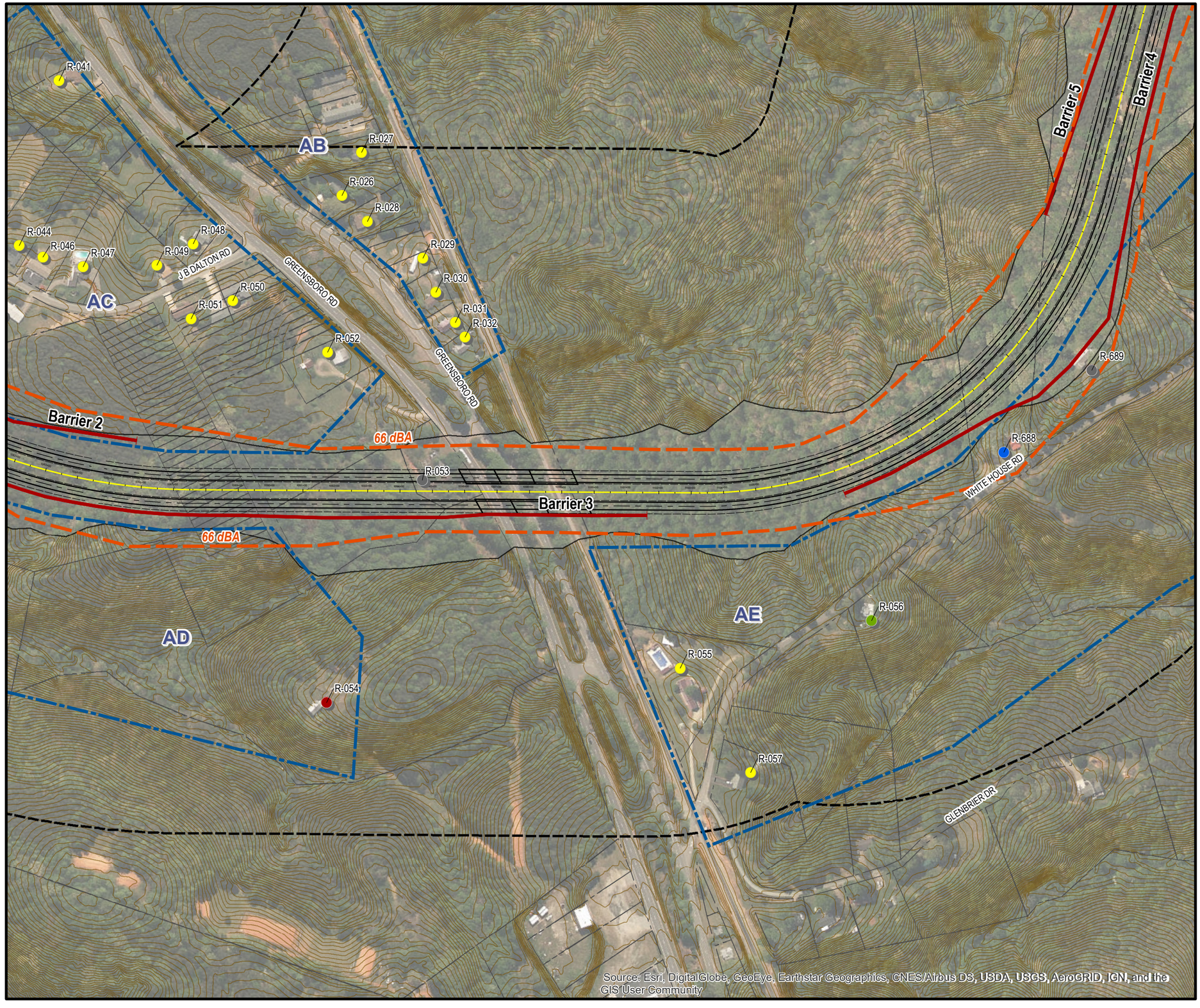


VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition

▲ NMS # Measurement Site

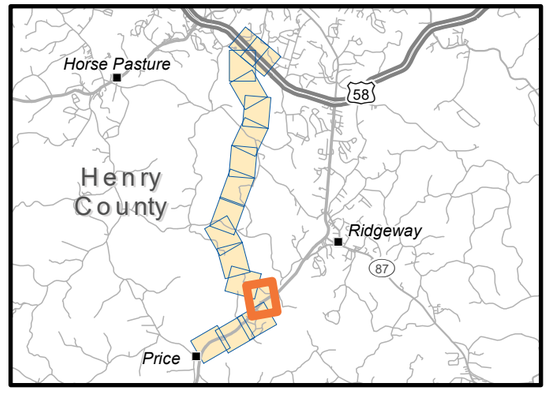
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 4 of 16

0 300 600 Feet



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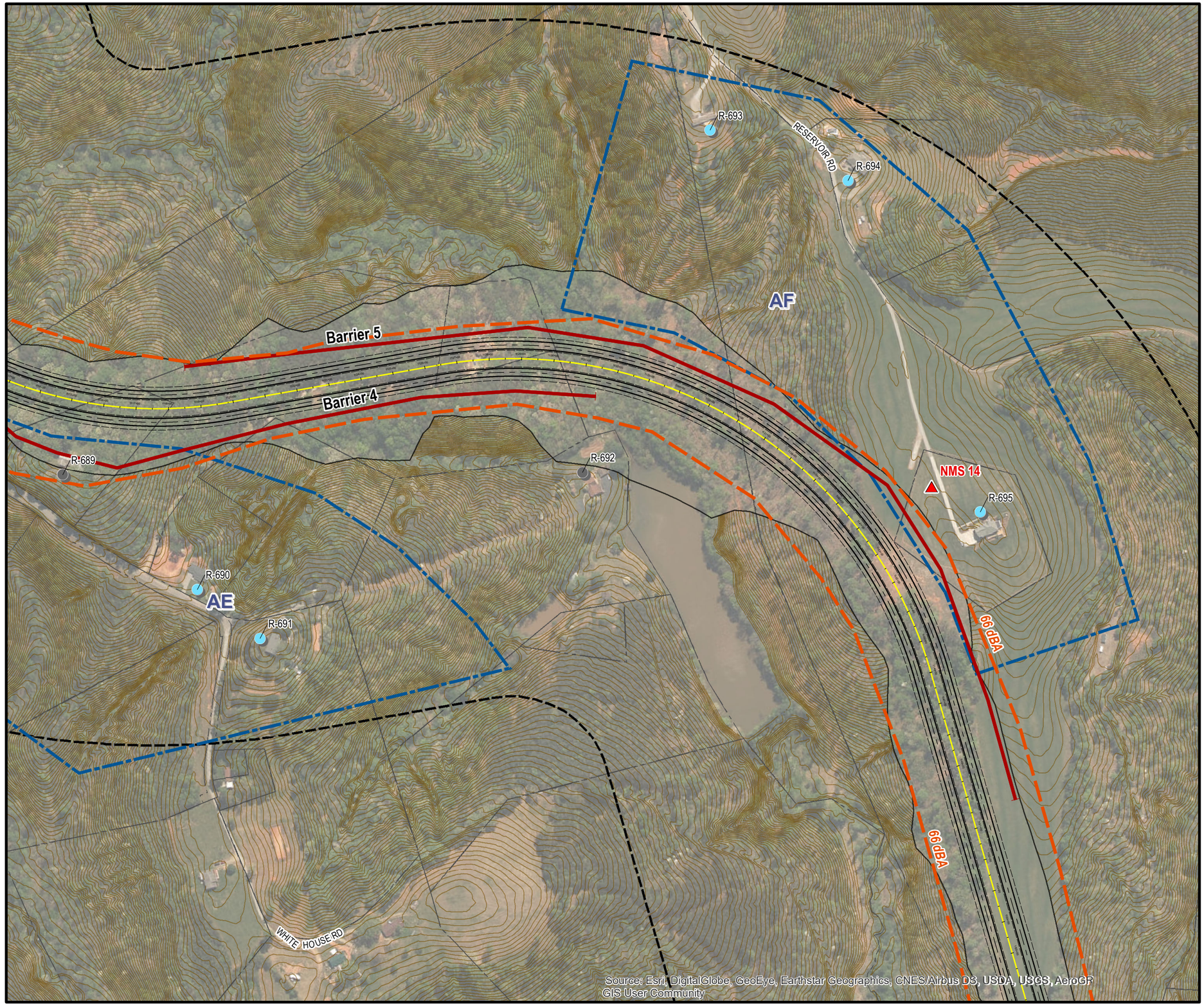


VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition

▲ NMS # Measurement Site

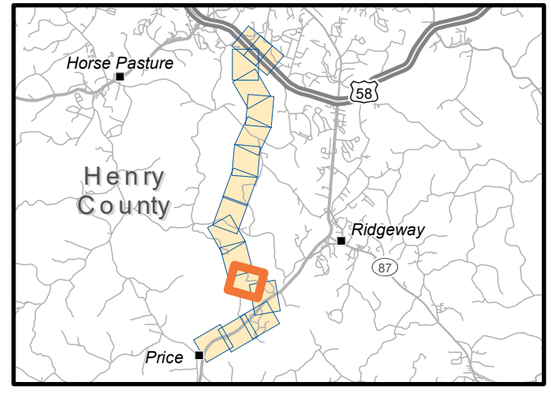
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 5 of 16

0 300 600 Feet



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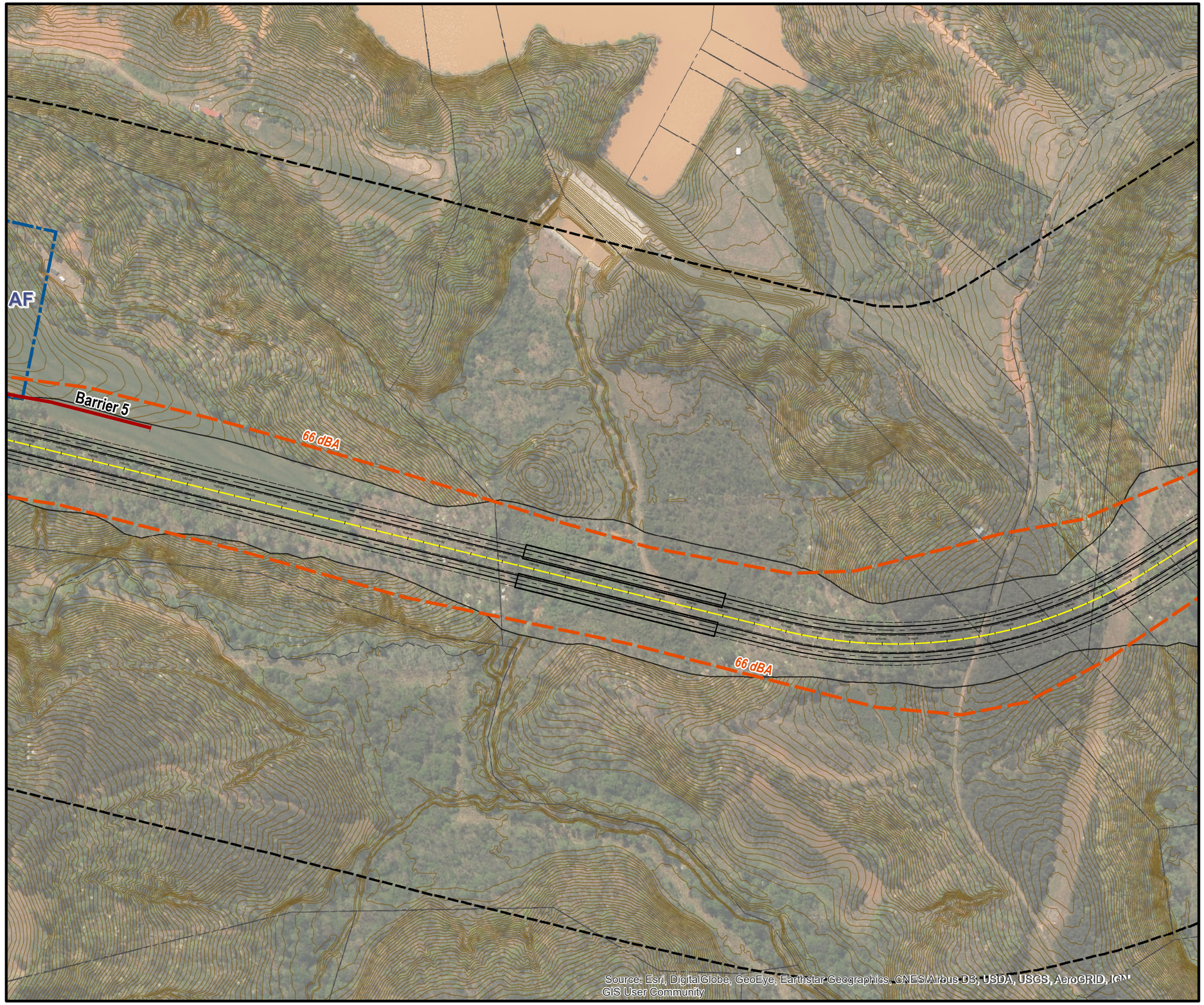

VDOT
Virginia Department of Transportation

Figure 3
Alternative A
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
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- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquisition
- NMS # Measurement Site

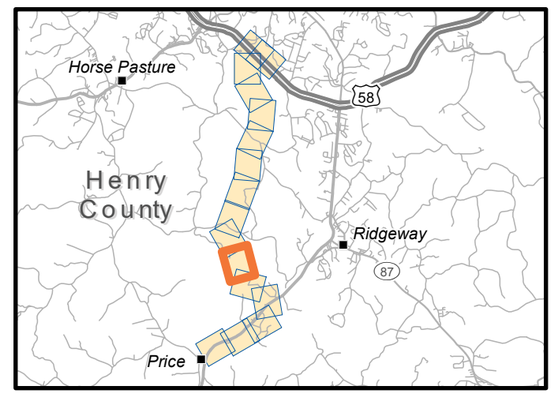
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Leq Contour
- 1,000' Noise Study Area

Sheet 6 of 16

0 300 600 Feet



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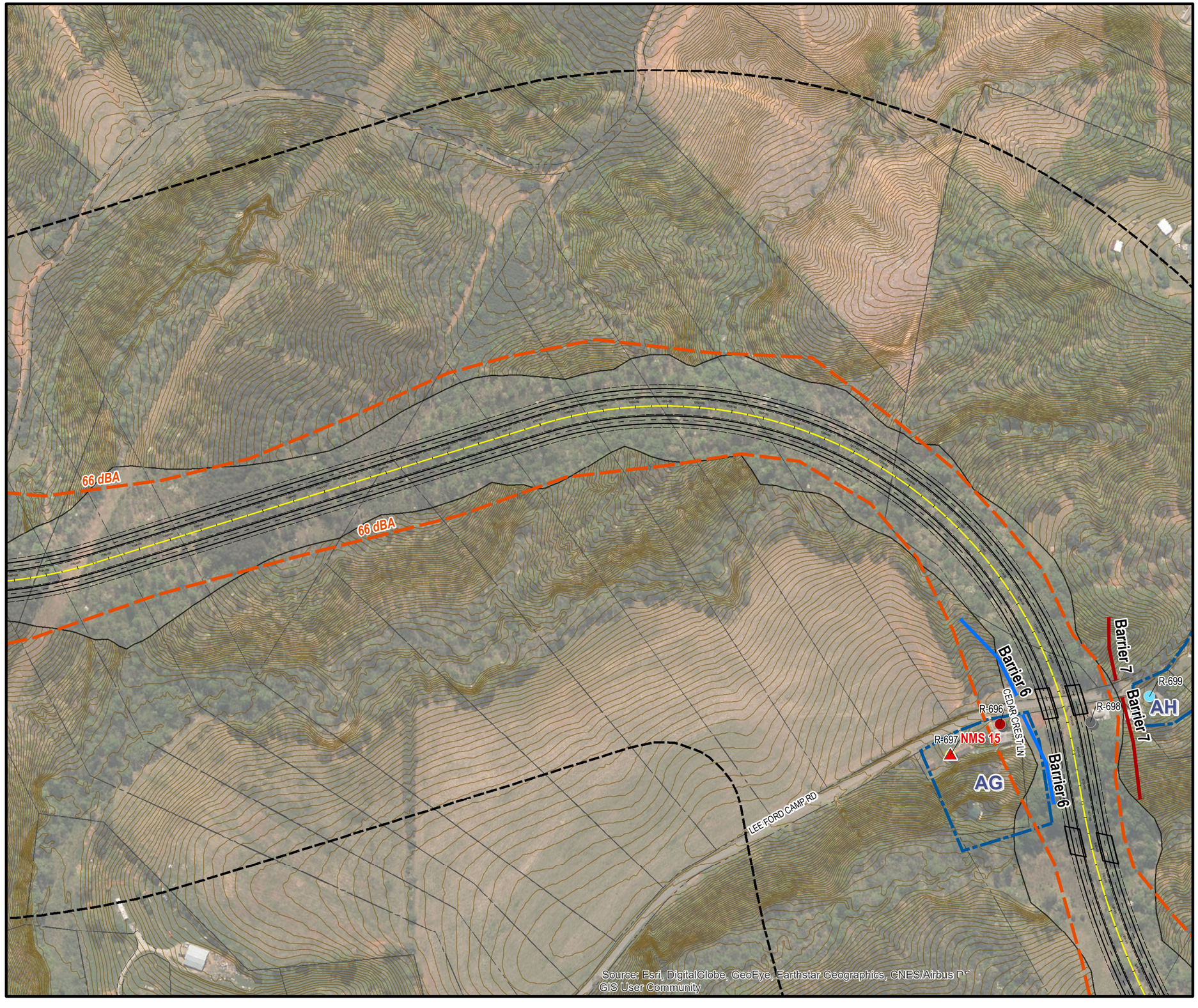

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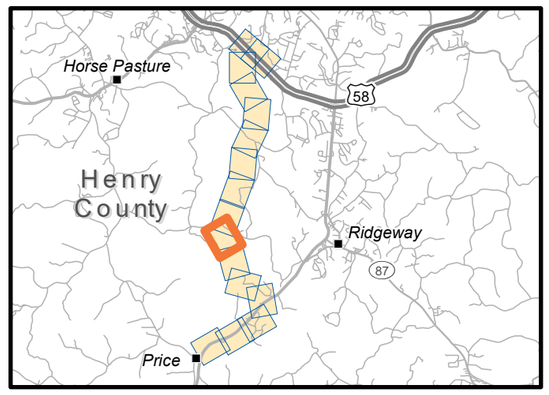

