Connecticut Type II Statewide Noise Analysis

Final Type II Noise Analysis Report

January 2024

Prepared for:

Connecticut Department of Transportation

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Executive Summary

This report documents the statewide Type II highway traffic noise analysis and priority rating system prepared for the Connecticut Department of Transportation (CTDOT) to identify and prioritize eligible Type II barrier areas for consideration in a Type II noise program. The noise study was performed pursuant to the Federal Highway Administration's (FHWA) federal traffic noise regulation, codified at Title 23 Code of Federal Regulations Part 772 (23 CFR 772) and in accordance with CTDOT's October 2022 *Highway Traffic Noise Abatement Policy for Projects Funded by the Federal Highway Administration*. As referenced within CTDOT's policy, the State currently does not have an approved Type II program.[1] In 1973, CTDOT had initiated a noise abatement program, which was subsequently suspended in 1982, due to a lack of funding. In 1985, pursuant to Special Act 85-107, CTDOT re-evaluated the program and created a priority list based on citizen complaints and population density. That list was unfunded, is now outdated, and no longer acceptable as a basis for a Type II Program in accordance with 23 CFR 772.7. This report represents the first in a series of steps to institute a federally approved program in Connecticut. Following federal approval of this report and methodology, CTDOT will need to update its Noise Policy to reflect the Type II Noise Program, and funding sources would need to be identified before any Type II projects could be initiated. It is important to note that each site identified would still need to undergo a more rigorous noise analysis (to determine if noise abatement meets the Noise Policy criteria), along with design, until construction could proceed. CTDOT currently does not have funding or staffing resources to administer a program for these Type II projects.

In the interim, projects meeting the criteria of Type 1 will continue to be evaluated in accordance with the existing Noise Policy. In addition, CTDOT has begun a program to replace existing noise barriers past their design life. These actions, which replace existing noise barriers, are known as Type III projects.

The candidate state roadways in this study included all Interstate highways and principal expressways. The study area included 38 Principal Arterial highways, covering approximately 645 miles of roadway within eight counties (Litchfield, Tolland, Windham, New London, Middlesex, Hartford, New Haven, and Fairfield Counties) and four CTDOT Districts (Districts 1, 2, 3 and 4). Due to the statewide scale and large size of the study area, a basic "flat earth" noise modeling approach was implemented, in lieu of a detailed noise study that is typically conducted for Type I projects. This simplified approach assumed flat terrain and eliminated building rows and barriers. To confirm the validity of this approach, noise measurements were conducted in eight barrier areas (two in each of the four CTDOT Districts) and were used to validate site-specific models for each area, which were developed using FHWA's Traffic Noise Model version 2.5 (TNM2.5). The noise models developed for validation included terrain lines, building barriers, building rows, and other modeling features that reflect real-world development characteristics and are necessary to ensure accuracy of TNM2.5-predicted noise levels.

Once validated, a set of modeling receivers was added to each validated model, and the same set of receivers was added to a basic model created for each of the eight areas. The basic model only included

[1] Connecticut Department of Transportation Highway Traffic Noise Abatement Policy For Projects Funded By The Federal Highway Administration. October 2022.

study area roadways, with each direction modeled as a single roadway with an assumed standard width of 12 feet per lane. A comparison of average noise levels computed with comprehensive models and basic noise models was performed, which showed good agreement (i.e., within 2 decibels, on average), and confirmed the validity of the basic noise model approach to developing the Type II noise barrier program.

Noise impacts were predicted throughout the Type II noise study area, and noise barriers were evaluated in areas with sufficient density of development to meet CTDOT acoustical feasibility and reasonableness criteria for construction of noise barriers. A total of 38 noise barriers were identified for prioritization. The following Type II priority equation was developed to incorporate five factors approved by FHWA and recommended within FHWA guidance[2]:

Priority Index = (Number x Age x Impact x Benefit)/Cost

The number term accounts for the number of benefits, while the age term incorporates date of development. The impact and benefit terms apply a weighting based on average noise levels and average insertion loss, respectively, for all receivers benefited by the proposed barrier. The cost term, expressed in millions of dollars, accounts for the total cost of the barrier, assuming a unit cost of $60 per square foot of barrier surface area, per CTDOT policy.

Although this statewide Type II Noise study has been completed, CTDOT does not currently have funding identified for this program. Funding for the Type II Noise program will be required for CTDOT to initiate the program. Please refer to the Connecticut Type II Statewide Noise Study, introduction section for more information.

The estimated cost of the noise barriers throughout this report are limited to the item cost of the noise barrier. The item cost does not include other required project costs associated with design and construction, such as: right of way acquisitions, survey, engineering, construction mobilization, maintenance and protection of traffic, utility relocation, clearing and grubbing, drainage, pavement as well as contingencies and incidentals related to construction. Site specific conditions will govern the total project cost and a more detailed estimate would be prepared during a project's engineering phase. Additionally, a detailed noise study would be required prior to initiating the design of these barriers and cost approximately $100,000 for each location.

Half of the noise barriers (19 of 38) recommended for inclusion on CTDOT's Type II priority list are located within Fairfield County. Out of the 19 barriers in Fairfield County, 12 barriers are located along I-95 within Stamford, Fairfield, Bridgeport, Greenwich, and Norwalk. The remaining seven barriers in Fairfield County are located on US-7 in Norwalk, SR-8 in Shelton and Bridgeport, and I-84 in Danbury. Seven of the 38 total noise barriers are located within New Haven County along SR-8 in Ansonia, Derby, and Naugatuck, I-95 in West Haven and Milford, I-84 in Waterbury, and SR-15 in Milford. Five total noise barriers are recommended for inclusion on CTDOT's Type II priority list in Hartford County, including two along I-84 (one in Manchester and one in West Hartford), one along I-384 in Manchester, one along I-91

[2] FHWA-HEP-10-025. Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.

in Windsor Locks, and one along SR-15 in Wethersfield. Four total noise barriers are located in Middlesex County along I-95, SR-9, and SR-17 in Middletown and along SR-9 in Cromwell. The remaining three noise barriers are located in New London County along I-95 in Waterford, I-395 in Montville, and SR-2 in Colchester.

All priority areas identified as part of this study will require additional noise analyses that satisfy both requirements of 23 CFR 772 as well as the National Environmental Policy Act (NEPA). Specifically, the same level of documentation and analyses required for Type I projects are required for Type II projects that will use federal funding.[3] Those analyses must determine whether the noise abatement meets CTDOT criteria.

[3] FHWA-HEP-10-025. Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.

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Introduction

The Federal Aid Highway Act of 1973 amended the Federal Highway Administration's (FHWA's) federal traffic noise regulations, codified at Title 23 Code of Federal Regulations Part 772 (23 CFR 772), to allow for federal participation in noise abatement along existing highways.[4] These projects are defined by the regulation as Type II projects and are also often referred to as "retrofit" projects. The decision to develop and implement a Type II program is an optional decision made by a state highway agency. Pursuant to 23 CFR 772.7(e), highway agencies choosing to participate in a Type II program shall develop a priority system to rank project areas in the program. The priority system shall be submitted and approved by FHWA prior to use of any federal-aid funds for a project included within the State's Type II program.

In 1973, the Connecticut Department of Transportation (CTDOT) initiated its first Retrofit Noise Abatement Program to provide noise abatement for residential areas along the State's existing expressway system. With the passage of the Federal Surface Transportation Act in 1981, federal funding became more limited, as it was allocated to road and bridge rehabilitation and safety projects.[5] As a result, the State's Retrofit Noise Abatement Program was suspended in March 1982. Subsequently, in 1985, pursuant to Special Act 85-107, CTDOT's Retrofit Noise Abatement Program was reevaluated in 196 residential areas along the State's expressways. The State's Retrofit Noise Abatement Program was reopened in 1987 and suspended again in 1992 due to lack of funding. Pursuant to CTDOT's October 2022 *Highway Traffic Noise Abatement Policy for Projects Funded by the Federal Highway Administration* (hereafter referred to as "CTDOT's Highway Traffic Noise Policy"), the State of Connecticut currently does not have an approved Type II program.[6]

On behalf of CTDOT, Harris Miller Miller & Hanson Inc. (HMMH), in cooperation with Fuss & O'Neill, collectively referred to hereafter as the "Consultant Team," conducted a Type II statewide noise study. The purpose of the study was to analyze areas adjacent to Principal Arterial highways and expressways in the State of Connecticut to identify areas experiencing existing noise levels that exceed the FHWA's Noise Abatement Criteria (NAC) and are thereby potentially eligible for inclusion in a Type II noise program. FHWA reviewed and approved this Final Type II Noise Study Report on January 31, 2024, in accordance with 23 CFR 772.7(e).

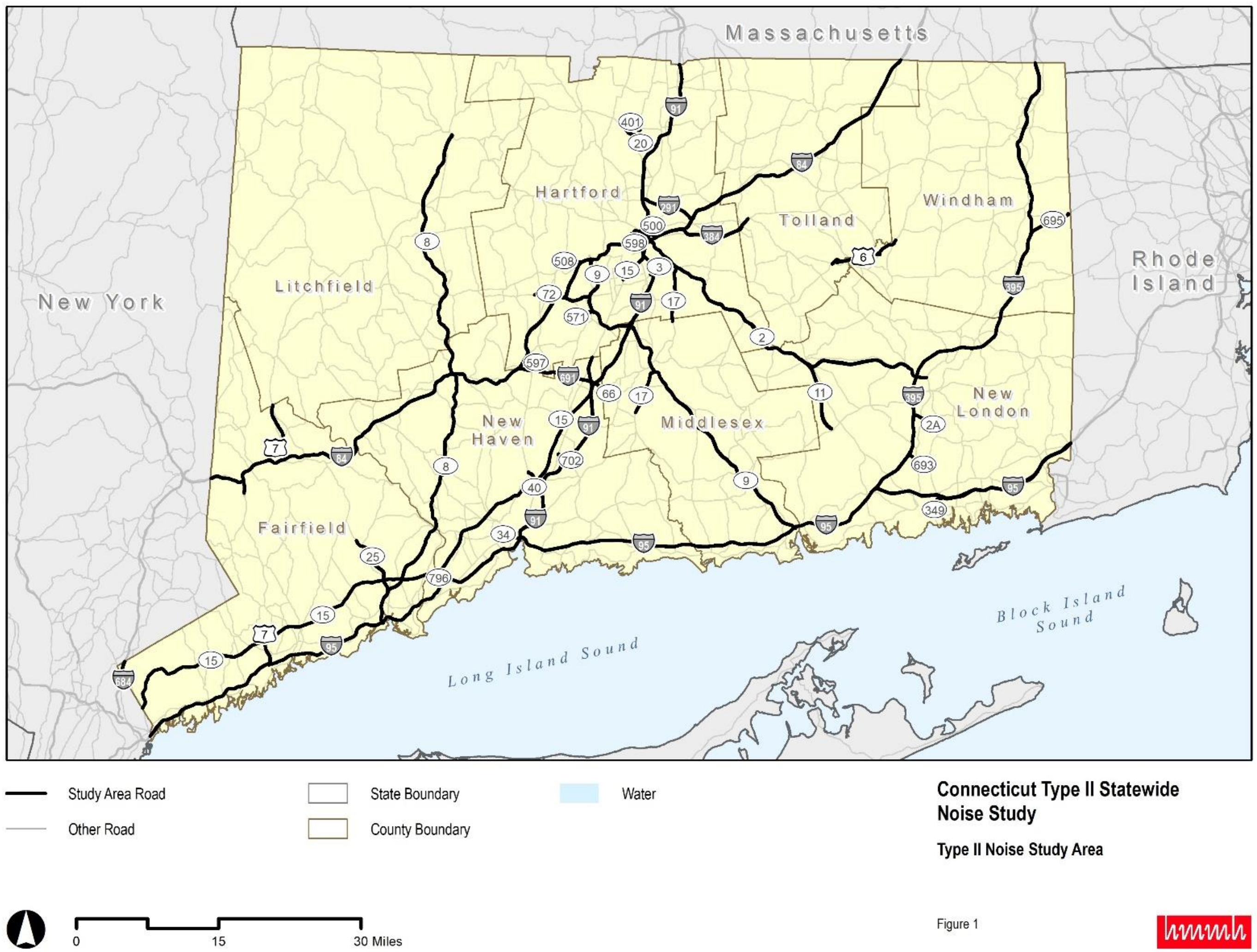
Project Location

CTDOT identified 38 Principal Arterial highways and expressways within eight counties (Litchfield, Tolland, Windham, New London, Middlesex, Hartford, New Haven, and Fairfield counties), and four Districts (Districts 1, 2, 3 and 4) to be included within the Type II noise barrier program study area. The Consultant Team performed a cursory review of these areas and further refined the study area to

[4] FHWA-HEP-10-025. Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.
[5] Report on the Reevaluation of The Connecticut Department of Transportation Retrofit Noise Abatement Program. Prepared Pursuant to Special Act 85-107. Office of Environmental Planning.
[6] Connecticut Department of Transportation Highway Traffic Noise Abatement Policy For Projects Funded By The Federal Highway Administration. October 2022.

exclude portions of roadway where construction of noise barriers would be precluded to maintain access to local streets and driveways. **Figure 1** illustrates the Type II statewide noise study area.

Figure 1: Type II Noise Study Area



Noise Measurements and Model Validation

To enable processing the hundreds of noise study areas throughout the state to be evaluated and prioritized for noise impacts and barrier feasibility and reasonableness, CTDOT and the Consultant Team developed a simplified approach that would make the process far more efficient than evaluating each study area with a detailed noise study.[7] The approach assumed flat terrain everywhere and involved creating basic "flat earth" traffic noise models (TNM) to represent each study area. To confirm the validity of this approach, the Consultant Team chose eight noise barrier study areas within which existing noise measurements were conducted and comprehensive noise models were developed. The comprehensive models included terrain lines, building rows and barriers for shielding, ground zones, and modeling of each individual traffic lane.

Selection of Comprehensive Noise Barrier Study Areas

Initially, a total of four areas per CTDOT District were chosen for detailed review for a total of 16 barrier areas. Four areas per CTDOT District were selected to provide sufficient geographic diversity, diversity of highway class (interstate and freeway/expressway), and to ensure the Consultant Team could narrow the selection to eight solid, representative areas that met the criteria described below. Selecting an equal number of areas per CTDOT District also avoided having too many areas along I-95 in the heavily populated southwest corner of the state. The 16 areas were mainly comprised of single-family residences with sufficient density and in fairly close proximity to the highway, such that a noise barrier could likely meet CTDOT criteria[8] for construction. Two areas per District were along an interstate highway, and the other two areas were along an "other freeway or expressway." In addition, areas selected were of moderate length, ranging from 1,500 to 3,000 feet. These 16 areas were subsequently narrowed down to eight comprehensive barrier areas (i.e., two per District for fairness and geographic diversity) based on the following criteria:

a) Areas with undulating or complex terrain,
b) Areas where the highway is elevated on fill (not on structure), relative to the community, for the majority of its length, and
c) Areas where the highway is in a cut section (depressed), relative to the community, for the majority of its length.

Table 1 summarizes the eight comprehensive barrier areas selected for noise measurements and model validation and describes the representative terrain in each area.

