Delaware River Joint Toll Bridge Commission

Scudder Falls Bridge Replacement Project Final Design

Township of Lower Makefield, Bucks County, Pennsylvania
Township of Ewing, Mercer County, New Jersey

Final Design Noise Analysis Report

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1. PROJECT BACKGROUND

The Delaware River Joint Toll Bridge Commission (DRJTBC) proposes improvements to the Scudder Falls Bridge over the Delaware River and 4.4 miles of the adjoining I-95 mainline to alleviate traffic congestion and improve operational and safety conditions. The I-95/Scudder Falls Bridge, which was constructed in 1959, carries Interstate 95 (I-95) over the Delaware River, between Lower Makefield Township in Bucks County, Pennsylvania, and Ewing Township, a suburb of Trenton, in Mercer County, New Jersey (Figure 1).

Figure 1: Aerial View of the Existing Scudder Falls Bridge

(LOWER SIDE IS NEW JERSEY, UPPER SIDE IS PENNSYLVANIA)

2. INTRODUCTION

Improvements are being evaluated to a total of approximately 4.4 miles of I-95 extending from the Bear Tavern Road (County Route 579) Interchange in New Jersey to the PA Route 332 (Newtown-Yardley Road) Interchange in Pennsylvania (Figure 2). For purposes of identifying communities and activities that may be affected by the proposed improvements along I-95/Scudder Falls Bridge, the study area is defined as 4.4 miles long and approximately one thousand feet wide centered on I-95. The study area defined for the consideration of noise in this report includes portions of Lower Makefield Township, PA and Ewing Township, NJ.

This draft report provides a detailed analysis of the noise barriers that are being carried forward into the final design stage. A final report will be provided after all design modifications have been approved and incorporated into the model.

The preliminary noise analysis was performed by Gannett Fleming, Inc., (December 2007) during the Environmental Assessment (EA) phase of the project to determine the reasonability and feasibility of noise mitigation in the project area. Several aspects and details of that report were also carried forward in this report in order to provide continuity. For example, the project area was still divided into 14 Noise Study Areas (NSAs) to represent the various noise sensitive land uses by geographic location and/or traffic volume characteristics, the receptor numbers were kept the same, general descriptions of the land uses, etc. Please refer to Figure 3 for the locations of the NSAs.

The results of the initial abatement analysis concluded that of the 14 NSAs that were analyzed, nine NSAs were determined to be reasonable and feasible based on DRJTBC criteria and were carried forward to this phase of the project. The remaining five NSAs (neither shown nor discussed further in this report) were dismissed from further noise abatement consideration, including DRJTBC criteria, for the following reasons:

- NSA 1 (Residences on large farm tracts north and south of PA Route 332, east of I-95): The noise sensitive receptors are located far enough away from I-95 that predicted future noise levels do not exceed the Noise Abatement Criteria (NAC), including DRJTBC criteria, and therefore, do not warrant any noise abatement consideration.

- NSA 2 (West of I-95 including the Hampton Inn near PA Route 332, the Breezyvale Farms complex and residences on Surrey Lane east of Newtown-Yardley Road): This area contains a hotel, and the predicted exterior noise levels previously approached/exceeded the NAC level of 66 decibels (dBA) for the design year. However, the land use is no longer considered to be impacted according to the updated 23 CFR 772 regulation, which reset the criteria level to 72 dBA (approach level is 71 dBA). Furthermore, the only exterior use area is the outdoor pool, which is shielded from I-95 by three sides of the building. The residences are located too far away to be impacted. Therefore, noise abatement consideration is not warranted, even under current DRJTBC noise abatement criteria.

- NSA 5 (Residences northwest of I-95 within the Makefield Brook I and II and Fairfield at Farmview subdivisions along Jacob Drive, Brentwood Road, and Wheatsheaf Road): These communities are located far enough away from I-95 that the predicted future noise levels do not exceed the NAC, including the DRJTBC criteria and therefore, do not warrant any noise abatement consideration.

- NSA 11 (Residences and the Delaware and Raritan Canal State Park along NJ Route 175, residences along State Police Drive, and the Villa Victoria Academy property along NJ Route 29, all south of I-95): The only receptor that was predicted to be impacted was the Delaware and Raritan Canal towpath adjacent to the bridge. Additionally, there was a commercial property formerly identified as NAC C (commercial land use). However, this land use is now considered to be NAC F according to the updated 23 CFR 772 regulation, which has no sound level criteria. Therefore, this type of land use is no longer analyzed for noise impacts. A noise barrier was determined to be feasible but not reasonable along the Delaware and Raritan Canal towpath. As a result, noise abatement consideration was not recommended, even under current DRJTBC noise abatement criteria.

- NSA 13 (Residences on Bernard Drive north of I-95 and the New Jersey State property south of I-95. The residences east of Bernard Drive, such as those on Ronit Drive, Beckett Court, Cramwell Court, and others at the Tamar Commons subdivision north of I-95, are currently protected by an existing noise barrier): The land uses in this area are comprised of the NJ State Police and NJ Department of Correction facilities, vacant land, and the Tamar Commons residential area (as mentioned, already protected by a noise barrier). The NJ State Police Headquarters, the closest of all existing or proposed buildings on the NJ State Police property, is an emergency services land use NAC F with no sound level criteria per the updated 23 CFR 772 regulation. Therefore, this type of land use is no longer analyzed for noise impacts and noise abatement consideration is not warranted, even under current DRJTBC noise abatement criteria.

The modeling performed for Final Design and present herein, concurs the dismal of the five (5) aforementioned NSAs.

Figure 2: Scudder Falls Bridge Replacement Project Limits

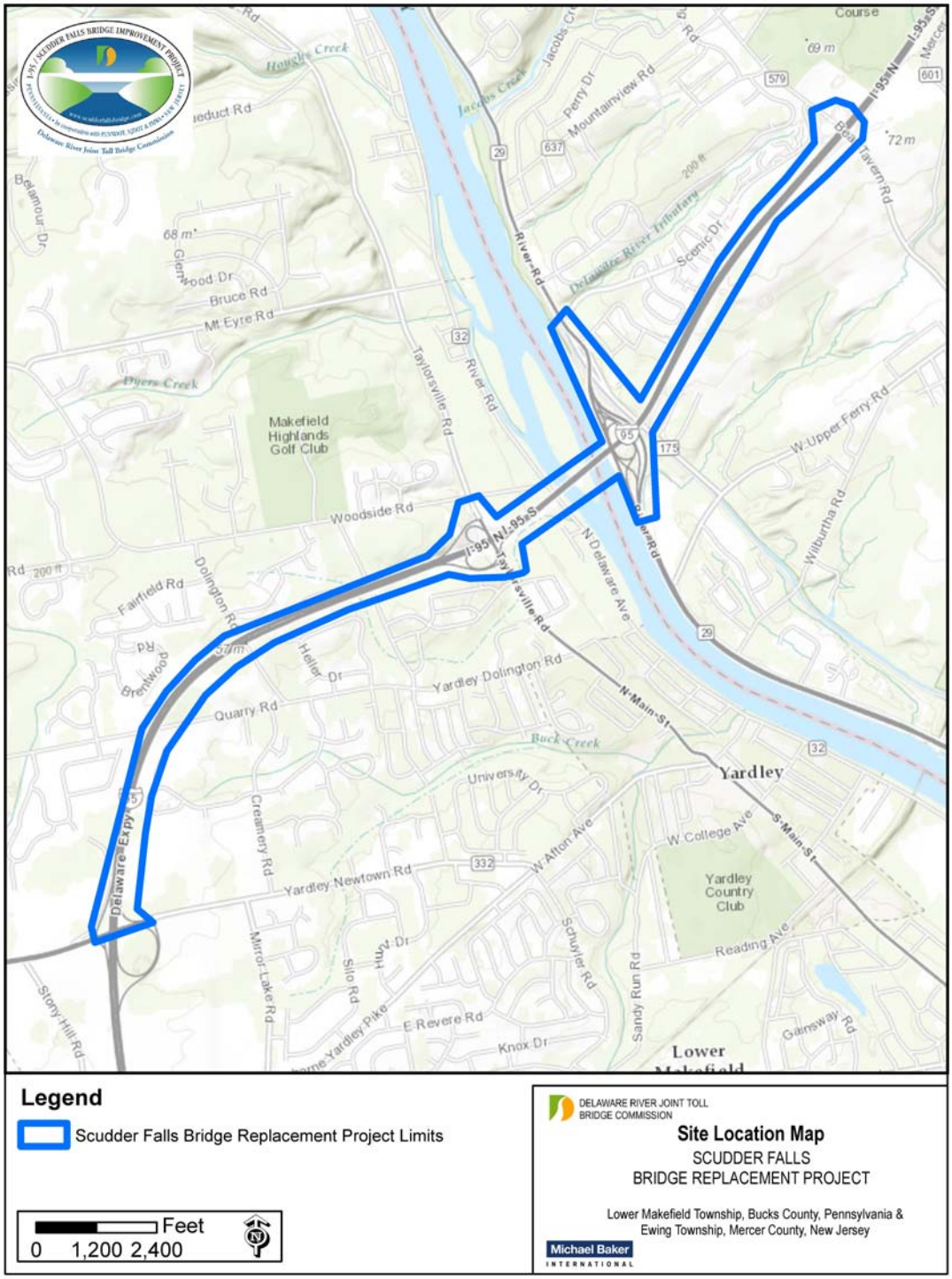
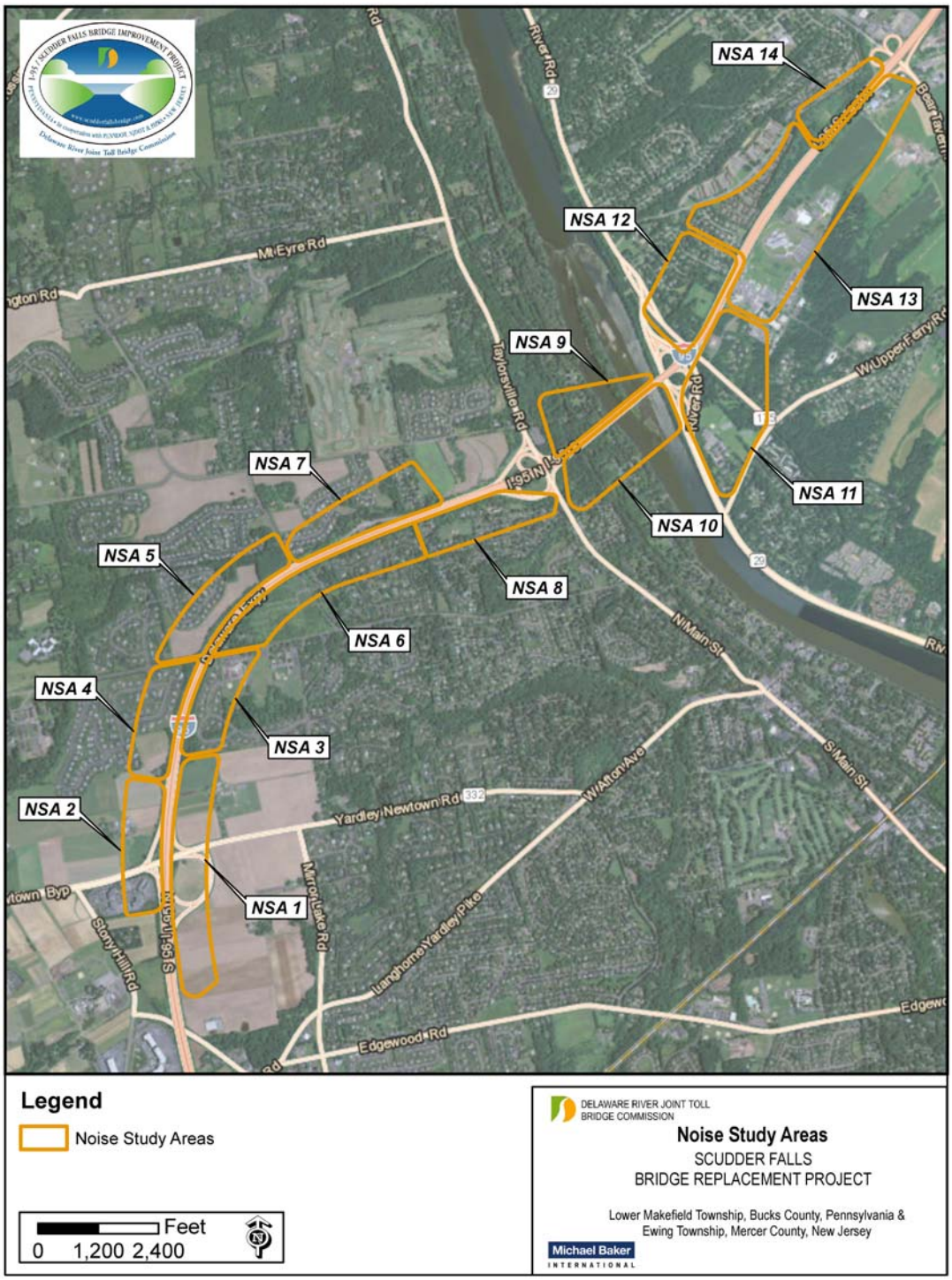


Figure 3: Project Area NSAs



3. METHODOLOGY

The Pennsylvania Department of Transportation (PennDOT) and the New Jersey Department of Transportation (NJDOT) Noise Abatement Criteria (NAC) for specific land use activities were used in the initial evaluation of traffic noise impacts. Predicted noise levels were determined using Version 2.5 of the FHWA Traffic Noise Model (FHWA TNM).

When applying the PennDOT and NJDOT criteria, several NSAs did not meet the warranted, feasible and reasonable criteria. Based on public comments expressed at the community meetings, the DRJBTC decided to offer noise abatement to additional NSAs that were not deemed to meet both the reasonable and feasible criteria. As a result, the DRJBTC established a project criteria that provided a minimum of 5 dBA noise reduction for the majority of first row impacted receptors with a maximum barrier height not to exceed 18 feet, as applicable. For purposes of this analysis, both the PennDOT and NJDOT criteria analysis are also presented with the DRJBTC criteria analyses in the tables found at the end of this report.

Since the initial analysis, there was an update to the noise regulation under 23 CFR 772 in the year 2011 that re-identified land use categories into seven new categories from the previous five categories. Subsequently, both Pennsylvania and New Jersey DOTs were required to update their noise analysis and abatement policies, which are reflected in Tables 1 and 2, respectively. Overall, since most of the noise sensitive land uses in this project area are residential, they are still classified as NAC B, similar to the previous version of 23 CFR 772. However, several commercial and emergency service receptors formerly classified as NAC C are now classified as NAC F. As mentioned previously, NAC F land uses have no sound level criteria and are no longer analyzed for noise impacts. There was also a change in the hotel land use sound level criteria mentioned previously for NSA 2, which was dismissed from further abatement study.

Please note that all of the predicted impacts were “absolute” impacts (i.e., sound level predicted to approach or exceed 67 dBA). The approach criteria is 66 dBA for a residential land use. Additionally, there were no predicted substantial increase impacts (10 or more dBA over the existing condition), which is typical of most widening projects.

The analyses performed at this stage in the project are based on the current proposed design. As the project progresses through this final design phase, it is likely that noise wall placement and height modifications will be made as a result of various design factors, such as drainage requirements. The resulting changes from these variables will be incorporated into the final design of the noise walls.

Table 1: Hourly Weighted Sound Levels dB(A) For Various Land Use Activity Categories (PennDOT)

Land Use Activity Category	L_{eq} (h)[1]	Description of Land Use Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Residential.
C	67 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A, B or C.
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.
[1] Impact thresholds should not be used as design standards for noise abatement purposes. [2] Includes undeveloped lands permitted for this activity category.		

*PennDOT has chosen to use Leq(h) [not L10(h)] on all of its transportation improvement projects.

Table 2: Noise Abatement Criteria (NAC) For Various Land Use Activity Categories (NJDOT)

(Source: 23 CFR 772)
Hourly A-Weighted Sound Level – decibels (dBA) (1)

Activity Category	Activity Criteria (2)		Evaluation Location	Activity Description
	L_{eq} (h)	L_{10} (h)		
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B (3)	67	70	Exterior	Residential.
C (3)	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E (3)	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties 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.

(l) Either Leq(h) or Ll0(h) (but not both) may be used on a project.
(2) The Leq(h) and Ll0(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
(3) Includes undeveloped lands permitted for this activity category.
Source: NJDOT and 23 CFR Part 772

4. FINAL DESIGN NOISE STUDY AREAS

The results of the initial abatement analysis concluded that nine NSAs were determined to be reasonable and feasible based on DRJTBC criteria and were carried forward to this phase of the project. For logical analysis purposes, some of the NSAs (or sections thereof) were combined. Figures 4 through 11, presented later in the report, show the NSAs with their respective impacts, benefits and current proposed barrier locations. These areas are described below:

- **NSA 3 and 6:** Residences located along Clydesdale Circle, Shetland Court within the Ridings subdivision, as well as residences and two elementary school properties (ballfield and playground) along Quarry Road, all located south of I-95, plus residences located along the north side of Quarry Road (Pennsylvania).

- **NSA 4:** The residences in the Devonshire subdivision located on Jockeys Way, Ascot Court, and Colts Lane and the residence at the end of Patterson Lane, all located west of I-95 between Yardley Newtown Road and Quarry Road (Pennsylvania).