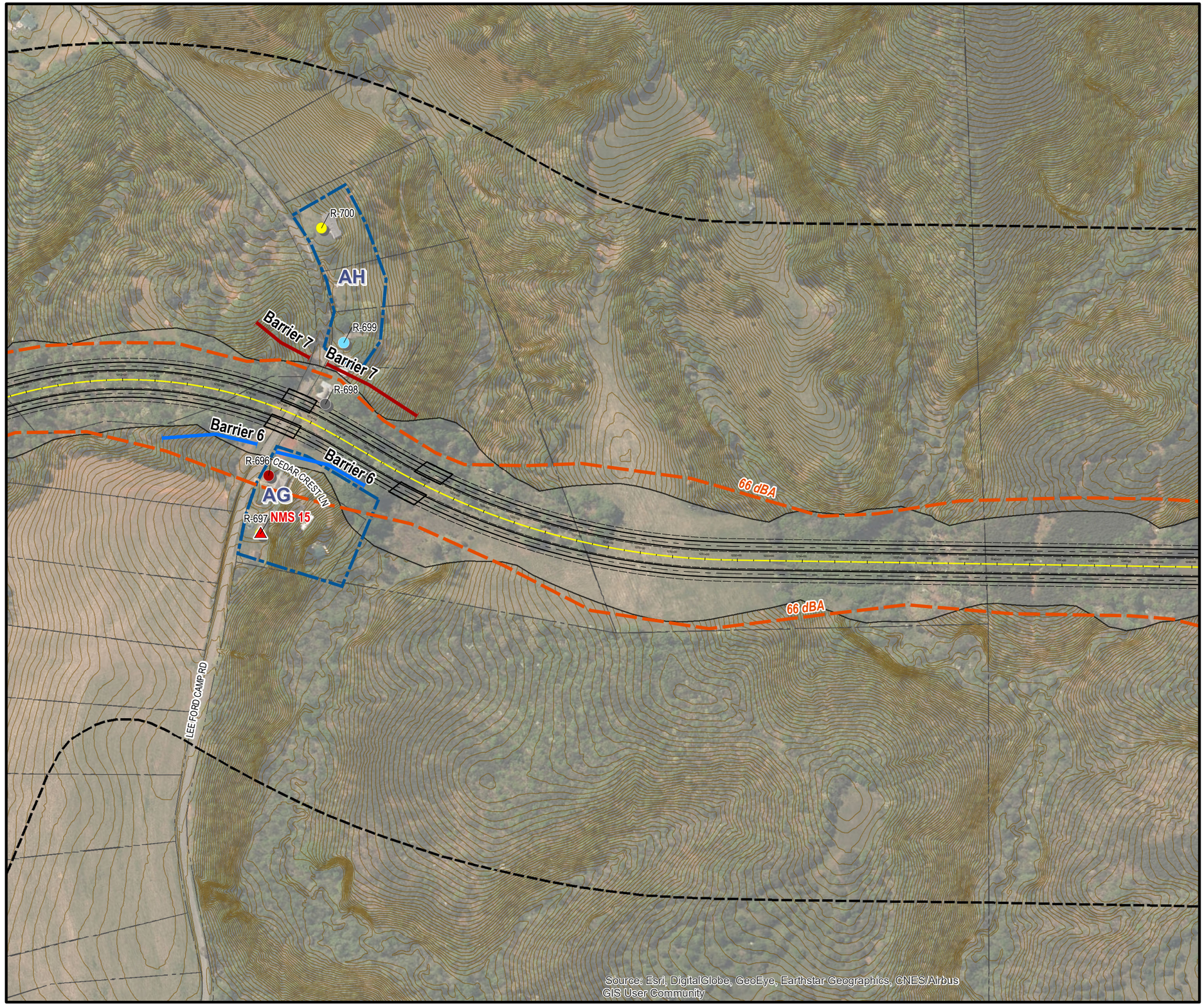

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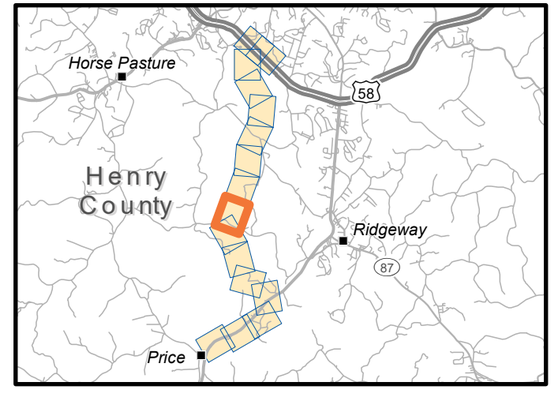

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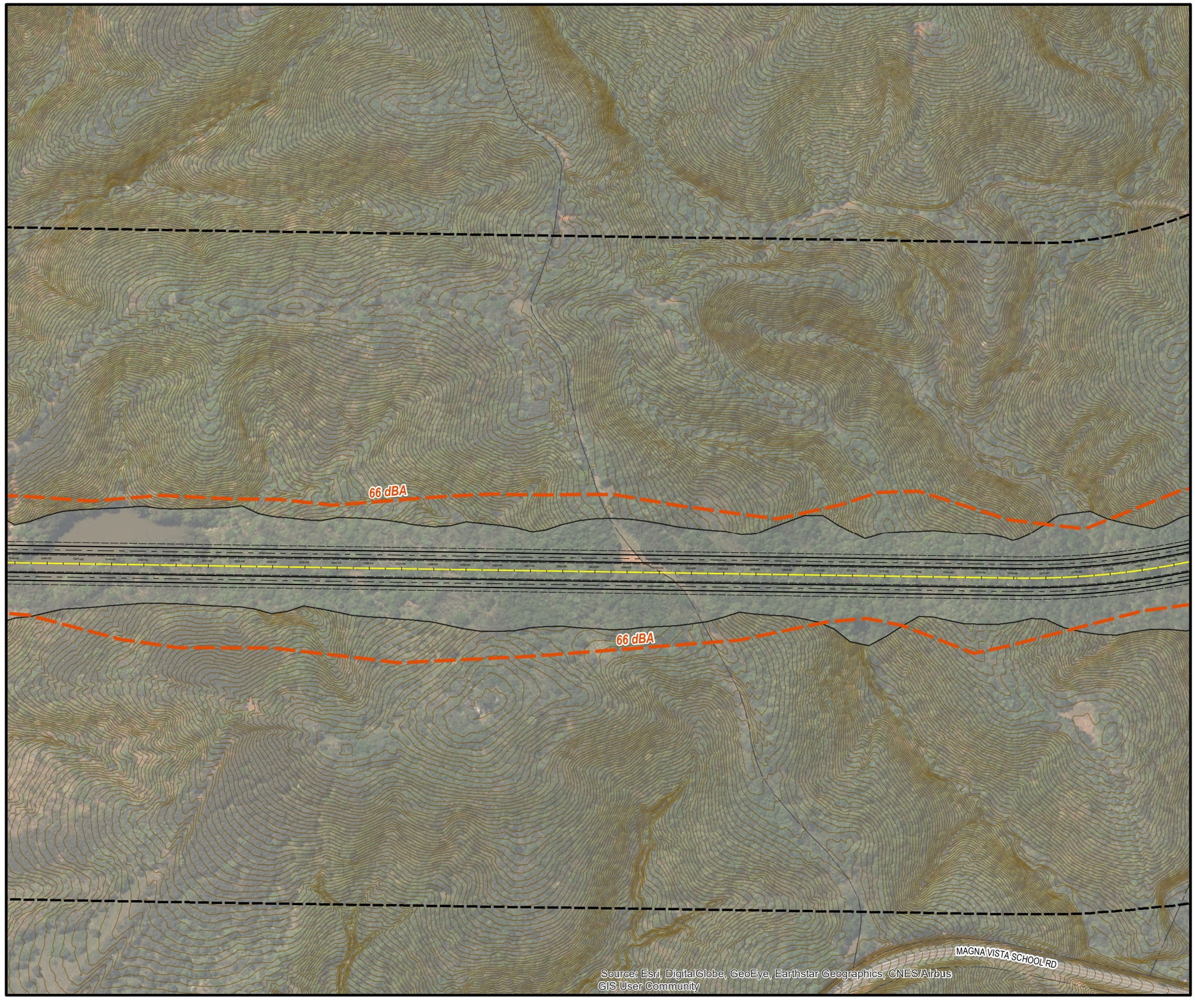

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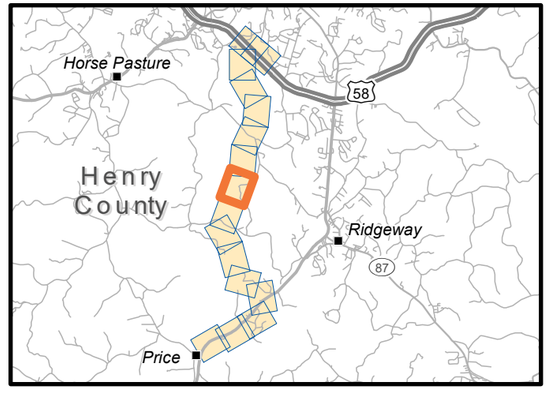

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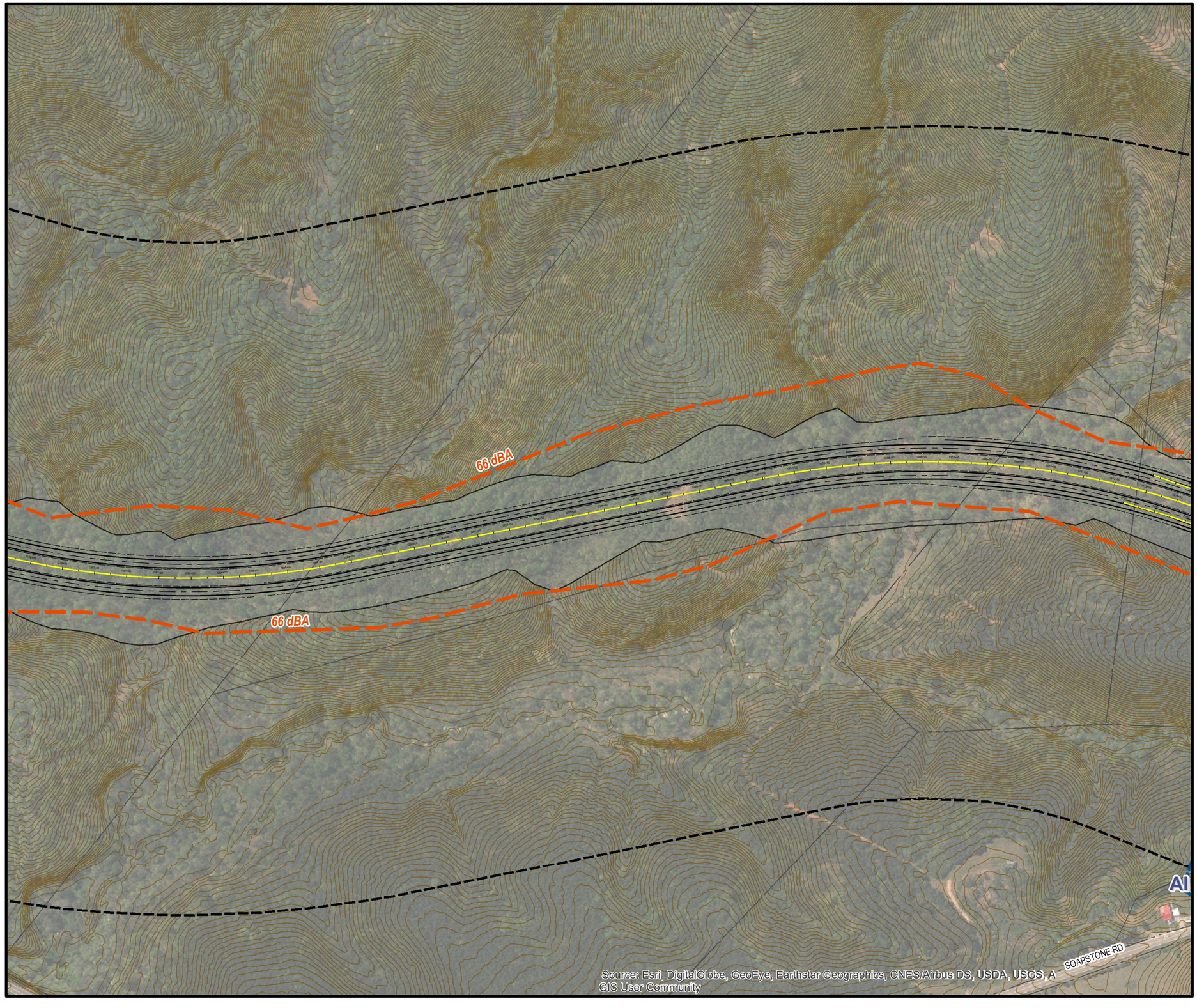

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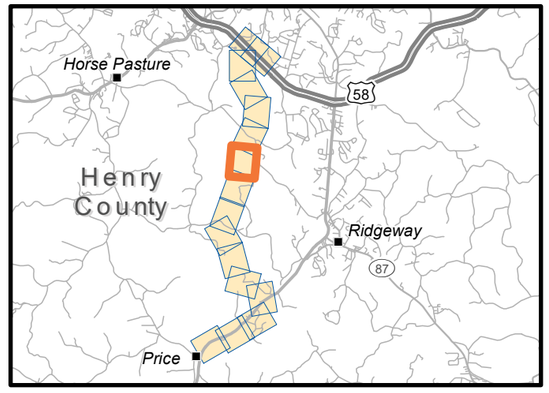

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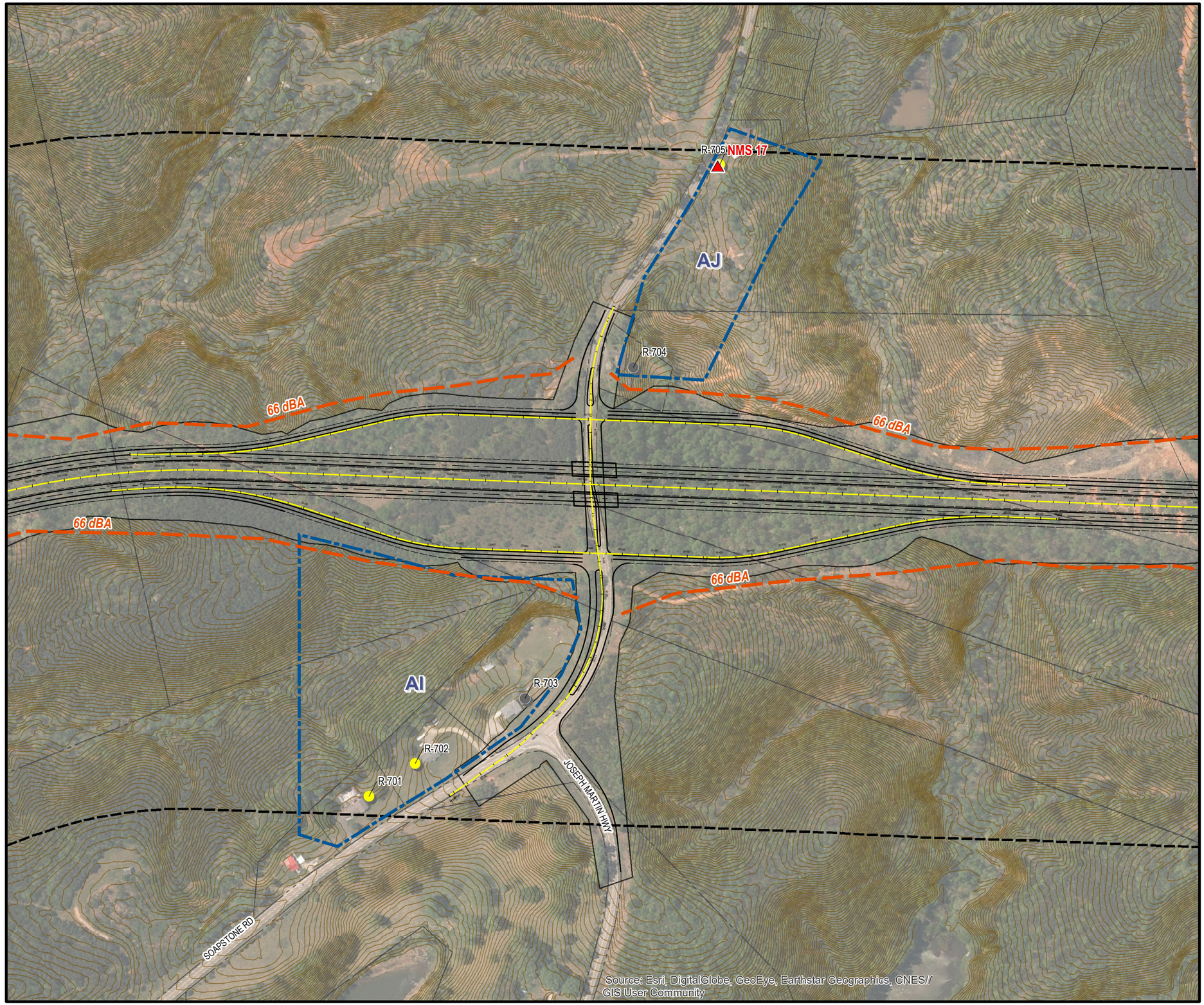

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Sheet 11 of 16

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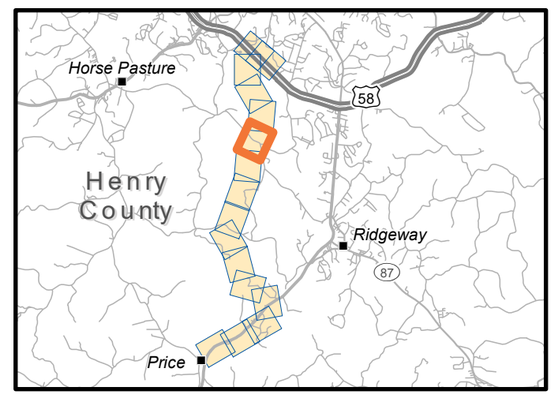

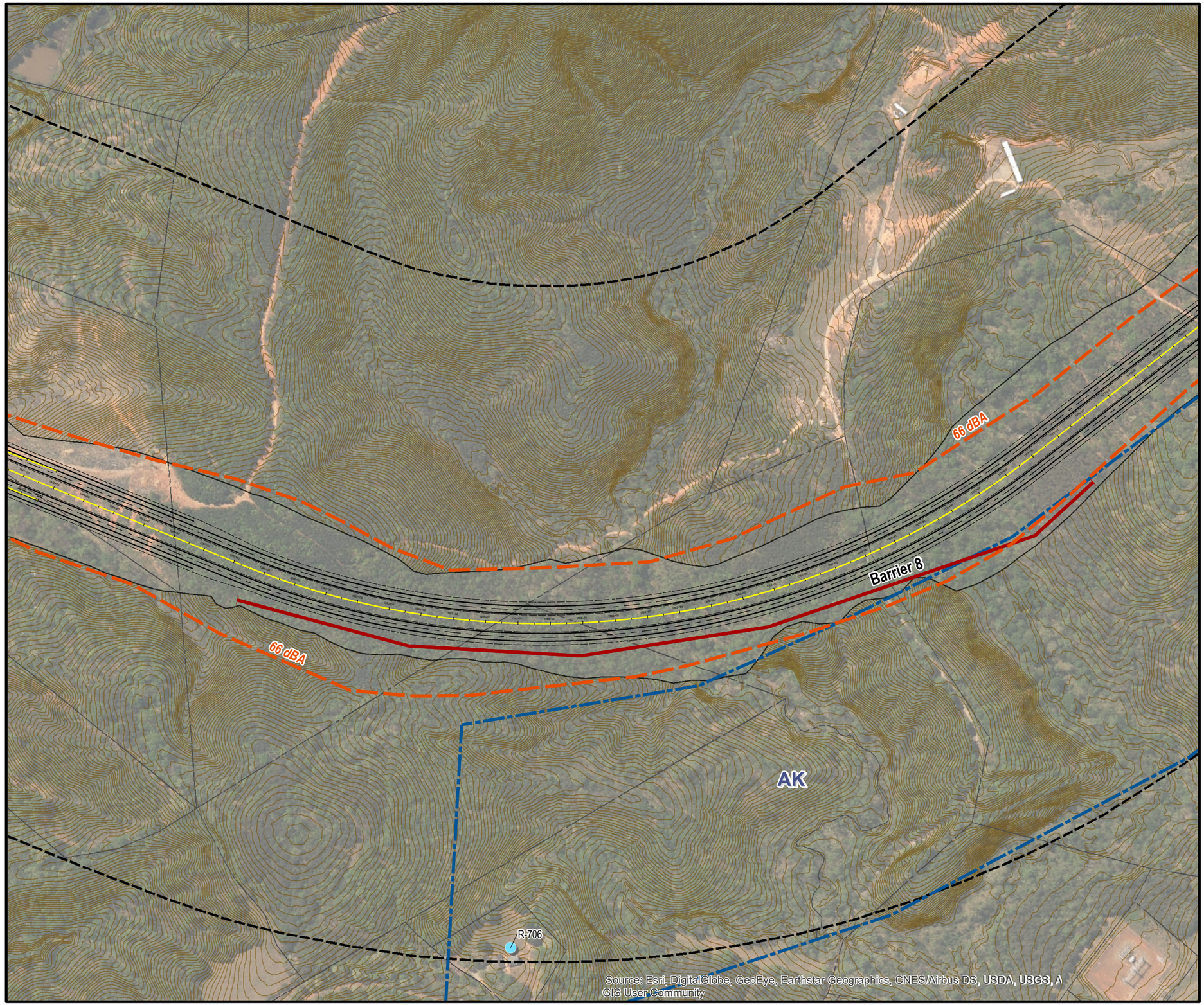

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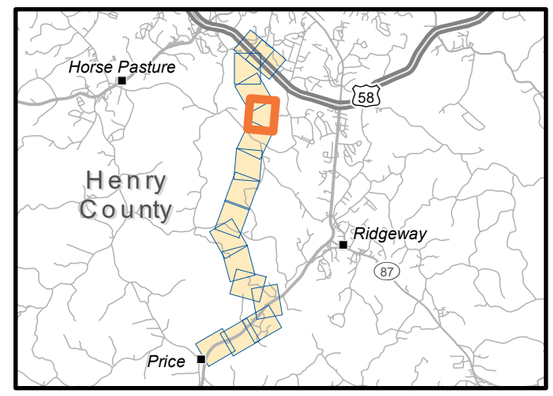