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[7] A detailed noise study satisfying 23 CFR 772 must be performed for each Type II project.
[8] Refer to CTDOT policy for criteria used to determine whether a noise abatement measure can be constructed. https://portal.ct.gov/-/media/DOT/documents/dpolicy/CTDOT-Noise-Policy-2022.pdf

Table 1: Comprehensive Noise Barrier Study Areas

Site ID	District	Road Type	Terrain	Area Location and Description
M1	2	Interstate	Road slightly depressed east end	South of I-95, New London, Norwood Ave area
M4	1	Other	Road at grade with homes	North of State Route 15 Berlin Turnpike, Wethersfield, Ridgecrest/Lille/Fairway area
M7	2	Other	Road slightly depressed, 7 ft	South of State Routes 2 & 11 VFW Hwy, Colchester, Midland Dr area
M9	4	Interstate	Road depressed 5 ft west, 13 ft east	South of I-84, Waterbury, Ponham St area
M12	3	Interstate	Road at grade in west, 4 ft elev. in east	North of I-95, Fairfield, Henderson Rd/Bradley St area
M15	3	Other	At grade at ends, depressed 4 ft middle	East of State Route 7, Norwalk, Fair St area
M16	4	Other	Road elevated 1 to 3 ft	East of State Route 8 General Jaskilka Hwy, Derby, Mohawk Ave area
M21	1	Interstate	Flat	West of I-84, Plainville, Pickney Ave/Pavano Dr area

Noise Measurements

A noise monitoring program was conducted throughout the noise study area, consistent with FHWA[9] and CTDOT procedures[10], to document existing noise levels in the eight comprehensive barrier areas and to provide a means for validation of the FHWA's TNM2.5 noise prediction model. Short-term noise monitoring provides a level of consistency between what is present in real-world situations and how that is represented in the computer noise model. Short-term monitoring does not need to occur within every Common Noise Environment (CNE) to validate the project-specific TNM2.5 noise model. Rather, measurement locations should provide a good sample of the entire noise study area, covering the range of different roadway and receiver geometries. Ensuring the model accurately reflects the different types of geometry throughout the study area provides a level of confidence in using the model to predict noise levels in all other locations.

Short-term (30 minutes in duration) noise monitoring was conducted at four to five sites in each noise barrier study area, depending on the complexity of the site, on September 7, 2022, September 8, 2022, September 14, 2022, and September 15, 2022. Measurement sites were generally located in areas with the highest noise exposures, adjacent to first-row properties, with a few sites adjacent to second-row

[9] RSG, Bowlby & Associates, Inc., ATS Consulting, Environmental Acoustics, Illingworth & Rodkin, "Noise Measurement Handbook," Federal Highway Administration Report No. FHWA-HEP-18-065, June 2018, available at https://www.fhwa.dot.gov/environment/noise/measurement/index.cfm

[10] Connecticut Department of Transportation Highway Traffic Noise Abatement Policy For Projects Funded By The Federal Highway Administration. October 2022.

properties. Vehicular traffic classification counts were conducted, and speed data was collected concurrently with noise measurements on the roadways nearest each measurement site. The short-term measurements characterized existing noise levels in the study area but were not necessarily conducted during the loudest hour of the day since the primary purpose of the noise measurement program is for noise model validation. Also, the loudest-hour conditions can be difficult to identify during a field measurement survey. The noise measurements included contributions from sources other than traffic, such as aircraft.

Short-term noise measurements were conducted using an HMMH-owned Bruel & Kjaer Model 2245 (ANSI Type I, “Precision”) integrating sound level meter. HMMH’s noise measurement instruments are 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.

The short-term data collection procedure involved measurement of 1-second equivalent sound levels ($L_{eq(s)}$) over a period of 30 minutes. The L_{eq} is a sound-energy average of the fluctuating sound level (in A-weighted decibels or dBA) measured over a specified period of time and is used by FHWA to define highway traffic noise levels. **Appendix A** provides an overview of the noise metrics used in this report. Continuous logging of events was conducted during the monitoring, so that intervals that included events not representative of the ambient noise environment or not traffic-related could be excluded later. 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.

Table 2 summarizes the measured noise levels used to validate the eight comprehensive noise barrier study area models. Measured A-weighted noise levels are presented in terms of the “Total L_{eq}” and the “Traffic-only L_{eq}”, as described above. **Figures 2a through 2h** illustrate the eight comprehensive barrier areas along with noise measurement locations for model validation. Each measurement site is labeled based on barrier area Site ID (M#) and measurement site number. Specifically, all measurement sites within barrier area M1 were labeled M1-1, M1-2, M1-3, etc.

Table 2: Summary of Noise Measurement Results

Site ID (Location & Route)	Measurement Site No.	Address	Date	Measured Noise Levels (dB(A))	
				Total L_{eq}	Traffic-only L_{eq}
M1 (New London: I-95)	M1-1	Field west of 175 Norwood Ave	9/7/22	67	67
	M1-2	147 Norwood side yard, cul-de-sac		69	69
	M1-3	23 Whittlesley St		59	59
	M1-4	73-76 Fitch Ave		66	63
	M1-5	32 Crest St		59	58
M4 (Wethersfield: US-5)	M4-1	144 Ridge Crest Cir	9/8/22	59	59
	M4-2	123 Goodwin Ave		68	68
	M4-3	110 Brussels Ave		66	66
	M4-4	37 Fairway Drive		68	68
	M4-5	70 Brookside Cir		62	62
M7 (Colchester SR-2 & SR-11)	M7-1	23 Midland Dr	9/8/22	59	59
	M7-2	29 Midland Dr		63	63
	M7-3	103 Midland Dr		53	53
	M7-4	112 Lynn Ln		62	62
M9 (Waterbury: I-84)	M9-1	123 Ponham St	9/14/22	66	66
	M9-2	81 Ponham St		67	67
	M9-3	29 Ponham St		68	67
	M9-4	90 Elk St		59	59
M12 (Fairfield: I-95)	M12-1	271 Henderson Rd	9/15/22	68	68
	M12-2	101 Henderson Ave		69	69
	M12-3	210 N Pine Creek Rd		70	70
	M12-4	70 Bradley St		68	67
M15 (Norwalk: US-7)	M15-1	25 Fair St	9/14/22	63	63
	M15-2	53 Fair St		70	70
	M15-3	Catherine St cul-de-sac		67	67
	M15-4	A. Santaniello Park		72	69
	M15-5	Forest St cul-de-sac		67	67
M16 (Derby: SR-8)	M16-1	86 Mohawk Ave	9/14/22	68	68
	M16-2	15 Mountain St		68	68
	M16-3	36 Cotter Ct		64	64
	M16-4	9 Mohawk Ave		63	61
M21 (Plainville: I-84)	M21-1	127 Pickney Ave	9/14/22	71	71
	M21-2	141 Pickney Ave		64	64
	M21-3	166 Pavano Dr		72	72
	M21-4	160 Pavano Dr		63	63
	M21-5	1175 Shuttle Meadow Rd		71	71

As shown in **Table 2**, the Total L_{eq} ranged from a low of 53 dBA at 103 Midland Drive in Colchester (M7-3), to a high of 72 dBA at A. Santaniello Park in Norwalk (M15-4) and 166 Pavano Drive in Plainville (M21-3). Values of the Traffic-only L_{eq} were very similar to the measured Total L_{eq} at all measurement sites, indicating that roadway traffic was the dominant source of noise despite the presence of other sporadic and occasional noise events due to human-related activity.

Other sources of noise in the existing environment included but were not limited to biogenic sounds (birds, insects, and dogs), car horns, trains, aircraft, landscaping equipment, and other human-related activity. **Appendix B** provides details of the data acquired during the noise measurement program, including site photographs and equipment laboratory calibration certificates.