- **NSA 6 and 8:** Residences located east of Dollington Road along Miller Place and Heller Drive, all located south of I-95 as well as residences south of I-95 east of Lower Hilltop Road to include the Hillwood Terrace subdivision residences on Highland Drive, Upton Lane, and Concord Lane (Pennsylvania).

- **NSA 7:** Longshore Estates subdivision residences along Pownal Drive and Bartlett Court as well as residences located along Upper Hilltop Road in the vicinity north of the I-95 rest area/weigh station (Pennsylvania).

- **NSA 9:** Residences located along Woodside Road and PA Route 32 as well as the Delaware Canal State Park, all located north of I-95 between the Taylorsville Road interchange and the Delaware River (Pennsylvania).

- **NSA 10:** Maplevale subdivision residents located along Taylorsville Road and Mapleview Drive, residences located along PA Route 32, Robinson Place, as well as the Delaware Canal State Park, all located south of I-95 between the Taylorsville Road interchange and the Delaware River (Pennsylvania).

- **NSA 12:** Residences located along NJ Route 175, Maddock Drive, Scudder Road and Bernard Drive, as well as the Delaware and Raritan Canal State Park, all located north of I-95 between the Delaware River and the existing noise barrier along I-95 (New Jersey).

- **NSA 14:** The future retirement community located south of Scenic Drive and north of I-95 between the Bear Tavern Road interchange and the existing noise barrier along I-95 (New Jersey).

5. NOISE MEASUREMENT PROGRAM

Fifty-one (51) short term and six long-term measurements were performed during the preliminary analysis to validate the model. Typically, additional noise measurements are not required at this stage of a project. Nevertheless, short-term measurements were performed to supplement and reaffirm the updated model for the final design phase. These readings were 20 minutes in length and were taken along with concurrent traffic counts (as applicable) using an ANSI Type II noise meter. Calibration certificates are contained in Appendix A.

Measurements were taken at various times of the day but outside the typical rush hour periods because of the extensive stop and go queuing conditions. Existing short-term measured noise levels are summarized and validated in Table 3, with field measurement sheets contained in Appendix B. Where traffic was not visible, existing traffic volumes were used to validate the sites. Measured versus modeled noise levels were within the acceptable 3 dBA for all sites. Existing L_{eq} noise levels at measurement sites ranged from 53 to 72 dBA (rounded).

6. NOISE MODELING PARAMETERS

To predict worst-case existing and future noise levels and to evaluate noise abatement options, the FHWA's Traffic Noise Model (FHWA TNM), Version 2.5, was used. The FHWA TNM predicts noise levels at specific sites based on traffic volume, roadway design and topographic data. Traffic data used for prediction of existing and future (year 2030) noise levels for both the Build and No-Build alternatives is the same used and approved in the previous study and can be found in the TNM input/output files that will be provided to DRJBTC on CD-ROM upon conclusion of the analysis.

Additionally, the updated analysis included the input of individual lane links into the model per recommended FHWA TNM modeling procedures. Previous procedures had allowed the use of multiple lanes to be modeled with one link, but current practice is to model individual links. FHWA does allow for two lanes to be modeled with one link; however, the proposed project was modeled as one lane per link to be consistent throughout the project area and to provide a more accurate analysis result.

Table 3: Existing Measured and Modeled Short-Term Noise Levels (dBA)

Site	Time Period	Date	Location	Measured Sound Level	Modeled Leq	Difference
1	10:45 – 11:05 AM	4/16/15	Hampton Inn Suites, Yardley Newtown Road	69.6	69.0	0.6
2	12:15 – 12:35 PM	4/16/15	Jockey's Way/Colts Lane	54.4	52.5	1.9
3	12:50 – 1:10 PM	4/16/15	Jockey's Lane	61.9	63.0	1.1
4	2:30 – 2:50 PM	4/16/15	Jacob Drive/Brentwood Road	53.1	54.6	1.5
5	3:00 – 3:20 PM	4/16/15	Brentwood Road	60.2	61.0	0.8
6	3:30 – 3:50 PM	4/16/15	Brentwood Road	59.3	61.0	1.7
7	10:15 – 10:35 AM	4/27/15	Bartlett Court	53.5	56.2	2.7
8	12:05 – 12:25 PM	4/27/15	Upper Hilltop Road	70.0	71.6	1.6
9	1:10 – 1:30 PM	4/27/15	Towpath North of I-95	64.4	66.8	2.4
10	1:35 – 1:55 PM	4/27/15	Towpath South of I-95	63.5	65.1	1.6
11	2:15 – 2:35 PM	4/27/15	Upton Lane	56.3	58.7	2.4
12	3:03 – 3:25 PM	4/27/15	Lower Hilltop Road	71.7	73.3	1.6
13	3:45 – 4:05 PM	4/27/15	Heller Drive	64.3	62.1	2.2
14	10:15 – 10:35 AM	4/28/15	Dollington Road	59.5	57.7	1.8
15	10:55 – 11:15 AM	4/28/15	Quarry Road	65.5	66.3	0.8
16	12:00 – 12:20 PM	4/28/15	Quarry Road at Playground	59.0	56.5	2.5
17	2:00 – 2:20 PM	4/28/15	Maple Drive	57.0	58.2	1.2
18	10:15 – 10:35 AM	4/29/15	Patterson Lane	54.7	57.7	3.0
19	2:00 – 2:20 PM	4/29/15	Northeast of River Road	67.7	69.3	1.6
20	3:15 – 3:35 PM	4/29/15	Beckett Court	60.2	61.0	0.8

SOURCE: Michael Baker International, April, 2015.

7. EVALUATION OF NOISE IMPACTS AND MITIGATION POTENTIAL

The predicted increases in noise for the future Build Alternative as compared to existing conditions range from 0–5 dBA for the worst-case noise conditions, with most of the sites increasing by 2–3 dBA over the existing conditions.

Updated PennDOT Criteria: Based on the most recent 23 CFR 772 update and PennDOT policy changes reflected in Publication 24, Project Level Highway Traffic Noise Handbook (effective December 12, 2013), feasible noise barriers must achieve a noise reduction of at least 5 dBA at the majority (50%$^{+}$) of impacted receptor units.

PennDOT's noise barrier cost reasonableness value is based upon a Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 2,000. This MaxSF/BR criterion shall be applied statewide as part of the noise barrier reasonableness determination process for all types of projects. It replaces the previously used "Cost per Benefited Receptor" criteria.

In determining the "Square Footage Per Benefited Receptor (SF/BR)" value during the reasonableness evaluation of any analyzed barrier, the square footage (SF) of a barrier shall be based upon its length and its height from the finished ground elevation at the base of the barrier to its top elevation (acoustical profile line). However, if the noise barrier will sit on top of a retaining wall, bridge parapet, Jersey barrier, or similar feature and this feature is modeled as a noise barrier in the analysis of the "No Barrier" case, then the base elevation of the noise barrier should be considered the top elevation of the supporting structure.

In determining "Benefited Receptor (BR)" values, count any receptor receiving 5 dBA or greater insertion loss (I.L.) as being benefited.

Updated NJDOT Criteria: Based on the most recent 23 CFR 772 update and NJDOT policy changes reflected in the Traffic Noise Management Policy and Noise Wall Design Guidelines (effective July 1, 2011), the noise reduction goal shall be to obtain a 7 dBA noise reduction to at least one-half of the first row of residences or the closest area of human use of a noise sensitive area while maintaining the following:

(1) A minimum of 5 dBA reduction is necessary to at least one-half of the first row of impacted residences or the closest area of human use of a noise sensitive impacted area for a barrier to be approved.

(2) The design goal of a barrier system will be to achieve the above noise reductions with a wall height that should not exceed 20 feet (6.0 m).

The Department will consider a cost of up to $50,000 per residential dwelling to be cost effective based on the total cost of the noise barrier. Each proposed barrier will be considered individually. Severe noise impacts, with absolute noise levels above 76 dBA or a 20 dBA increase over existing, will be given additional consideration (up to $55,000 per dwelling) when evaluating cost effectiveness. Dwellings that receive a 5 dBA reduction but are not impacted by

noise will be considered as Supplemental Benefits through a one half weighting ($25,000 per residential dwelling) in the cost effective evaluation.

Based on a review of recent projects that contained noise barriers (year 2010), $70 per square foot shall be used for barriers being incorporated into highway projects (type I), and $90 per square foot shall be used for noise barrier with a sound absorbing treatment. These costs may change as necessary as part of the periodic review of barrier cost which takes place at least once every five years.

DRJBTC Project Criteria: Based on the initial public involvement process and public input received at the community meetings, the DRJBTC decided to offer noise abatement areas which were not warranted, feasible and reasonable under PennDOT and NJDOT criteria. The DRJBTC has established a project criteria that provides, at a minimum, a 5 dBA sound level reduction for the majority (50%$^{+}$) of first row impacted receivers, and noise barrier height not to exceed 18 feet, as applicable. The 18 foot high maximum was based on the previous NJDOT policy. The current policy allows for a maximum of 20 feet. However, the analysis results did not indicate a need to go beyond 18 feet. Therefore, the 20 feet maximum height change was not applied.

A discussion of noise impacts and proposed abatement is presented below for each NSA. The respective tables and figures for each grouping are shown immediately after the entire NSA analysis. All of the walls discussed below are proposed for construction at this time.

The tables identify the impacted receptors, the first row receptors, the benefited receptors and the details of the DRJTBC, PennDOT and NJDOT noise abatement criteria. The figures show the location of the noise sensitive receptors (both existing and proposed) as well as the current locations of the proposed noise barriers. The figures also indicate (by color code) which receptors are 1) impacted and benefited (green, 5 dBA or more reduction); 2) not impacted but still benefited (blue, 5 dBA or more reduction); 3) not impacted and not benefited (white, less than a 5 dBA reduction), and; 4) impacted but not benefited (red, less than a 5 dBA reduction).

NSA 3 & NSA 6 (Table 4 and Figure 4): When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible and reasonable. The NSA 3 wall section is approximately 1,803 feet long with an average height of 12.3 feet. The NSA 6 wall section is approximately 756 feet long with an average height 7.9 feet. The total barrier square footage is 28,000 and the number of benefited receptors is 14. The square footage per benefited rector is 2,000, which meets the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 9 and the number of benefited impacted first row receptors is 9. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

NSA 4 (Table 5 and Figure 4): Based on the preliminary analysis, the mitigation in this area was initially proposed to incorporate a 50 inch high “glarescreen” combined with a traditional noise barrier. For engineering reasons, the mitigation is now proposed to incorporate a single traditional noise barrier for its entire proposed length with no glarescreen.

When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 4 wall is approximately 2,340 feet long with an average height of 13 feet. The total barrier square footage is 30,505 and the number of benefited receptors is 7. The square footage per benefited rector is 4,358, which exceeds the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 5 and the number of benefited impacted first row receptors is 5. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

NSA 6 and NSA 8 Main

Scheme 1 (Table 6 and Figures 5 and 6): The proposed noise barrier for Scheme 1 traverses nearly the entire area/length of NSAs 6 and 8 as shown in the Environmental Assessment. When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 6/8 wall is approximately 5,237 feet long with an average height of 12.6 feet. The total barrier square footage is 66,197 and the number of benefited receptors is 31. The square footage per benefited rector is 2,135, which is just above the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 11 and the number of benefited impacted first row receptors is 11. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

Scheme 2 (Table 7 and Figures 5 and 7): The proposed noise barrier for Scheme 2 traverses the entire area/length of NSA 6. It then continues to traverse east across the NSA 8 area, ending at a point along the east bound off-ramp to Taylorsville Road, as the ramp turns toward the southeast. This scheme was analyzed because many of the residences on the east side of NSA 8 near the interchange are not impacted because they sit far back enough or are over and back well past the top of slope.

When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 6/8 wall is approximately 4,319 feet long with an average height of 13.1 feet. The total barrier square footage is 56,428 and the number of benefited receptors is 23. The square footage per benefited rector is 2,453, which is above the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 11 and the number of benefited impacted first row receptors is 11. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

Although Scheme 2 adequately addresses noise mitigation with less barrier, Scheme 1 is recommended as it reflects the limits included in the approved Environmental Assessment and shared with the public.

NSA 7 (Table 8 and Figures 5 and 6): When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 7 south wall is approximately 1,118 feet long with an average height of 10 feet. The NSA 7 north wall is approximately 1,327 feet long with an average height 11.8 feet. The total barrier square footage is 26,833 and the number of benefited receptors is 11. The square footage per benefited rector is 2,439, which exceeds the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 6 and the number of benefited impacted first row receptors is 6. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

NSA 9 (Table 9 and Figure 8): When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible and reasonable. The NSA 9 wall is approximately 1,093 feet long with an average height of 11.2 feet. The total barrier square footage is 8,443 and the number of benefited receptors is 5. The square footage per benefited rector is 1,689, which is less than the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 4 and the number of benefited impacted first row receptors is 4. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

NSA 10 (Table 10 and Figure 9): When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible and reasonable. The NSA 10 wall is approximately 760 feet long with an average height of 11.6 feet. The total barrier square footage is 5,989 and the number of benefited receptors is 3. The square footage per benefited rector is 1,996, which is less than the maximum SF/BR of 2,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 3 and the number of benefited impacted first row receptors is 3. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

NSA 12 (Table 11 and Figure 10): Based on the previous analysis, the mitigation in this area was initially proposed to incorporate a 50 inch high "glarescreen" combined with a traditional noise barrier. For engineering reasons, the mitigation is now proposed to incorporate a single traditional noise barrier for its entire proposed length with no glarescreen.

When NJDOT criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 12 wall is approximately 1,743 feet long with an average height of 11.3 feet. The total number of <u>all</u> first row receptors is 4. The total number of <u>all</u> first row receptors receiving a 7 dBA or more design goal sound level reduction is 3. The first row receptors receiving a minimum 7 dBA reduction is 75%, which meets the minimum of 50%.

The total number of <u>impacted</u> first row receptors is 4. The total number of first row <u>impacted</u> receptors receiving a 5 dBA or more sound level reduction is 3. The impacted first row receptors

receiving a minimum 5 dBA reduction is 75%, which meets the minimum of 50%. The total barrier cost is approximately $1,314,880 and the weighted number of benefited receptors is 5. The cost per benefited receptor is $262,976, which exceeds the maximum criteria of $50,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 4 and the number of benefited impacted first row receptors is 3. The impacted first row receptors receiving a minimum 5 dBA reduction is 75%, which meets the minimum of 50%.

NSA 14 (Table 12 and Figure 11): When NJDOT criteria are applied, the noise barrier system was determined to be feasible but not reasonable. The NSA 14 wall is approximately 1,499 feet long with an average height of 15.1 feet. The total number of all first row receptors is 14. The total number of all first row receptors receiving a 7 dBA or more design goal sound level reduction is 13. The first row receptors receiving a minimum 7 dBA reduction is 93%, which meets the minimum of 50%.

The total number of impacted first row receptors is 14. The total number of first row impacted receptors receiving a 5 dBA or more sound level reduction is 14. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%. The total barrier cost is approximately $1,580,178 and the weighted number of benefited receptors is 24. The cost per benefited receptor is $65,028, which exceeds the maximum criteria of $50,000.

When DRJTBC project criteria are applied, the recommended noise barrier system was determined to be feasible. The total number of impacted first row receptors is 14 and the number of benefited impacted first row receptors is 14. The impacted first row receptors receiving a minimum 5 dBA reduction is 100%, which meets the minimum of 50%.