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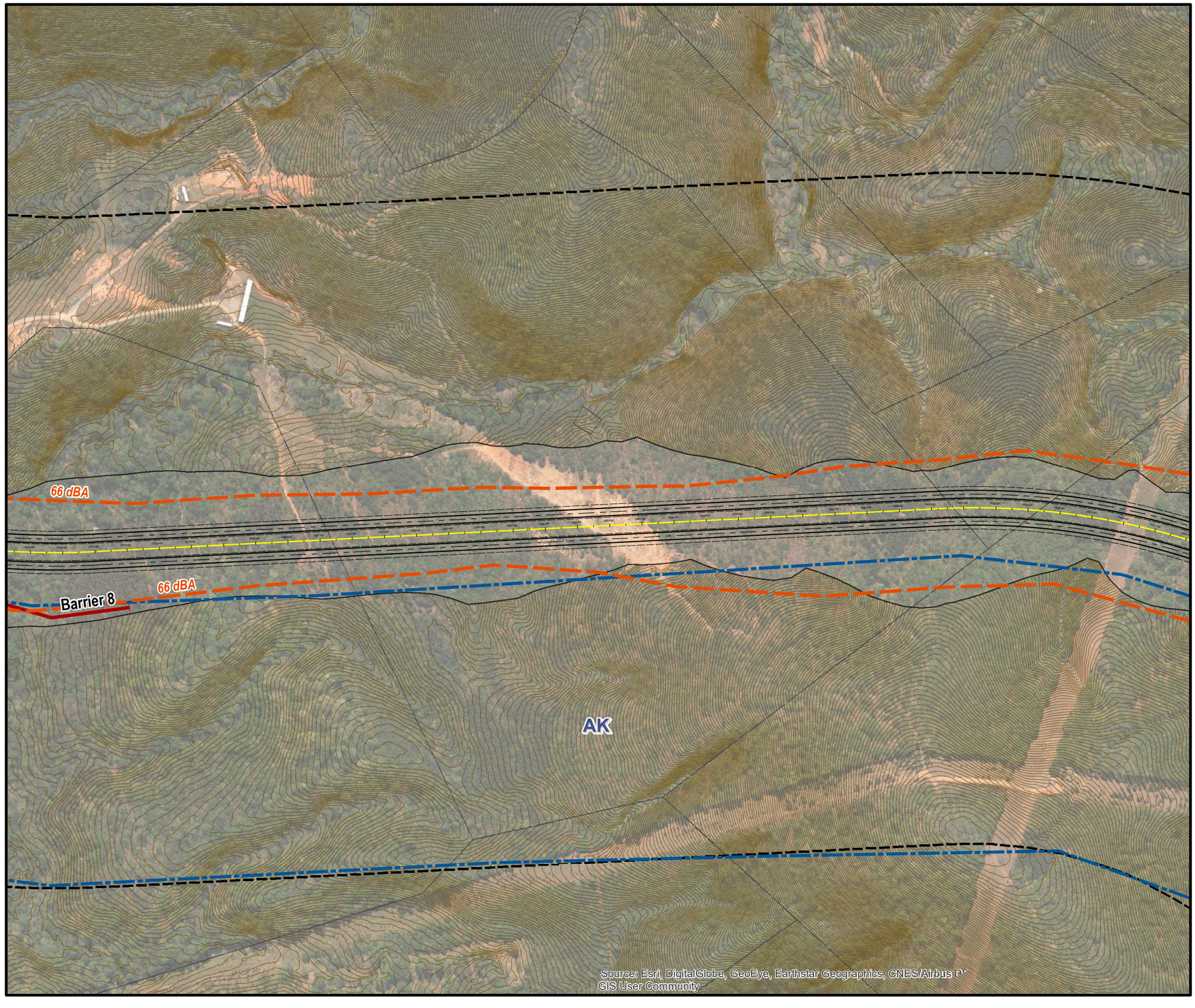

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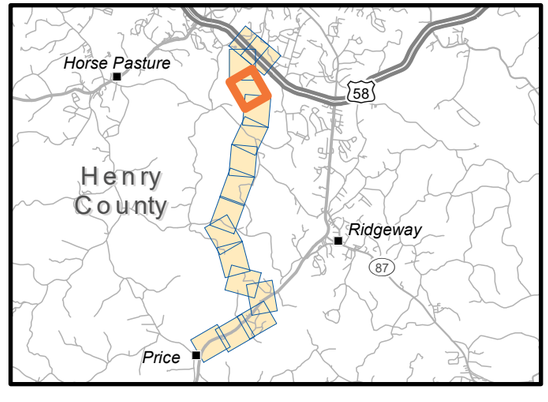
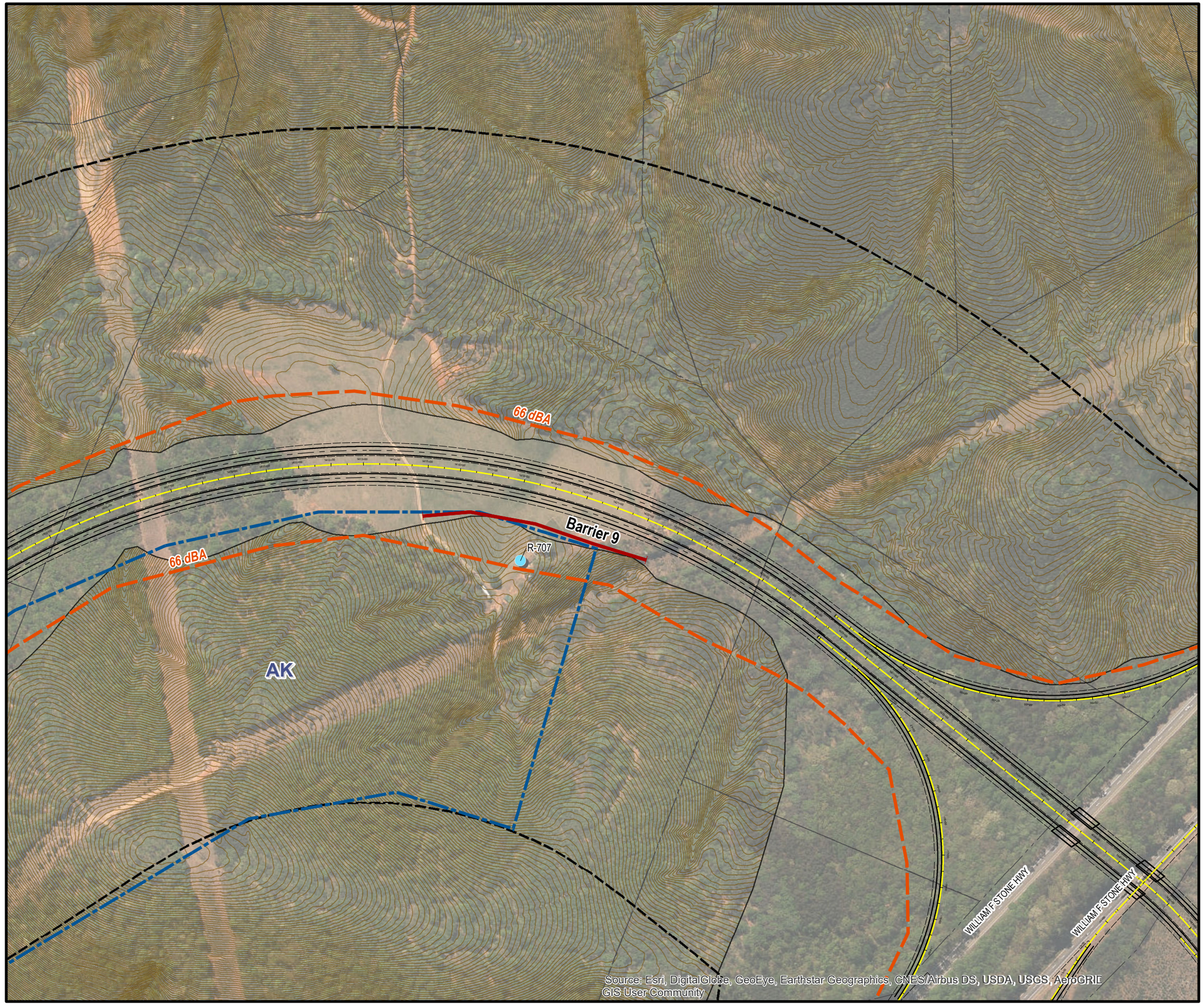
0 300 600 Feet





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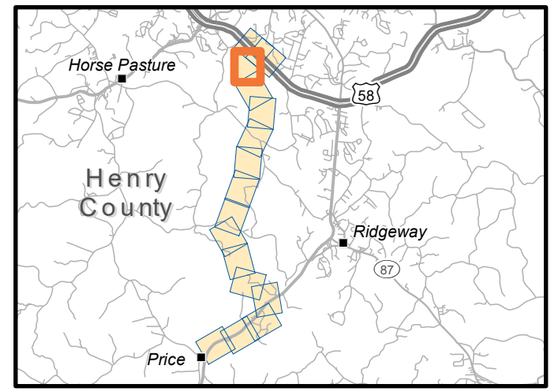
Sheet 14 of 16

0 300 600 Feet



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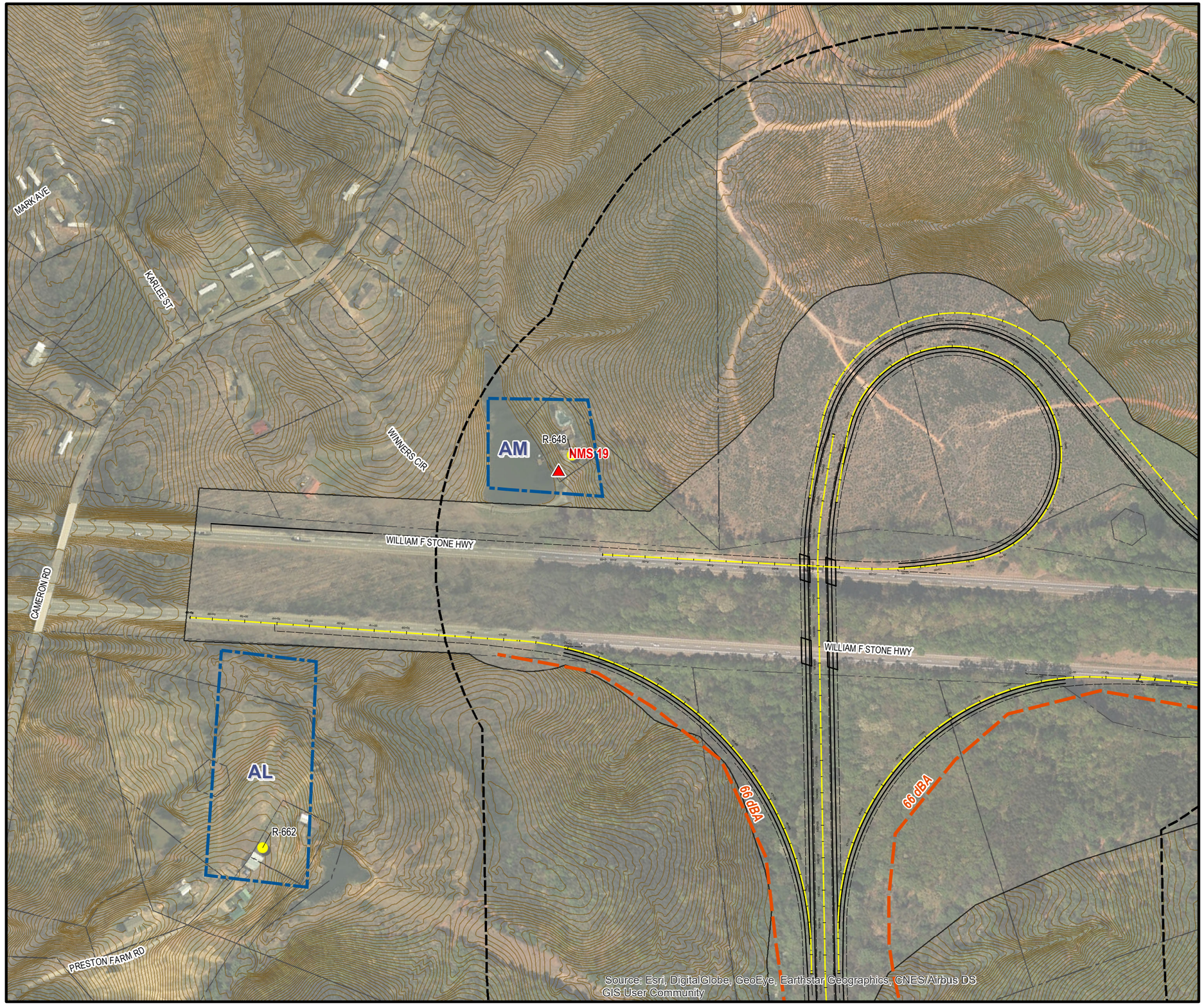

VDOT
Virginia Department of Transportation

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Martinsville Southern Connector / Route 220 EIS
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Sheet 15 of 16

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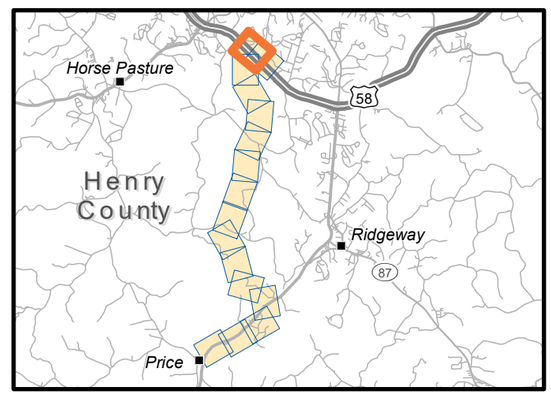

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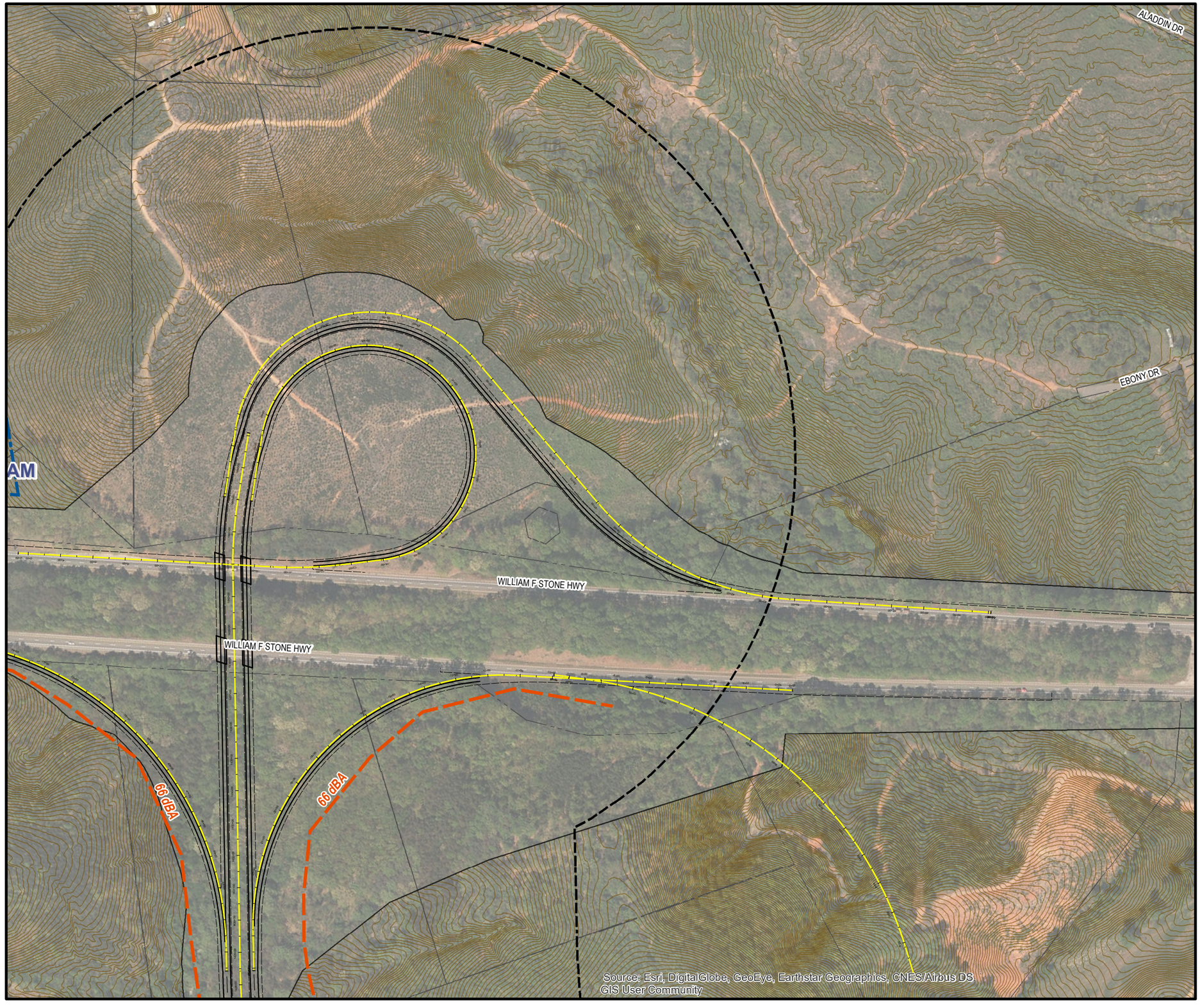

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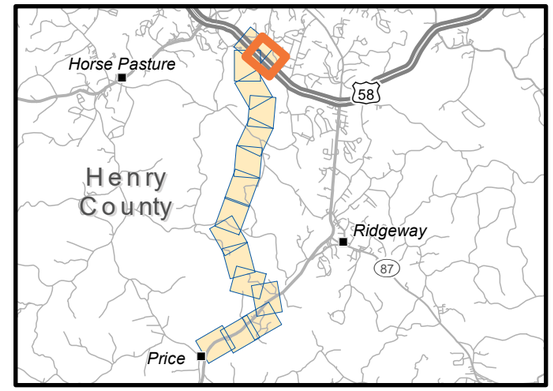