Figure 2a: Area M1 Noise Measurement Locations

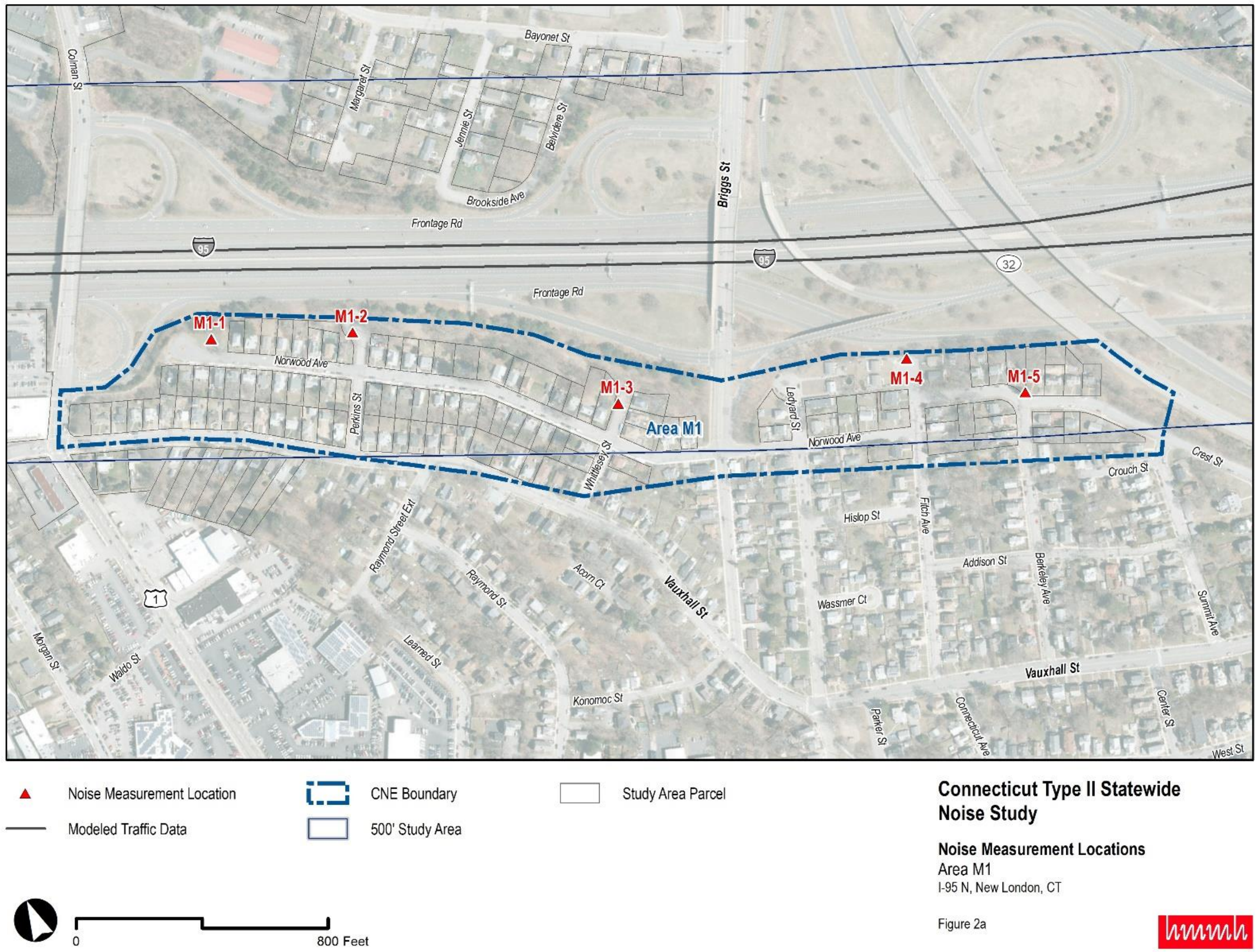


Figure 2a: Area M4 Noise Measurement Locations

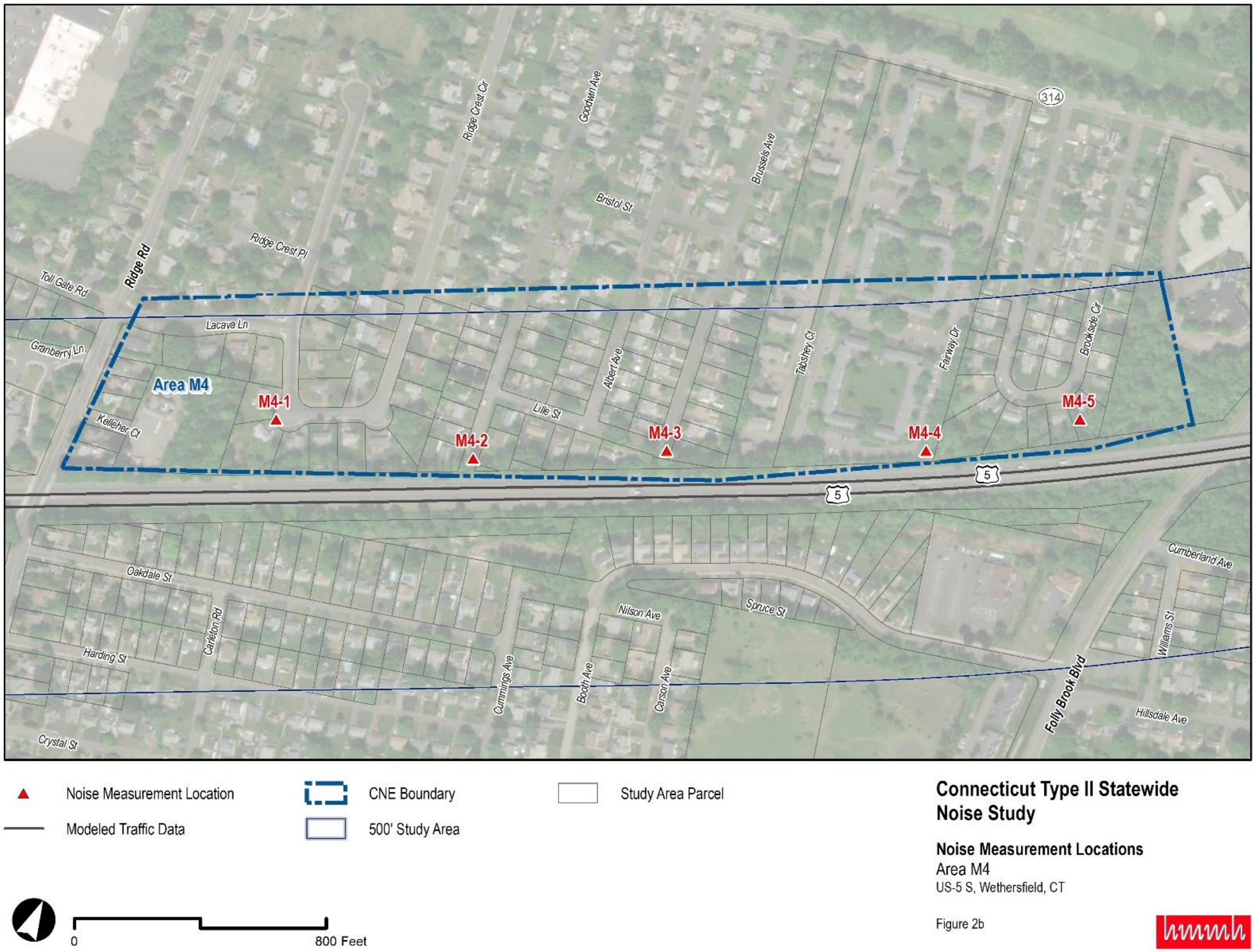


Figure 2b: Area M7 Noise Measurement Locations

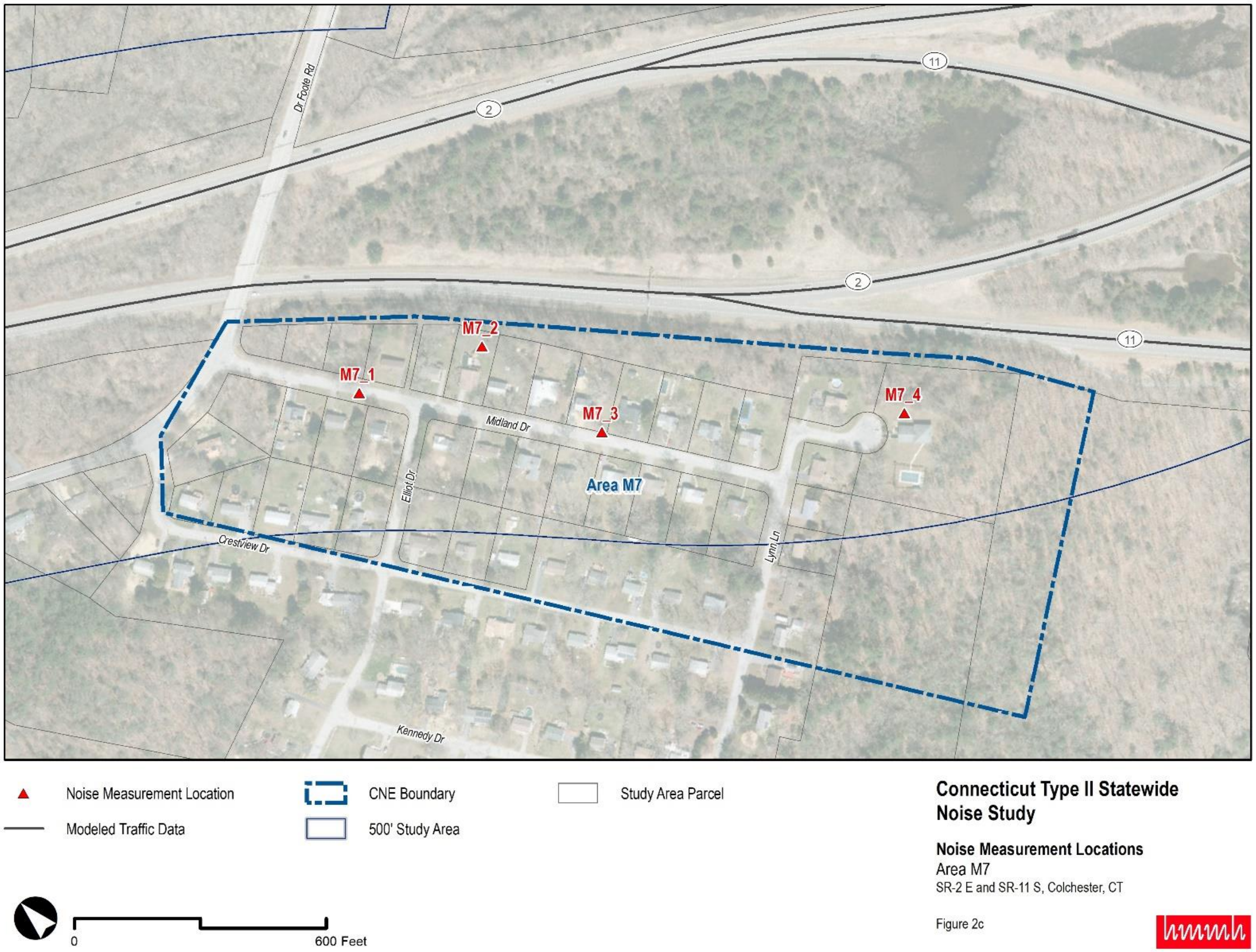


Figure 2c: Area M9 Noise Measurement Locations

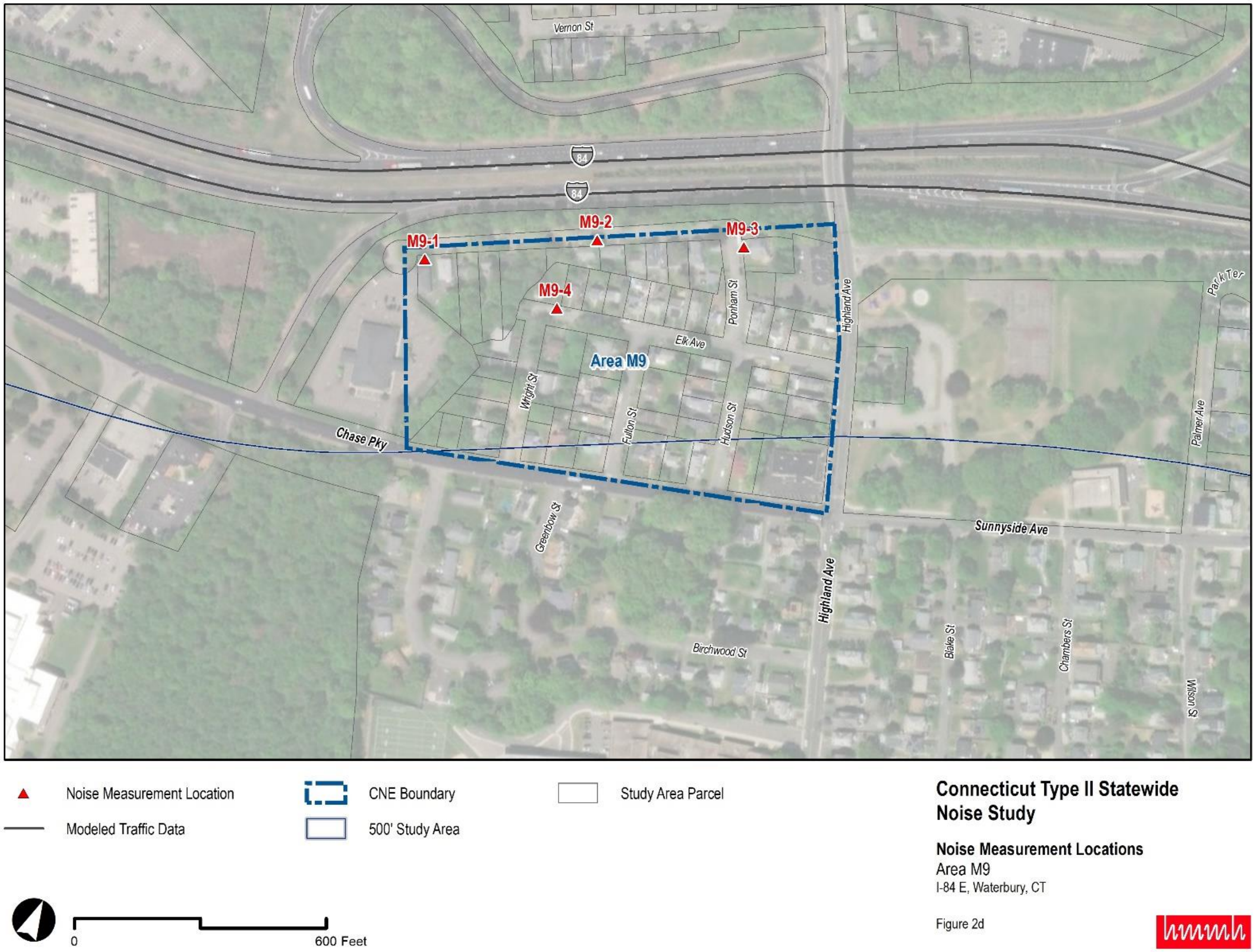


Figure 2d: Area M12 Noise Measurement Locations

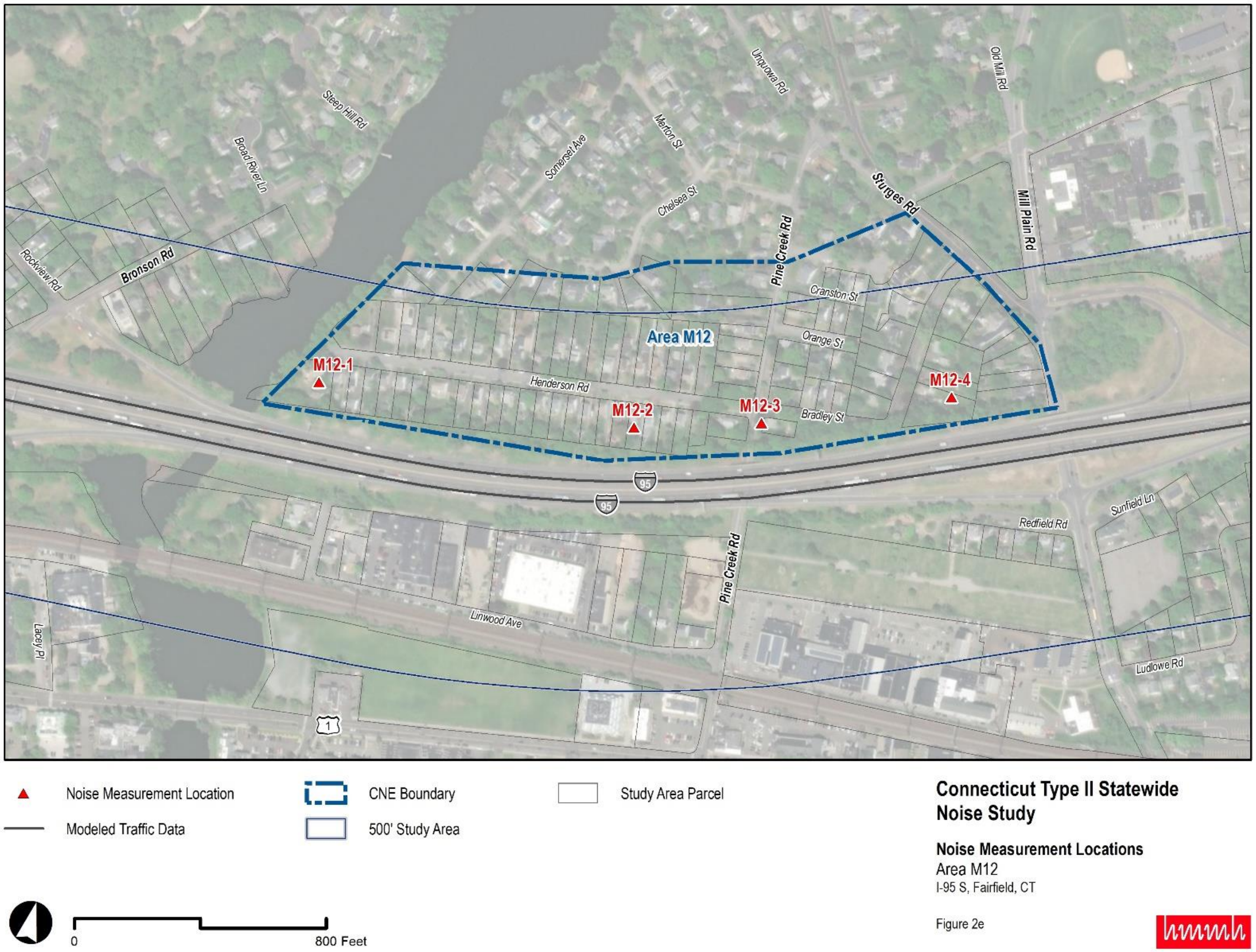


Figure 2e: Area M15 Noise Measurement Locations

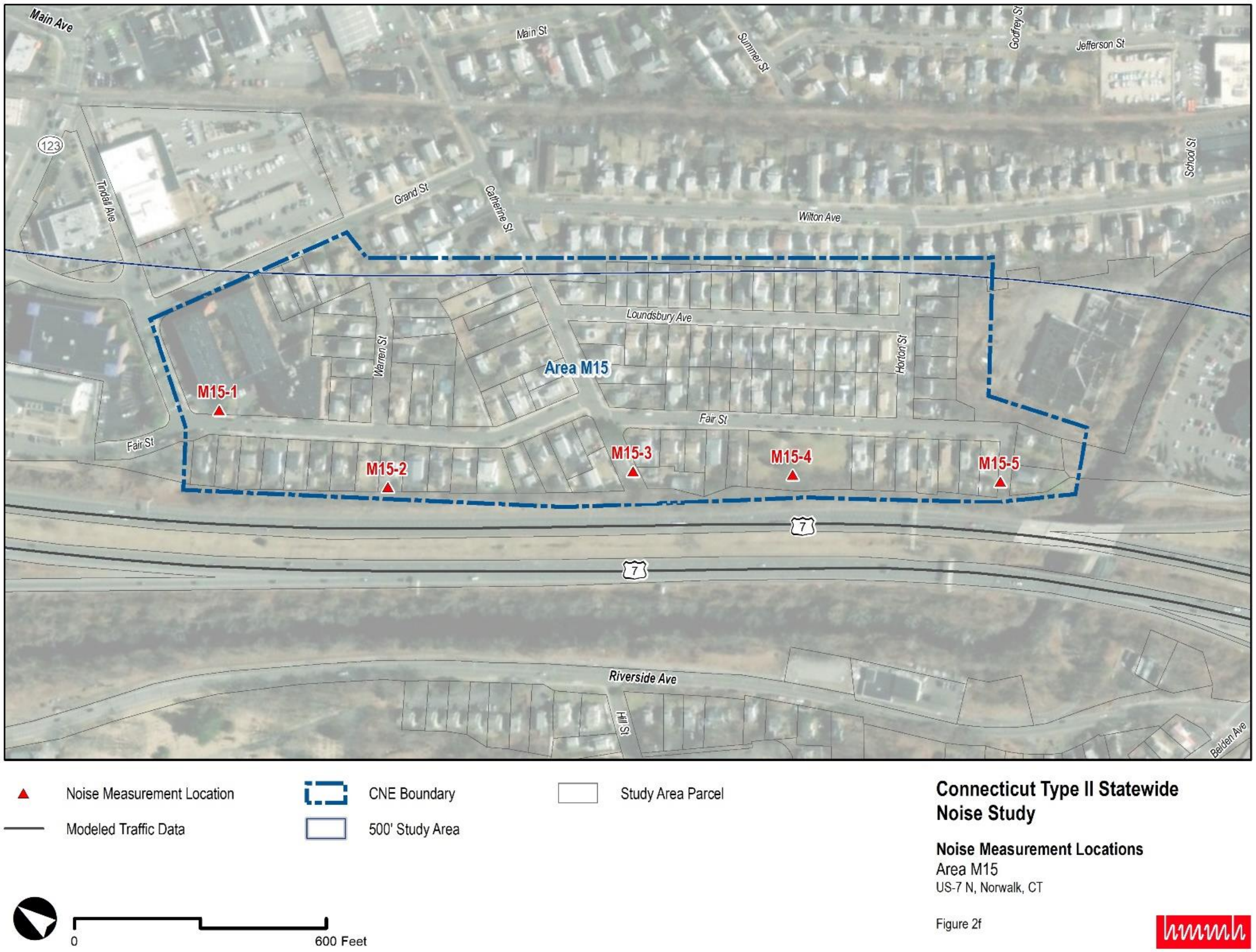


Figure 2f: Area M16 Noise Measurement Locations

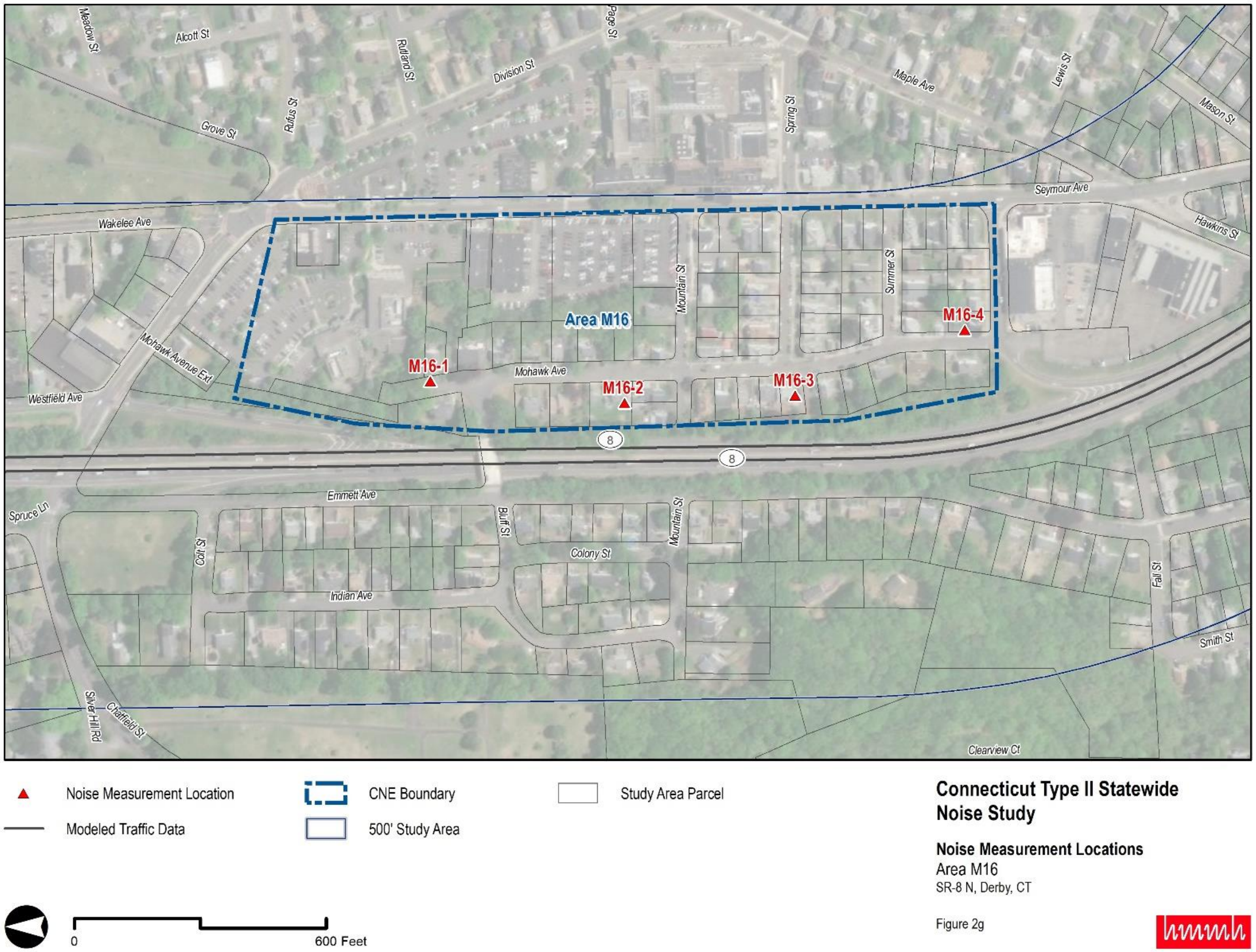
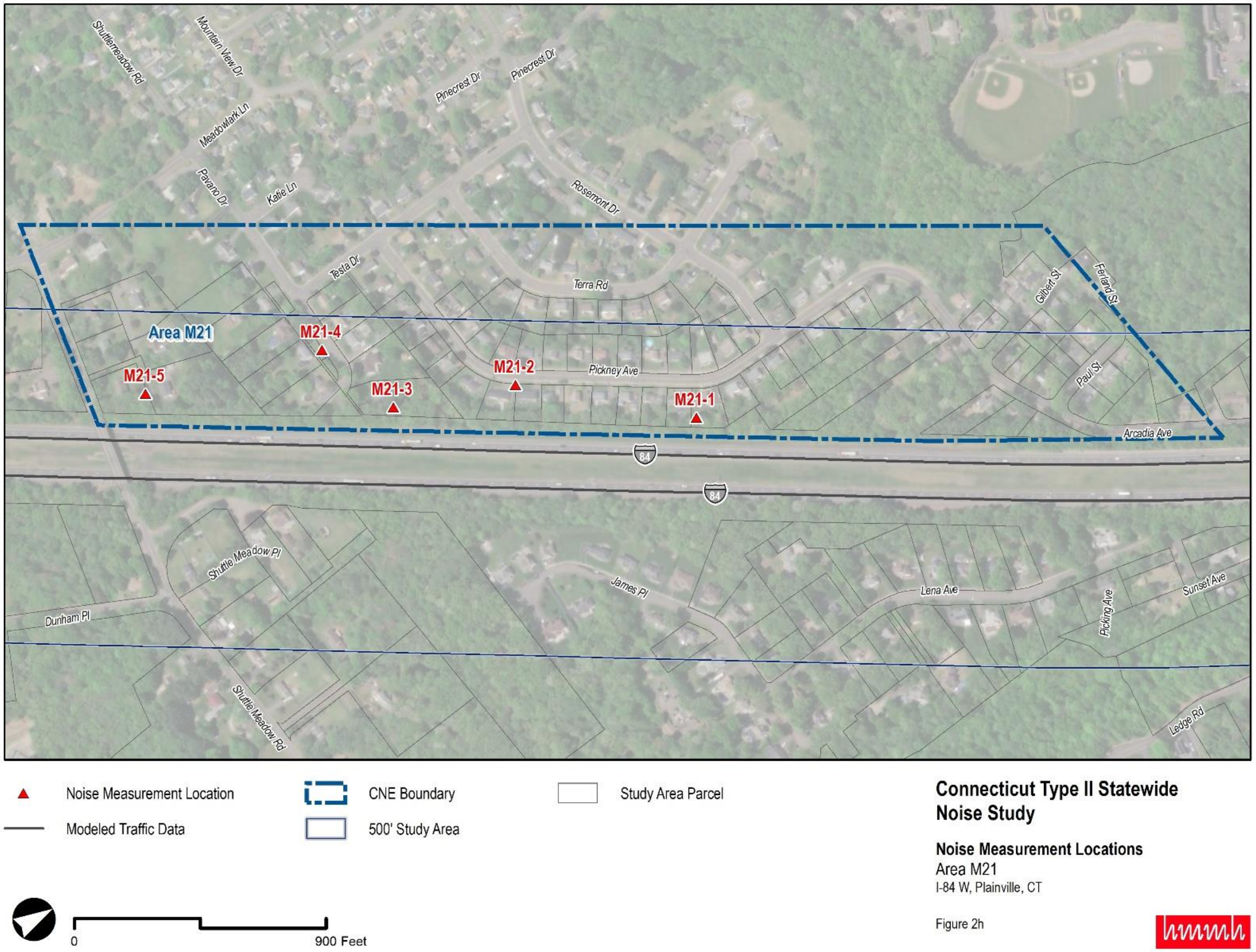


Figure 2g: Area M21 Noise Measurement Locations



Noise Model Validation

According to FHWA's federal traffic nose regulation and guidance and CTDOT policies, the accuracy of the noise prediction model must be verified in project level noise studies. The noise model validation process compares existing noise levels measured 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 can affect measured noise levels include:

- Atmospheric conditions (upwind, neutral, or downwind conditions)
- Shielding by structures that are difficult to model
- "Loud" vehicle pass-bys during the measurement (e.g., emergency vehicles with sirens, vehicles with unmuffled exhausts, etc.)

Examples of factors that can affect predicted noise levels include:

- Level of detail in modeling terrain features, sparse rows of buildings and locating receivers

FHWA and CTDOT consider the noise model to be validated when measured noise levels are within +/- 3 dBA of predicted noise levels for existing conditions.[11]

FHWA discourages "calibration" of a project-specific noise model using 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. Such cases are to be documented in the noise study report.

Table 3 presents a site-by-site comparison of measured noise levels and the corresponding TNM-computed noise levels. Not all sites validated within the desired 3 decibels; however, most of the sites in each barrier area validated well. All but eight sites were within 3 decibels. Sites that did not validate precisely mainly include those with more complex geometry between the source and measurement location as well as varying speeds during the measurement period. The project-wide average difference between calculated noise levels and measured noise levels was 1.8 decibels, which generally shows

[11] FHWA-HEP-10-025. Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.

good agreement between measured and modeled sound levels and suggests confidence in the modeling assumptions.

Table 3: Model Validation Results

Site ID (Location & Route)	Measurement Site No.	Address	Measured Traffic-only L_{eq} in dB(A)	FHWA TNM $L_{eq(h)}$ in dB(A)	Measured Minus Modeled Noise Levels dB
M1 (New London: I-95)	M1-1	Field west of 175 Norwood Ave	66.7	68.1	1.4
	M1-2	147 Norwood side yard, cul-de-sac	68.7	68.4	-0.3
	M1-3	23 Whittlesley St	58.7	63.3	4.6
	M1-4	73-76 Fitch Ave	63.0	61.4	-1.6
	M1-5	32 Crest St	58.4	61.2	2.8
M4 (Wethersfield: US-5)	M4-1	144 Ridge Crest Cir	58.8	61.7	2.9
	M4-2	123 Goodwin Ave	67.7	69.5	1.8
	M4-3	110 Brussels Ave	66.3	68.6	2.3
	M4-4	37 Fairway Drive	68.2	68.7	0.5
	M4-5	70 Brookside Cir	61.7	61.7	0
M7 (Colchester: SR-2 & SR-11)	M7-1	23 Midland Dr	59.2	59.9	0.7
	M7-2	29 Midland Dr	62.9	66.1	3.2
	M7-3	103 Midland Dr	53.1	53.7	0.6
	M7-4	112 Lynn Ln	61.7	63.9	2.2
M9 (Waterbury: I-84)	M9-1	123 Ponham St	65.9	69.4	3.5
	M9-2	81 Ponham St	67.0	70.6	3.6
	M9-3	29 Ponham St	67.3	67.9	0.6
	M9-4	90 Elk St	58.6	60.1	1.5
M12 (Fairfield: I-95)	M12-1	271 Henderson Rd	67.5	73.7	6.2
	M12-2	101 Henderson Ave	68.8	71.6	2.8
	M12-3	210 N Pine Creek Rd	69.7	71.5	1.8
	M12-4	70 Bradley St	67.4	69.9	2.5
M15 (Norwalk: US-7)	M15-1	25 Fair St	62.7	62.2	-0.5
	M15-2	53 Fair St	70.2	70.7	0.5
	M15-3	Catherine St cul-de-sac	66.6	70.1	3.5
	M15-4	A. Santaniello Park	69.1	69.3	0.2