Table 4: NSA 3 and 6 Sound Levels

NSA 3 & 6 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
3	3-1	1710 Clydesdale Circle	68	69	71	3	65	6
	3-2	1225 Shetland Court	62	63	64	2	59	5
	3-3A	1673 Quarry Road (Playground)	55	56	58	3	56	2
	3-3B	1673 Quarry Road (Ballfield)	55	56	57	2	54	3
	3-4	1728 Clydesdale Circle	61	62	64	3	63	1
	3-5	1702 Clydesdale Circle	65	66	67	2	62	5
	3-6	1209 Shetland Court	67	68	70	3	61	9
	3-7	1217 Shetland Court	65	66	67	2	60	7
	3-8	1686 Clydesdale Circle (2 homes)	58	59	61	3	57	4
	3-9	Clydesdale Circle	68	68	70	2	64	6
	3-10	Shetland Court	65	66	68	3	62	6
	3-11	Shetland Court	67	68	70	3	62	8
	3-12	Shetland Court	67	68	70	3	61	9
	3-13	Shetland Court	62	63	65	3	59	6
	3-14	Shetland Court	59	60	61	2	56	5
	3-15	Shetland Court (2 homes)	59	60	62	3	57	5
	3-16	Clydesdale Circle (2 homes)	60	61	63	3	60	3
6	6-1	1660 Quarry Road	66	68	70	4	63	7
	6-10	1660 Quarry Road	60	61	63	3	61	2
	6-13	Quarry Road	59	60	62	3	59	3
	6-14	Quarry Road	57	58	60	3	59	1

RECOMMENDED BARRIER DETAILS: DRJBTC		
Total Receptors Impacted	9	
Number of Impacted First Row Receptors	9	
Impacted First Row Residential Units Receiving > 5 dBA IL	9	
Percent of Impacted First Row Units Receiving > 5 dBA IL	100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes	
RECOMMENDED BARRIER DETAILS: PennDOT		
Barrier Area (ft2)	28,000	
Total Number of Benefited Receptors	14	
Square Footage Per Benefited Receptor (SF/BR)	2,000	
Meets Max SF/BR value of 2,000 ft2?	Yes	
Barrier Reasonable from a SF/BR Standpoint?	Yes	
Total Barrier Length (ft)	NSA 3 - 1803	NSA 6 - 756
Barrier Height Range (min/max from base elevation) (ft)	NSA 3 - 10/14	NSA 6 - 6/10
Average Barrier Height from base elevation (ft)	NSA 3 - 12.3	NSA 6 - 7.9

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

		Barrier Recommended?
	Impacted Receptors	Yes
	Impacted Receptors Receiving IL >= 5 dBA	
	Front Row Receptor	

Table 5: NSA 4 Sound Levels

NSA 4 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
4	4-2	Jockey's Way	60	60	62	2	60	2
	4-3	Jockey's Way	65	65	67	2	62	5
	4-4	Patterson Lane	66	67	69	3	64	5
	4-5	Jockey's Way (2 homes)	59	60	62	3	59	3
	4-6	Jockey's Way	62	63	66	4	61	5
	4-7	Jockey's Way	62	63	65	3	60	5
	4-8	Jockey's Way (3 homes)	58	59	60	2	58	2
	4-9	Jockey's Way	63	64	65	2	61	4
	4-10	Jockey's Way	65	66	68	3	62	6
	4-11	Jockey's Way	64	64	66	2	61	5
	4-12	Jockey's Way	63	63	65	2	60	5
RECOMMENDED BARRIER DETAILS: DRJBTC								
Total Receptors Impacted							5	
Number of Impacted First Row Receptors							5	
Impacted First Row Residential Units Receiving > 5 dBA IL							5	
Percent of Impacted First Row Units Receiving > 5 dBA IL							100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)							Yes	
RECOMMENDED BARRIER DETAILS: PennDOT								
Barrier Area (ft2)							30,505	
Total Number of Benefited Receptors							7	
Square Footage Per Benefited Receptor (SF/BR)							4,358	
Meets Max SF/BR value of 2,000 ft2?							No	
Barrier Reasonable from a SF/BR Standpoint?							No	
Total Barrier Length (ft)							2,340	
Barrier Height Range (min/max from base elevation) (ft)							8/14	
Average Barrier Height from base elevation (ft)							13.0	
NOTES:								
dBA = Decibels on the A-weighted scale								
Leq = Equivalent sound level (peak hour)								
1. All sound levels are rounded off to the nearest whole number								
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)								
3. Parapet height is not counted in the total barrier square footage calculation								
							Barrier Recommended?	
	Impacted Receptors						**Yes**	
	Impacted Receptors Receiving IL >= 5 dBA							
	Front Row Receptor							

Figure 4: NSA 3/6 & 4 Receptor Locations, Impacts, Benefits, Proposed Barrier Locations

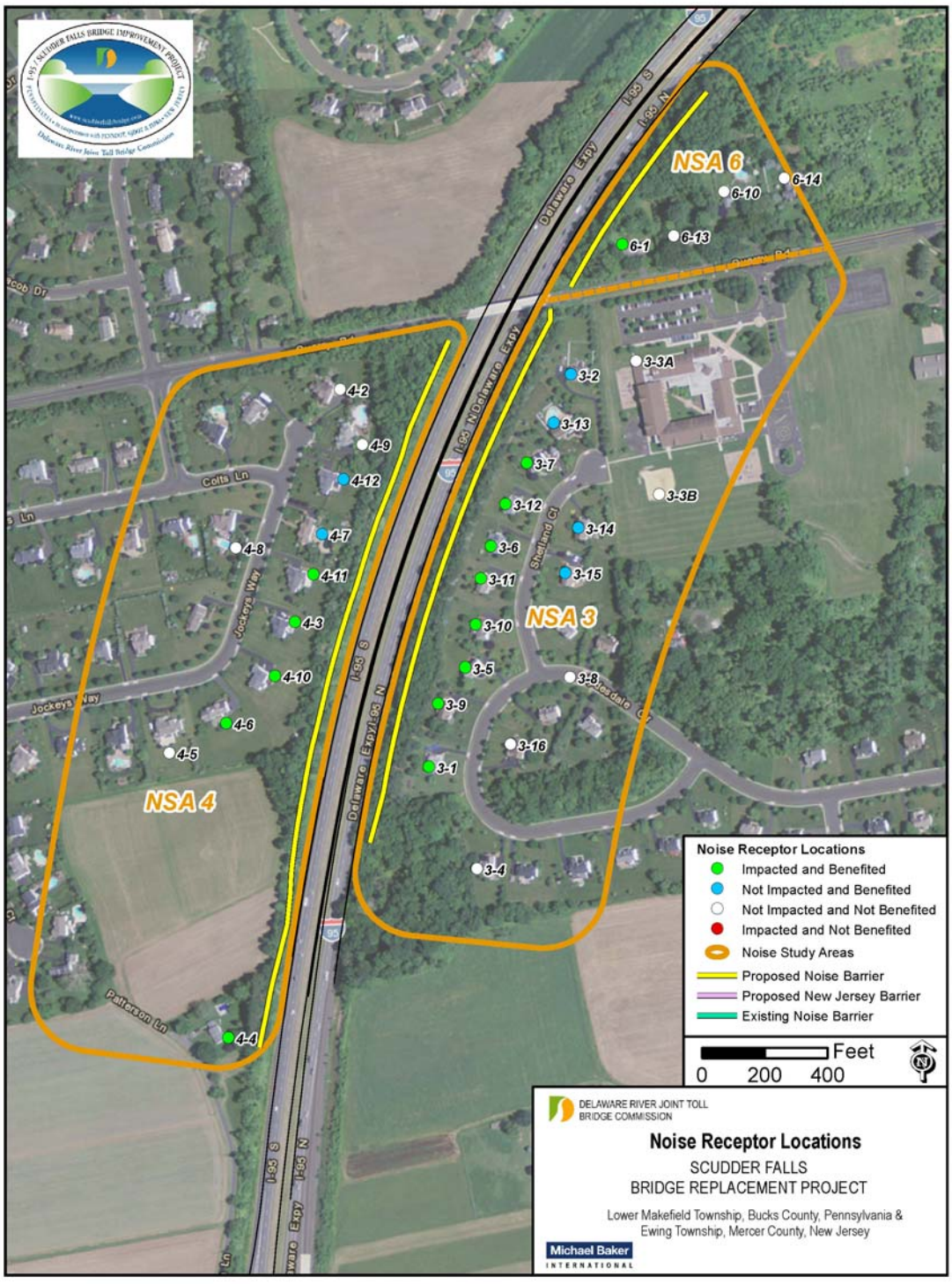


Table 6: NSA 6 and 8 Sound Levels (Scheme 1)

NSA 6 & 8 Full Length Option 1- EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
6	6-3	1524 Miller Place	60	61	63	3	58	5
	6-4	1330 Heller Drive (2 homes)	68	68	71	3	63	8
	6-5	1350 Heller Drive	58	59	61	3	57	4
	6-6	1512 Miller Place	65	66	69	4	60	9
	6-7	1506 Miller Place	65	66	68	3	60	8
	6-8	1358 Heller Drive	58	59	61	3	57	4
	6-9	1342 Heller Drive	64	65	68	4	60	8
	6-11	1368 Heller Drive (3 homes)	55	56	58	3	55	3
	6-12	1327 Heller Drive (6 homes)	56	57	60	4	56	4
	6-15	Miller Place	59	60	62	3	57	5
	6-16	Heller Drive	57	58	60	3	57	3
	6-17	Heller Drive	61	62	64	3	58	6
	6-18	Heller Drive	63	64	67	4	60	7
	6-19	Heller Drive	66	67	70	4	62	8
8	8-1	37 Lower Hilltop Road	74	75	76	2	65	11
	8-2	29 Concord Lane	65	67	69	4	61	8
	8-3	4 Upton Lane (4 homes)	56	57	57	1	55	2
	8-4	14 Upton Lane (3 homes)	62	63	65	3	60	5
	8-5	32 Lower Hilltop Road	66	67	70	4	63	7
	8-6	46 Highland Drive	56	57	60	4	55	5
	8-7	26 Upton Lane (2 homes)	60	62	63	3	57	6
	8-8	22 Upton Lane (3 homes)	61	62	64	3	57	7
	8-9	6 Highland Drive (2 homes)	60	61	62	2	61	1
	8-10	Concord Lane (2 homes)	59	60	61	2	56	5
	8-11	Concord Lane	63	64	66	3	59	7
	8-12	34 Lower Hilltop Road	71	72	74	3	64	10
	8-13	33 Lower Hilltop Road	63	64	67	4	61	6
	8-14	35 Lower Hilltop Road	67	68	71	4	64	7
	8-15	30 Lower Hilltop Road	61	63	65	4	60	5
	8-16	31 Lower Hilltop Road	60	61	64	4	59	5
	8-17	28 Lower Hilltop Road	59	60	63	4	59	4
	8-18	Highland Drive	59	60	62	3	57	5

RECOMMENDED BARRIER DETAILS: DRJBTC	
Total Receptors Impacted	14
Number of Impacted First Row Receptors	11
Impacted First Row Residential Units Receiving > 5 dBA IL	11
Percent of Impacted First Row Units Receiving > 5 dBA IL	100%
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes
RECOMMENDED BARRIER DETAILS: PennDOT	
Barrier Area (ft2)	66,197
Total Number of Benefited Receptors	31
Square Footage Per Benefited Receptor (SF/BR)	2,135
Meets Max SF/BR value of 2,000 ft2?	No
Barrier Reasonable from a SF/BR Standpoint?	No
Total Barrier Length (ft)	5,237
Barrier Height Range (min/max from base elevation) (ft)	10/16
Average Barrier Height from base elevation (ft)	12.6

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent sound level (peak hour)
1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

		Barrier Recommended?
	Impacted Receptors	Yes
	Impacted Receptors Receiving IL >= 5 dBA	
	Front Row Receptor	

Table 7: NSA 6 and 8 Sound Levels (Scheme 2)

NSA 6 & 8 Partial Design Option 2- EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
6	6-3	1524 Miller Place	60	61	63	3	58	5
	6-4	1330 Heller Drive (2 homes)	68	68	71	3	63	8
	6-5	1350 Heller Drive	58	59	61	3	57	4
	6-6	1512 Miller Place	65	66	69	4	60	9
	6-7	1506 Miller Place	65	66	68	3	60	8
	6-8	1358 Heller Drive	58	59	61	3	57	4
	6-9	1342 Heller Drive	64	65	68	4	60	8
	6-11	1368 Heller Drive (3 homes)	55	56	58	3	55	3
	6-12	1327 Heller Drive (6 homes)	56	57	60	4	56	4
	6-15	Miller Place	59	60	62	3	57	5
	6-16	Heller Drive	57	58	60	3	57	3
	6-17	Heller Drive	61	62	64	3	58	6
	6-18	Heller Drive	63	64	67	4	60	7
	6-19	Heller Drive	66	67	70	4	62	8
8	8-1	37 Lower Hilltop Road	74	75	76	2	65	11
	8-2	29 Concord Lane	65	67	69	4	61	8
	8-3	4 Upton Lane (4 homes)	56	57	57	1	55	2
	8-4	14 Upton Lane (3 homes)	62	63	65	3	64	1
	8-5	32 Lower Hilltop Road	66	67	70	4	63	7
	8-6	46 Highland Drive	56	57	60	4	55	5
	8-7	26 Upton Lane (2 homes)	60	62	63	3	60	3
	8-8	22 Upton Lane (3 homes)	61	62	64	3	62	2
	8-9	6 Highland Drive (2 homes)	60	61	62	2	62	0
	8-10	Concord Lane (2 homes)	59	60	61	2	56	5
	8-11	Concord Lane	63	64	66	3	60	6
	8-12	34 Lower Hilltop Road	71	72	74	3	64	10
	8-13	33 Lower Hilltop Road	63	64	67	4	61	6
	8-14	35 Lower Hilltop Road	67	68	71	4	64	7
	8-15	30 Lower Hilltop Road	61	63	65	4	60	5
	8-16	31 Lower Hilltop Road	60	61	64	4	59	5
	8-17	28 Lower Hilltop Road	59	60	63	4	59	4
	8-18	Highland Drive	59	60	62	3	57	5

RECOMMENDED BARRIER DETAILS: DRJBTC	
Total Receptors Impacted	14
Number of Impacted First Row Receptors	11
Impacted First Row Residential Units Receiving > 5 dBA IL	11
Percent of Impacted First Row Units Receiving > 5 dBA IL	100%
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes
RECOMMENDED BARRIER DETAILS: PennDOT	
Barrier Area (ft2)	56,428
Total Number of Benefited Receptors	23
Square Footage Per Benefited Receptor (SF/BR)	2,453
Meets Max SF/BR value of 2,000 ft2?	No
Barrier Reasonable from a SF/BR Standpoint?	No
Total Barrier Length (ft)	4,319
Barrier Height Range (min/max from base elevation) (ft)	10/16
Average Barrier Height from base elevation (ft)	13.1

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

		Barrier Recommended?
	Impacted Receptors	Yes
	Impacted Receptors Receiving IL >= 5 dBA	
	Front Row Receptor	

Table 8: NSA 7 Sound Levels

NSA 7 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
7	7-1	42 Upper Hilltop Road	74	74	76	2	65	11
	7-2	1398 Dolington Road	68	69	70	2	64	6
	7-3	1513 Pownal Drive	62	63	64	2	60	4
	7-4	1445 Bartlett Court	59	59	61	2	59	2
	7-5	1525 Pownal Drive	61	62	64	3	61	3
	7-6	1517 Pownal Drive	64	65	67	3	61	6
	7-7	1507 Pownal Drive	57	57	60	3	59	1
	7-8	1451 Bartlett Court	57	57	58	1	57	1
	7-9	49 Upper Hilltop Road	58	58	60	2	59	1
	7-10	45 Upper Hilltop Road	64	64	66	2	61	5
	7-11	59 Upper Hilltop Road	71	72	74	3	64	10
	7-13	Pownal Drive	63	63	65	2	61	4
	7-14	Pownal Drive	63	63	65	2	61	4
	7-15	Pownal Drive	64	65	67	3	62	5
	7-16	Pownal Drive	64	65	67	3	61	6
	7-17	Pownal Drive	61	62	64	3	61	3
	7-18	Pownal Drive	60	60	62	2	61	1
	7-19	Upper Hilltop Road	61	61	63	2	60	3
	7-20	Bartlett Court	57	58	59	2	58	1
	7-21	Bartlett Court	58	58	60	2	58	2
	7-22	Bartlett Court	56	56	58	2	56	2
	7-23	Upper Hilltop Road	67	67	69	2	63	6
	7-24	Upper Hilltop Road	69	69	72	3	63	9
	7-25	Upper Hilltop Road	65	65	68	3	62	6
	7-26	Upper Hilltop Road	63	62	65	2	60	5

RECOMMENDED BARRIER DETAILS: DRJBTC		
Total Receptors Impacted	10	
Number of Impacted First Row Receptors	6	
Impacted First Row Residential Units Receiving > 5 dBA IL	6	
Percent of Impacted First Row Units Receiving > 5 dBA IL	100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes	
RECOMMENDED BARRIER DETAILS: PennDOT		
Barrier Area (ft2)	26,833	
Total Number of Benefited Receptors	11	
Square Footage Per Benefited Receptor (SF/BR)	2,439	
Meets Max SF/BR value of 2,000 ft2?	No	
Barrier Reasonable from a SF/BR Standpoint?	No	
Total Barrier Length (ft)	South-1118	North-1327
Barrier Height Range (min/max from base elevation) (ft)	South-10/10	North-10-14
Average Barrier Height from base elevation (ft)	South-10	North-11.8

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

		Barrier Recommended?
	Impacted Receptors	Yes
	Impacted Receptors Receiving IL >= 5 dBA	
	Front Row Receptor	

Figure 5: NSA 6/8 & 7 Receptor Locations, Impacts, Benefits, Proposed Barrier Locations (West)