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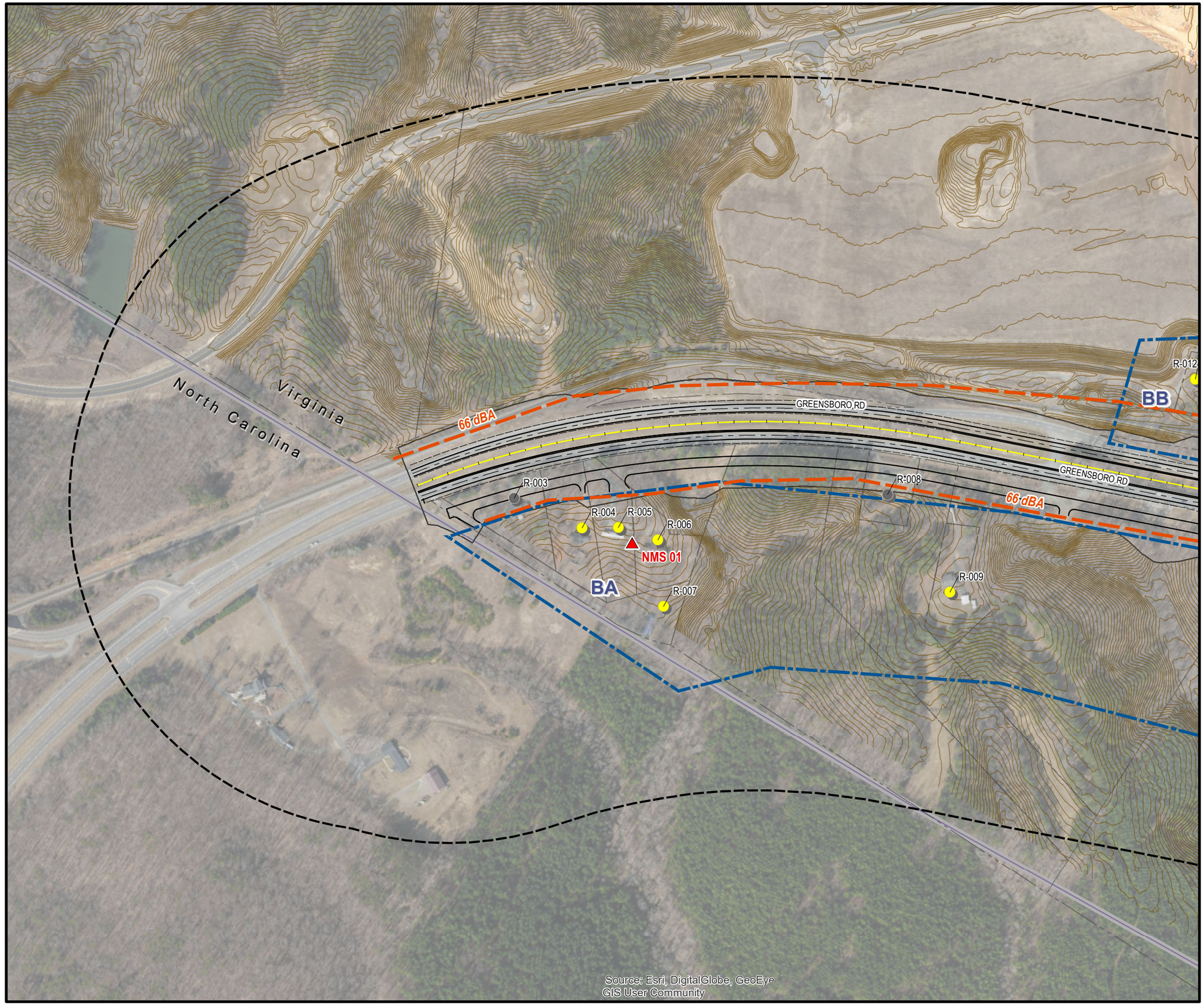
FIGURE 4 - ALTERNATIVE B

Location Map for Common Noise Environments, Receptors,
Build Contours, and Barriers



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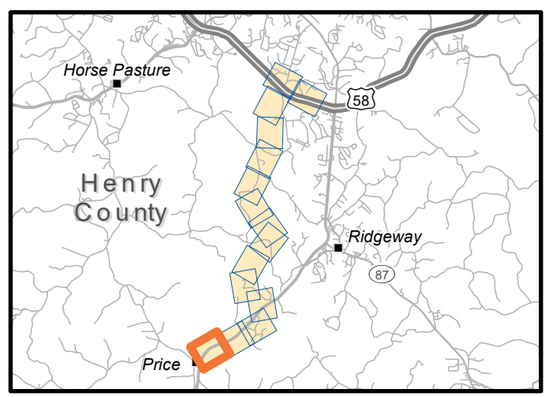
Sheet 1 of 15



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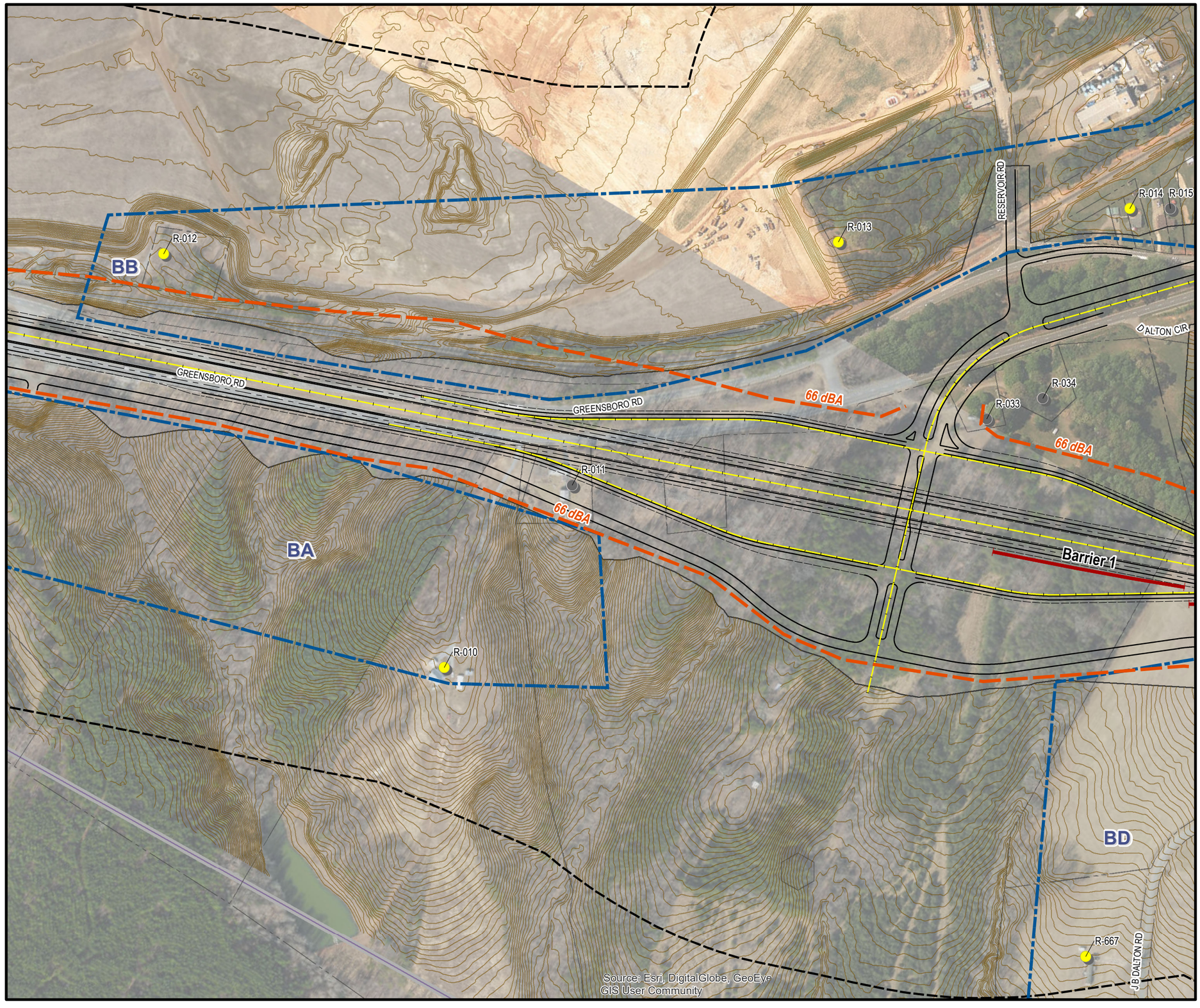

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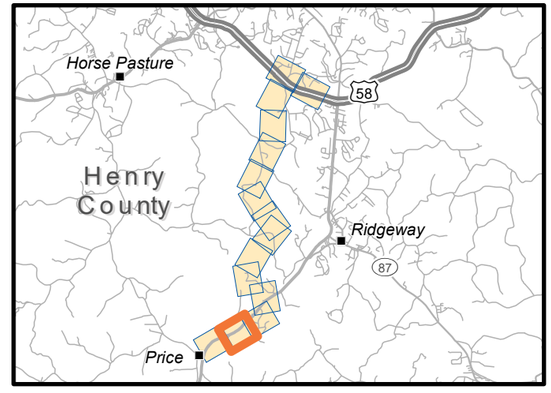

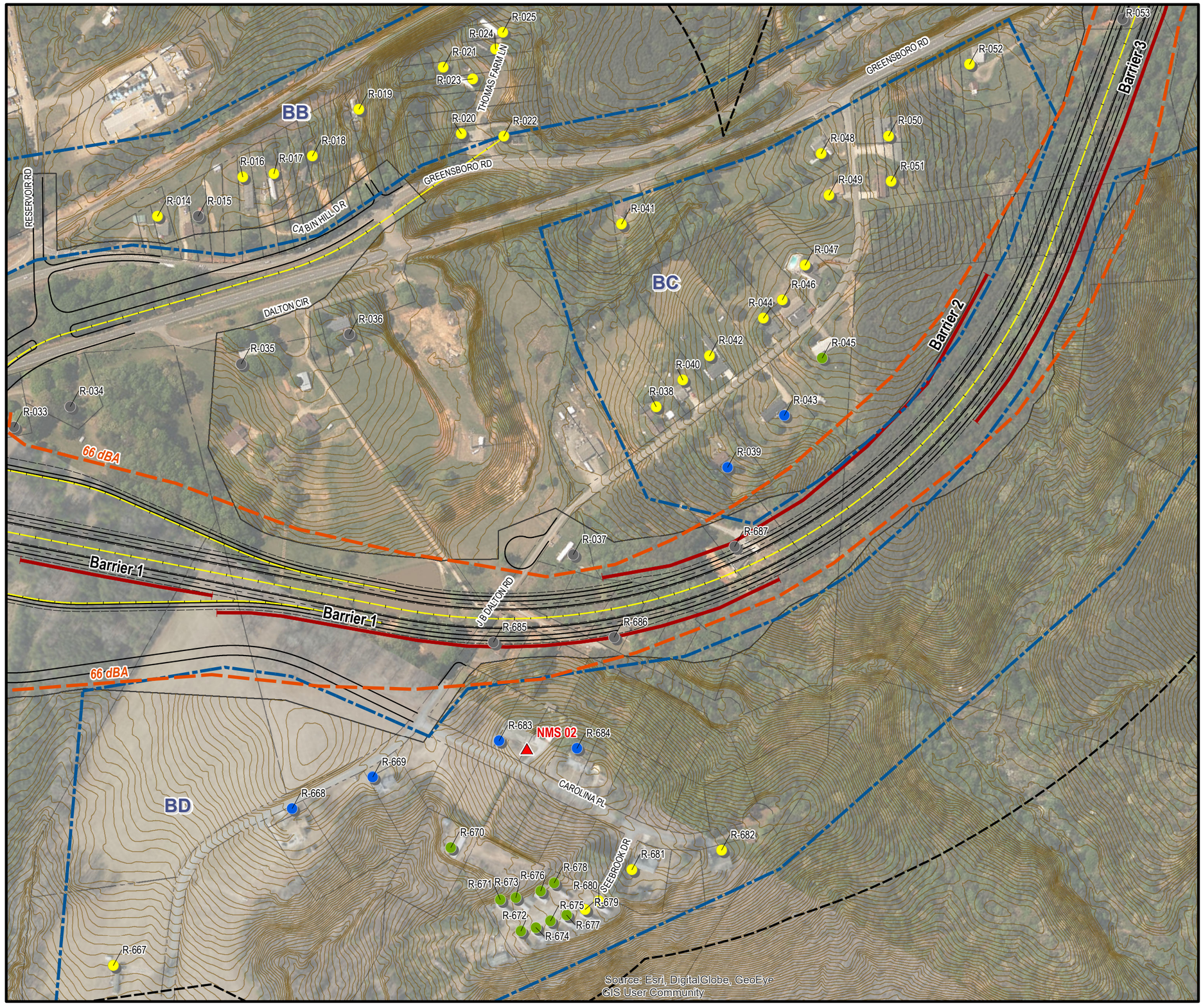

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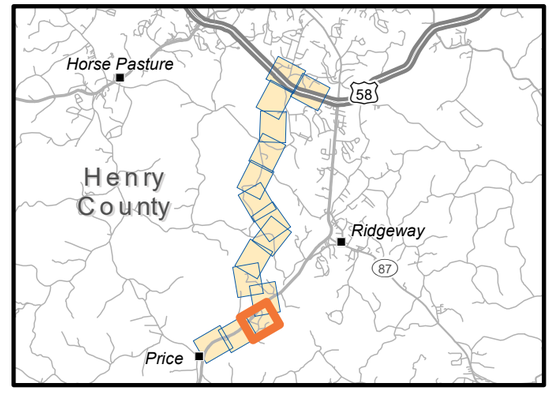

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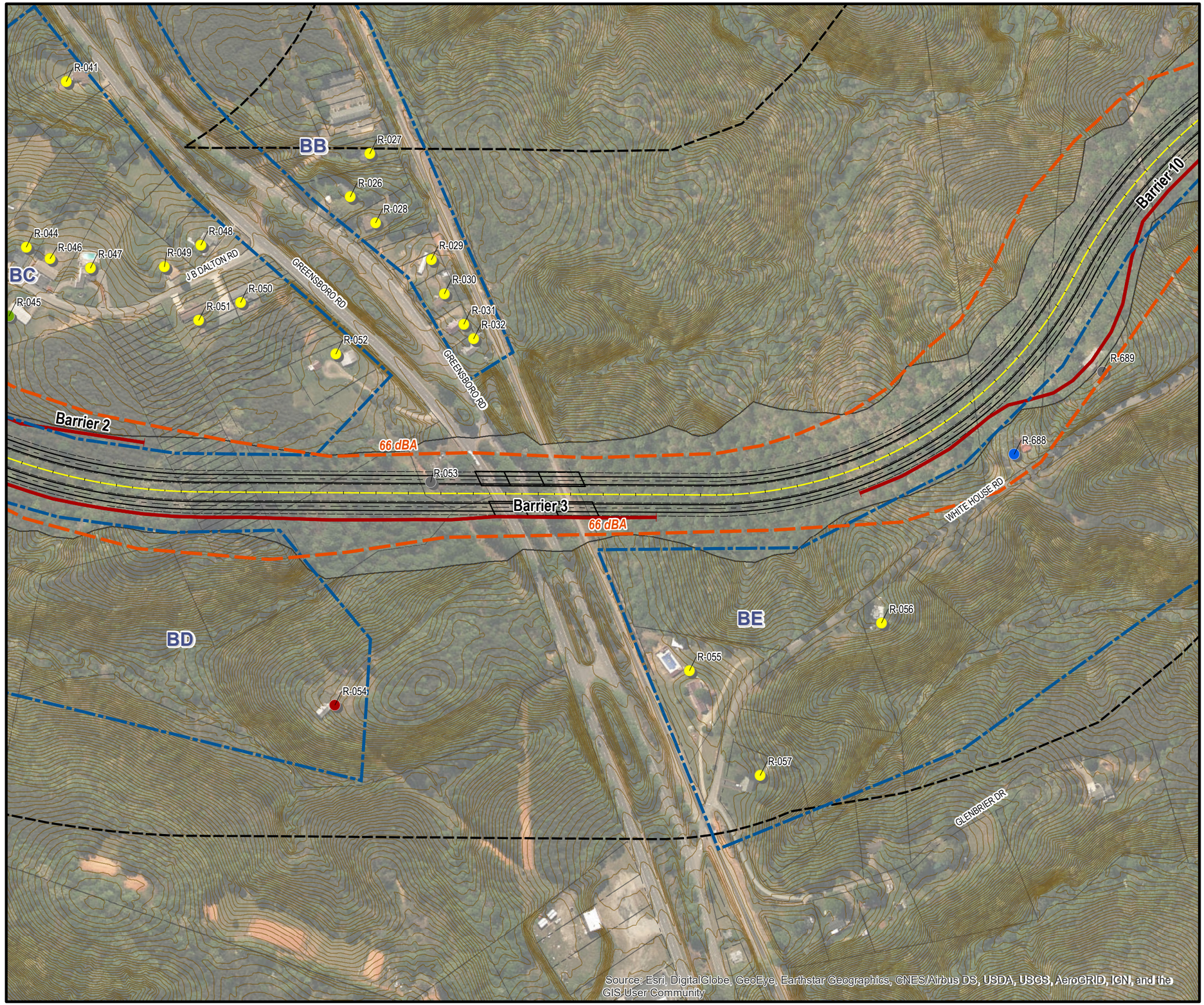

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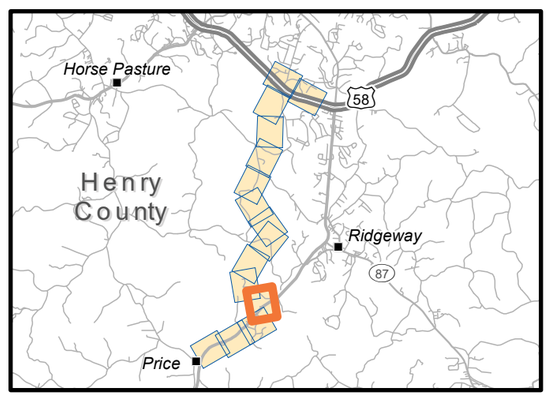

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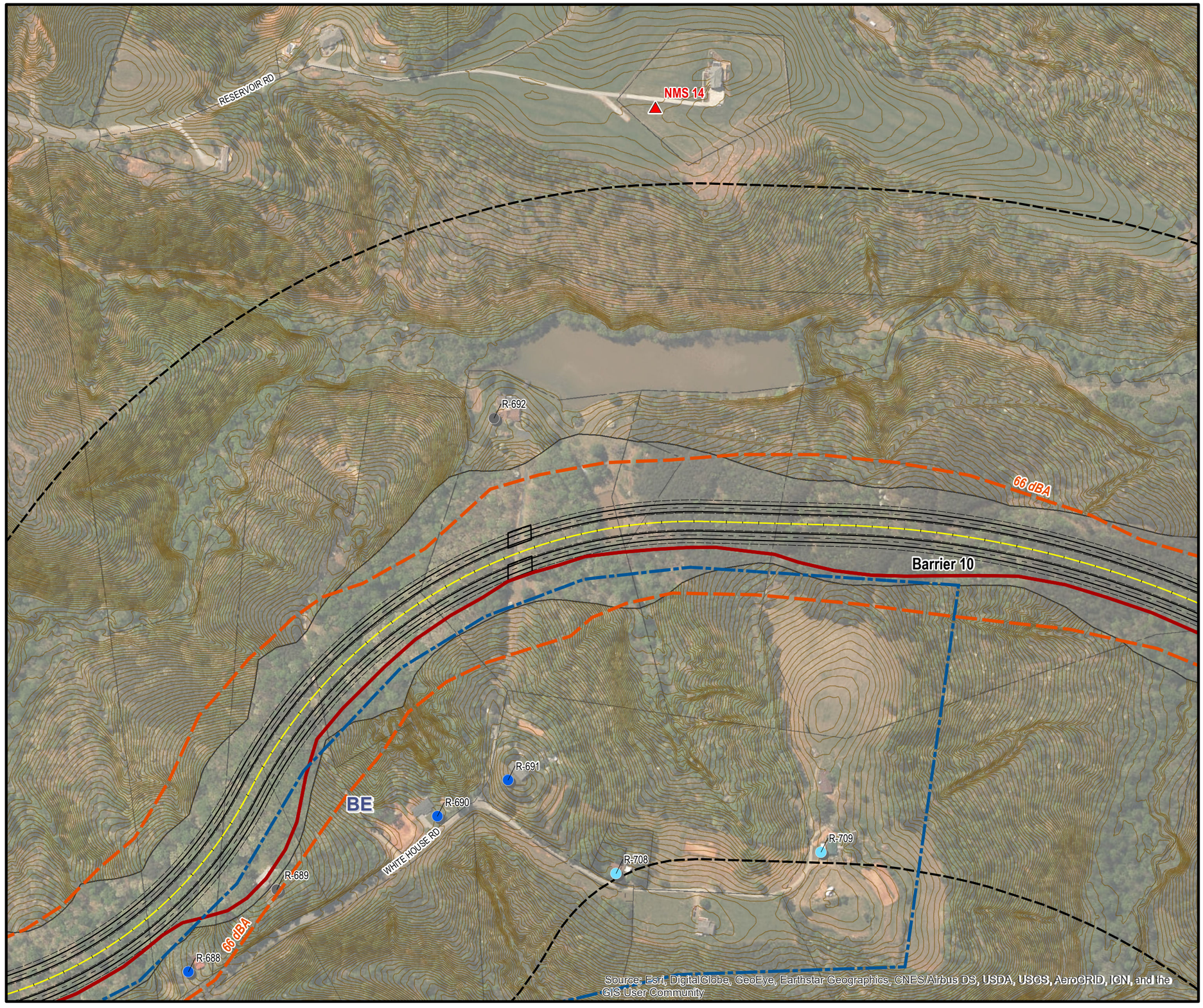