Table 3: Model Validation Results

Site ID (Location & Route)	Measurement Site No.	Address	Measured Traffic-only L_{eq} in dB(A)	FHWA TNM $L_{eq(h)}$ in dB(A)	Measured Minus Modeled Noise Levels dB
	M15-5	Forest St cul-de-sac	66.8	69.5	2.7
M16 (Derby: SR-8)	M16-1	86 Mohawk Ave	67.8	68.6	0.8
	M16-2	15 Mountain St	67.7	66.5	-1.2
	M16-3	36 Cotter Ct	64.2	67.7	3.5
	M16-4	9 Mohawk Ave	61.3	62.5	1.2
M21 (Plainville: I-84)	M21-1	127 Pickney Ave	71.1	70.9	-0.2
	M21-2	141 Pickney Ave	63.7	67.4	3.7
	M21-3	166 Pavano Dr	71.8	73.9	2.1
	M21-4	160 Pavano Dr	63.0	65.1	2.1
	M21-5	1175 Shuttle Meadow Rd	70.9	71.9	1
Average Difference					1.8
Standard Deviation of the Differences					1.7

Notes:
Traffic-only L_{eq} = the Equivalent Noise Level, excluding measurement periods dominated by non-traffic sources
L_{eq}(h) = Hourly L_{eq}
dB = Decibel
dB(A) = A-Weighted Sound Level

Traffic counts that were used to validate the project-specific TNM2.5 models in each of the eight comprehensive barrier areas are included within **Appendix C**. The traffic counts were normalized to a one-hour time period and used as input to the FHWA TNM for the purpose of model validation.

Identification and Categorization of Eligible Land Use

Parcel-specific land use information was obtained from the Connecticut Office of Policy and Management (CT OPM) for each planning region and municipality within the Type II noise study area. The datasets received from OPM represented the most current statewide parcel data for the year 2022, which was made publicly available in February 2023. The parcel information, stored in the computer-assisted mass appraisal (CAMA) database tables, included fields for parcel address and ownership, land use codes, and date of development. The CAMA database tables were each joined to respective GIS polygon features of parcel boundaries to identify properties within the study area. Approximately 10 percent of the data in the database tables was unavailable in a usable digital format. Therefore, the Consultant Team developed town-specific routines that extracted the data for each property. Manual processing was required for all other towns where data extraction could not be automated. In total, data for approximately 75,000 parcels within the noise study area were reviewed and processed.

In accordance with CTDOT policy, the study area extended 500 feet[12] from the edge of travel lanes along each route. A buffer of approximately 800 feet was generated from georeferenced roadway centerlines provided by CTDOT to account for varying number of travel lanes on each roadway. The 800-foot buffer ensured that the minimum 500-foot study area from edge of travel lanes required by CTDOT's policy[13] would be captured. All parcels within the Type II noise study area were then categorized based on their appropriate FHWA activity category, which defines their NAC. **Table 4** provides the FHWA activity categories and corresponding NAC.

Table 4: FHWA Noise Abatement Criteria (Hourly A-Weighted Sound Level – Decibels, dB(A))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 sports 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, recreational 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.

Notes:
[1] Either $L_{eq}(h)$ or $L_{10}(h)$ (but not both) may be used on a project.
[2] The $L_{eq}(h)$ or $L_{10}(h)$ Activity Criteria values are for impact determination only and are not design standards for noise abatement measures. CTDOT uses $L_{eq}(h)$ to evaluate noise impact.
[3] Includes undeveloped lands permitted for this activity category.

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[12] Connecticut Department of Transportation Highway Traffic Noise Abatement Policy For Projects Funded By The Federal Highway Administration. October 2022.
[13] Connecticut Department of Transportation Highway Traffic Noise Abatement Policy For Projects Funded By The Federal Highway Administration. October 2022.