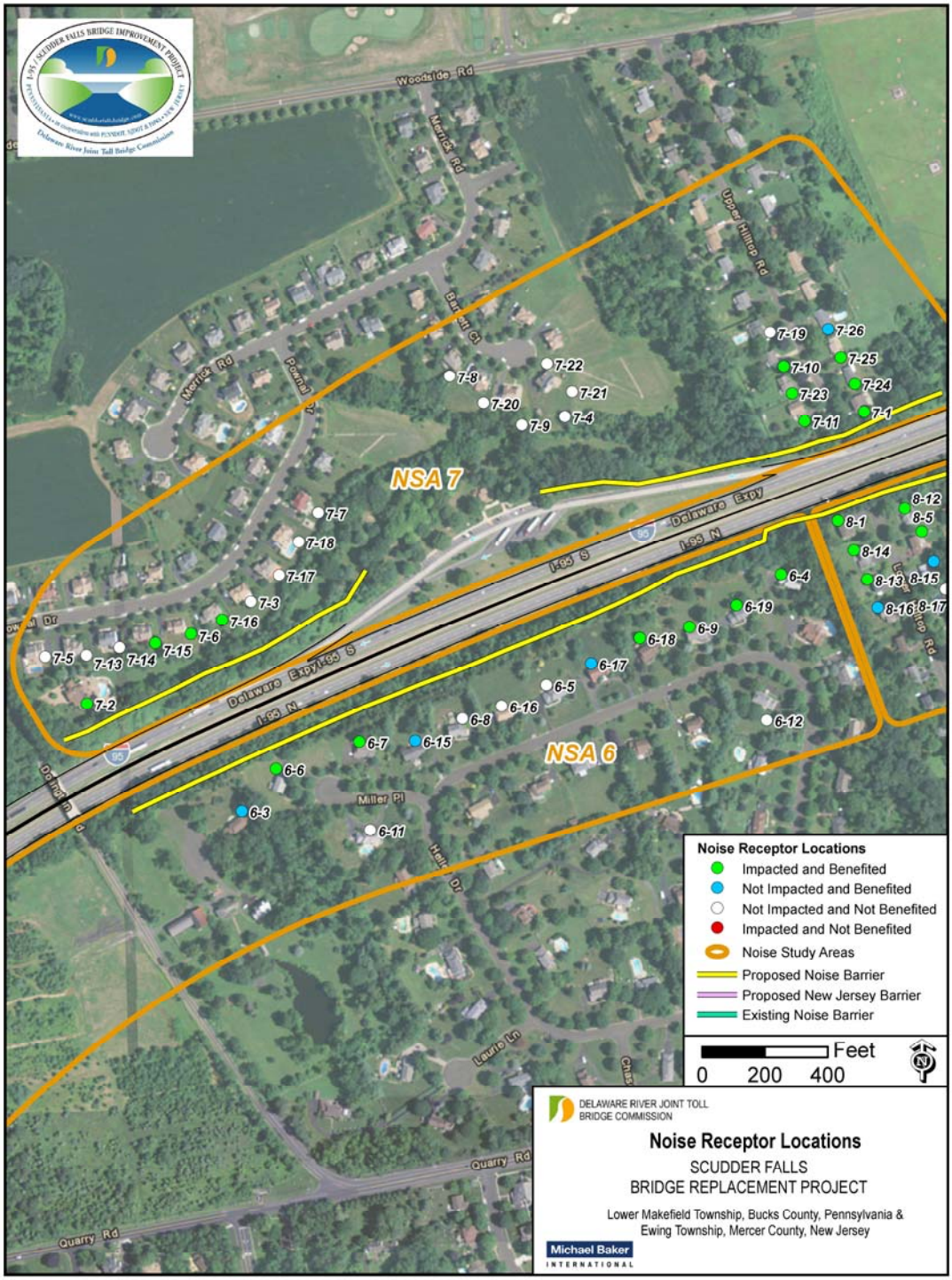


Figure 6: NSA 6/8 & 7 Receptor Locations, Impacts, Benefits, Proposed Barrier Locations (East)

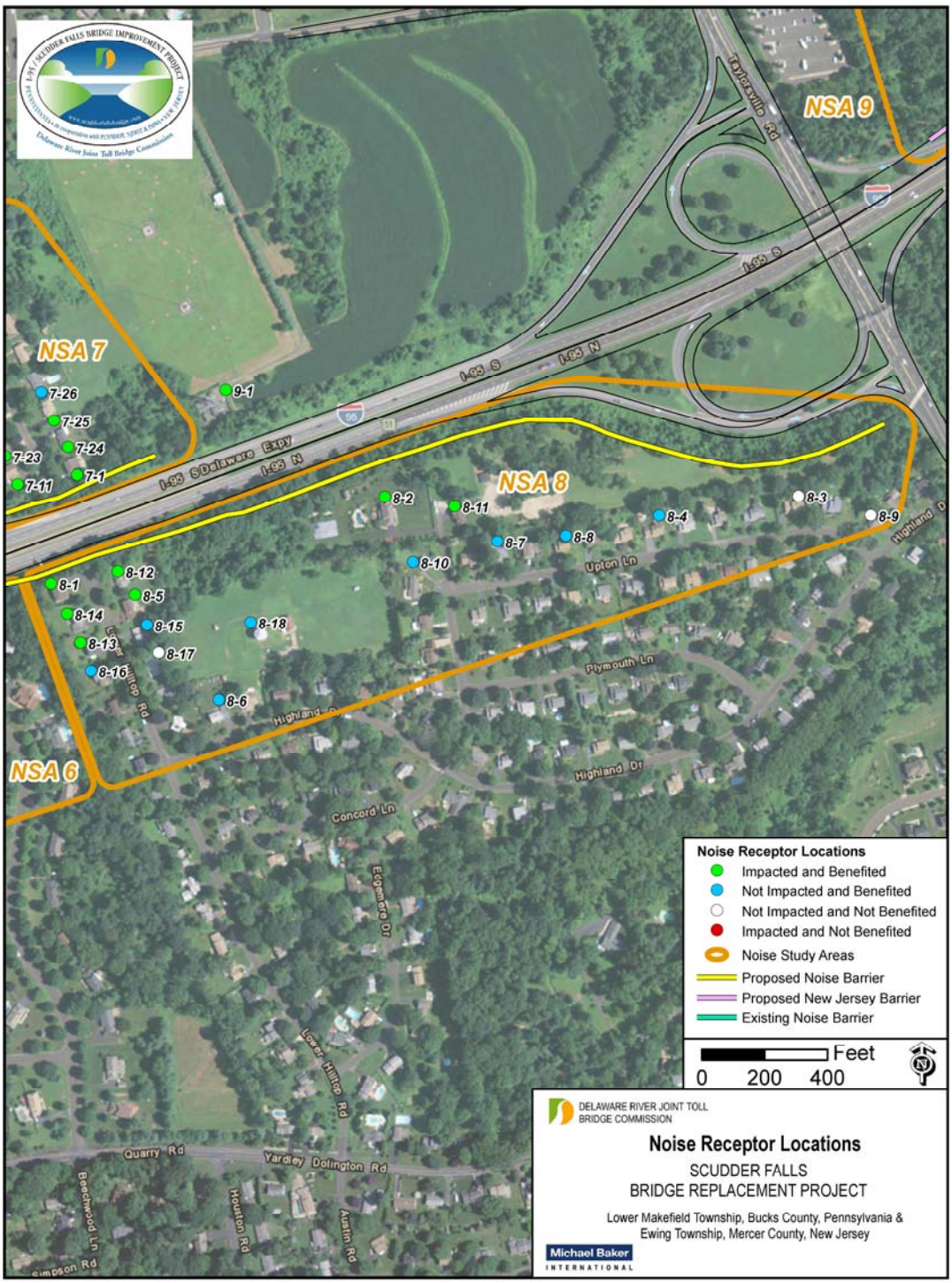


Figure 7: NSA 6 & 8 (Scheme 2) Receptor Locations, Impacts, Benefits, Proposed Barrier Location (East)

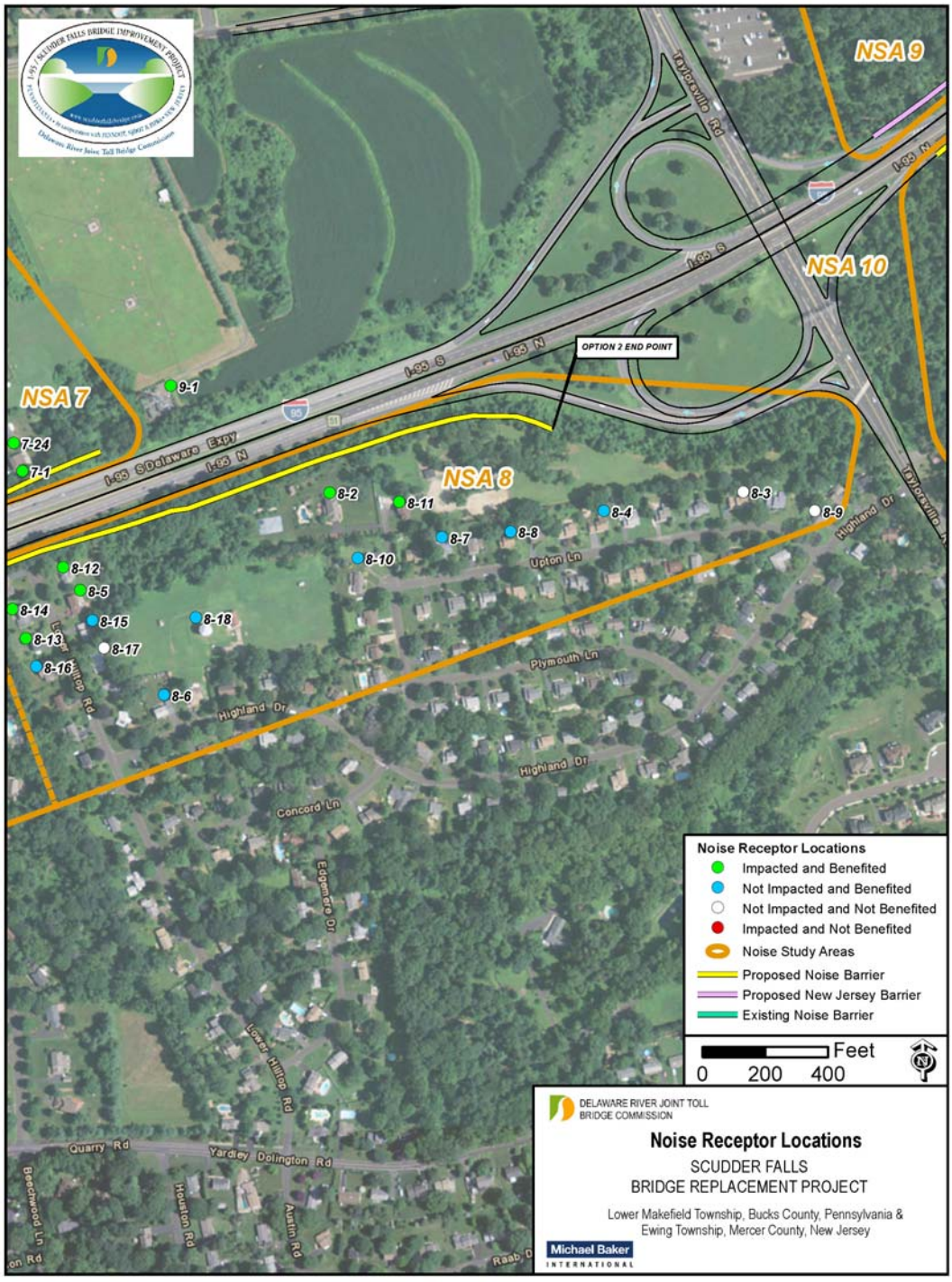


Table 9: NSA 9 Sound Levels

NSA 9 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
9	R9-5	1149 Woodside Road	65	65	68	3	62	6
	R9-6	1509 North River Road	67	67	69	2	63	6
	TP2N	Canal Towpath	66	66	69	3	64	5
	R9-3	1167 Woodside Road	65	66	68	3	65	3
	R9-4	1510 North River Road	67	68	70	3	65	5
	R9-7	1525 North River Road	66	66	68	2	64	4
	R9-8	North River Road	63	63	66	3	63	3
	R9-9	Woodside Road East of Canal	67	68	68	1	65	3
	R9-10	Woodside Road East of Canal	65	66	67	2	63	4
	R9-11	North River Road	64	65	67	3	63	4
	R9-12	North River Road	63	64	66	3	63	3
RECOMMENDED BARRIER DETAILS: DRJBTC								
Total Receptors Impacted							11	
Number of Impacted First Row Receptors							4	
Impacted First Row Residential Units Receiving > 5 dBA IL							4	
Percent of Impacted First Row Units Receiving > 5 dBA IL							100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)							Yes	
RECOMMENDED BARRIER DETAILS: PennDOT								
Barrier Area (ft2)							8,443	
Total Number of Benefited Receptors							5	
Square Footage Per Benefited Receptor (SF/BR)							1,689	
Meets Max SF/BR value of 2,000 ft2?							Yes	
Barrier Reasonable from a SF/BR Standpoint?							Yes	
Total Barrier Length (ft)							1,093	
Barrier Height Range (min/max from base elevation) (ft)							11/11.5	
Average Barrier Height from base elevation (ft)							11.2	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

* Receptor site representative of the Canal property for the reasonableness criteria variable

1. Values represent the highest modeled AM or PM peak hour traffic periods assuming free flow traffic speeds
2. All sound levels are rounded off to the nearest whole number, including the IL (may not match rounded sound level caluclations)
3. Parapet height is not counted in the total barrier square footage calculation

	Impacted Receptors	**Barrier Recommeded?**
	Impacted Receptors Receiving IL >= 5 dBA	**Yes**
	First Row Receptor	

Table 10: NSA 10 Sound Levels

NSA 10 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
10	10-2	32 Mapleview Drive	58	59	61	3	60	1
	10-3	1451 DeSantis Place	62	63	65	3	62	3
	10-4	1455 Robinson Place	64	66	68	4	64	4
	10-5	1479 River Road	67	68	68	1	63	5
	10-6	End of Robinson Place	66	67	68	2	63	5
	10-7	1473 River Road	65	66	68	3	65	3
	10-8	Robinson Place	64	65	67	3	65	2
	10-9	Robinson Place	61	62	65	4	62	3
	10-10	Mapleview Drive	60	60	62	2	61	1
	10-11	Robinson Place	60	61	63	3	62	1
	TP2S	Canal Towpath	67	68	69	2	63	6
RECOMMENDED BARRIER DETAILS: DRJBTC								
Total Receptors Impacted							6	
Number of Impacted First Row Receptors							3	
Impacted First Row Residential Units Receiving > 5 dBA IL							3	
Percent of Impacted First Row Units Receiving > 5 dBA IL							100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)							Yes	
RECOMMENDED BARRIER DETAILS: PennDOT								
Barrier Area (ft2)							5,989	
Total Number of Benefited Receptors							3	
Square Footage Per Benefited Receptor (SF/BR)							1,996	
Meets Max SF/BR value of 2,000 ft2?							Yes	
Barrier Reasonable from a SF/BR Standpoint?							Yes	
Total Barrier Length (ft)							760	
Barrier Height Range (min/max from base elevation) (ft)							7.5/12.5	
Average Barrier Height from base elevation (ft)							11.6	
NOTES:								
dBA = Decibels on the A-weighted scale								
Leq = Equivalent sound level (peak hour)								
1. All sound levels are rounded off to the nearest whole number								
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)								
3. Parapet height is not counted in the total barrier square footage calculation								
							Barrier Recommended?	
	Impacted Receptors						**Yes**	
	Impacted Receptors Receiving IL >= 5 dBA							
	Front Row Receptor							

Figure 8: NSA 9 & 10 Receptor Locations, Impacts, Benefits, Proposed Barrier Location

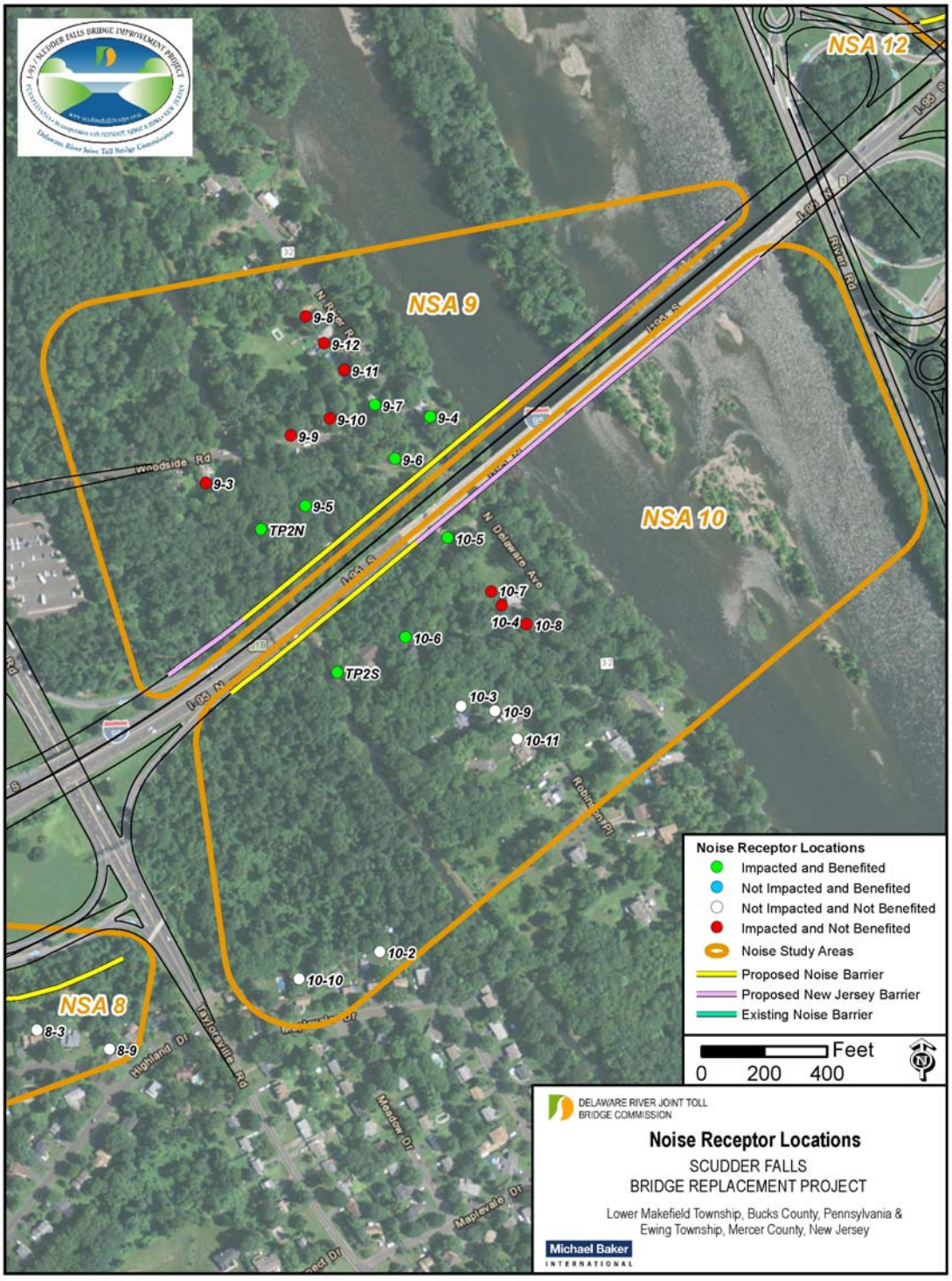


Table 11: NSA 12 Sound Levels

NSA 12 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
12	12-1	1048 River Road	71	72	76	5	65	11
	12-7	1064 River Road	64	65	68	4	65	3
	12-8	River Road	68	69	73	5	66	7
	12-9	River Road	71	71	72	1	65	7
	12-10	19 Scudder Drive	59	59	62	3	59	3
	12-11	River Road	66	67	71	5	66	5
	12-12	River Road	65	65	69	4	65	4
	12-13	River Road	62	63	66	4	64	2
	12-14	Maddock Drive (3 homes)	61	62	64	3	62	2
	12-15	Scudder Road	59	60	62	3	60	2
	12-16	Scudder Road	60	61	63	3	60	3
	12-17	Scudder Road	59	60	62	3	60	2
	Towpath	-	65	66	67	2	65	2