VDOT Virginia Department of Transportation

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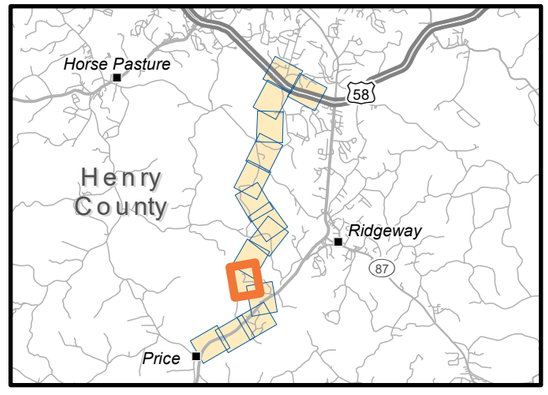

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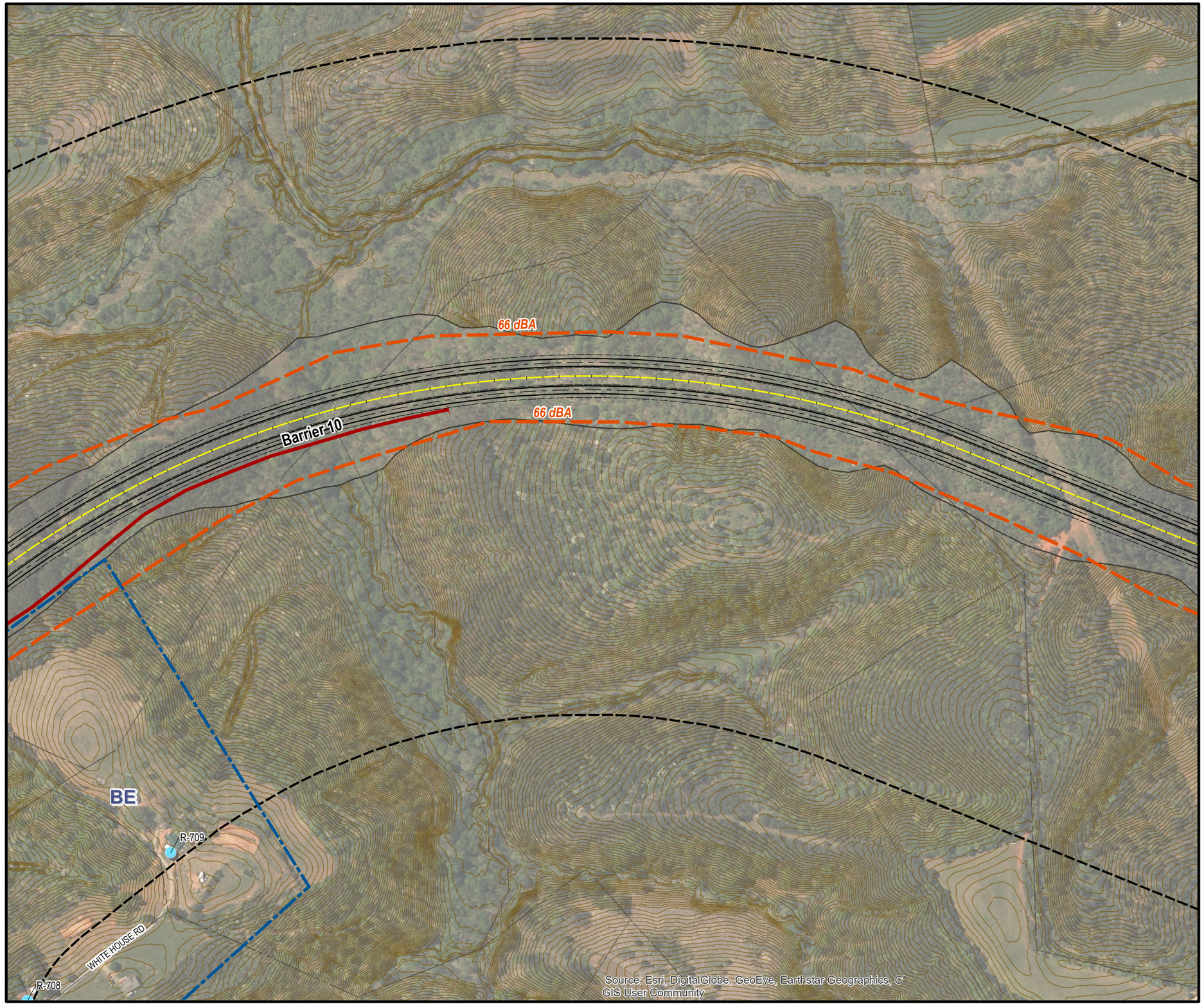

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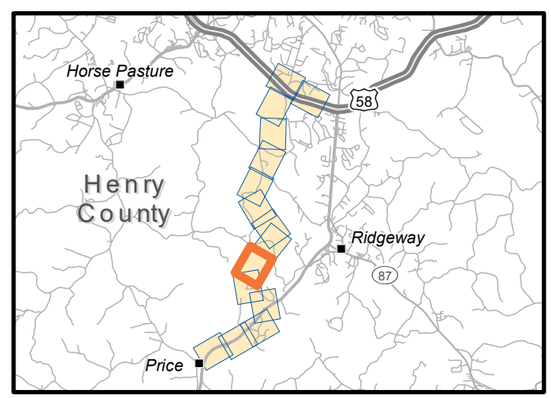
Sheet 6 of 15



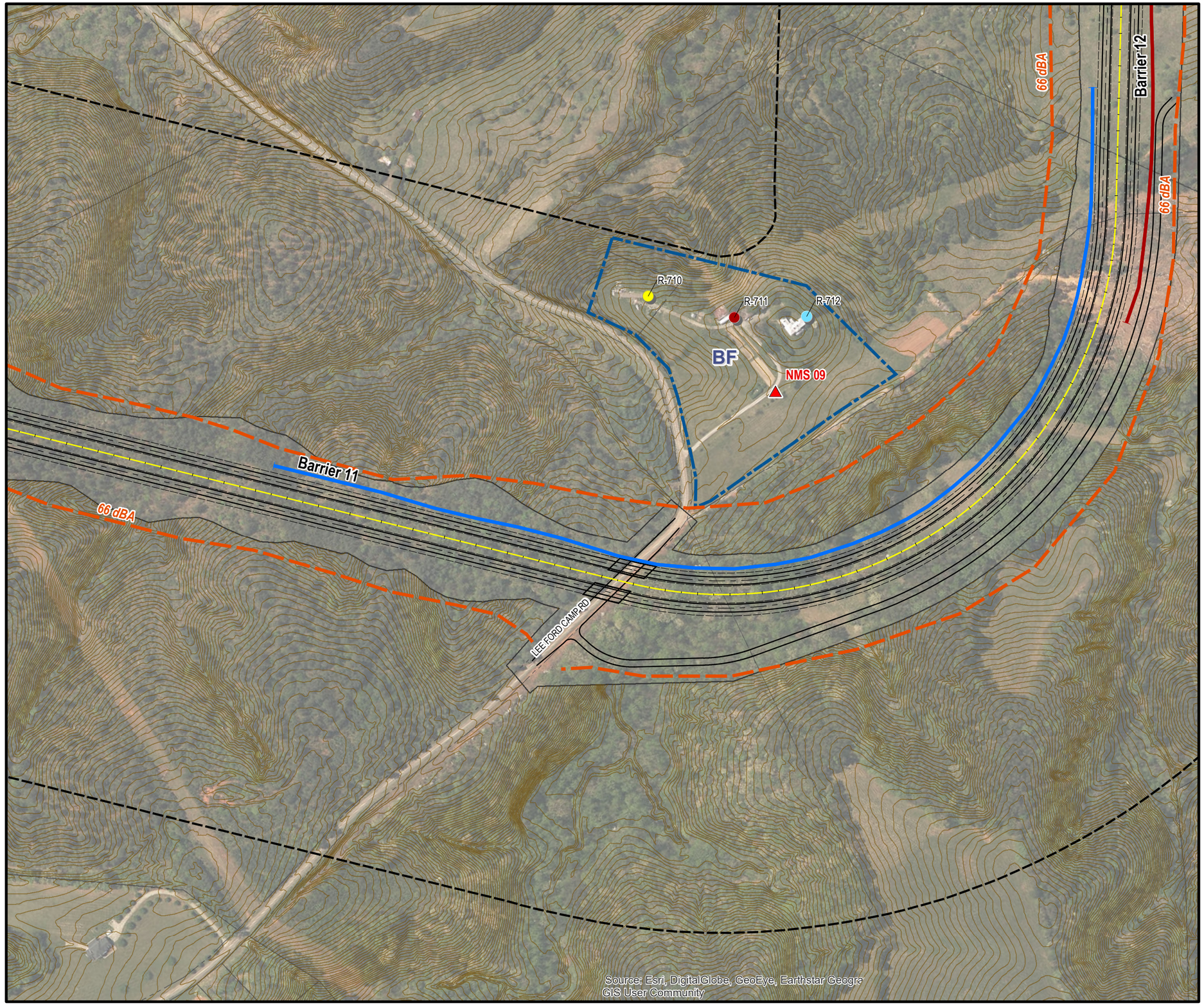


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Figure 4
Alternative B
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
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- Potential Property Acquistion

▲ NMS # Measurement Site

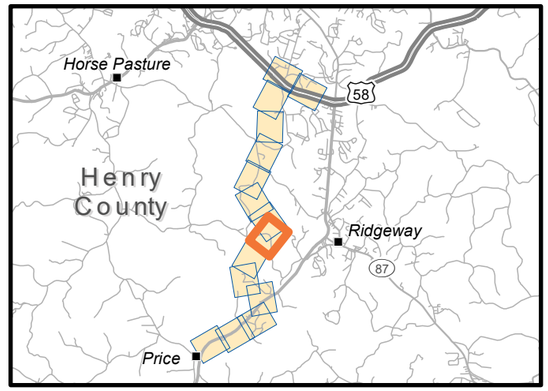
Noise Barriers

- Feasible and Not Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

0 300 600 Feet

Sheet 7 of 15



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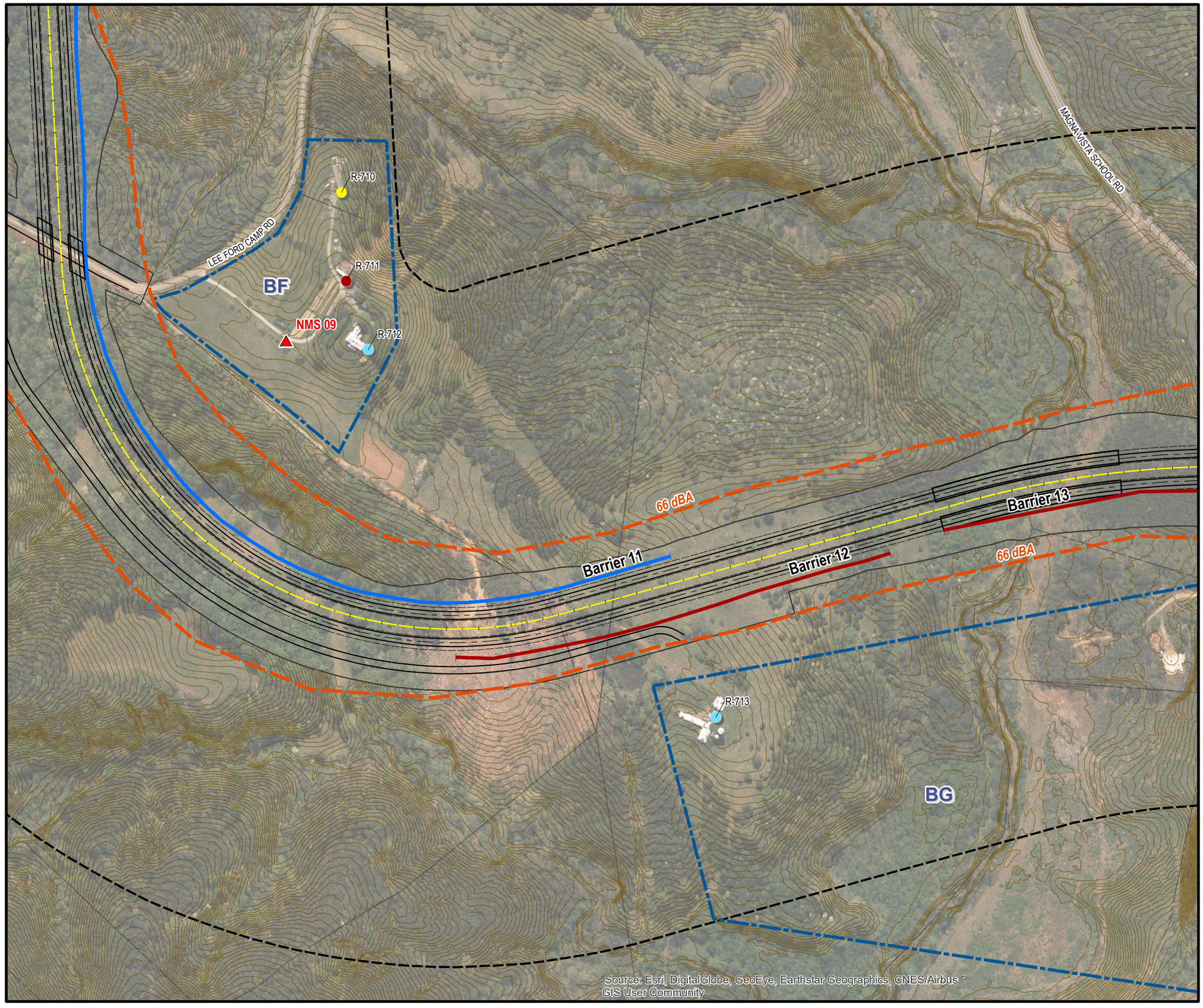

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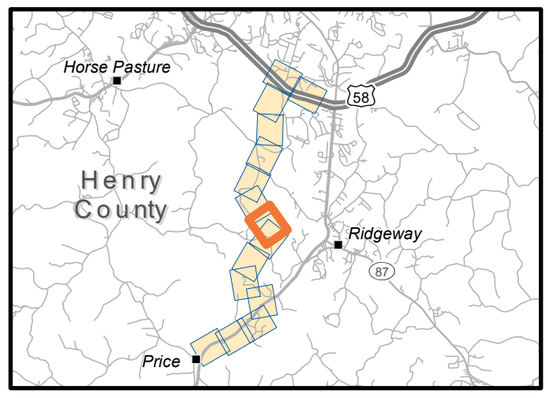

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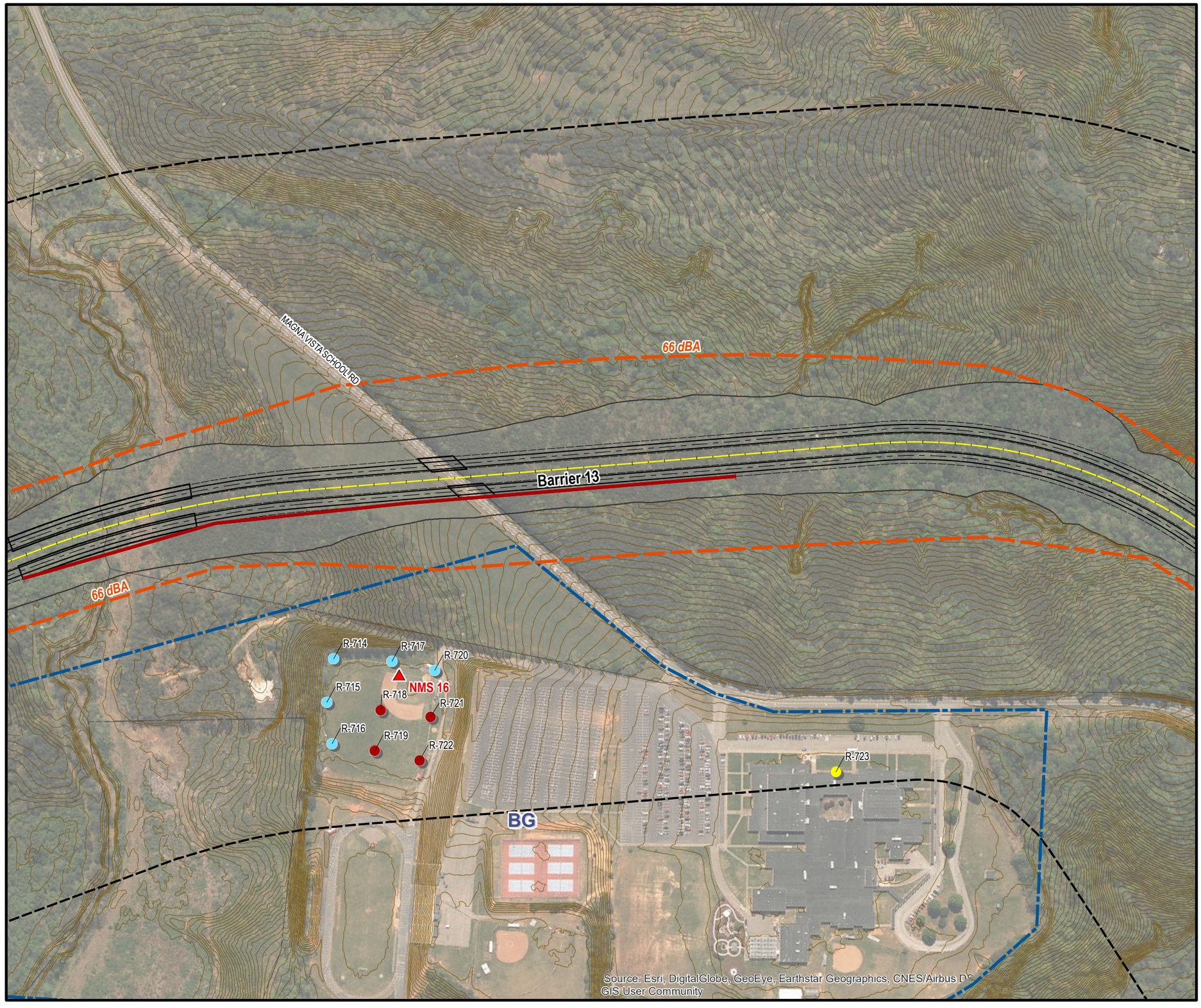

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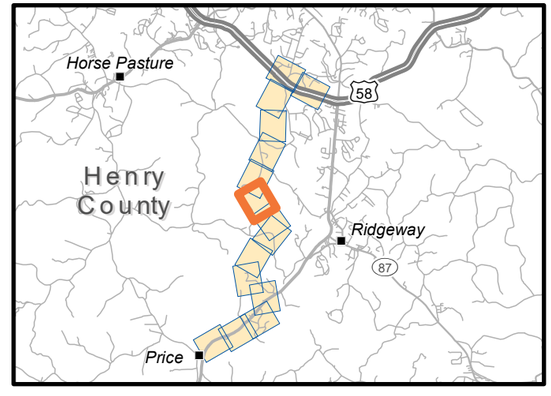