Land use codes and descriptions available within the CAMA data were used to group parcels into more general categories including single family residential, multi-family residential, commercial, recreational, public use, industrial and agricultural, and vacant land. The latest edition of the Connecticut Association of Assessing Officers (CAAO)[14] handbook was used to define the land use codes in the CAMA data tables. To streamline parcel identification, those with available land use codes and descriptions were initially assigned to the above-mentioned general land use categories. However, the quality of the CAMA data varied by municipality, and therefore, parcel categorization could not be automated in many locations. The format of the CAMA data was not standardized across each Council of Government (COG)/municipality. Municipalities had different names for the same fields, and some fields were missing or incomplete for certain municipalities. For each municipality, a standardized field name was created and populated with available data, allowing datasets to be consistently and seamlessly joined across the state. Differences also existed in the land use classifications used by different COGs/municipalities, so the land use data were re-classified using a consistent land use classification scheme for the study area.

In addition, for areas with insufficient or missing land use information, manual classification was necessary, which was conducted by referencing Google Street View, aerial imagery available from Environmental Systems Research Institute (ESRI) and Google Earth and reviewing publicly available property records. Errors in parcel classification generated by the automated process also resulted from outdated CAMA data, whereby the most common error occurred with recently developed parcels that were automatically marked “vacant.” Where parcel categorization could not be automated, visual inspection via aerial mapping and Google Street View ™ was also required to identify exterior areas of frequent human use. All residential development was generally assumed to include some exterior use areas.

Once parcels were organized into the more general land use categories, they were assigned to their appropriate FHWA activity categories. The study excluded parcels in FHWA activity category F or G, for which there are no NAC, parcels directly behind an existing noise barrier[15] (i.e., within the limits of the barrier termini), and those with no outdoor use (e.g., restaurants with no outdoor seating, hotels/motels with no outdoor amenities). Four shapefiles (one for each of the four CTDOT Districts included within the Type II noise study area) and four spreadsheets with attribute tables exported from GIS were provided to CTDOT identifying the excluded parcels.

Noise Model Development

The following sections detail the development of the basic noise prediction model for identifying existing impacted areas and its inputs. Also, the validity of the basic model approach is confirmed through comparison of the results from the comprehensive models prepared for the eight validated barrier areas to the results from the basic prediction models developed for those same areas. The

[14] The Handbook for Connecticut Assessors. Connecticut Association for Assessing Officers. Revised 2017.
[15] A shapefile illustrating locations of existing noise barriers was provided to the Consultant Team by CTDOT.

following sections provide further detail on factors used to determine the validity of the basic model approach.

Traffic Data Development

During the COVID-19 pandemic, stay-at-home orders significantly affected traffic volumes on interstates and expressways with most commuters working remotely[16]; therefore, to identify representative traffic noise impacts, CTDOT and the Consultant Team agreed to use 2019 pre-pandemic traffic volumes in the noise model. CTDOT provided 2019 traffic data for mainline roadways from their Highway Performance Management System (HPMS). The linear-referenced dataset included mile markers, Average Annual Daily Traffic (AADT) volumes, peak hour factors (k-factor), posted speed limits, and medium and heavy truck percentages. However, this data set lacked sufficient travel directionality information, and study area routes were very finely segmented with multiple traffic changes where no changes in highway access were identified. The 2019 HPMS data set was also incomplete for many roadway segments within the noise study area. Georeferenced traffic data from CTDOT's Traffic Monitoring Station Viewer[17] was the intended backup data source to populate any gaps in the 2019 HPMS data set. However, the data from the CTDOT's Traffic Monitoring Station Viewer was only available in a pop-up format that could not be easily applied to segments of the noise study area routes within GIS.

Therefore, the Consultant Team used historical CTDOT traffic monitoring data in GIS shapefile format[18] that included the traffic data necessary for model input on bidirectional centerlines along each roadway in the noise study area. A limited number of routes only included traffic volumes representative of both travel directions; for those routes, the total traffic was split evenly (i.e., 50 percent applied to each direction). Year 2019 traffic volumes were available for approximately one-third of study area roadways, while year 2017 and 2018 volumes were available for the remaining two-thirds of the study area roadways. A growth factor of 0.5 percent per year was applied to 2017 and 2018 volumes to yield 2019 volume estimates to achieve consistency on all modeled roadways throughout the Type II noise study area. Peak hour k-factors below 8 percent and above 12 percent were adjusted based on direction from CTDOT.[19]

[16] The CTDOT Traffic Monitoring Count Data: Volume and Classification Information website (https://portal.ct.gov/DOT/PP_SysInfo/Traffic-Monitoring) provides Continuous Count Station Volume Summaries graphs for each traffic count station operated by CTDOT. In general, summary graphs show a pronounced decrease in traffic volumes beginning in March 2020 and continuing through the remainder of 2020, through 2021, 2022, and the end of 2023, relative to 2019 traffic volume counts.
[17] Traffic Monitoring Count Data: Volume and Classification Information.
[18] CTDOT Historical Traffic Monitoring Data | CTDOT Historical Traffic Monitoring Data | CTDOT Open Data (arcgis.com)
[19] The Consultant Team participated in a conference call with CTDOT traffic engineers on February 10, 2023. CTDOT traffic engineers agreed to use of the historical traffic data set and instructed the Consultant Team to apply a 0.5% growth factor per year to 2017 and 2018 traffic volumes. CTDOT traffic engineers also advised the Consultant Team that peak hour k-factors on expressways and limited access highways generally range between 8% and 12% and to adjust any lower or higher k-factors up to 8% and down to 12%, respectively.

Roadways Development

The georeferenced bidirectional centerlines available for the study area routes in CTDOT's historical traffic data set were used to develop a shapefile for all roadways in the study area, which was populated with peak hour automobile and light truck volumes, medium truck (two axles, six tires) volumes and heavy truck (three or more axles) volumes. The volumes were derived from k-factors applied to AADT volumes and single (medium truck) and combination (heavy truck) truck percentages. K-factors were only available for a limited number of segments and routes in both the historical data set and 2019 HPMS data set. Therefore, the Consultant Team manually assigned k-factors to missing portions of study area routes based on trends of k-factors prior to and after segments with missing values. Posted speed limits available within the 2019 HPMS data set were also assigned to each route segment.

The Consultant Team used the roadway shapefile populated with traffic volumes and speeds, as described above, to establish the noise model for impact determination. To develop the number of lanes for each route, the Consultant Team used a georeferenced HPMS data file provided by CTDOT that included the total combined number of lanes (both travel directions) on each study area route. For simplicity, the number of lanes was divided in half, assigning an even number of lanes to both sides of each roadway. A standard 12-foot lane width was assumed and multiplied by the total number of lanes in each direction to populate roadway widths within the noise model.

Basic Noise Model Development and Implementation

For noise impact identification and visualization, the Consultant Team chose to develop noise impact contours utilizing the TNM2.5 module within SoundPLAN GmbH acoustical modeling software. While FHWA's TNM2.5 includes a noise contour generation feature, it is not as robust and reliable as the grid noise map feature in SoundPLAN, which facilitates a seamless export of contours generated by user-defined intervals. Grid size can easily be varied for better accuracy, as well. It is important to note that the noise contours were used solely to facilitate identification of locations within the noise study area that experience existing highway traffic noise impact and where a feasible and reasonable noise barrier could potentially be constructed. This approach was approved by CTDOT and FHWA.

The Consultant Team's ESRI shapefile license for SoundPLAN was used to import the roadways shapefile created in GIS. No other modeling features (e.g., terrain lines, building rows, barriers, ground zones, etc.) were included within the basic noise model. Calculation areas were developed to produce noise contours by generating a 2,000-foot buffer from the bidirectional centerlines in the roadway shapefile. The selected buffer distance was considered sufficient to capture the extent of impacts for all activity categories and define the ground type within the model. The ground type within the buffer and outside of modeled roadways was assigned as TNM lawn. The single buffer was then divided into eight individual county buffers following county boundaries available in GIS.[20] The Consultant Team was therefore able to execute one model run per county, expedite results, and view individual counties to identify potential necessary modeling edits. Once all county-specific runs were complete, resultant noise contours were easily merged within SoundPLAN into one data set for the entire study area.

[20] https://ctdot.maps.arcgis.com/apps/webappviewer/index.html?id=a3590a7b074e41099cb5304e39dba314

Using the Consultant Team's ESRI shapefile license for SoundPLAN, statewide noise impact contours were exported to a GIS shapefile in 1-decibel intervals from 66 dBA to 72 dBA to cover all exterior FHWA and CTDOT NAC. Based on a parcel's intersection with noise impact contours, the parcel was automatically assigned as an "impact" in GIS. This impact status assignment was used later during processing of potential noise barriers.

To evaluate consistency of the SoundPLAN GmbH-generated noise contours with FHWA's TNM2.5 sound level prediction, half-mile radius sections of each traffic route were evaluated with a set of receivers every 10 feet, beginning 10 feet from the edge of travel and extending to a distance of 500 feet from edge of travel. The receiver sets were executed in FHWA's TNM2.5 as well as in SoundPLAN single point sound level runs, using the TNM2.5 module. Modeled sound levels in TNM2.5 at each receiver point were compared with the single point sound levels from SoundPLAN model runs as well as contour values. The receiver point comparison between SoundPLAN (using the TNM2.5 module) and FHWA's TNM2.5 showed good agreement, with an average difference in sound levels of approximately 0.3 decibels. Contours in general are less accurate than single point sound level prediction; however, spot checks of receiver sound levels with contours also showed good agreement to validate use of SoundPLAN's TNM2.5 module for noise impact contour generation.

Comprehensive Noise Model

To confirm the validity of the basic model approach, first a complete set of receivers was added to the comprehensive TNM models of each of the eight barriers areas for which model validation was performed. Traffic volumes were updated to reflect the volumes used in the basic noise models. Then, the same set of receivers was added to the basic models in the eight barrier areas. Both models were executed, and noise levels were compared.

Comparison of Basic and Comprehensive Noise Models

Table 5 summarizes the noise level differences between the basic and comprehensive models averaged over all receivers in each of the eight study areas. On average, the comprehensive models predicted approximately 2 decibels lower than the basic noise models due to the effects of terrain lines, building rows and building barriers used for large structures in the comprehensive model. The sites with the greatest differences are M9 and M16. The roadway in area M9 is in a deep cut section with steep rock walls up to the residential development overlooking I-84. A portion of the roadway within area M16 is also located in a cut section with a significant slope up to the residential neighborhood. All other barrier areas do not exhibit significant terrain variation; therefore, the main differences in noise levels in those areas between basic and comprehensive models stem from building rows and building barriers (i.e., large buildings modeled as TNM barriers for noise shielding).

FHWA requires that detailed noise models should predict sound levels within 3 decibels of measured values unless there are unusual site conditions that cannot be accounted for within the traffic noise model. Since the basic noise model predicts sound levels that are within 3 decibels of modeled sound levels for all but two locations, this suggests strong confidence in the basic noise model being quite representative. The two sites with greater than 3 decibel differences have significant variation in the terrain and elevation, which explains the greater differences. Further, the average difference among all sites is also less than 3 decibels.

Table 5: Comprehensive vs. Basic Noise Model Comparison

Barrier Area (Location & Route)	Average Noise Levels (L_{eq} dBA)		Difference (dB)
	Detailed Model	Basic Model	(Basic – Detailed)
M1 (New London: I-95)	64	62	-2
M4 (Wethersfield: US-5)	62	63	1
M7 (Colchester: SR-2 & SR-11)	56	58	2
M9 (Waterbury: I-84)	60	64	4
M12 (Fairfield: I-95)	67	68	1
M15 (Norwalk: US-7)	59	61	2
M16 (Derby: SR-8)	60	66	6
M21 (Plainville: I-84)	66	65	-1
Average Difference			2

Noise Barrier Evaluation

After confirming the validity of the basic noise model approach to identifying existing impacts for the Type II noise study area, potential noise barrier areas were reviewed. As previously discussed, CTDOT provided the Consultant Team with a shapefile of existing noise barriers within the state that was referenced when identifying potential Type II barrier areas. Pursuant to 23 CFR 772.15(b)(3), FHWA will not approve and provide funding for noise abatement measures on Type II projects where these measures were previously determined to not be feasible and reasonable for a Type I project. CTDOT reviewed best available historical records to eliminate any former Type I project locations where abatement measures were previously found to be not feasible or reasonable. Noise barriers were also not evaluated in active Type I project areas with secured funding as of April 25, 2023. A list of three active projects was provided by CTDOT. **Appendix D** includes a list of prior Type I project areas as well as currently active Type I projects with secured funding identified by CTDOT. Should funding for a Type I project become available in any areas on the Type II priority list, those areas will be removed from the priority list and evaluated for noise impacts and abatement, pursuant to requirements of 23 CFR 772 for a Type I noise study.

CTDOT primarily considers three types of abatement measures that may be incorporated in Type II projects to reduce traffic noise impact, which include:

- Traffic management measures,
- Alteration of horizontal and vertical alignments, and
- Construction of noise barriers (and/or earthen berms).

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 reduction in speed of 10 miles per hour (mph) will result in only a 2 to 3 dBA decrease in noise level, which is not considered a sufficient level of attenuation to be considered feasible. Further, a 2 to 3 dBA change in noise level is not considered to be generally perceptible. Restricting truck usage on the study area roadways is not practical since one purpose of these facilities is to accommodate trucks.

A significant **alteration of the horizontal or vertical alignment** of the study area roadways is not a practical abatement measure for a Type II project. The intent of Type II projects is to abate existing highway traffic noise impacts on existing roadways that are not slated for a Type I improvement project. In most cases, no roadway improvements are included in Type II projects. Further, horizontal and vertical alignment changes are costly measures, which can include right-of-way acquisitions and structure relocations and would likely trigger a Type I project. Similarly, raising or lowering the vertical alignment of existing roadways would result in significant environmental impacts to the surrounding environment and costly engineering challenges, and would also likely trigger a Type I project. Pursuant to 23 CFR 772, Type II abatement benefits must outweigh the overall adverse social, economic, and environmental (SEE) effects and costs of the highway traffic noise abatement measures. Therefore, alteration of the horizontal or vertical alignments of existing roadways is not a practical Type II abatement measure.

The **construction of non-structural barriers (i.e., earthen berms)** is considered a more attractive alternative to noise walls where there is sufficient land and fill available for them. However, non-structural barriers do not appear to be feasible for most of the study area because of the cost and footprint required for their construction. Guidelines established for the Merritt Parkway prohibit the use of structural noise barriers along the Parkway.[21] Therefore, non-structural barriers were considered along the Merritt Parkway. In all other areas, structural noise barriers were evaluated as the best, most cost-effective abatement measure for existing highway traffic noise impacts.