RECOMMENDED BARRIER DETAILS: DRJBTC		
Total Receptors Impacted	8	
Number of Impacted First Row Receptors	4	
Impacted First Row Residential Units Receiving > 5 dBA IL	3	
Percent of Impacted First Row Units Receiving > 5 dBA IL	75%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes	
RECOMMENDED BARRIER DETAILS: NJDOT		
Barrier Area (ft2)	18,784	
Barrier Cost	$1,314,880	
Total Receptors Impacted	8	
Number of First Row Receptors	4	
Number of First Row Receptors Receiving 7+ dBA IL	3	
Percent of First Row Receptors Receiving 7+ dBA IL	75%	
Meets 50% (or more) noise reduction goal?	Yes	
Number of Impacted First Row Receptors	4	
Number of Impacted First Row Receptors Receiving 5+ dBA IL	3	
Percent of First Row Receptors Receiving 5+ dBA IL	75%	
Meets 50% (or more) Criteria?	Yes	
	Actual #	Weighted #
Number of Impacted and Benefited Receptors (No adjustment)	3	3
Number of Non-Impacted but Benefited Receptors (0.5 weighted adjustment)	0	0
Number of Severe-Impacted Benefited Receptors (1.1 weighted adjustment)	1	2
Total Number of Benefited Receptors		5
Cost per Benefited Receptor	$262,976	
Meets $50,000 (or less) Criteria?	No	
Total Barrier Length (ft)	1,743	
Barrier Height Range (min/max from base elevation) (ft)	8/14	
Average Barrier Height from base elevation (ft)	11.3	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

	Barrier Recommended?
Impacted Receptors	**Yes**
Severe Noise Impacts (76+ dBA)	
Impacted Receptors Receiving IL 5-6 dBA	
Impacted Receptors Receiving IL >= 7 dBA	
Front Row Receptor	

Figure 9: NSA 12 Receptor Locations, Impacts, Benefits, Proposed Barrier Location

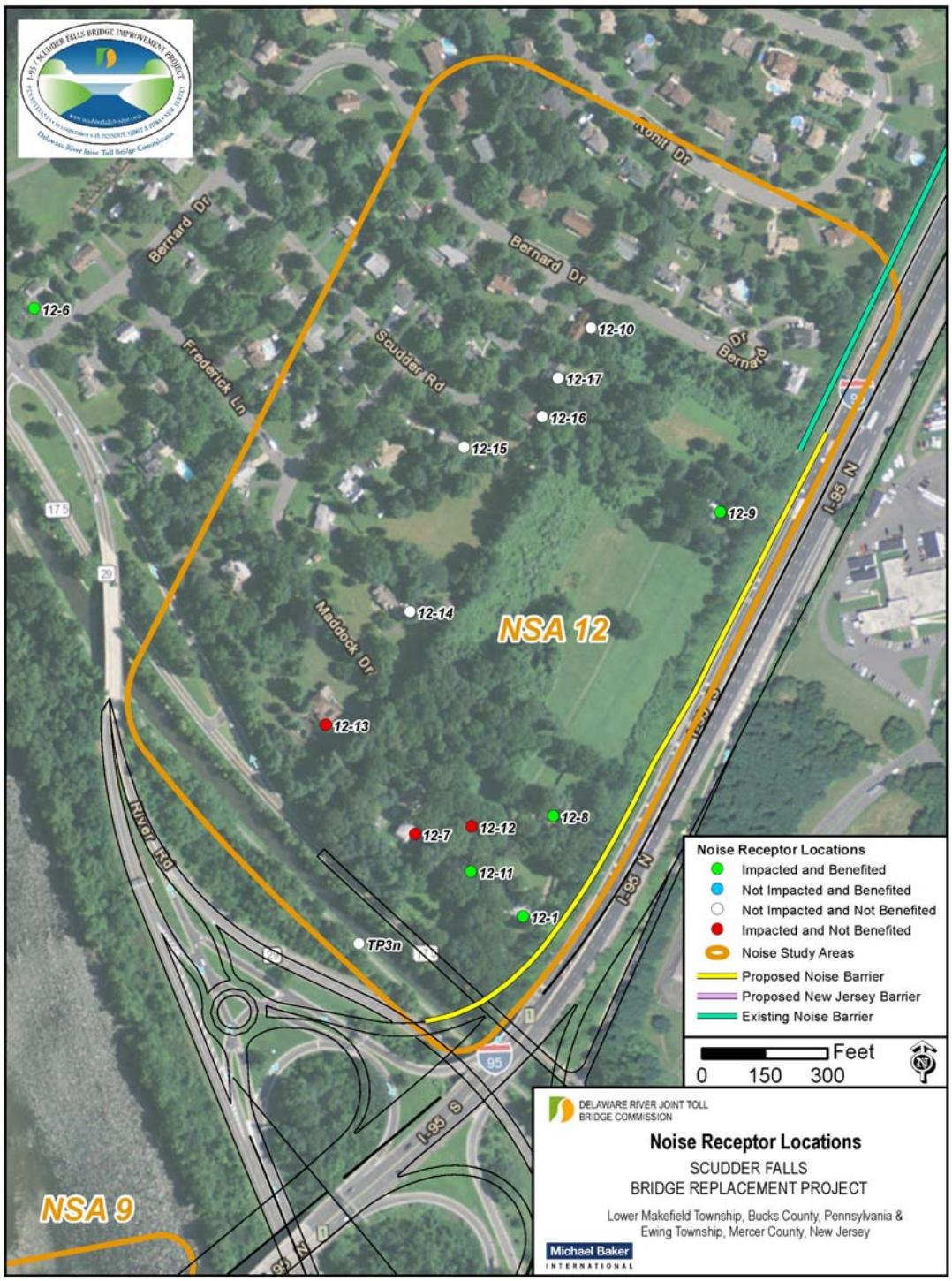


Table 12: NSA 14 Sound Levels

NSA 14 - EXISTING AND DESIGN YEAR SOUND LEVELS (dBA)								
Noise Study Area (NSA)	Receptor ID	Address	Existing	Design Year No-Build	Design Year Build (No Barrier)	Increase Over Existing	Design Year Build (with Recommended Barrier)	Insertion Loss (IL)
14	U1-1	Off of Scenic Drive	70	71	73	3	64	9
	U1-2	Off of Scenic Drive	69	70	71	2	63	8
	U1-3	Off of Scenic Drive	66	67	68	2	63	5
	U1-4	Off of Scenic Drive	66	67	68	2	62	6
	U2-1	Off of Scenic Drive	68	69	71	3	64	7
	U2-2	Off of Scenic Drive	64	65	66	2	61	5
	U2-3	Off of Scenic Drive	63	64	66	3	61	5
	U2-4	Off of Scenic Drive	67	68	69	2	63	6
	U3-1	Off of Scenic Drive	67	68	70	3	63	7
	U3-2	Off of Scenic Drive	63	64	65	2	60	5
	U3-3	Off of Scenic Drive	62	63	65	3	60	5
	U3-4	Off of Scenic Drive	67	67	69	2	62	7
	CTD-1	Off of Scenic Drive	63	63	65	2	59	6
	CTD-2	Off of Scenic Drive	61	62	63	2	58	5
	U5-1	Off of Scenic Drive	61	62	63	2	58	5
	U5-2	Off of Scenic Drive	59	60	61	2	57	4
	U6-1	Off of Scenic Drive	60	61	62	2	58	4
	U6-2	Off of Scenic Drive	59	60	61	2	56	5
	U7-1	Off of Scenic Drive	61	61	63	2	58	5
	U7-2	Off of Scenic Drive	59	60	61	2	57	4
	U7-3	Off of Scenic Drive	59	60	61	2	57	4
	U7-4	Off of Scenic Drive	61	62	63	2	58	5
	CTG-1	Off of Scenic Drive	59	60	61	2	57	4
	CTG-2	Off of Scenic Drive	58	58	59	1	56	3
	U10-1	Off of Scenic Drive	57	58	59	2	56	3
	U10-2	Off of Scenic Drive	56	57	58	2	55	3
	CTH-1	Off of Scenic Drive	56	56	58	2	56	2
	CTH-2	Off of Scenic Drive	55	56	57	2	55	2
	CTI-1	Off of Scenic Drive	55	56	58	3	56	2
	CTI-2	Off of Scenic Drive	55	56	57	2	55	2
	CTJ-1	Off of Scenic Drive	55	55	58	3	56	2
	U13-1	Off of Scenic Drive	59	60	60	1	58	2
	CTK-1	Off of Scenic Drive	59	59	60	1	58	2
	CTK-2	Off of Scenic Drive	55	56	58	3	57	1
	U15-1	Off of Scenic Drive	59	59	59	0	59	0
	U15-2	Off of Scenic Drive	55	55	58	3	57	1
	CTT-1	Off of Scenic Drive	62	62	63	1	62	1
	CTT-2	Off of Scenic Drive	59	59	60	1	59	1
	CTU-1	Off of Scenic Drive	62	63	63	1	62	1
	CTU-2	Off of Scenic Drive	60	60	61	1	60	1
	ST-1	Off of Scenic Drive	66	66	68	2	63	5
	CTV-1	Off of Scenic Drive	74	74	76	2	63	13
	CTV-2	Off of Scenic Drive	62	63	64	2	60	4
	CTW-1	Off of Scenic Drive	76	77	78	2	64	14
	CTW-2	Off of Scenic Drive	63	63	65	2	60	5
	CTX-1	Off of Scenic Drive	76	77	79	3	64	15
	CTX-2	Off of Scenic Drive	63	63	65	2	59	6

Table 13: NSA 14 Sound Levels (continued)

14	CTY-1	Off of Scenic Drive	71	71	73	2	63	10
	CTY-2	Off of Scenic Drive	63	63	65	2	59	6
	U31-1	Off of Scenic Drive	71	72	73	2	63	10
	U31-2	Off of Scenic Drive	66	67	68	2	61	7
	U31-3	Off of Scenic Drive	62	63	65	3	58	7
	U31-4	Off of Scenic Drive	67	68	69	2	62	7
	park-1	Off of Scenic Drive	59	60	61	2	57	4
	park-2	Off of Scenic Drive	58	59	60	2	57	3
	park-3	Off of Scenic Drive	60	61	61	1	58	3

RECOMMENDED BARRIER DETAILS: DRJBTC		
Total Receptors Impacted	18	
Number of Impacted First Row Receptors	14	
Impacted First Row Residential Units Receiving > 5 dBA IL	14	
Percent of Impacted First Row Units Receiving > 5 dBA IL	100%	
Barrier Feasible Based on 5 dBA Reduction DRJBTC Criteria? (majority of 1st row impacts)	Yes	
RECOMMENDED BARRIER DETAILS: NJDOT		
Barrier Area (ft2)	22,574	
Barrier Cost	$1,580,178	
Total Receptors Impacted	18	
Number of First Row Receptors	14	
Number of First Row Receptors Receiving 7+ dBA IL	13	
Percent of First Row Receptors Receiving 7+ dBA IL	93%	
Meets 50% (or more) noise reduction goal?	Yes	
Number of Impacted First Row Receptors	14	
Number of Impacted First Row Receptors Receiving 5+ dBA IL	14	
Percent of First Row Receptors Receiving 5+ dBA IL	100%	
Meets 50% (or more) Criteria?	Yes	
	Actual #	Weighted #
Number of Impacted and Benefited Receptors (No adjustment)	15	15
Number of Non-Impacted but Benefited Receptors (0.5 weighted adjustment)	12	6.0
Number of Severe-Impacted Benefited Receptors (1.1 weighted adjustment)	3	3.3
Total Number of Benefited Receptors		24
Cost per Benefited Receptor	$65,028	
Meets $50,000 (or less) Criteria?	No	
Total Barrier Length (ft)	1,499	
Barrier Height Range (min/max from base elevation) (ft)	8/18	
Average Barrier Height from base elevation (ft)	15.1	

NOTES:

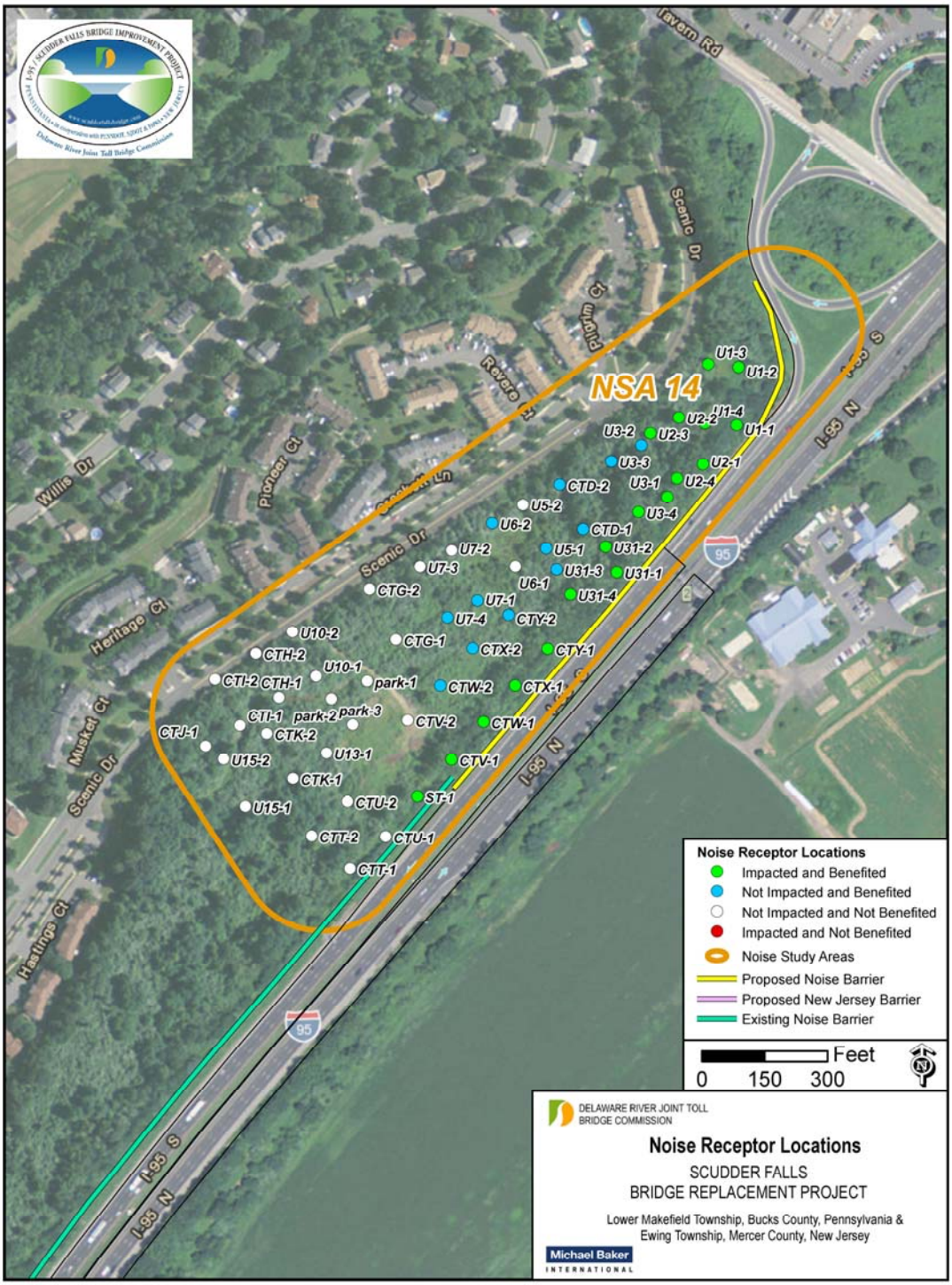
dBA = Decibels on the A-weighted scale

Leq = Equivalent sound level (peak hour)

1. All sound levels are rounded off to the nearest whole number
2. Barrier recommendation based on DRJTBC criteria for this project (5 dBA IL for the majority of 1st row impacted receptors)
3. Parapet height is not counted in the total barrier square footage calculation

	Barrier Recommended?
Impacted Receptors	**Yes**
Severe Noise Impacts (76+ dBA)	
Impacted Receptors Receiving IL 5-6 dBA	
Impacted Receptors Receiving IL >= 7 dBA	
Front Row Receptor	

Figure 10: NSA 14 Receptor Locations, Impacts, Benefits, Proposed Barrier Location



8. CONCLUSIONS

During this final design phase, the detailed optimization of barrier lengths, heights, and locations are being coordinated with the final design engineering process to insure compatibility with the desires of the DRJTBC in conjunction with the public involvement process.