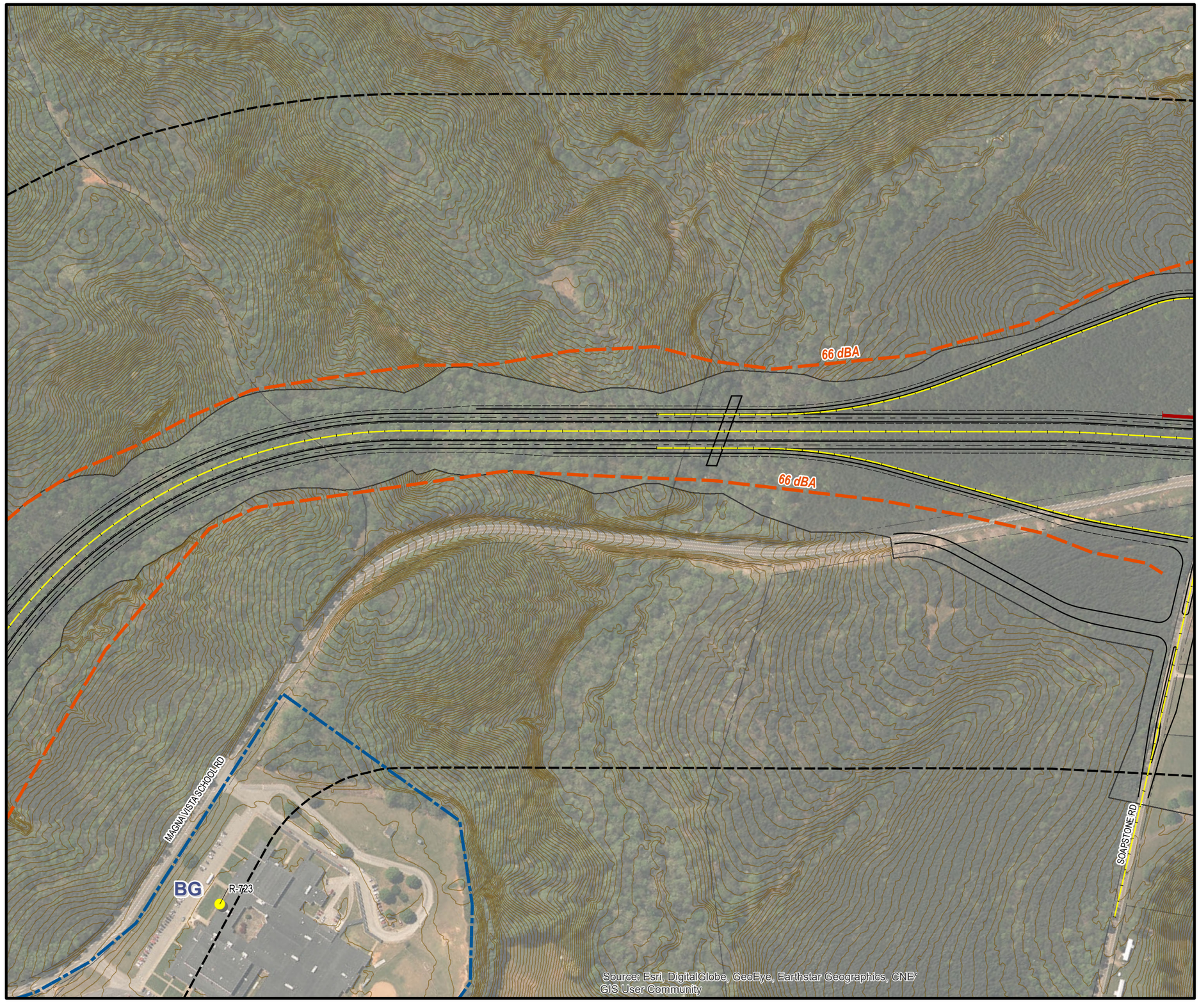

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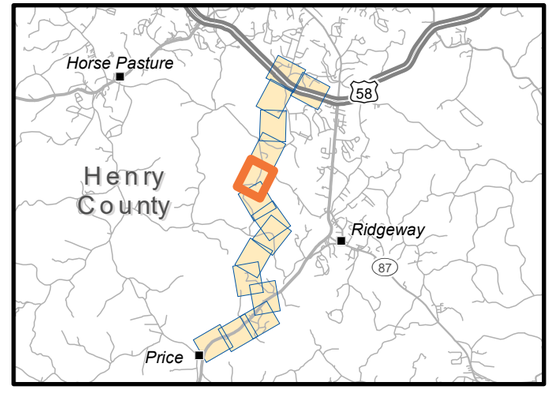

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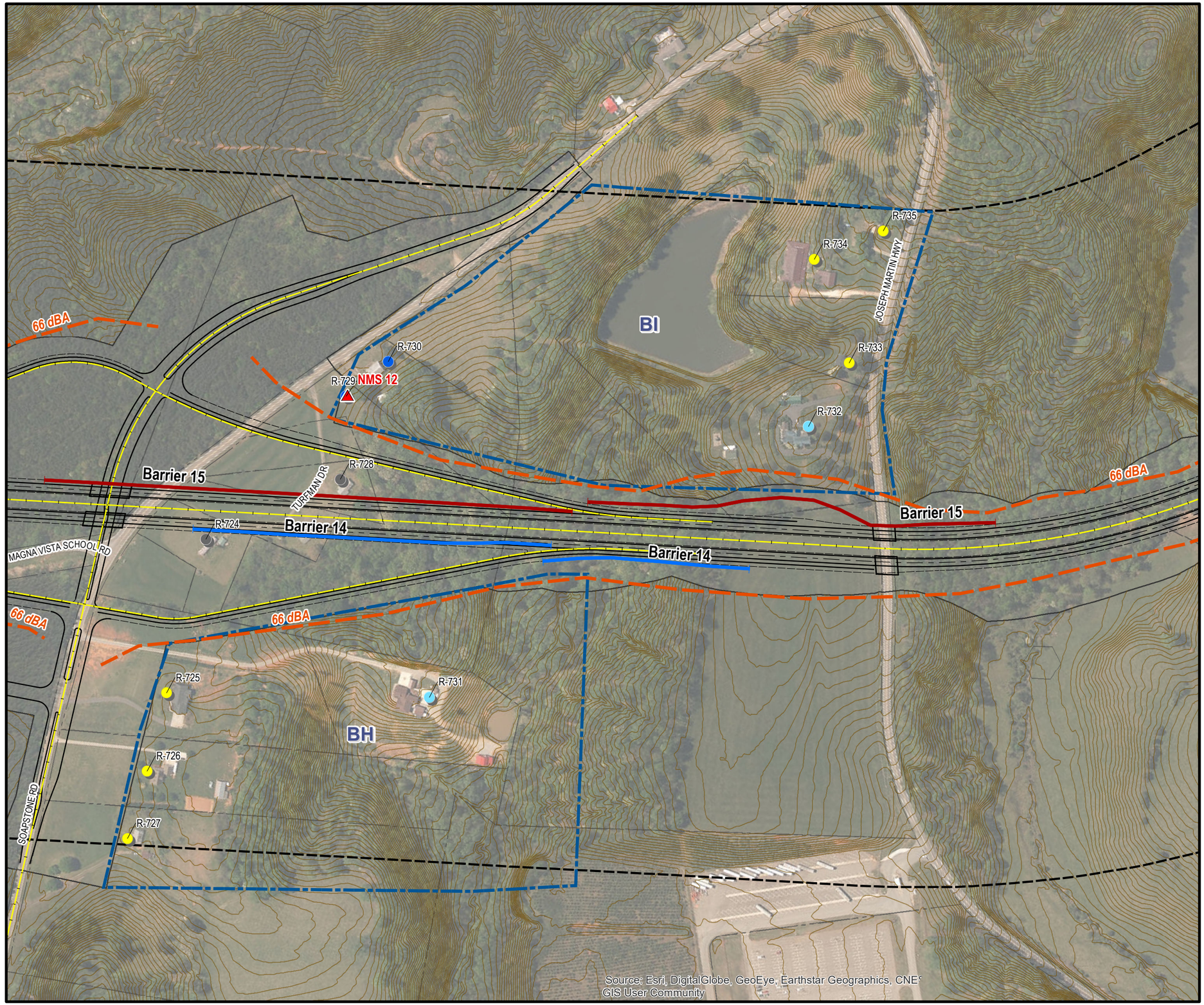

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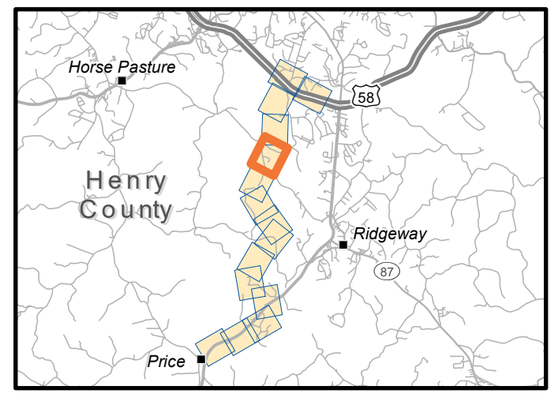

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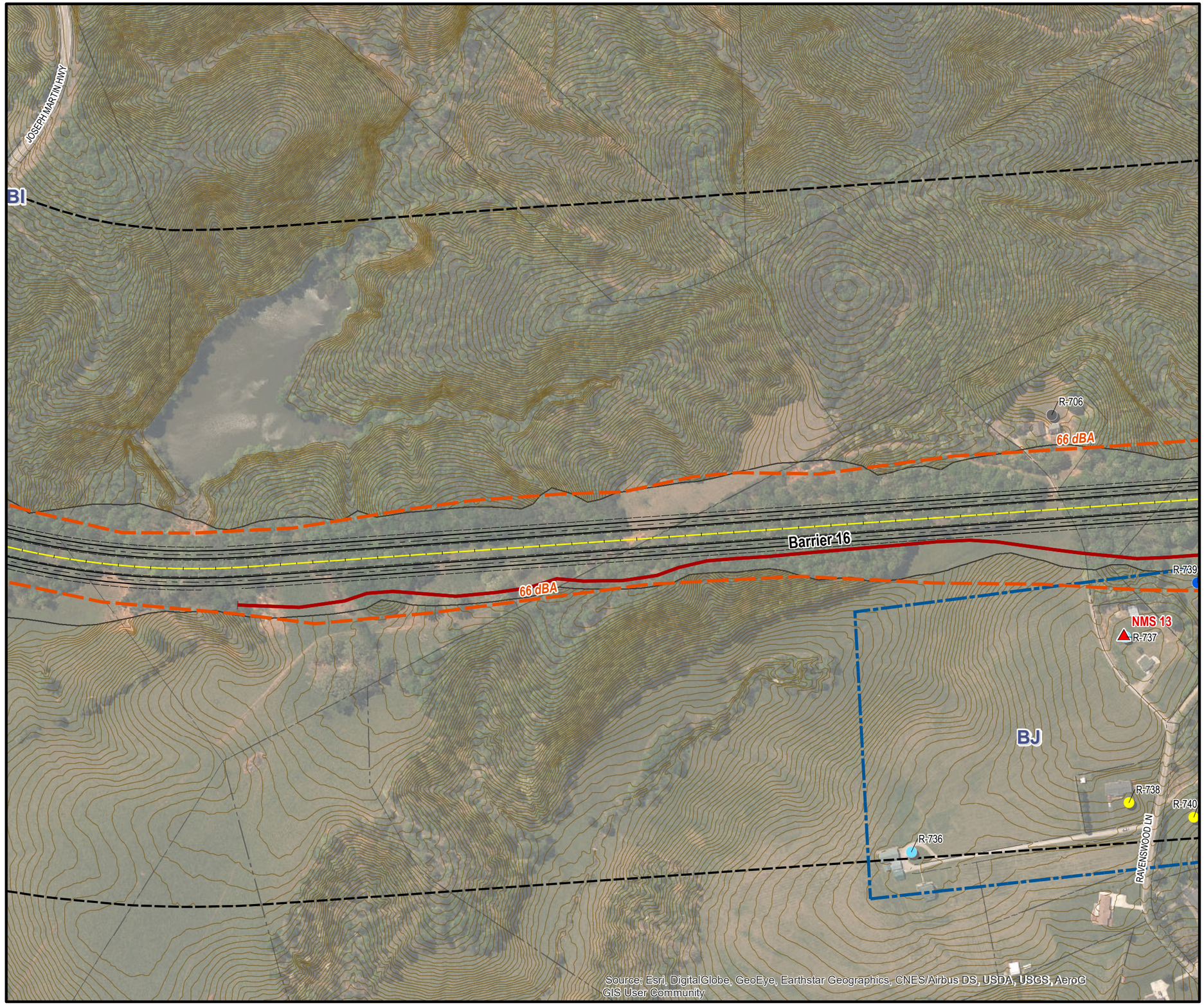

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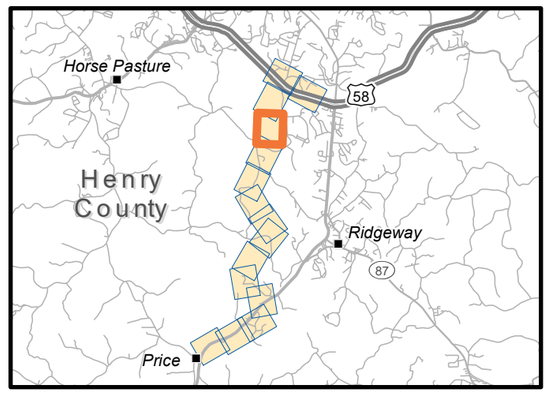

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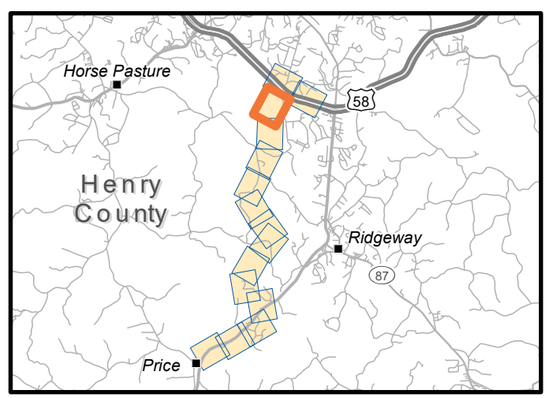

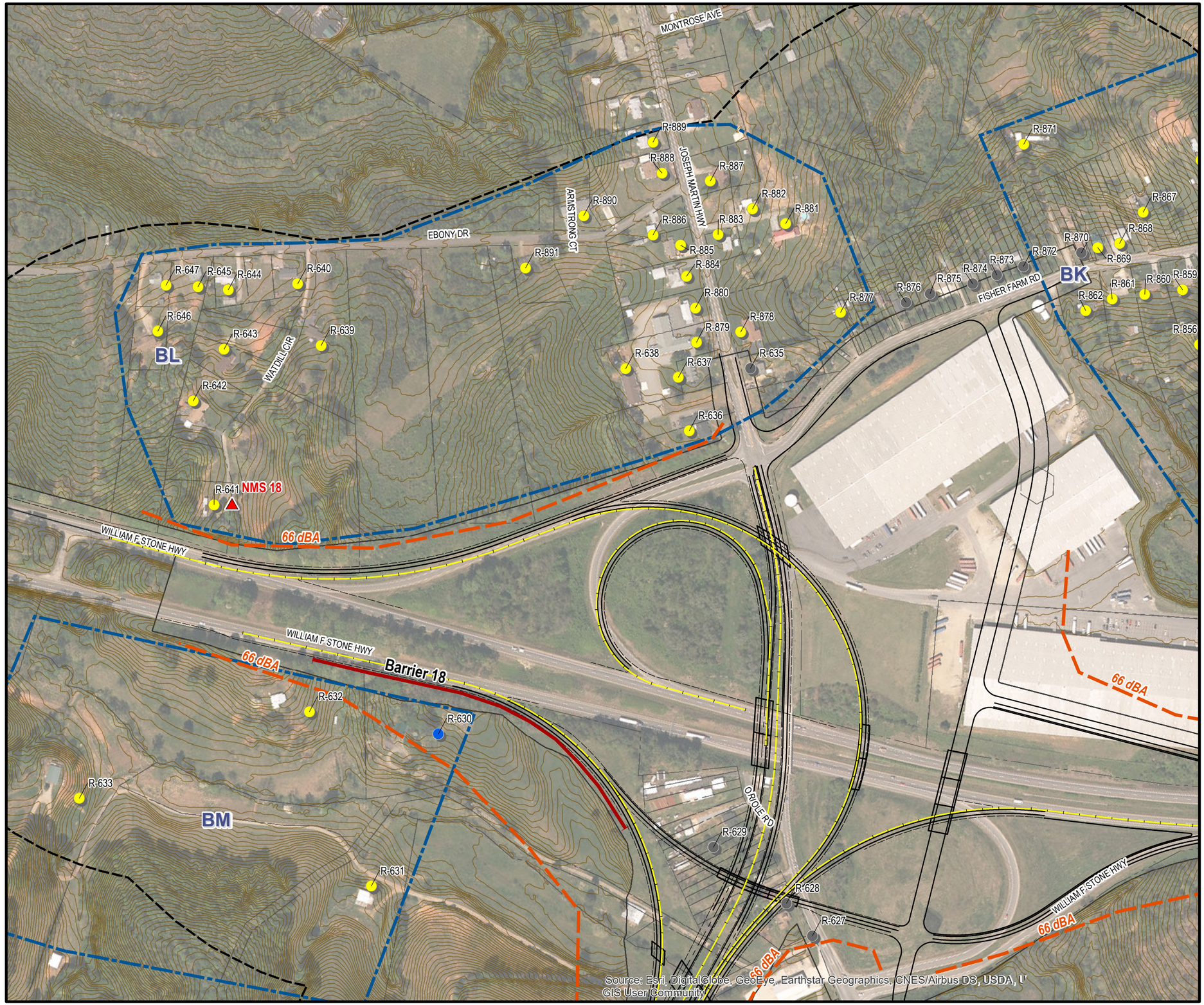

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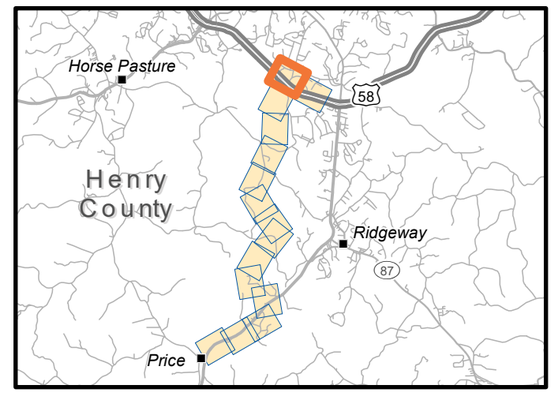
Sheet 14 of 15



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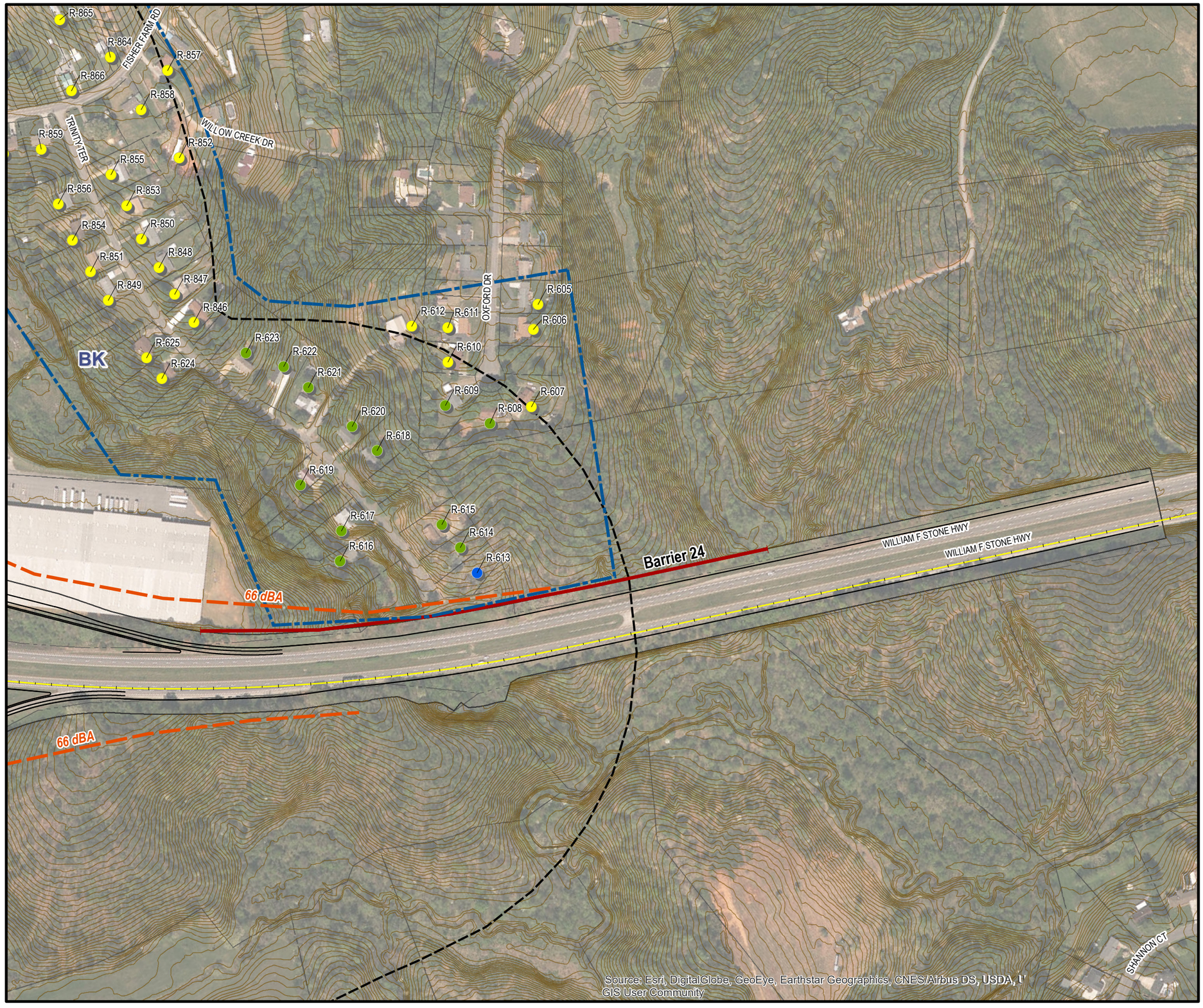