FHWA and CTDOT require that noise barriers be both “feasible” and “reasonable” to be recommended for construction. Feasibility includes acoustical and engineering feasibility. Acoustical feasibility evaluates the level of noise reduction achieved by the noise wall (i.e., insertion loss or “IL”) at impacted receptors. Engineering feasibility addresses whether engineering constraints preclude construction of a

[21] Merritt Parkway Guidelines for General Maintenance and Transportation Improvements. Prepared by the Merritt Parkway Working Group. June 1994.

noise abatement measure. Reasonableness considers viewpoints of the affected property owners and residents, the cost-effectiveness of the proposed abatement measure, and ability of the abatement measure to achieve a noise reduction design goal. State DOTs have established individual feasibility and reasonableness criteria within federally mandated requirements. CTDOT's feasibility and reasonableness criteria are summarized below:

Feasibility

a) Acoustical feasibility – The noise barrier must reduce noise levels at noise-sensitive locations by at least 5 decibels, thereby "benefiting" the property. CTDOT requires that at least two-thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
b) Engineering feasibility – It must be possible to design and construct the barrier. Engineering feasibility of the noise abatement measure(s) shall consider adverse impacts created by or upon property access, drainage, topography, utilities, safety, and maintenance requirements.

Reasonableness

a) Any receiver that receives a minimum noise level reduction of 5 dB(A) due to noise abatement measures shall be considered a benefited receptor.
b) A noise reduction design goal (NRDG) of 7 dB(A) must be met or exceeded for a minimum of two-thirds of the *benefited* receptors.
c) Viewpoints of the benefited property owners and residents shall be solicited. For the abatement measure to be considered, two-thirds of the returned solicited viewpoints must be in favor of the abatement measure(s).
d) A Cost-Effective Index (CEI) of $55,000 per benefited receptor based on a unit cost of $60 per square foot ($60/SF) for a noise barrier wall. In the case of an earthen berm, the cost will be based upon the actual unit costs for the materials used.

The Consultant Team reviewed the noise impact contours for each county and identified locations where noise impact is occurring, and noise barriers could potentially meet the CTDOT criteria described above. Four heights were evaluated in 5-foot increments from 10 feet to 25 feet. As a first-tier screening, the number of benefits required to achieve both CTDOT's acoustic feasibility and reasonableness requirements was identified for various barrier lengths and the four barrier heights. For example, based on CTDOT's CEI of $55,000 per benefited receptor and unit cost of $60/SF, a noise barrier 1,000 feet in length and 10 feet in height, equating to 600,000 SF, requires at least 11 benefited receptors to meet CTDOT's CEI. If the CNE within 500 feet of the edge of travel did not include sufficient density of noise-sensitive land use to meet CTDOT acoustical feasibility and reasonableness criteria, a noise barrier was eliminated from consideration.

For locations with sufficient density to potentially meet CTDOT criteria, noise barriers were evaluated at each height using SoundPLAN. Use of SoundPLAN for this task was approved by CTDOT and FHWA. Similar to the noise impact evaluation, a grid noise analysis was executed, and difference level contours were calculated to identify noise barrier insertion loss. Insertion loss contours were exported to a GIS shapefile for visualizing noise level reductions at parcels within each CNE behind each noise barrier. For each county, parcels within a 500-foot CNE boundary were assigned to noise barriers, and values of 5+ (benefited) or 7+ (meets NRDG) for each barrier height were assigned to parcels based on the insertion loss contours. The populated parcel attribute tables, by county, which also included the impact status of each parcel, as described earlier in the "Basic Noise Model Development and Implementation" section of this report, were exported to a spreadsheet for further processing.

All single-family residential parcels were counted as one dwelling unit. CAMA data tables for multifamily developments did not provide sufficient information to identify dwelling units; therefore, a combination of methods was used for these properties. Specifically, where possible Google Maps, Globe View, and Google Street View were used to count balconies, electrical and/or water meters, driveways, individual patios, yards, etc. Real estate and apartment rental websites were also used to identify total numbers of dwelling units within some complexes.[22] In addition, a statewide residential zoning analysis conducted in 2013 provided the allowable number of dwelling units per acre, by town, in multifamily zoning districts.[23] To approximate the number of dwelling units, the allowable number of units per acre was divided by the multifamily parcel acreage, calculated in GIS. The total number of dwelling units was then evenly distributed among buildings within the multifamily developments to calculate impacts and benefits for barrier evaluation.

For nonresidential parcels, CTDOT calculates equivalent number of dwelling units for Type I projects based on person-hours per day. CTDOT's Type I approach to calculating equivalent dwelling units for nonresidential parcels will be used in any forthcoming detailed analyses. However, this method was determined to be impractical for a Type II program screening. To streamline the process of identifying equivalent dwelling units for nonresidential parcels, CTDOT approved the Consultant Team's suggested FHWA-approved lot-based calculation method.[24] The method involves calculation of the impacted square footage of land area and dividing that area by the average residential lot size to yield equivalent number of dwelling units. Using GIS, the Consultant Team calculated an average residential lot size for the Type II study area of 50,243 SF, which is based on available single-family residential lot sizes. To determine if noise barriers would meet CTDOT acoustical feasibility and reasonableness criteria for nonresidential parcels, the number of equivalent dwelling units within impacted land area was reviewed, and the same first-tier screening approach described above for residential land use was implemented. Except for one Activity Category C parcel, none of the other nonresidential parcels passed the first-tier screening approach because equivalent dwelling units were either too low for a noise barrier to meet CTDOT feasibility and reasonableness criteria, or the impacted land area did not represent the parcel's outdoor use areas. The only noise barrier evaluated for a nonresidential parcel was along I-95 southbound in North Stonington, New London County, for the Mystic KOA Holiday

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[22] Websites, including zillow.com and apartments.com were used for apartment complexes with limited visibility on Google Street View and on aerial mapping.

[23] https://fionnualadh.github.io/cfhc-residential-zoning-analysis/#explore-section. Accessed June 17, 2023.

[24] FHWA-HEP-17-056. Calculating and Placing Non-Residential ReceiverReceiversReceivers (NRRs). Methodology: Lot Size.

campsites. The common outdoor use areas were not predicted to experience impacts due to their distance from I-95; however, the individual campsites were predicted to experience impacts due to their adjacency to I-95 travel lanes. While several barrier heights evaluated were determined to be acoustically feasible and meet CTDOT's CEI, none of the barrier heights achieved the noise reduction design goal.

Table 6 summarizes the noise barriers that were determined to meet CTDOT acoustical feasibility and reasonableness criteria and were thereby advanced to barrier prioritization. **Appendix E** provides a summary table of all noise walls that passed first-tier screening and were evaluated in SoundPLAN, including any barriers that were determined not to be feasible and/or reasonable. The table includes the highway year "on system" as well as the percentage of development protected by the noise barrier that predates and postdates the highway based on available information within the CAMA data tables. This information was determined in preparation for noise barrier prioritization, and the process to identify that information is described in the following sections.

Table 6: Evaluated Noise Wall Summary Table

Wall Name	Description of Noise Wall Location	Height (ft)	Length (ft)	Wall Area (ft^2)[1]	Acoustic Feasibility Goal (AFG)[2]	Noise Reduction Design Goal (NRDG)[3]	Cost per Benefit[4]	Highway Year	% Predate	% Postdate
Development Mixed Before/After Highway										
Cromwell_17	SR-9 northbound between Evergreen Rd. and Coles Rd.	20	3,605	72,097	100%	67%	$ 50,892	1969	1%	99%
		25		90,121	100%	66%	$ 48,279			
Manchester_4	I-384 eastbound between Bidwell St. and Keeney St.	10	2,405	24,052	100%	78%	$ 53,448	1971	88%	12%
WestHartford_7	I-84 westbound between Quaker Ln. and Trout Brook Dr.	10	1,531	15,311	69%	95%	$ 41,758	1965	95%	5%
		20		30,623	88%	77%	$ 41,758			
		25		38,278	91%	66%	$ 43,334			
Wethersfield_18	SR-15 northbound between Goff Rd. and Ridge Rd.	10	2,700	27,001	100%	69%	$ 50,627	1942	4%	96%
		15		40,502	100%	73%	$ 44,183			
		20		54,002	100%	84%	$ 51,431			
Milford_4	I-95 northbound between Milford Pkwy. And River St.	20	2,093	41,855	100%	85%	$ 52,319	1957	67%	33%
WestHaven_9	I-95 northbound between Oleander St. and Stevens Ave.	25	963	24,087	90%	69%	$ 45,163	1957	73%	27%
Naugatuck_32	SR-8 northbound between Calvin St. and Smith St.	20	2,140	42,806	97%	75%	$ 42,104	1960	85%	15%
		25		53,507	97%	77%	$ 52,630			
Ansonia_35	SR-8 southbound between Hull St. and Division St.	15	3,697	55,462	100%	91%	$ 40,582	1959	57%	43%
		20		73,949	100%	92%	$ 52,821			
Derby_37	SR-8 southbound between Bluff St. and Hawkins St.	10	2,072	20,721	82%	68%	$ 40,105	1959	81%	19%
		25		51,802	95%	70%	$ 42,001			
Norwalk_M15	US-7 northbound between Belden Ave. and SR-123	15	2,774	41,604	100%	67%	$ 32,846	1970	95%	5%
		20		55,473	100%	73%	$ 41,091			
		25		69,341	100%	74%	$ 42,454			
Shelton_5	SR-8 southbound between Prospect Ave. and Constitution Blvd.	25	3,137	78,419	94%	72%	$ 51,143	1972	82%	18%
Bridgeport_6	SR-8 southbound between Old Town Rd. and Sylvan Ave.	15	4,905	73,572	100%	81%	$ 27,249	1972	57%	43%
		20		98,096	100%	98%	$ 36,109			
		25		122,620	100%	98%	$ 44,861			
Bridgeport_7	SR-8 southbound between Lindley St. and Parallel St.	25	1,876	46,907	100%	69%	$ 30,262	1972	94%	6%
Stamford_18	I-95 northbound between Myrtle Ave. and Maher St.	15	2,631	39,459	92%	68%	$ 24,407	1958	85%	15%
		20		52,612	95%	79%	$ 31,567			
		25		65,764	99%	81%	$ 38,309			
Stamford_19	I-95 northbound between Blachley Rd. and Seaside Ave.	20	1,284	25,683	100%	78%	$ 48,155	1958	75%	25%
Norwalk_20	I-95 northbound between Scribner Ave. and Taylor Ave.	25	1,963	49,074	86%	67%	$ 53,535	1958	84%	16%
Fairfield_M12	I-95 southbound between Mill Plain Rd. and Bronson Rd.	15	3,455	51,830	100%	80%	$ 31,733	1958	89%	11%
		20		69,107	100%	96%	$ 42,310			
		25		86,384	100%	99%	$ 52,888			
Fairfield_30	I-95 southbound between Ash Creek and Chambers St.	15	3,226	48,390	100%	89%	$ 34,564	1958	86%	14%
		20		64,520	100%	99%	$ 45,543			
Bridgeport_31		15	2,148	32,226	100%	85%	$ 41,140	1958	80%	20%

Table 6: Evaluated Noise Wall Summary Table

Wall Name	Description of Noise Wall Location	Height (ft)	Length (ft)	Wall Area (ft^2)[1]	Acoustic Feasibility Goal (AFG)[2]	Noise Reduction Design Goal (NRDG)[3]	Cost per Benefit[4]	Highway Year	% Predate	% Postdate
	I-95 southbound between I-95 southbound on-ramp from Seaview Ave. and I-95 southbound on-ramp from SR-127	20		42,968	100%	94%	$ 53,711			
Stratford_32-33	I-95 northbound between I-95 northbound off-ramp to Honeyspot Rd. and Stratford Ave.	25	3,466	86,662	100%	71%	$ 39,998	1959	67%	33%
Danbury_35	I-84 eastbound between Beckett St. and Kohanza St.	15	3,151	47,262	85%	67%	$ 32,594	1962	36%	64%
		20		63,016	86%	82%	$ 41,549			
		25		78,769	86%	87%	$ 51,936			
Danbury_36	I-84 eastbound between SR-37 and Germantown Rd.	15	5,354	80,306	97%	89%	$ 36,781	1962	50%	50%
		20		107,074	98%	93%	$ 47,588			
Waterbury_M9	I-84 eastbound between I-84 eastbound on-ramp from Chase Parkway and Highland Ave.	15	1,250	18,752	100%	72%	$ 45,004	1966	86%	14%
Norwalk_2	US-7 northbound between Butler Ln and Union Park	15	1,739	26,091	100%	91%	$ 44,727	1970	80%	20%
Fairfield_28	I-95 northbound between Mill Plain Rd and Unquowa Rd	15	1,813	27,193	100%	87%	$ 26,748	1958	67%	33%
		20		36,258	100%	89%	$ 35,088			
		25		45,322	100%	89%	$ 42,490			
Middletown_19	I-95 northbound between Smith St. and Berlin Rd.	20	6,262	125,231	100%	68%	$ 10,140	1965	40%	60%
		25		156,539	100%	78%	$ 11,624			
Waterford_3	I-95 northbound between SR-85 and Vauxhall St.	20	1,416	28,316	100%	72%	$ 43,563	1943	70%	30%
		25		35,395	100%	74%	$ 50,564			
WindsorLocks_1	I-91 southbound between Belaire Park and Center St.	15	3,968	59,527	100%	94%	$ 52,524	1958	74%	26%
Greenwich_10-11-41	I-95 southbound between Hartford Ave. and Richard St.	20	3,860	77,190	97%	80%	$ 40,273	1958	88%	12%
		25		96,488	97%	96%	$ 49,481			
Greenwich_14	I-95 southbound between Indian Field Rd. and Steamboat Rd.	15	5,701	85,519	99%	84%	$ 43,856	1958	73%	27%
Greenwich_15	I-95 southbound between River Rd. and Sound Shore Dr.	15	4,454	66,815	100%	92%	$ 43,575	1958	60%	40%
Greenwich_17	I-95 northbound between Peters Rd. and Laddins Rock Rd.	15	3,756	56,334	100%	83%	$ 31,887	1958	83%	17%
		20		75,112	100%	99%	$ 42,516			
		25		93,890	100%	100%	$ 53,145			
Development Postdates Highway										
Middletown_14	SR-17 southbound between Wesleyan Hills Rd. and Brush Hill Rd.	20	2,976	59,524	93%	78%	$ 37,202	1913	0%	100%
		25		74,405	90%	90%	$ 45,094			
Manchester_15	I-84 eastbound between Slater St. and Buckland St. ramp	15	2,848	42,716	100%	92%	$ 7,651	1948	0%	100%
		20		56,954	100%	92%	$ 10,201			
		25		71,193	100%	92%	$ 12,751			
Montville_10	I-395 southbound between Trading Cove Brook and Leffingwell Rd.	20	1,595	31,910	100%	74%	$ 25,873	1958	0%	100%
		25		39,887	100%	84%	$ 32,341			
Colchester_13	SR-2 westbound between Chestnut Hill Rd. and Parum Rd.	10	1,498	14,981	95%	100%	$ 49,937	1971	0%	100%
Middletown_10	Hwy 9 northbound between Eastern Dr. and Walnut St.	25	840	21,000	100%	67%	$ 16,154	1958	0%	100%
Milford_30		15	1,303	19550.96474	100%	80%	$ 19,551	1937	0%	100%

Table 6: Evaluated Noise Wall Summary Table

Wall Name	Description of Noise Wall Location	Height (ft)	Length (ft)	Wall Area (ft²)[1]	Acoustic Feasibility Goal (AFG)[2]	Noise Reduction Design Goal (NRDG)[3]	Cost per Benefit[4]	Highway Year	% Predate	% Postdate
	Milford Parkway (SR-796) northbound from E Rutland Rd to SR-15 interchange	20		26067.95298	100%	67%	$ 21,723			
		25		32584.94123	100%	71%	$ 23,275			

Notes:
[1] – Wall area is calculated based on wall length and height. For example, Cromwell_17 Wall Area (ft²) = 20 ft x 3,605 ft = 72,100 ft². Note that the lengths presented are rounded for presentation, so the exact calculated wall area equates to 72,097 ft², as shown in the table.
[2] – Acoustic Feasibility Goal (AFG): CTDOT requires that at least two thirds (66.667%) of the impacted receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
[3] –Noise Reduction Design Goal (NRDG): CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds (66.667%) of the benefited receptors.
[4] – Cost per benefit ($) = Total NW Cost ($) / No. of Benefits where,
Total NW Cost ($) = Wall Area (ft²) x $60/ft²

Prioritization of Noise Barriers

This section details the development of the priority equation, including a summary of factors considered by CTDOT, and provides the recommended priority equation and priority list with ranked noise barrier areas. **Appendix F** includes details regarding FHWA's priority equation requirements and the Consultant Team's research of other state Type II policies.