This draft report currently incorporates recent changes suggested by the engineering design team as of approximately mid-June, 2015. It is expected that the iterative process will result in further design modifications which follow engineering guidelines regarding design items such as sloping, maintenance access, drainage, barriers on bridge structures, etc. At this time, these changes are not likely (though not guaranteed) to involve major modifications to the noise barrier locations in regards to the desired results for sound level reduction. Naturally, any changes will ultimately be approved by the DRJTBC.

Regardless, the noise barriers in NSAs 3, 4, 6, 7, 8, 9, 10, 12, and 14 are proposed to be carried forward to construction at this time. It is expected that during the public involvement and final design engineering process, changes will be made to the noise wall designs. Furthermore, community opinion may either modify, accept (as is) or reject the proposed barriers. Final decisions, of course, will be made with the approval of the DRJTBC.

APPENDIX A

CALIBRATION CERTIFICATES

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30886

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **4/3/2014**	*Cal Due:*
Model:	**407744**	*Status:*	**Received** / **Sent**
Manufacturer:	**Extech**	*In tolerance:*	X / X
Serial number:	**Z206457_H175429**	*Out of tolerance:*	
Class (IEC 60942):	**2**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	__Yes _X_ No
Barometer s/n:			

Customer:	**Michael Baker Jr., Inc.**	*Address:*	**100 Airside Drive,**
Tel/Fax:	**412-269-4644 /**		**Moon Township, PA 15108**

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
4938-Norsonic	SME Cal Unit	31061	Jul 18, 2013	Scantek, Inc./ NVLAP	Jul 18, 2014
DS-360-SRS	Function Generator	88077	Aug 30, 2012	ACR Env./ A2LA	Aug 30, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 3, 2013	ACR Env./ A2LA	Sep 3, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2014
140-Norsonic	Real Time Analyzer	1403978	Mar 21, 2014	Scantek, Inc. / NVLAP	Mar21, 2015
PC Program 1018 Norsonic	Calibration software	v.5.2	Validated March 2011	Scantek, Inc.	-
40AG-GRAS	Microphone	88484	May 1, 2013	Scantek, Inc. / NVLAP	May 1, 2014
1203-Norsonic	Preamplifier	92271	Oct 24, 2013	Scantek, Inc./ NVLAP	Oct 24, 2014

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

Calibrated by:	Mariana Buzduga	Authorized signatory:	Valentin Buzduga
Signature		Signature	
Date	4/3/2014	Date	4/4/2014

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Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30885

Instrument:	**Sound Level Meter**	*Date Calibrated:*	**4/3/2014** *Cal Due:*
Model:	**132**	*Status:*	**Received** / **Sent**
Manufacturer:	**Norsonic**	*In tolerance:*	X / X
Serial number:	**1322870**	*Out of tolerance:*	
Tested with:	**Microphone 1229 s/n 00529**	*See comments:*	
	Preamplifier	*Contains non-accredited tests:*	__Yes X No
Type (class):	**2**	*Calibration service:*	__ Basic X Standard
Customer:	**Michael Baker Jr., Inc.**	*Address:*	**100 Airside Drive,**
Tel/Fax:	**412-269-4644 /**		**Moon Township, PA 15108**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
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
4231-Norsonic	SME Cal Unit	31052	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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 °C	99.900 kPa	41.1 %RH

Calibrated by:	Lydon Dawkins	Authorized signatory:	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	4/4/2014	Date	4/4/2014

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Page 1 of 2

APPENDIX B

FIELD MEASUREMENT SHEETS

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

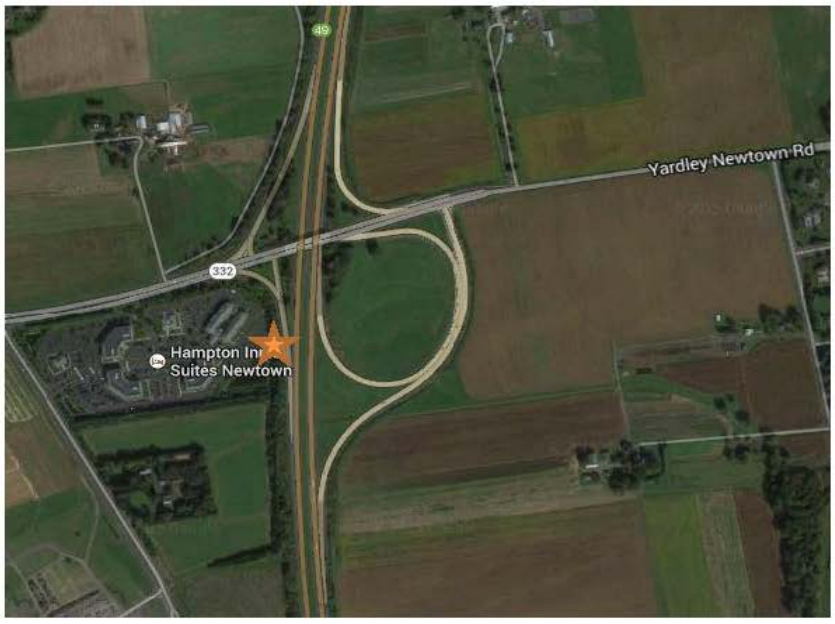
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: high 50's, partly sunny, <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	222	438
MED TRKS	22	22
HVY TRKS	22	43
DURATION	20 minutes	20 Minutes

DATE: 4/16/2015
SITE #: 1
START: 10:45 AM
END: 11:05 AM
LEQ: 69.6
SPEED: 65-70

SITE SKETCH



BACKGROUND NOISE: Birds in nearby tree
MAJOR SOURCES: I-95
UNUSUAL EVENTS: truck horn
OTHER NOTES:

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

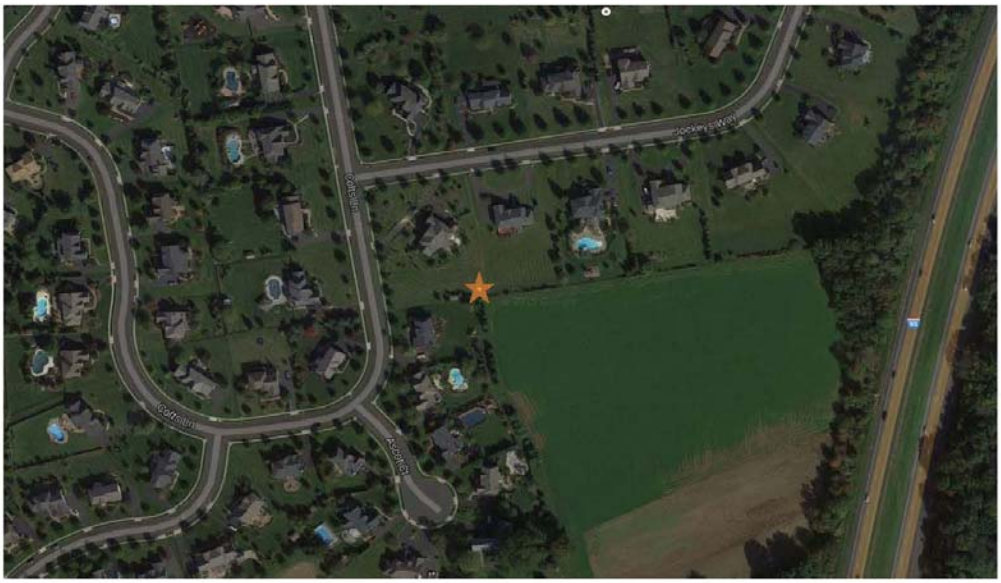
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 60s, partly sunny, <5 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	342	397
MED TRKS	16	16
HVY TRKS	21	37
DURATION	20 minutes	20 Minutes

DATE: 4/16/2015
SITE #: 2
START: 12:15 PM
END: 12:35 PM
LEQ: 54.4
SPEED: 65

SITE SKETCH



BACKGROUND NOISE: school busses passing on local streets, neighborhood cars starting
MAJOR SOURCES: I-95
UNUSUAL EVENTS:
OTHER NOTES: Property owners in the area requested noise walls.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

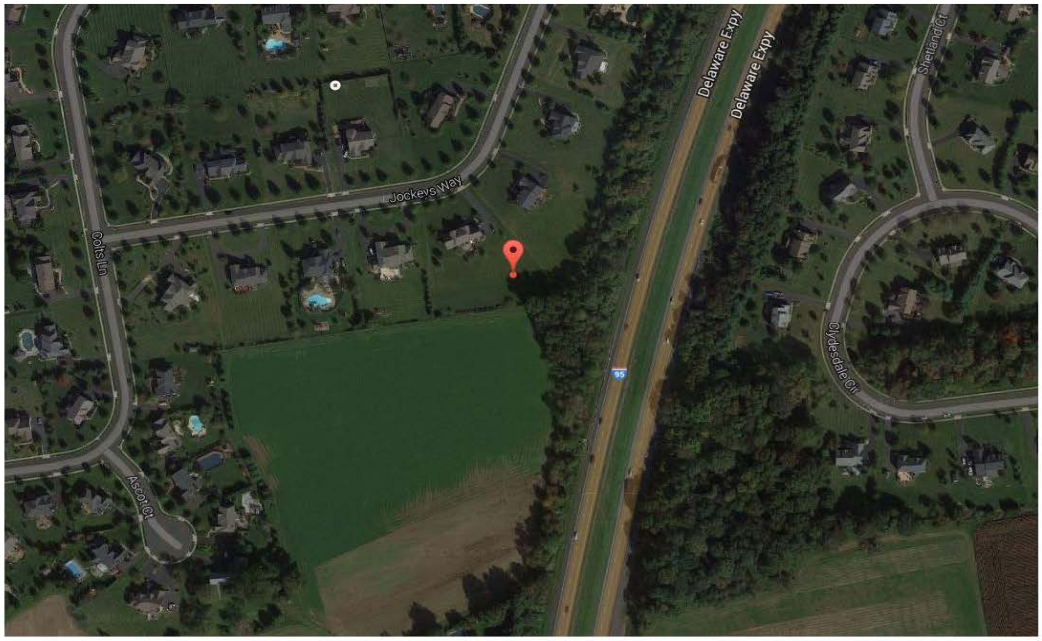
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: Mid 60s, partly sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	299	381
MED TRKS	21	11
HVY TRKS	19	47
DURATION	20 Minutes	20 Minutes

DATE: 4/16/2015
SITE #: 3
START: 12:50 PM
END: 1:10 PM
LEQ: 61.9
SPEED: 70

SITE SKETCH



BACKGROUND NOISE: Neighborhood noise
MAJOR SOURCES: I-95
UNUSUAL EVENTS:
OTHER NOTES: Property owners requested noise walls

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

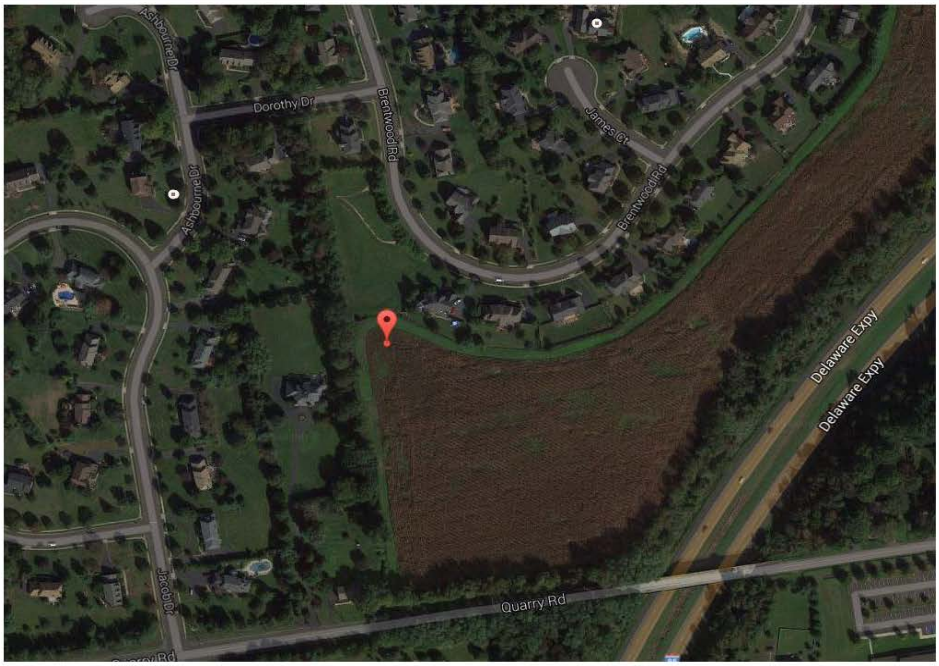
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: Mid 60's, partly sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	483	1302
MED TRKS	16	34
HVY TRKS	30	68
DURATION	20 minutes	20 minutes

DATE: 4/16/2015
SITE #: 4
START: 2:30 PM
END: 2:50 PM
LEQ: 53.1
SPEED: unknown

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

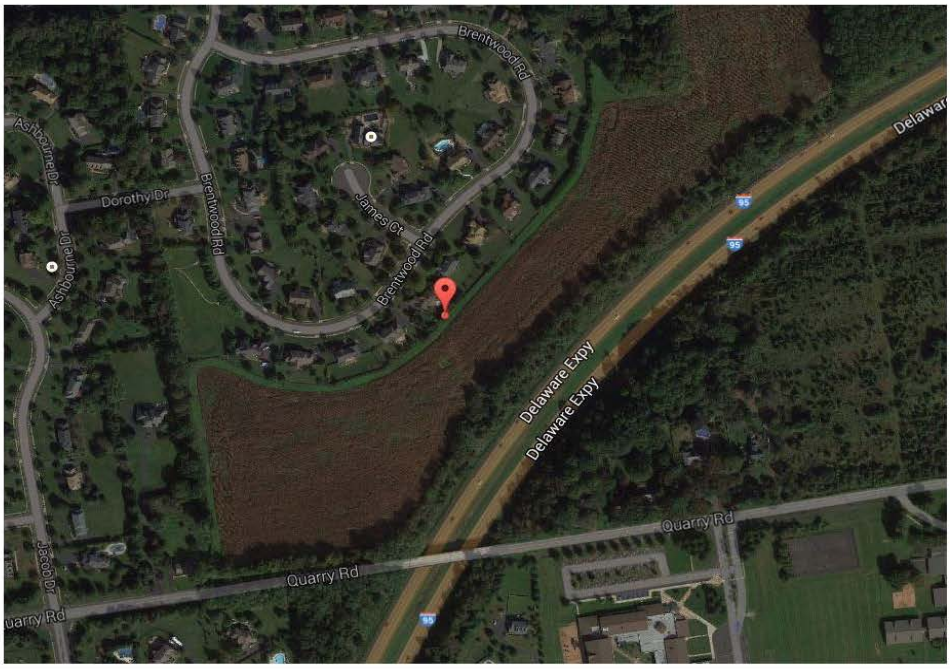
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 60's, partly sunny, wind <12 mph

TRAFFIC DATA		
ROAD	I-95 SB	I-95 NB
AUTOS	1302	483
MED TRKS	4	16
HVY TRKS	68	30
DURATION	20 minutes	20 minutes

DATE: 4/16/2015
SITE #: 5
START: 3:00 PM
END: 3:20 PM
LEQ: 60.2
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES ____

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

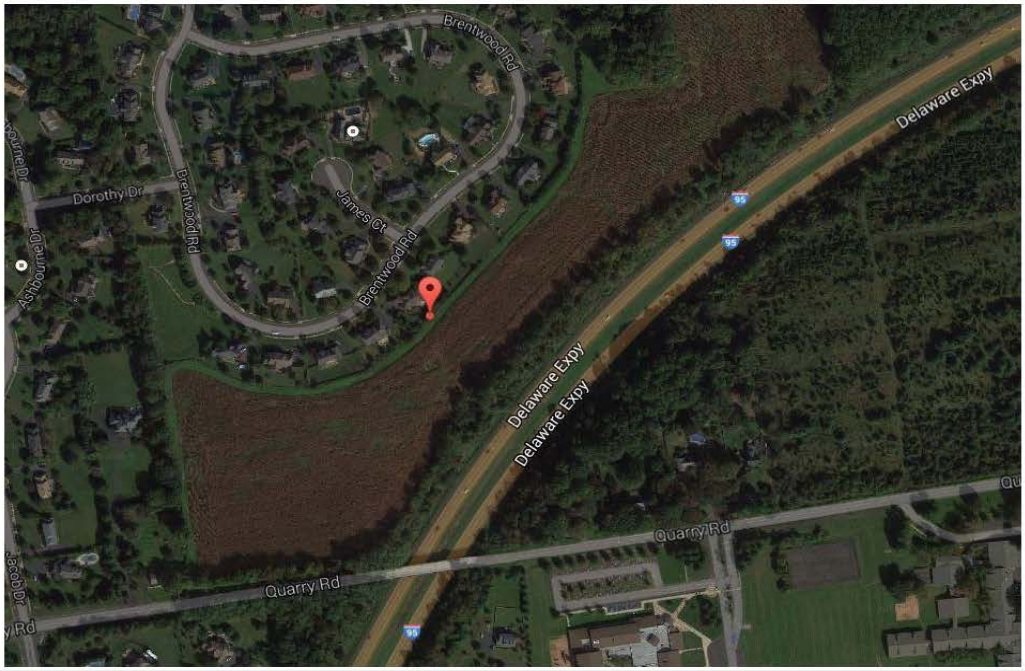
EQUIPMENT:	METER	Norsonics 132		CALIBRATOR	EXTECH 407744		
CALIBRATION:	START	94.0	dB	END	94.0	dB	
RESPONSE:	FAST		SLOW X	A-WEIGHTING	X	BATTERY CHECK	X