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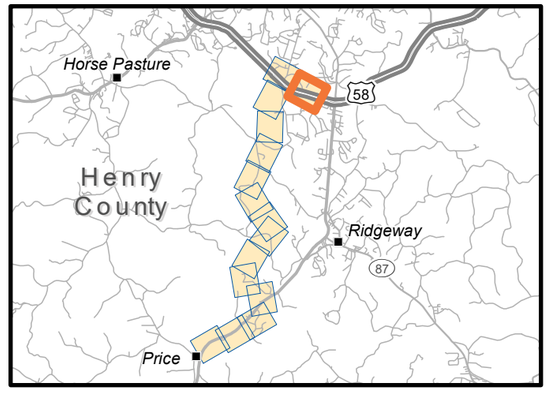

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FIGURE 5 - ALTERNATIVE C

Location Map for Common Noise Environments, Receptors,
Build Contours, and Barriers

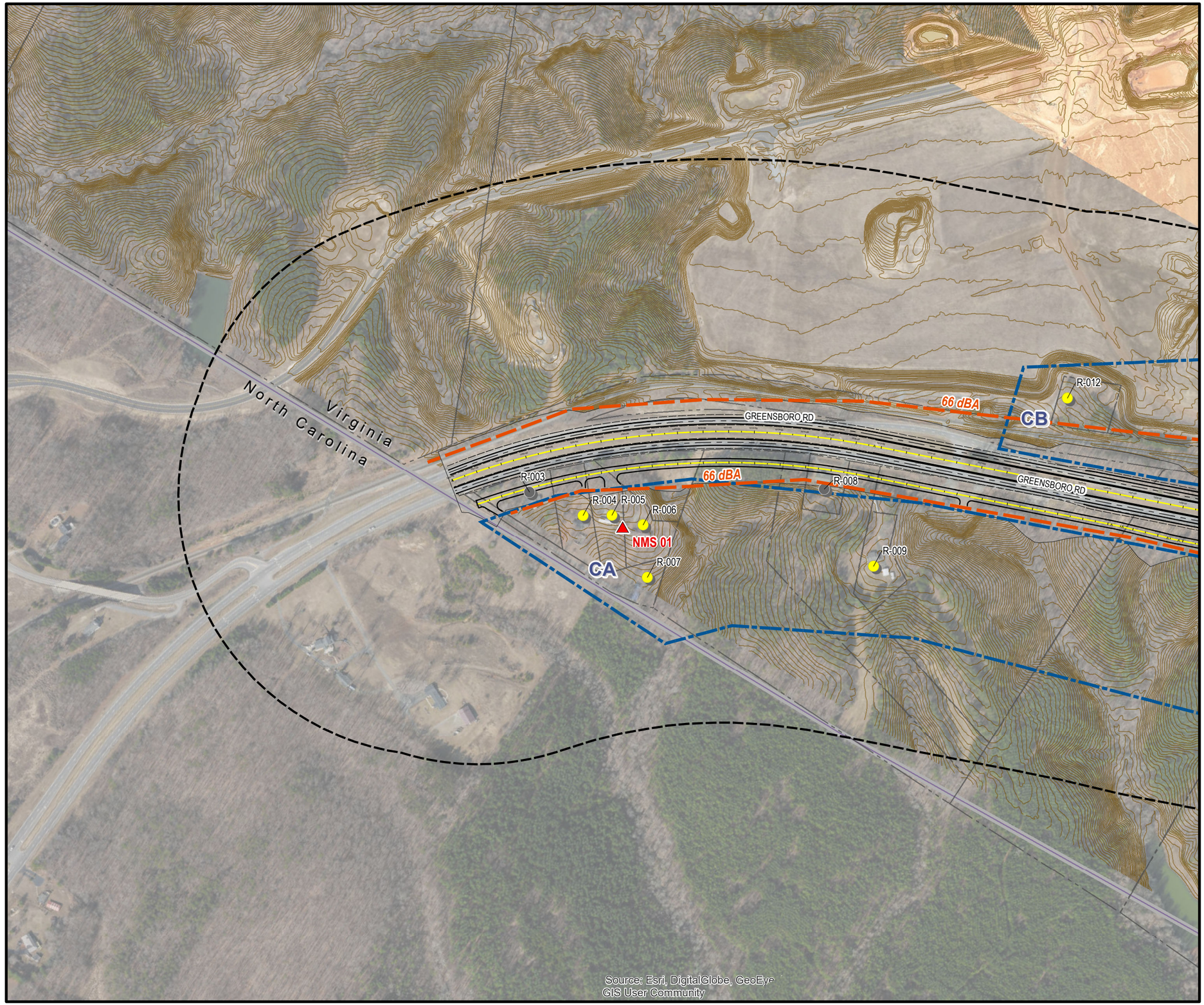

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Figure 5
Alternative C
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

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Noise Barriers
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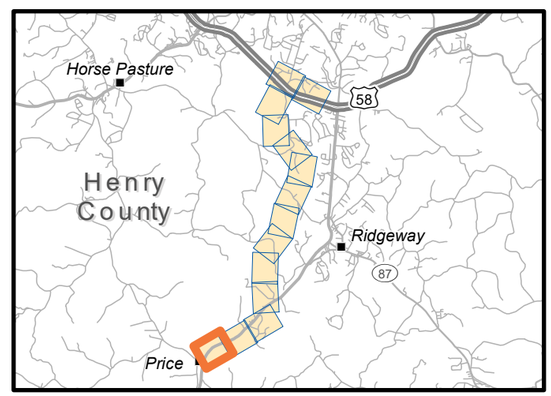
- Not Feasible

- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 1 of 14

0 300 600 Feet



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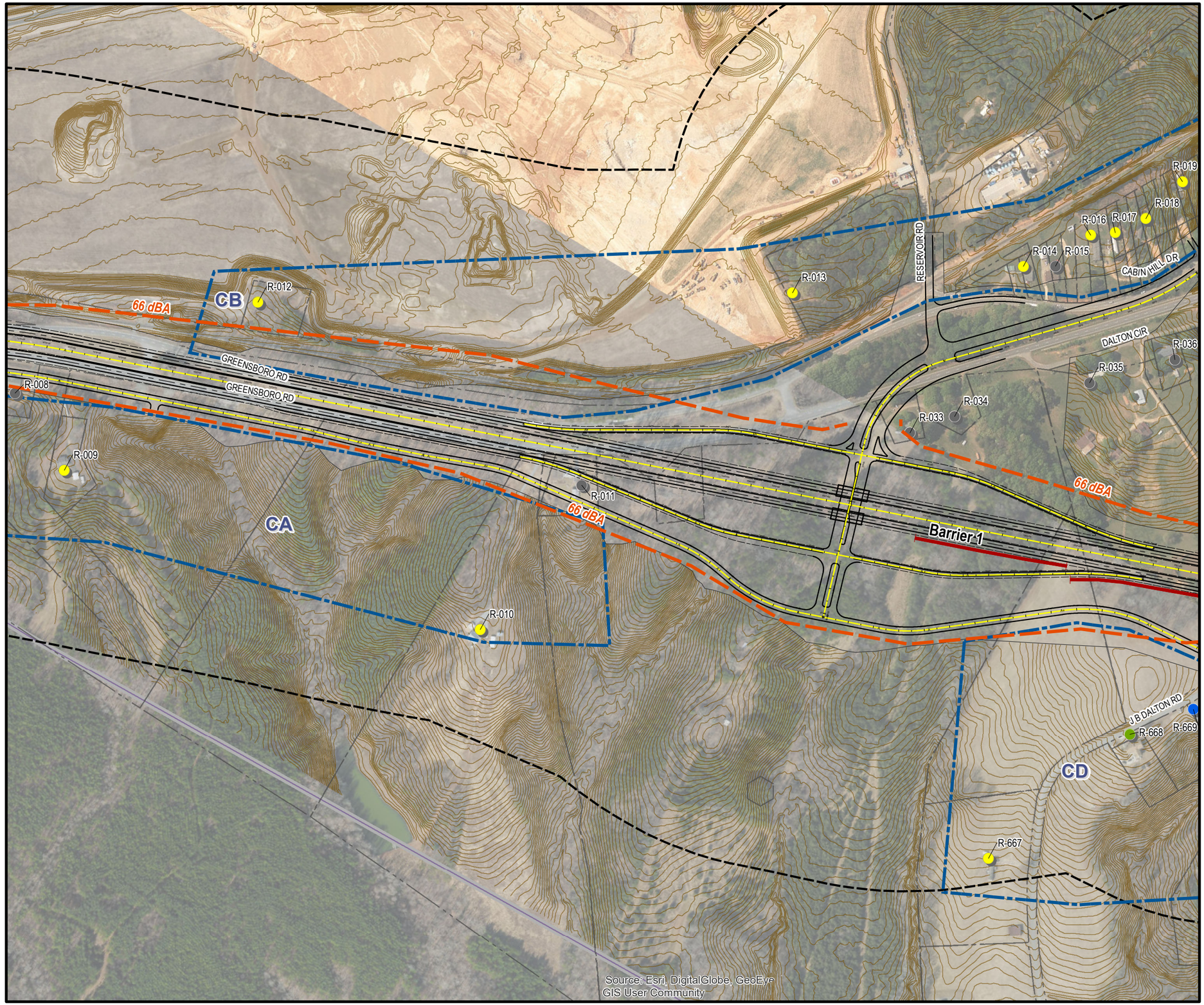

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Figure 5
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Martinsville Southern Connector / Route 220 EIS
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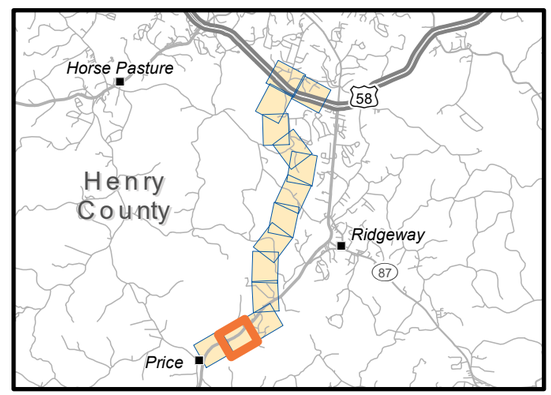
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 2 of 14

0 300 600 Feet



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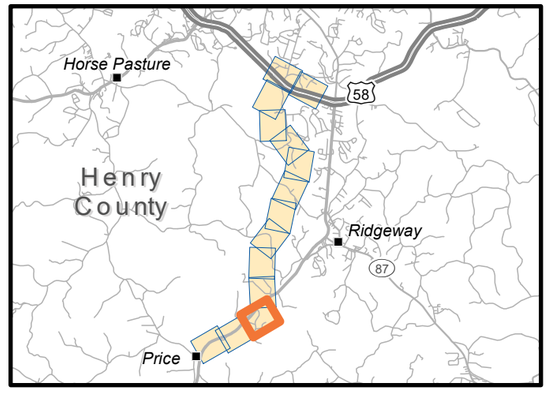

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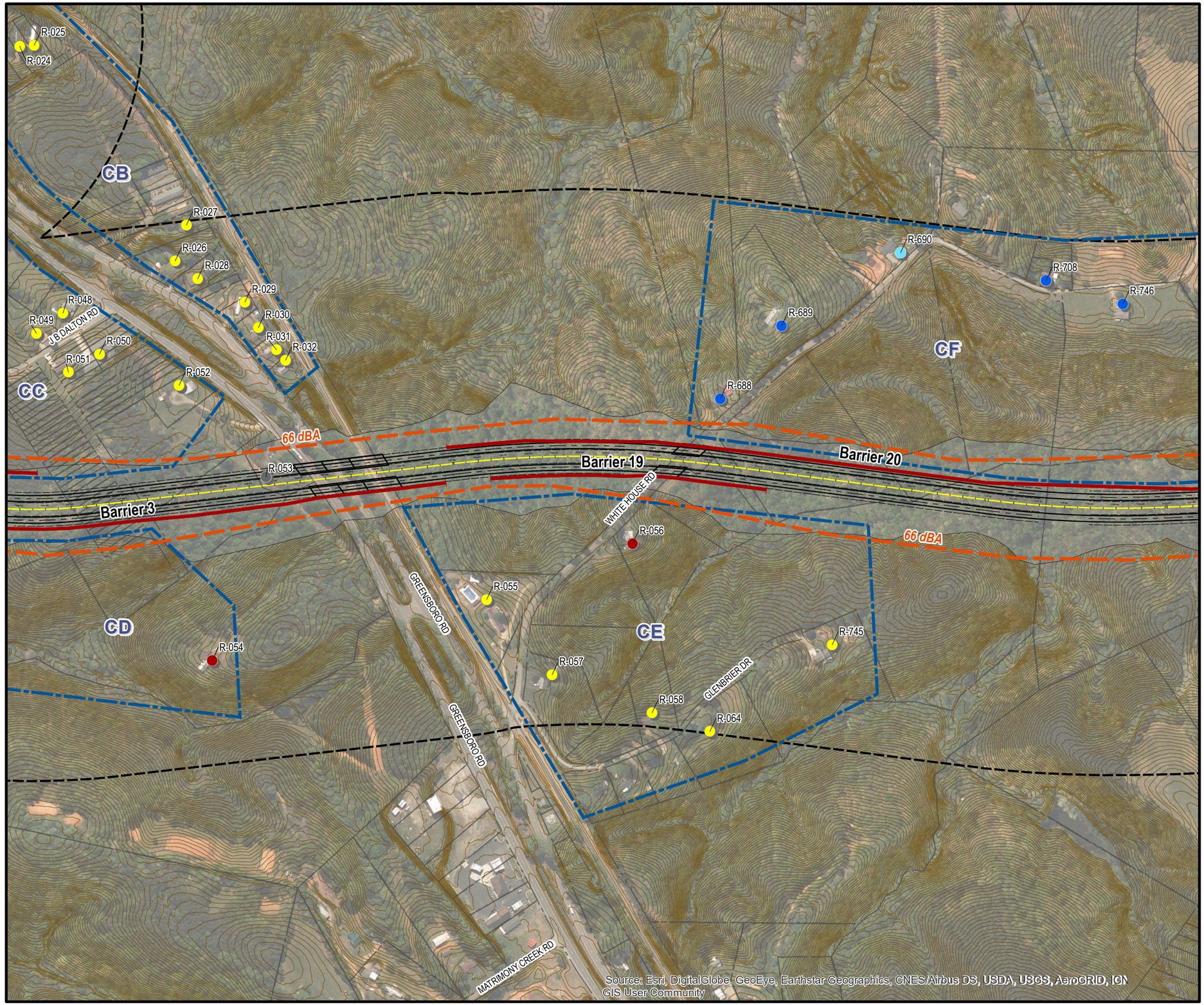

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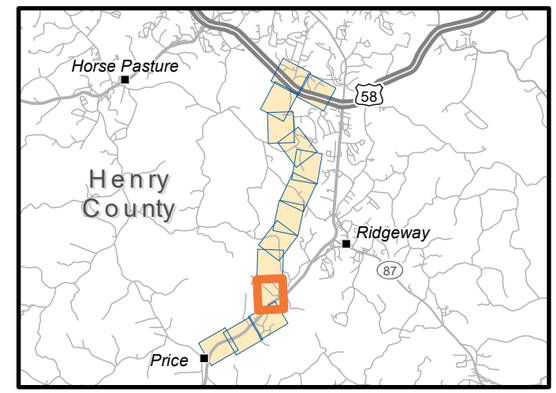

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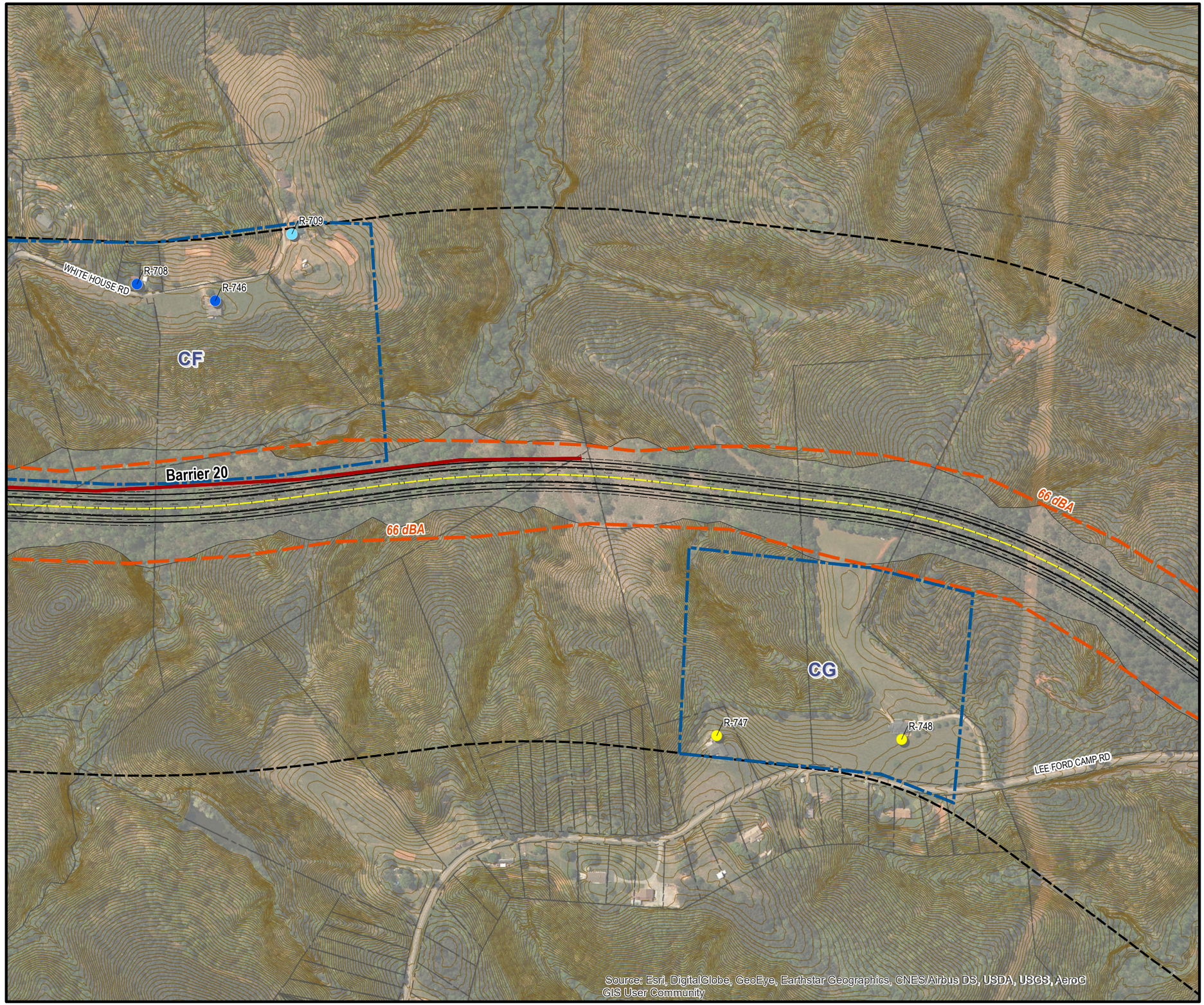