Priority Rating System Factors Considered by CTDOT

CTDOT considered several factors in the development of the Type II priority equation, which are presented in **Table 7**. **Table 7** also summarizes which factors are considered by FHWA and each state for which Type II noise policies were reviewed (refer to **Appendix F** for details of each state's Type II policy review).

Table 7: Summary of Priority Rating Factors Considered

Factor	FHWA	CTDOT 1986 Type II Policy	MTA/ D.C.DOT	NHDOT[2]	TxDOT
Severity of Noise Impact	✓	✓	✓	✓	✓
Number of Benefited Receptors	✓	✓	✓	✓	✓
Date of Development[1]	✓	✓	✓	✓	✓
Abatement Cost	✓	✓	✓	✓[3]	✓
Achievable Noise Reduction	✓		✓	✓	✓

Notes:

1. MTA/D.C.DOT, NHDOT, and TxDOT consider date of development during barrier area screening (i.e., areas where development does not predate highway are eliminated upfront; therefore, these states do not include a term for development date in their priority equations).

2. NHDOT's Type II development study does not include a priority ranking equation, however, the study lists factors to consider in ranking the Type II barrier areas presented in the report.

3. NHDOT's traffic noise policy uses a dimensional effectiveness index (DEI) rather than a cost-effectiveness index. The DEI is based on an allowable square footage of barrier per benefited receptor.

A brief discussion on how each factor listed in **Table 7** has historically been implemented by these states in their Type II policies as well as approaches that were suggested by the Consultant Team and considered by CTDOT are presented below.

Severity of Noise Impact – CTDOT expressed interest in including a term in the priority ranking equation that is based on the severity of noise impact, relative to FHWA's NAC for each noise-sensitive land use category. The degree of impact is a critical factor, as the premise of the Type II program is to control existing highway traffic noise impacts in areas where Type I projects are not planned or programmed, and therefore, these areas may not otherwise experience relief from elevated traffic noise levels.

The FHWA NAC is in part based on speech intelligibility. Areas in which traffic noise levels are at or just above the applicable FHWA NAC are barely impacted, and individuals should be able to hold conversations approximately at an arm's length apart without raising their voices. For every 6-decibel increase in noise levels, the communication distance is halved, and individuals need to speak with raised voices.

FHWA, CTDOT's 1986 Type II policy, MTA, D.C.DOT, NHDOT, and TxDOT all consider severity of impact, as discussed herein. The Consultant Team provided a suggested approach to simplifying how severity of noise impact is addressed relative to the FHWA NAC. The approach includes a scale developed based on the widely known concept that a 10-decibel increase in noise level is generally heard as twice as loud by average listeners. Based on this concept, areas with the highest noise levels would be prioritized by the ranking equation, and a barrier area with impact noise levels averaging 10 decibels higher than another would have a priority factor twice as high, all other things being equal.

Number of Benefited Receptors – The number of receptors benefited by the proposed abatement measure is another critical factor in the priority ranking equation, which is directly related to population density as well as severity of noise impact. FHWA, CTDOT's 1986 Type II policy, MTA, D.C.DOT, NHDOT, and TxDOT all consider number of benefits within their respective Type II priority ranking equations.

In all Type II policies reviewed, residential receptors were counted as one dwelling unit, whereas nonresidential receptors were given less weight, usually based on a usage factor. The Consultant Team suggested a more streamlined approach, relative to CTDOT's person-hour usage-based approach in the current highway traffic noise policy, to counting the number of benefits for nonresidential receptors for Type II screening. The suggested approach was to use FHWA's lot size methodology,[25] which involves identifying an average lot size in SF for the noise study area. The square footage of impacted land area is then divided by the average lot size to determine the total number of equivalent dwelling units for nonresidential impacts and benefits.

Date of Development – FHWA will only provide federal funding for abatement protecting developments that either predate the highway or substantial construction predates the highway, or for developments approved prior to November 28, 1995. Date of development is thereby an important factor.

Based on discussions with CTDOT, funding sources for Type II abatement are unknown at this time; therefore, barriers were evaluated for areas with mixed development dates and areas that either fully predate the highway or fully postdate the highway. In other states, including Texas, Massachusetts, New Hampshire, and Washington D.C., areas with developments that do not predate the highway were removed from the barrier areas considered so that the priority equations in these states do not include a development date factor.

CTDOT's 1986 Type II priority equation includes weighting factors for consideration of development date. CTDOT expressed interest in prioritizing areas where 50 percent of the development predates the highway.

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[25] Calculating and Placing Non-Residential Receptors (NRRs). Methodology: Lot Size. FHWA-HEP-17-056.

Abatement Cost – FHWA, MTA, D.C.DOT, and TxDOT all consider abatement cost in their priority ranking systems. NHDOT considers a dimensional effectiveness index, which is based on a square footage of barrier per benefit rather than cost.

Cost of abatement has historically been considered by other states in the denominator of the priority ranking equation, such that the higher the total abatement cost, the lower the priority index assigned.

Achievable Noise Reduction – CTDOT's 1986 Type II priority equation lacks consideration of achievable noise reduction, which is a critical factor in priority ranking. The goal of the Type II program is to control noise along existing highways, which is most important in areas severely affected by elevated noise levels and those in which the greatest reduction in noise levels can be realized. Most complaints originate from these severely impacted areas. Achievable noise reduction is included within the priority equations developed for MTA, D.C.DOT, TxDOT and is a considered factor in NHDOT's Type II study.

One suggested approach CTDOT considered in addressing the benefit factor was to use a sliding scale, like that suggested for determining severity of impact. For example, areas receiving 15-decibel reductions are assigned twice as much weight as those areas only receiving 5-decibel reductions due to the 10-decibel difference.

Recommended Priority Equation

At the heart of the priority rating system is the priority equation—an equation or algorithm that balances several factors in the design of a noise barrier. CTDOT identified which factors to include in the State's Type II priority equation for ranking noise barrier areas. CTDOT expressed a desire to develop a priority equation that is fair for all communities and both easy to understand and explain. CTDOT also requested that, due to unknown funding sources, developments that both predate and postdate the highway be considered in the development of the Type II priority list. CTDOT determined that the Date of Development should be given the most weight, relative to the other terms in the equation. Based on CTDOT's requests, the Consultant Team developed the following priority equation, which includes five terms that are further explained below:

Priority Index = (Number x Age x Impact x Benefit)/Cost

Number – The "Number" term of the proposed equation requires tallying the total number of *benefits* achieved by the barrier and thereby incorporates the "Number of Benefitted Receivers" factor CTDOT requested to include in the priority equation. This term also accounts for the portion of the community in which prioritization is desired, as opposed to the entire community within the 500-foot CNE behind the barrier. In other words, prioritization is desired for receivers that benefit from a proposed barrier.

Table 8 summarizes the methodology for tallying benefits based on activity category.

Table 8: Methodology for Identifying 'Number' Term by Activity Category

Activity Category	Methodology
Category B	Count each single-family residential lot that is benefitted as 1 benefit. Count each benefitted dwelling unit within a multifamily structure as 1 benefit.
Category C & E	Calculate the average residential lot size (in square feet) in the CTDOT Type II noise study area. Identify the equivalent number of dwelling units represented by the non-residential parcel by dividing the non-residential lot size (in square feet) by the average residential lot size. Generate a grid and tally only the points that benefit from the barrier.
Category D	Utilize lot-size methodology applied to Category C and E parcels, or identify a typical number of occupants in highway-facing classrooms (institutional land use) and multiply by a usage fraction, relative to 24/7 usage.

Age – The "Age" term applies a multiplier to the "Number" term to account for the "Date of Development" factor that CTDOT requested to include. The information available to the Consultant Team within the parcel shapefile for each study area includes the percentage of homes that predate and postdate the highway date "on system." Therefore, the Consultant Team recommends application of a sliding scale coefficient to the "Number" term based on the percentage of homes behind the barrier that predates the highway. The objective of the sliding scale is to apply full weight (x1) to the number of homes that predate the highway and 1/3 weight (x0.33) to those that postdate the highway. This approach is consistent with CTDOT's 1986 Type II policy. This sliding scale approach also yields a smooth transition between areas with more or less than 50 percent of homes predating the highway, as opposed to a sharp increase at 50 percent. To calculate the "Age" coefficient, we recommend assigning a coefficient of 1 to the "Number" term where 100 percent of the development predates the highway and a multiplier of 1/3 where 0 percent of the development predates the highway. Then, interpolate between these two values to establish coefficients for intermediate percentages. Specifically, the interpolation calculation would be as follows:

$$Age = 1/3+(\%\ Predate)x(1-1/3)/100$$

Table 9 summarizes various coefficients interpolated for percentages of development that fall between 0 percent and 100 percent predating the highway. However, the equation above was used to calculate the exact value of the age coefficient based on the percentage of benefitted receivers that predate the highway date on system.

Table 9: Age Coefficients by Percent of Development Pre-dating Highway

Percent of Development that Predates Highway	Age Coefficient
0	0.33
20	0.47
40	0.60
50	0.67
60	0.73
80	0.87
100	1.00

Impact – The "Impact" term of the proposed equation requires performing an arithmetic average of the noise level at each *benefitted* receiver without the noise barrier. Once the average noise level is calculated, the impact term can be identified based on the well-known concept that a 10 dBA difference in noise levels is "heard" as twice as loud or quiet, based on hearing research (refer to **Appendix A** for additional information). Receivers with an average noise level that is equal to 66 dBA would yield an impact term of 1. For receivers with noise levels that are twice as loud, or 76 dBA, a weighting factor of 2 would be applied. This term thereby accounts for the "Severity of Impact" factor CTDOT requested to include within the priority equation, assigning least weight to receivers that experience sound levels that approach the Activity Category B and C NAC[26] and more weight to receivers that experience higher noise levels. **Table 10** provides various impact factors based on average noise level, which can be calculated as follows:

$$1 + (\text{Avg Noise Level} - 66) \times 0.1$$

[26] CTDOT's October 2022 Highway Traffic Noise Abatement Policy defines "approach" as being within 1 decibel of the applicable NAC level.

Table 10: Impact Term Values for Various Average Noise Levels

Average Noise Level without Noise Barrier (L_{eq} dBA)	Impact Factor
66	1
67	1.1
68	1.2
69	1.3
70	1.4
71	1.5
72	1.6
73	1.7
74	1.8
75	1.9
76	2.0
77	2.1
78	2.2
79	2.3
80	2.4

Benefit – The "Benefit" term of the proposed equation requires performing an arithmetic average of the insertion loss value achieved at each *benefitted* receiver with the barrier. An average insertion loss that is equal to 5 dBA would yield a benefit term of 1, thereby giving least weight to receivers that experience the least amount of noise level reduction required to benefit from the barrier. On the other hand, a stronger weighting factor is applied for higher levels of noise reduction, whereby a reduction of 15 dBA would yield a factor of 2. This term thereby accounts for the "Achievable Noise Reduction" factor CTDOT requested to include within the priority equation. **Table 11** provides various benefit factors based on average insertion loss, which can be calculated as follows:

1 + (Avg Insertion Loss - 5) x 0.1

Table 11: Benefit Term Values for Various Average Insertion Loss Values

Average Insertion Loss (dBA)	Benefit Factor
5	1
6	1.1
7	1.2
8	1.3
9	1.4
10	1.5
11	1.6
12	1.7
13	1.8
14	1.9
15	2.0
16	2.1
17	2.2
18	2.3
19	2.4

Cost – The "Cost" term in the proposed priority equation is based on the total calculated barrier cost, assuming the same unit cost of $60/SF, as defined in CTDOT's October 2022 policy, for each noise wall. The total cost term accounts for the "Abatement Cost" factor CTDOT requested to incorporate into the priority equation. Barriers with higher total costs will lower the priority factor since this term is in the denominator of the equation. Overall, the most cost-effective barriers will rise to the top of the priority list. Since the cost term is in the denominator of the priority equation, expressing costs in millions yields more manageable priority index values. For example, if the "Number" term is equal to 15, the "Impact" term is equal to 1, the "Benefit" term is equal to 2, and the total abatement cost is $500,000, the priority index would equal 0.00006. If cost is expressed in millions (i.e., $0.5 million), the priority index would equal 60.

Priority Equation Testing and Type II Priority List

Based on the recommended priority equation, all areas with noise barriers meeting CTDOT's feasibility and reasonableness criteria were ranked to determine their place on the Type II priority list. For many barrier areas, multiple barrier heights were determined to meet all CTDOT criteria; however, the priority equation was executed with the most cost-effective barriers (i.e., lowest cost per benefit) to ensure each barrier has the best chance at being ranked higher on the priority list.

Table 12 summarizes the priority index, total number of benefits, average sound level, average insertion loss value, percentage of development predating the highway, and the noise wall cost expressed in millions of dollars for all 38 noise walls recommended for inclusion within CTDOT's Type II noise barrier program. The number of benefits per cost is also provided to facilitate comparison of barriers. **Appendix G** includes figures of the 38 noise barriers, illustrating location, height, benefited parcels and parcels that achieve the NRDG as well as parcels impacted but not benefited by the proposed noise barrier. However, it is important to note that a detailed noise analysis will be conducted if and when funding is secured for the Type II program, which could affect the geometry of the potential noise barriers.

Overall, the “Age” and “Number” factors appear to be the most influential terms, as expected and requested by CTDOT. The barrier areas with the highest average sound levels tend to have higher priority indexes, thereby elevating those areas to the top of the priority list, which is also desirable. As shown in **Table 12**, most of the developments that largely postdate the highway appear towards the bottom of the list due to the 1/3 weighting factor applied to these developments.