WEATHER DATA: mid 60's, partly sunny, wind <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	483	1302
MED TRKS	16	34
HVY TRKS	30	68
DURATION	20 minutes	20 minutes

DATE: 4/16/2015
SITE #: 6
START: 3:30 PM
END: 3:50 PM
LEQ: 58.3
SPEED: NA

SITE SKETCH



BACKGROUND NOISE
MAJOR SOURCES: I-95
UNUSUAL EVENTS
OTHER NOTES: Could not see I-95 from roadway.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

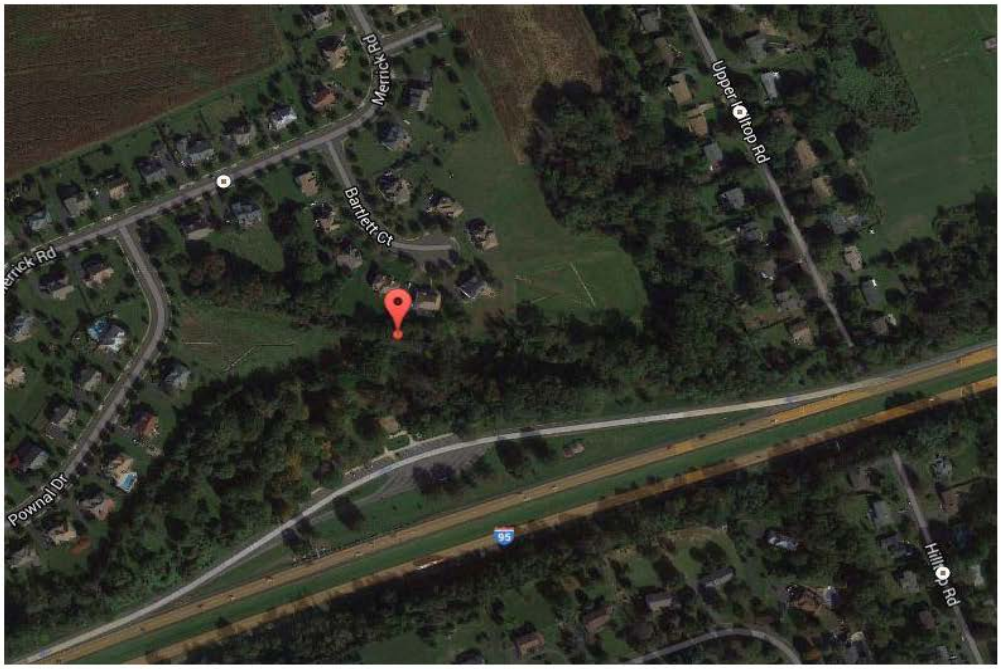
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 50's, cloudy, wind <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	483	1032
MED TRKS	16	34
HVY TRKS	30	68
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 7
START: 10:15 AM
END: 10:35 AM
LEQ: 53.5
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Home owners request noise wall; especially loud at night. Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

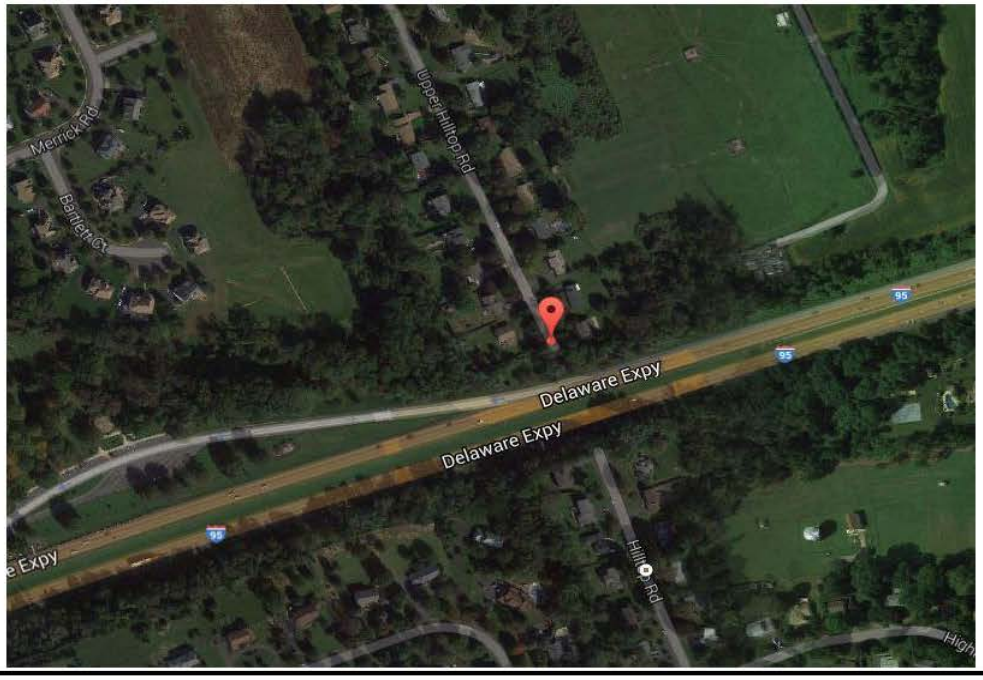
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 50's, partly cloudy, wind <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	483	1032
MED TRKS	16	34
HVY TRKS	30	68
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 8
START: 12:05 PM
END: 12:25 PM
LEQ: 70
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES ____

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

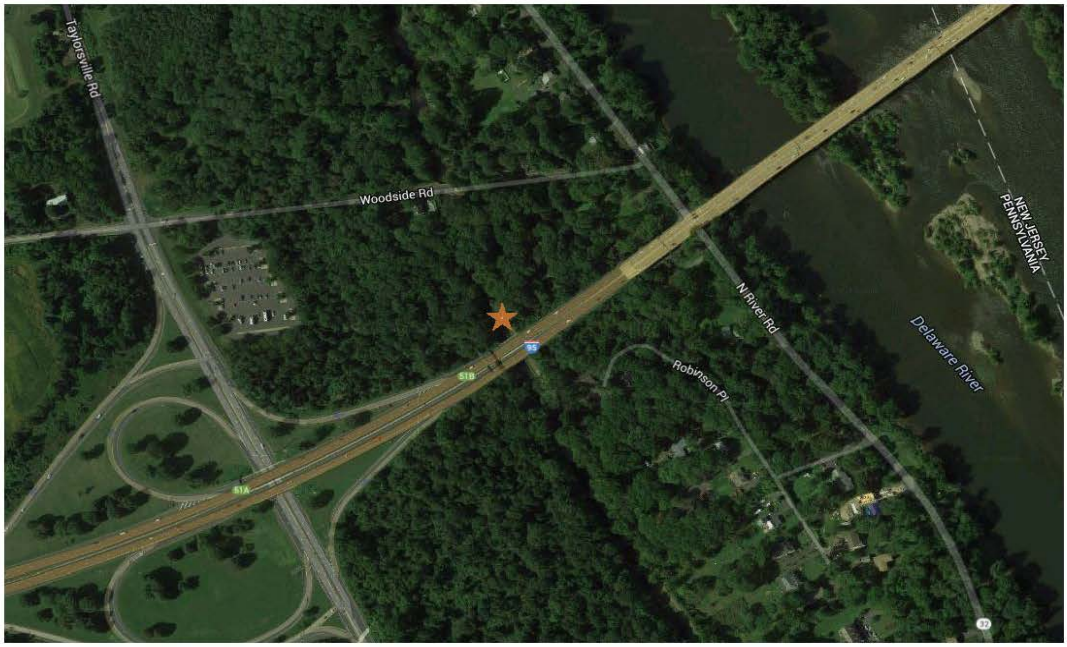
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: upper 50's, cloudy, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	477	1213
MED TRKS	16	40
HVY TRKS	31	80
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 9
START: 1:10 PM
END: 1:30 PM
LEQ: 64.4
SPEED: NA

SITE SKETCH



BACKGROUND NOISE: A few bikes and pedestrians passing
MAJOR SOURCES: I-95
UNUSUAL EVENTS:
OTHER NOTES: Could not see I-95 traffic from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

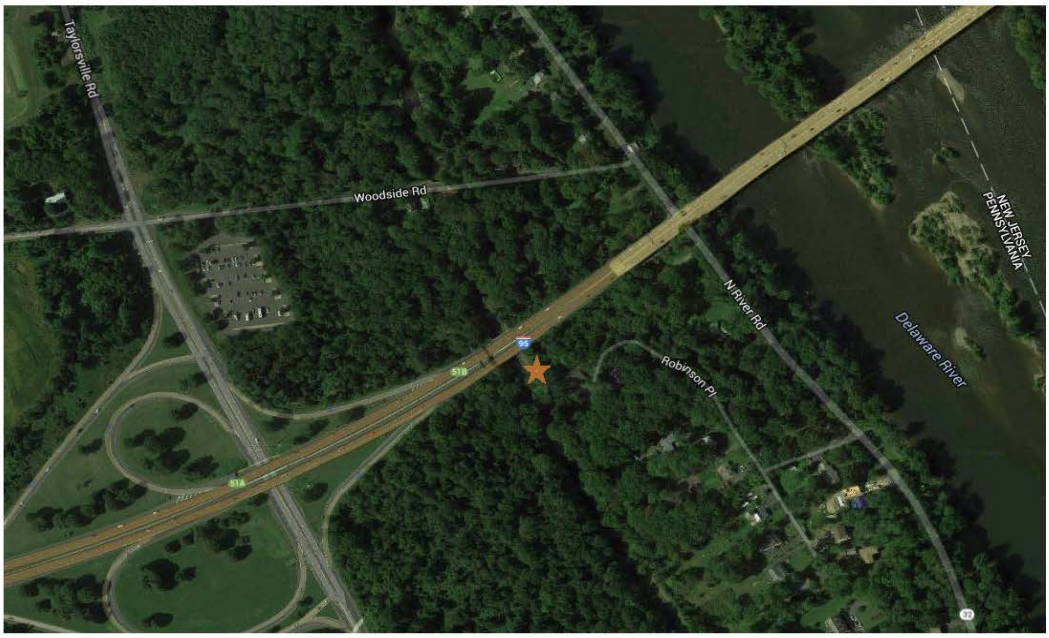
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: upper 50's, partly cloudy, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 SB	I-95 NB
AUTOS	422	1213
MED TRKS	14	40
HVY TRKS	28	80
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 10
START: 1:35 PM
END: 1:55 PM
LEQ: 63.5
SPEED: NA

SITE SKETCH



BACKGROUND NOISE: A few cyclists and a runner went past during survey.
MAJOR SOURCES: I-95
UNUSUAL EVENTS:
OTHER NOTES: Could not see I-95 traffic from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

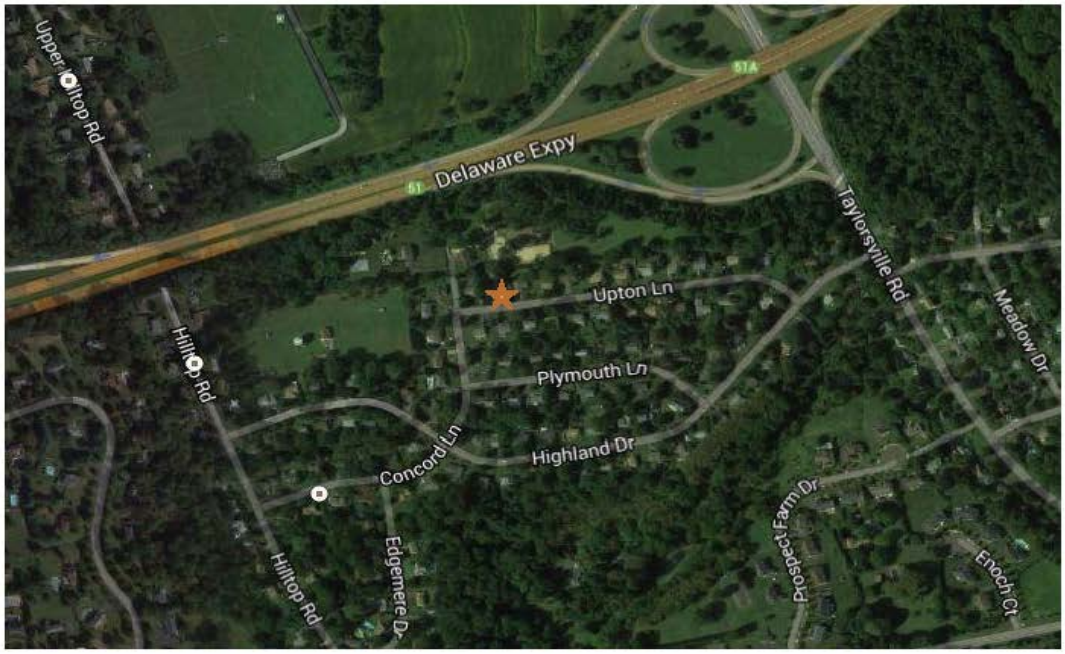
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 50's, cloudy, wind <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	837	365
MED TRKS	28	12
HVY TRKS	55	24
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 11
START: 2:15 PM
END: 2:35 PM
LEQ: 56.3
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

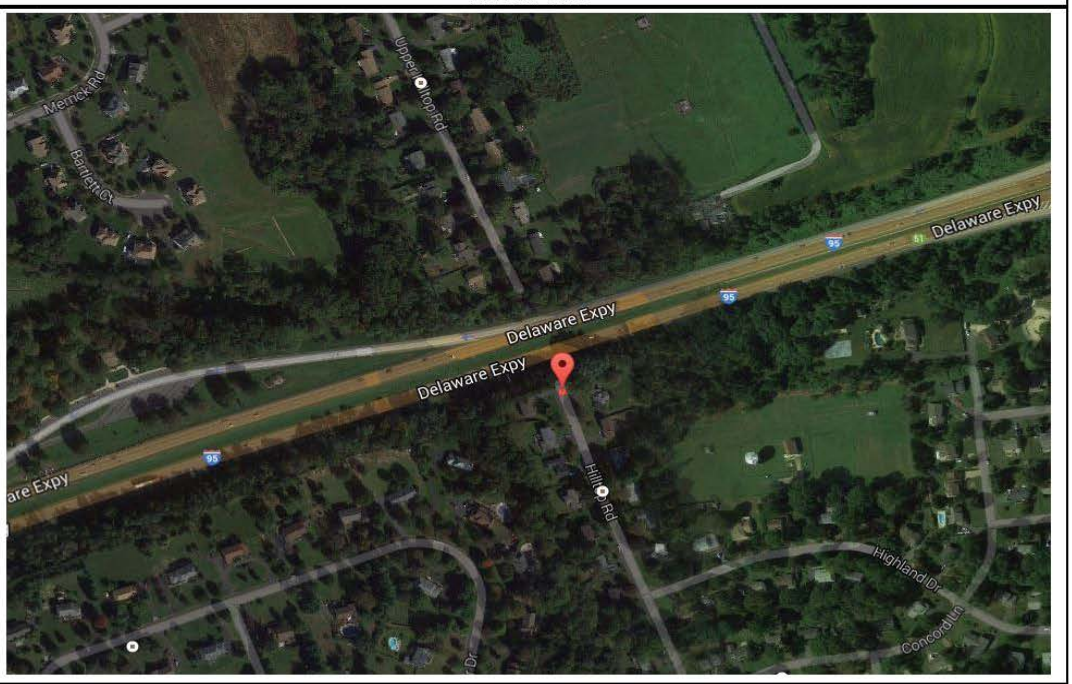
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 50's, cloudy, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	431	563
MED TRKS	15	75
HVY TRKS	20	31
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 12
START: 2:05 PM
END: 2:25 PM
LEQ: 71.7
SPEED: 65-75

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Home Owners requested noisewall.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

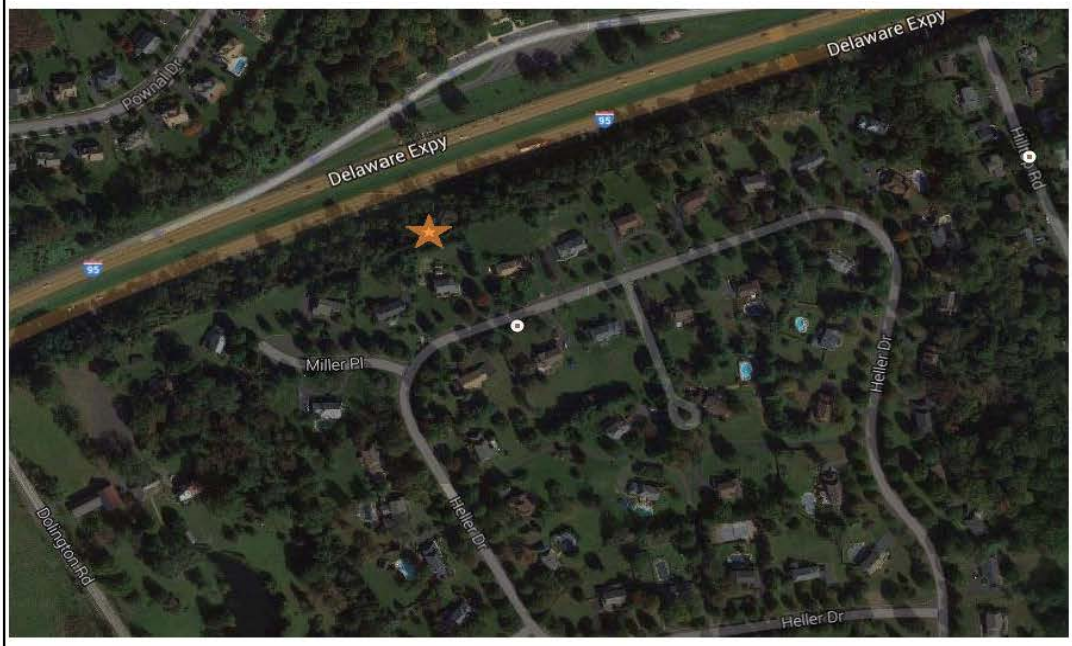
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 50's, cloudy, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	968	467
MED TRKS	32	15
HVY TRKS	85	31
DURATION	20 minutes	20 minutes