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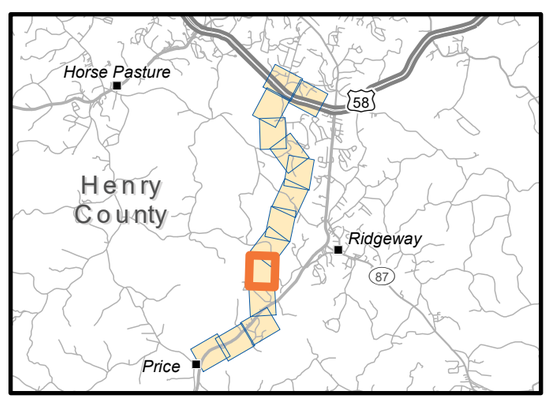

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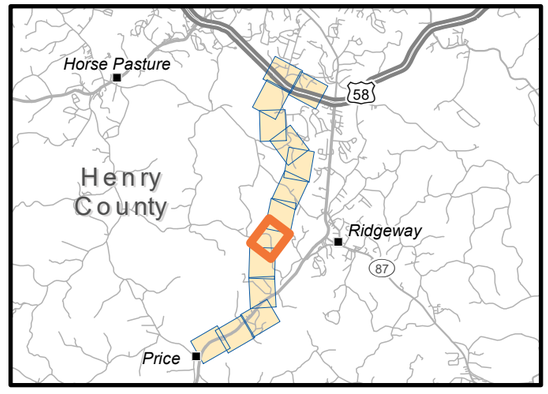

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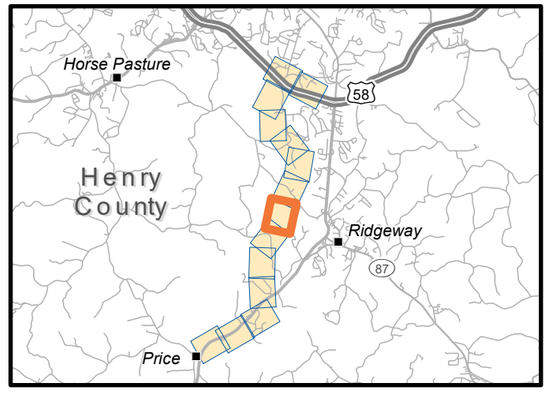

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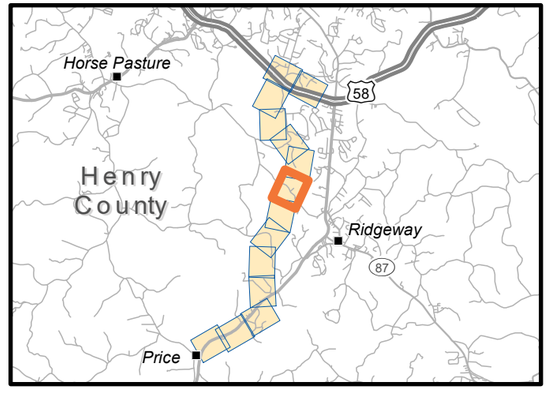

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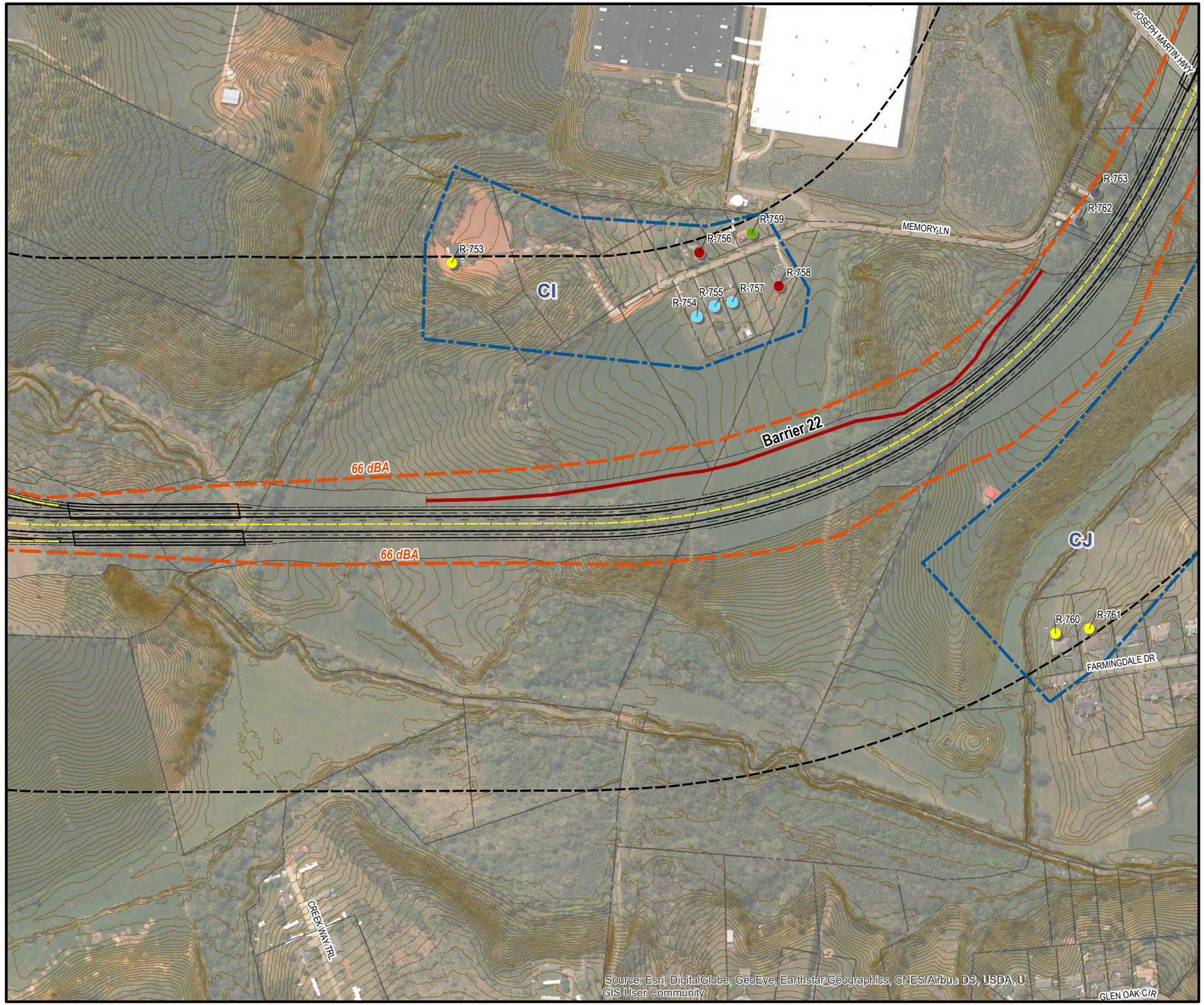

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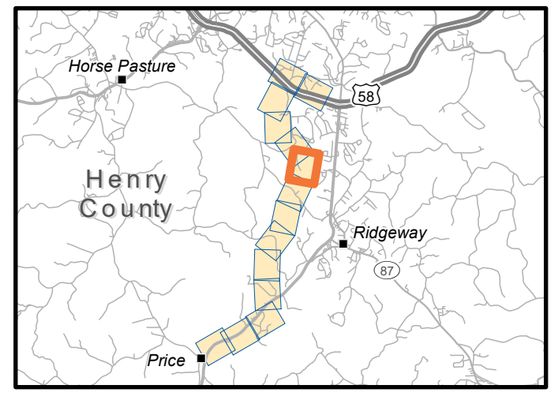
Sheet 9 of 14

0 300 600 Feet



hmmh

Figure 5
Alternative C
Location Map for Common Noise Environments, Receptors, Build Contours, and Barriers

Martinsville Southern Connector / Route 220 EIS
Henry County, Virginia

VDOT Project No. 0220-044-052, P101; UPC: 110916

Receiver Site and Number
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Potential Property Acquistion

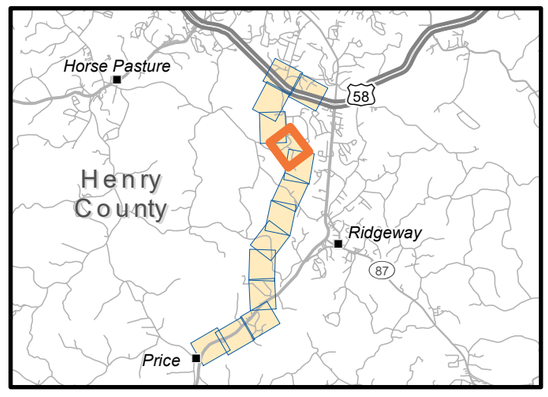
▲ NMS # Measurement Site

Noise Barriers
- Feasible and Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 10 of 14

0 300 600 Feet



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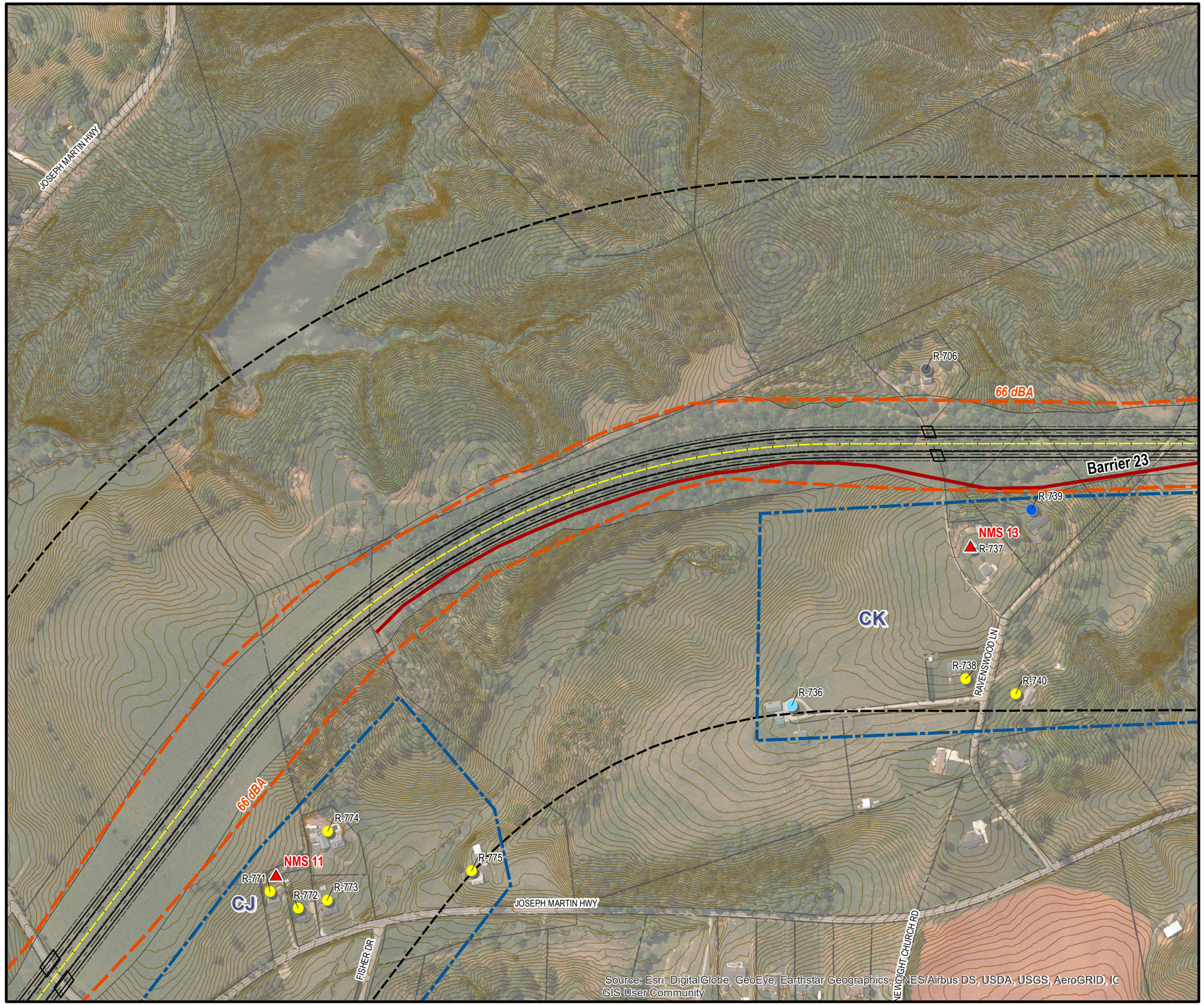

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NMS # Measurement Site

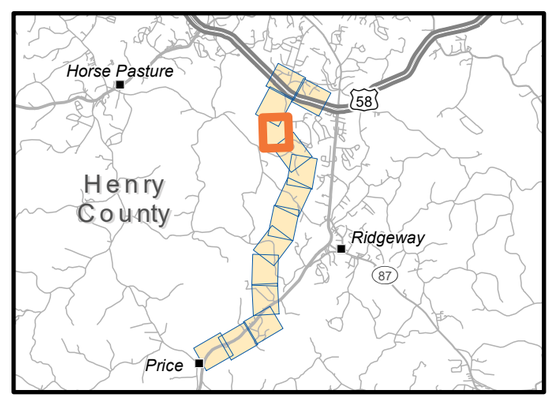
Noise Barriers

- Feasible and Reasonable
- Not Feasible

- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 11 of 14

0 300 600 Feet



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▲ NMS # Measurement Site

Noise Barriers
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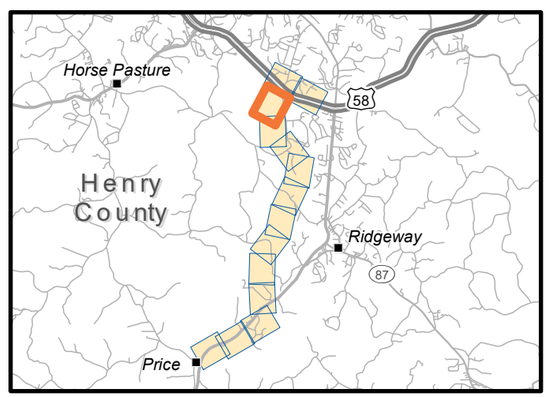
- Not Feasible

- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 12 of 14

0 300 600 Feet



VDOT
Virginia Department of Transportation

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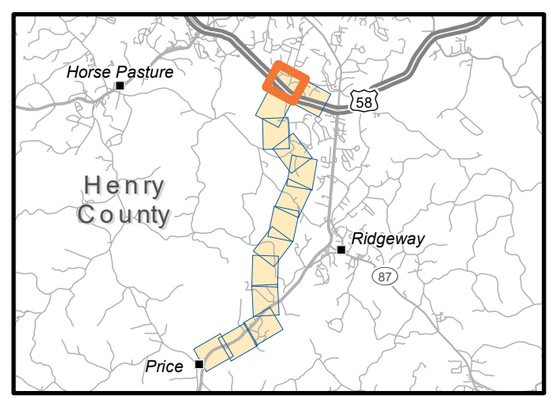
- CNE Boundary
- 66 dBA Contour
- 1,000' Noise Study Area

Sheet 13 of 14

0 300 600 Feet



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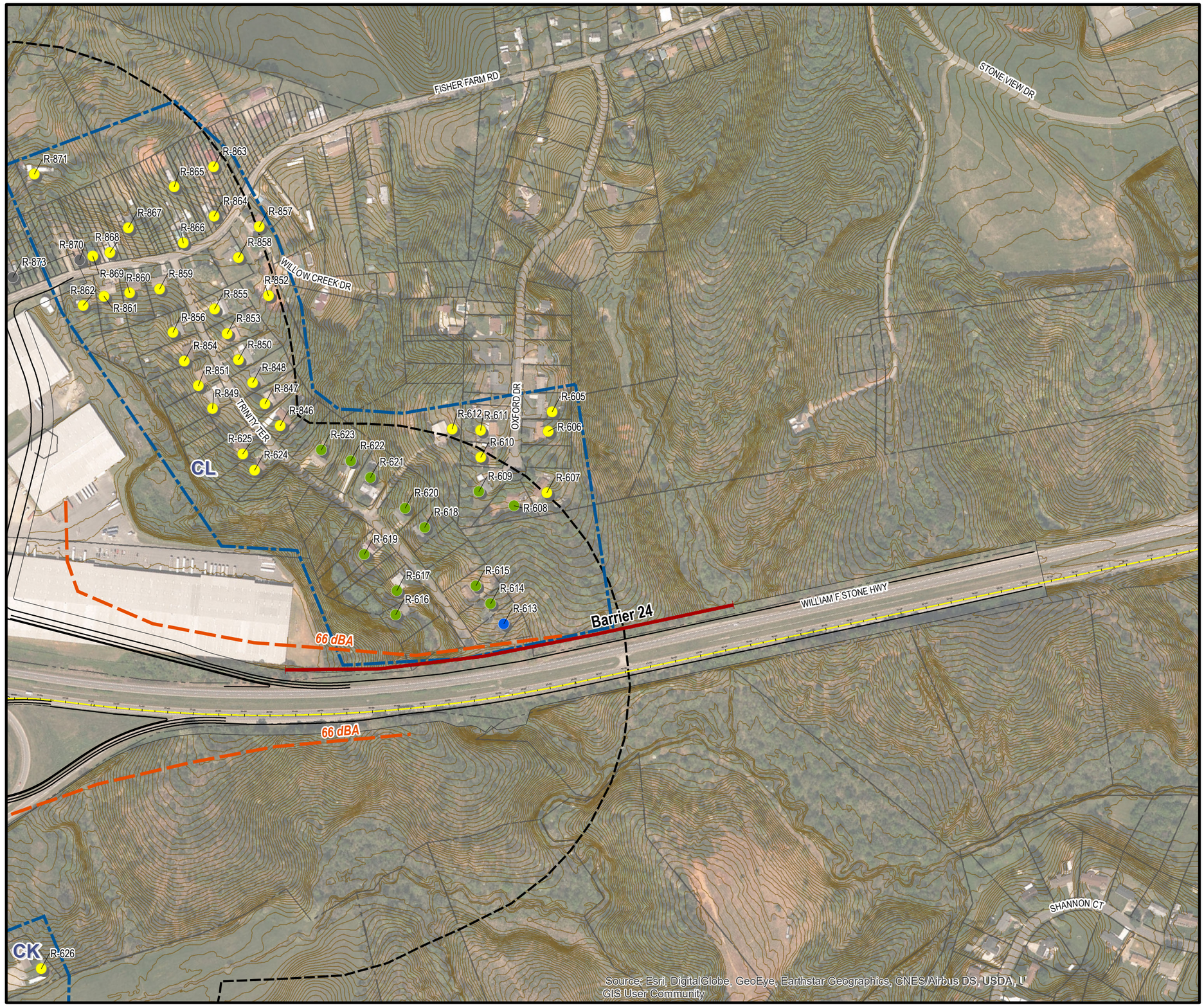

VDOT
Virginia Department of Transportation

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Sheet 14 of 14

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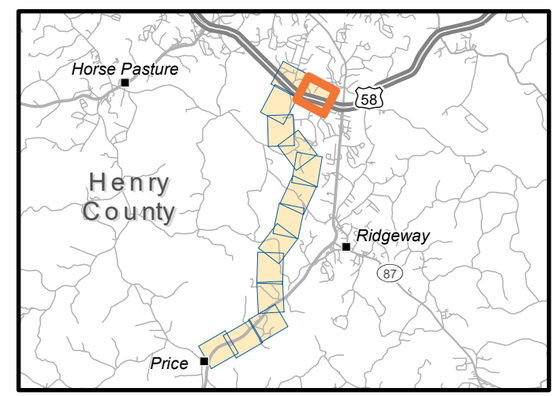

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