DATE: 4/27/2015
SITE #: 13
START: 3:45 PM
END: 4:05 PM
LEQ: 64.3
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

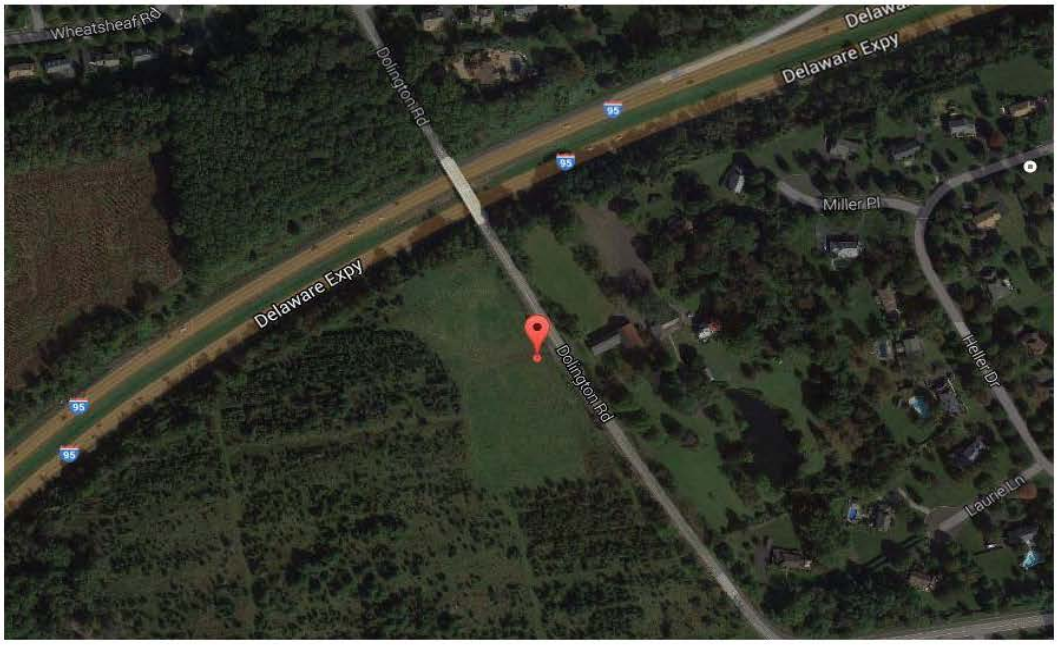
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: upper 50's, partly sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 SB	I-95 NB
AUTOS	467	968
MED TRKS	15	32
HVY TRKS	31	85
DURATION	20 minutes	20 minutes

DATE: 4/28/2015
SITE #: 14
START: 10:15 AM
END: 10:35 AM
LEQ: 59.5
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 traffic from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

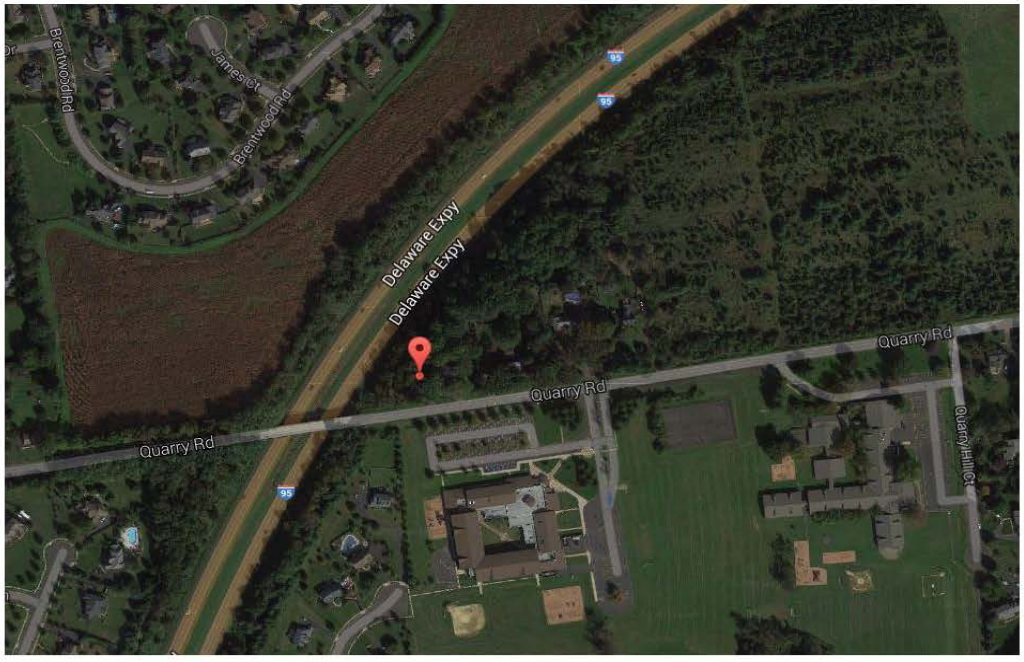
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: upper 50's, partly sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 SB	I-95 NB
AUTOS	467	968
MED TRKS	15	32
HVY TRKS	31	85
DURATION	20 minutes	20 minutes

DATE: 4/28/2015
SITE #: 15
START: 10:55 AM
END: 11:15 AM
LEQ: 65.5
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

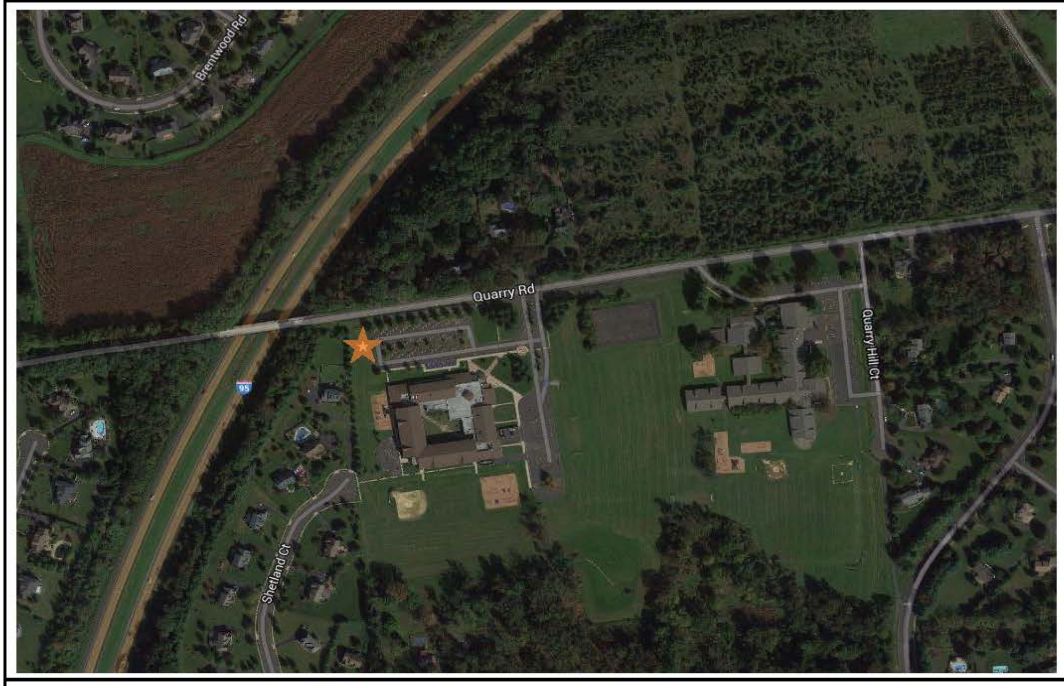
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: lower 60's, partly sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	568	467
MED TRKS	32	15
HVY TRKS	85	31
DURATION	20 minutes	20 minutes

DATE: 4/28/2015
SITE #: 16
START: 12:00 PM
END: 12:20 PM
LEQ: 59
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____
MAJOR SOURCES I-95
UNUSUAL EVENTS ____
OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

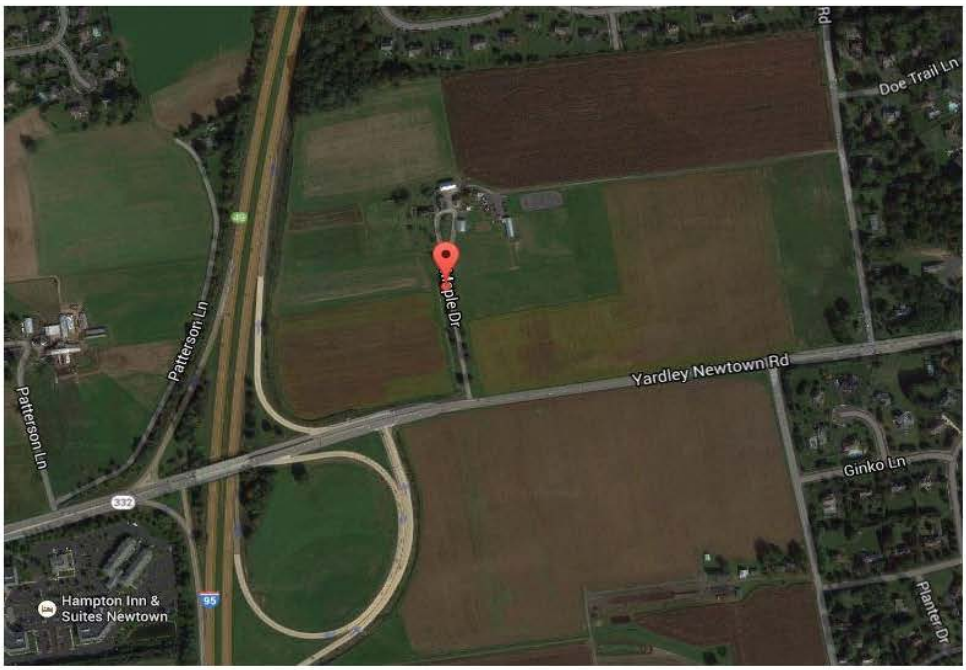
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 60's, partly sunny, winds <12mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	968	467
MED TRKS	32	15
HVY TRKS	85	31
DURATION	20 minutes	20 minutes

DATE: 4/28/2015
SITE #: 17
START: 2:00 PM
END: 2:20 PM
LEQ: 57
SPEED: NA

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 traffic from site.

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

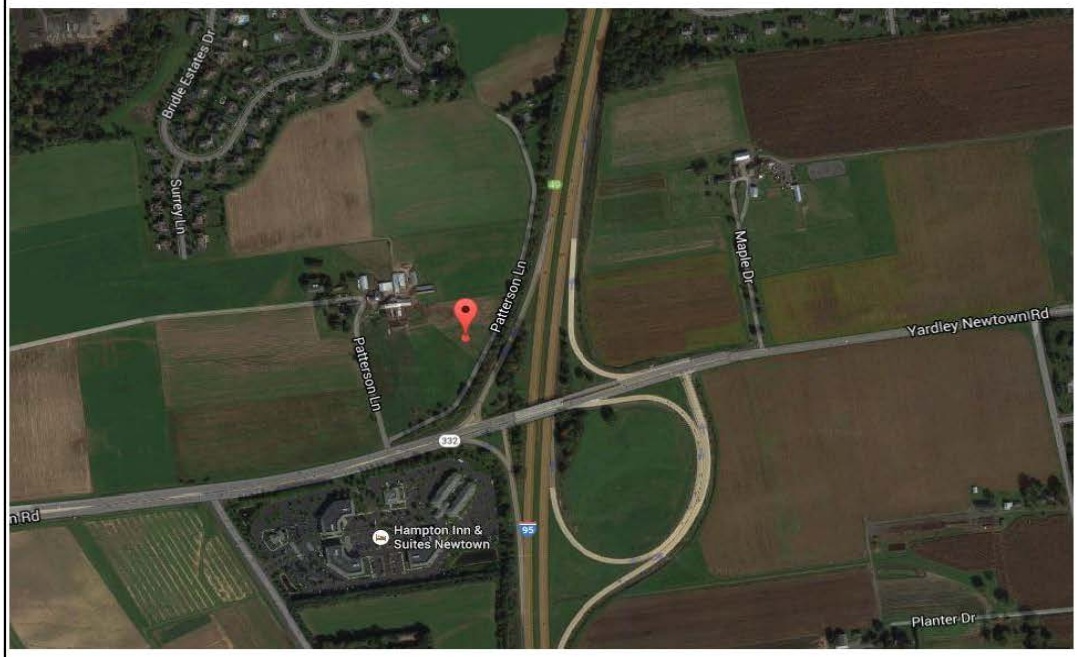
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: mid 60's, sunny, winds < 12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	583	332
MED TRKS	19	11
HVY TRKS	30	22
DURATION	20 minutes	20 minutes

DATE: 4/29/2015
SITE #: 18
START: 10:15 AM
END: 10:35 AM
LEQ: 54.7
SPEED: NA

SITE SKETCH



BACKGROUND NOISE: farm animals
MAJOR SOURCES: I-95
UNUSUAL EVENTS:
OTHER NOTES: Could not see I-95 traffic from site

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

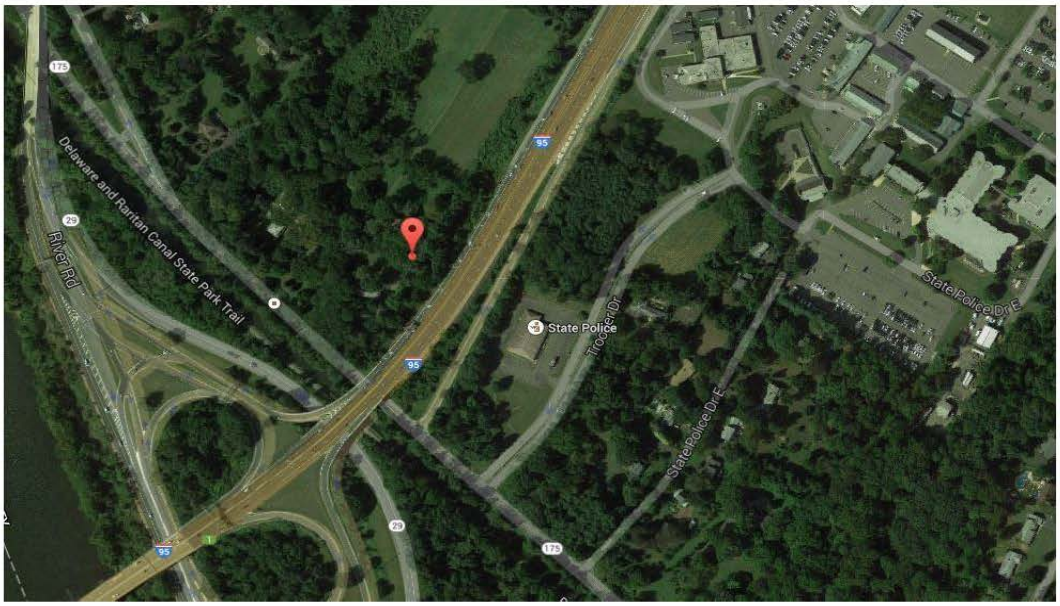
RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: low 70's, sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	220	351
MED TRKS	8	15
HVY TRKS	15	41
DURATION	20 minutes	20 minutes

DATE: 4/29/2015
SITE #: 19
START: 2:00 AM
END: 2:20 AM
LEQ: 67.7
SPEED: 65-70

SITE SKETCH



BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES ____

Michael Baker Jr., Inc. 2005

NOISE SURVEY SHEET

EQUIPMENT: METER Norsonics 132 CALIBRATOR EXTECH 407744

CALIBRATION: START 94.0 dB END 94.0 dB

RESPONSE: FAST ____ SLOW X A-WEIGHTING X BATTERY CHECK X

WEATHER DATA: low 70's, sunny, winds <12 mph

TRAFFIC DATA		
ROAD	I-95 NB	I-95 SB
AUTOS	430	1236
MED TRKS	14	41
HVY TRKS	28	81
DURATION	20 minutes	20 minutes

DATE: 4/29/2015
SITE #: 20
START: 3:15 PM
END: 3:35 PM
LEQ: 60.2
SPEED: NA

SITE SKETCH

BACKGROUND NOISE ____

MAJOR SOURCES I-95

UNUSUAL EVENTS ____

OTHER NOTES Could not see I-95 from site.

Michael Baker Jr., Inc. 2005