Table 12: Summary of Type II Noise Barrier Priority Indices

Barrier Name	State Route No.	Priority Index Value	No. of Benefits	Average Sound Level (dBA L_{eq})	Average Insertion Loss Value	% Predate Roadway	Cost ($ millions)	No. Benefits/Cost
*Manchester_15	I-84 E	84.1	308	72	9	0%	2.56	120
Stamford_18	I-95 N	65.5	97	70	8	85%	2.37	41
Middletown_19	I-91 N	53.7	741	63	7	40%	7.51	99
Fairfield_M12	I-95 S	51.5	98	69	8	89%	3.11	32
Fairfield_28	I-95 N	50.3	61	70	8	67%	1.63	37
Ansonia_35	SR-8 S	47.3	82	75	9	57%	3.33	25
WestHartford_7	I-84 W	46.4	44	69	10	95%	1.84	24
Fairfield_30	I-95 S	44.7	84	69	8	86%	2.9	29
Greenwich_17	I-95 N	42.5	106	68	8	83%	3.38	31
Derby_37	SR-8 S	41.9	31	72	7	81%	1.24	25
Norwalk_M15	US-7 N	36.7	76	65	9	95%	2.5	30
Bridgeport_7	SR-8 S	34.9	93	64	9	94%	2.81	33
Bridgeport_6	SR-8 S	34.8	162	66	9	57%	4.41	37
Bridgeport_31	I-95 S	34.5	47	68	8	80%	1.93	24
Greenwich_10-11-41	I-95 S	34.3	115	67	8	88%	4.63	25
Waterbury_M9	I-84 E	33.9	25	68	9	86%	1.13	22
Danbury_36	I-84 E	33.1	131	70	9	50%	4.82	27
WestHaven_9	I-95 N	31.2	32	69	8	73%	1.45	22
Naugatuck_32	SR-8 N	31.1	61	66	9	85%	2.57	24
WindsorLocks_1	I-91 S	30.7	68	70	9	74%	3.57	19
Greenwich_15	I-95 S	29.6	92	69	8	60%	4.01	23
Greenwich_14	I-95 S	29.5	117	68	8	73%	5.13	23
Danbury_35	I-84 E	28.9	87	69	8	36%	2.84	31
Stratford_32-33	I-95 N	28.8	130	67	8	67%	5.2	25
Manchester_4	I-384 E	28.6	27	69	8	88%	1.44	19
*Milford_30	I-796 N	27.8	60	69	7	0%	1.17	51
Milford_4	I-95 N	27.4	48	69	9	67%	2.51	19
Stamford_19	I-95 N	26.1	32	68	8	75%	1.54	21
Norwalk_2	US-7 N	25.9	35	67	8	80%	1.57	22
*Middletown_10	SR-9 N	23.8	78	65	8	0%	1.26	62
Waterford_3	I-95 N	23.6	38	66	8	70%	1.7	22
Norwalk_20	I-95 N	23.2	S55	67	8	84%	2.94	19
Shelton_5	SR-8 S	20.3	92	65	9	82%	4.71	20
*Montville_10	I-395 S	14.0	74	65	7	0%	1.91	39
*Wethersfield_18	SR-15 N	10.2	55	65	9	4%	2.43	23
*Colchester_13	SR-2 W	8.3	18	67	7	0%	0.9	20
*Cromwell_17	SR-9 N	6.5	112	64	7	1%	5.41	21
*Middletown_14	SR-17 S	2.5	96	58	9	0%	3.57	27

Notes:
1 – CTDOT considers 'substantial development' pre-dating the highway to be 25%, which was approved by FHWA. Eight barrier areas, shown with an asterisk (*), are not eligible for federal funding since less than 25% of development in those areas pre-dates the highway 'year on system.' These barrier areas would be state funded.

Table 12: Summary of Type II Noise Barrier Priority Indices

Barrier Name	State Route No.	Priority Index Value	No. of Benefits	Average Sound Level (dBA L_{eq})	Average Insertion Loss Value	% Predate Roadway	Cost ($ millions)	No. Benefits/Cost

2 – Cost in millions of dollars = Total NW Cost ($)/1,000,000
3 – No. Benefits/Cost Example: 32 benefits/$1.45 million = 22 benefits/cost

To demonstrate the influence of terms in the priority equation, three examples are presented below. Example 1 demonstrates the influence of the "Age" factor in the priority equation. Example 2 illustrates the influence of the number of benefits, and more specifically the number of benefits per cost of abatement, on the overall priority index value. Example 3 demonstrates the influence of average sound levels on the priority index value.

Example 1 – Date of Development

Table 13 presents the priority indices for Fairfield_M12 (I-95 S) and Danbury_35 (I-84 E). As shown in the table, the number of benefits per cost of abatement is nearly identical for both walls as are the average sound levels and insertion loss values. However, the Fairfield_M12 (I-95 S) noise wall has a higher priority index by 23 points simply due to the greater percentage of development that predates the highway (approximately 53 percent more development predates the highway). This example thereby demonstrates the strength of the "Age" factor when all other terms are comparable.

Table 13: Influence of Date of Development

Barrier Name	State Route No.	Priority Index Value	No. of Benefits	Average Sound Level (dBA L_{eq})	Average Insertion Loss Value	% Predate Roadway	Cost (millions)	No. Benefits/Cost
Fairfield_M12	I-95 S	52	98	69	8	89%	3.11	32
Danbury_35	I-84 E	29	87	69	8	36%	2.84	31

Example 2 – Number of Benefits Per Abatement Cost

Table 14 shows the priority indices for Stamford_18 (I-95 N) and Fairfield_30 (I-95 S). As shown in the table, all factors are comparable, including age. However, Stamford_18 (I-95 N) is ranked 20 points higher than the Fairfield_30 (I-95 S) noise wall due to the higher number of benefits per cost of abatement. With average sound level, insertion loss, cost, and date of development all being similar for these two walls, this comparison demonstrates the influence of the number of benefited receptors in the Priority Equation.

Table 14: Influence of Number of Benefits per Abatement Cost

Barrier Name	State Route No.	Priority Index Value	No. of Benefits	Average Sound Level (dBA L_{eq})	Average Insertion Loss Value	% Predate Roadway	Cost (millions)	No. Benefits/Cost
Stamford_18	I-95 N	65	97	70	8	85%	2.37	41
Fairfield_30	I-95 S	45	84	69	8	86%	2.9	29

Example 3 – Impact Term

Table 15 presents the priority indices for Derby_37 (SR-8 S) and Bridgeport_7 (SR-8 S). As shown in the table, despite Bridgeport_7 (SR-8 S) having a higher number of benefits per abatement cost and higher average insertion loss, this wall is ranked 7 points lower than Derby_37 (SR-8 S) due to the influence of the impact term. Specifically, the average sound level for parcels behind Derby_37 (SR-8 S) is 8 decibels higher than the average sound level for parcels behind Bridgeport_7 (SR-8 S). This outcome is favorable, as the goal is to prioritize more severely impacted developments.

Table 15: Influence of Impact Term

Barrier Name	State Route No.	Priority Index Value	No. of Benefits	Average Sound Level (dBA L_{eq})	Average Insertion Loss Value	% Predate Roadway	Cost (millions)	No. Benefits/Cost
Derby_37	SR-8 S	42	31	72	7	81%	1.24	25
Bridgeport_7	SR-8 S	35	93	64	9	94%	2.81	33

Appendix A: Overview of Noise Metrics used in this Report

To assist reviewers in interpreting the complex noise metrics used in evaluating roadway traffic noise, we present below an introduction to relevant fundamentals of acoustics and noise terminology. Three acoustical descriptors of noise are introduced here in increasing degree of complexity:

- Decibel, dB;
- A-weighted decibel, dBA; and
- Equivalent Sound Level, L_{eq}.

These noise metrics form the basis for the majority of environmental noise analysis conducted for most transportation projects throughout the U.S.

Decibel, dB

All sounds come from a sound source—a musical instrument, a voice speaking, an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in sound waves—tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear.

Our ears are sensitive to a wide range of sound pressures. Although the loudest sounds that we hear without pain have about one million times more energy than the quietest sounds we hear, our ears are incapable of detecting small differences in these pressures. Thus, to better match how we hear this sound energy, we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level.

Sound pressure levels are measured in decibels (or "dB"). Decibels are logarithmic quantities reflecting the ratio of the two pressures, the numerator being the pressure of the sound source of interest, and the denominator being a reference pressure (the quietest sound we can hear).

The logarithmic conversion of sound pressure to sound pressure level (SPL) means that the quietest sound that we can hear (the reference pressure) has a sound pressure level of about 0 dB, while the loudest sounds that we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels on the order of 30 to 100 dB.

Because decibels are logarithmic quantities, combining decibels is unlike common arithmetic. For example, if two sound sources each produce 100 dB operating individually and they are then operated together, they produce 103 dB – not the 200 decibels we might expect. Four equal sources operating simultaneously produce another three decibels of noise, resulting in a total sound pressure level of 106 dB. For every doubling of the number of equal sources, the sound pressure level goes up another three decibels. A tenfold increase in the number of sources makes the sound pressure level go up 10 dB. A hundredfold increase makes the level go up 20 dB, and it takes a thousand equal sources to increase the level 30 dB.

If one noise source is much louder than another, the two sources operating together will produce virtually the same sound pressure level (and sound to our ears) that the louder source would produce alone. For example, a 100 dB source plus an 80 dB source produce approximately 100 dB of noise when operating together (actually, 100.04 dB). The louder source "masks" the quieter one. But if the quieter source gets louder, it will have an increasing effect on the total sound pressure level such that, when the two sources are equal, as described above, they produce a level three decibels above the sound of either one by itself.

Conveniently, people also hear in a logarithmic fashion. Two useful rules of thumb to remember when comparing sound levels are (1) a 6 to 10 dB increase in the sound pressure level is perceived by individuals as being a doubling of loudness, and (2) changes in sound pressure level of less than about three decibels are not readily detectable outside of a laboratory environment.

A-Weighted Decibel, dBA

Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of the sound pressure oscillations as they reach our ear. When analyzing the total noise of any source, acousticians often break the noise into frequency components (or bands) to determine how much is low-frequency noise, how much is middle-frequency noise, and how much is high-frequency noise. This breakdown is important for three reasons:

1. People react differently to low-, mid-, and high-frequency noise levels. This is because our ear is better equipped to hear mid and high frequencies but is quite insensitive to lower frequencies. Thus, we find mid- and high-frequency noise to be more annoying.
2. Mid- and high-frequency sound is in the same range as and therefore interferes with our speech communication.
3. Engineering solutions to a noise problem are different for different frequency ranges. Low-frequency noise is generally harder to control.

The normal frequency range of hearing for most people extends from a low frequency of about 20 Hz to a high frequency of about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, typically around 1,000 to 2,000 Hz. Acousticians have developed several filters which roughly match this sensitivity of our ear and thus help us to judge the relative loudness of various sounds made up of many different frequencies. The so-called A-weighting network, does this best for most environmental noise sources. Sound pressure levels measured through this filter are referred to as A weighted sound levels (measured in A-weighted decibels, or dBA).

The A-weighting network significantly discounts those parts of the total noise that occur at lower frequencies (those below about 500 Hz) and also at very high frequencies (above 10,000 Hz) where we do not hear as well at low sound levels, and where the noise does not interfere with speech communication. The network has very little effect, or is nearly "flat," in the middle range of frequencies between 500 and 10,000 Hz where our hearing is most sensitive. Because this network generally matches our sensitivity to noise, sounds having higher A-weighted sound levels are judged to be noisier than those with lower A-weighted sound levels, a relationship which otherwise might not be true. A-weighted sound levels correlate better with human response to noisiness than other metrics do, most likely due to the emphasis the network has on the mid- and high frequencies and the interference with speech such noise causes. It is for these reasons that A-weighted sound levels are normally used to evaluate environmental noise sources. **Figure A-1** presents typical A weighted sound levels of several common environmental sources.

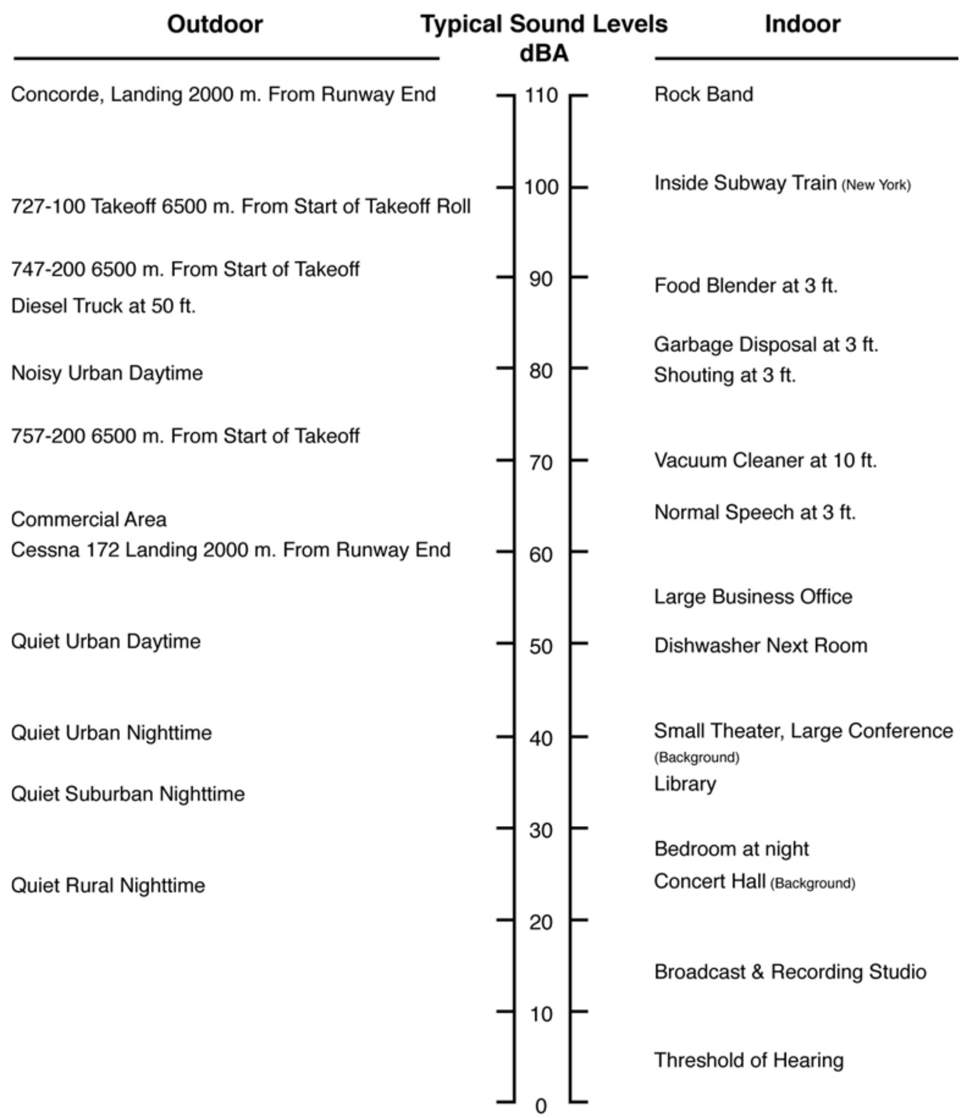


Figure A-1: Common Environmental Sound Levels, in dBA

An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as a truck approaches, then falls and blends into the background as the truck recedes into the distance (though even the background varies as birds chirp, the wind blows, or a vehicle passes by). This is illustrated in **Figure A-2**.

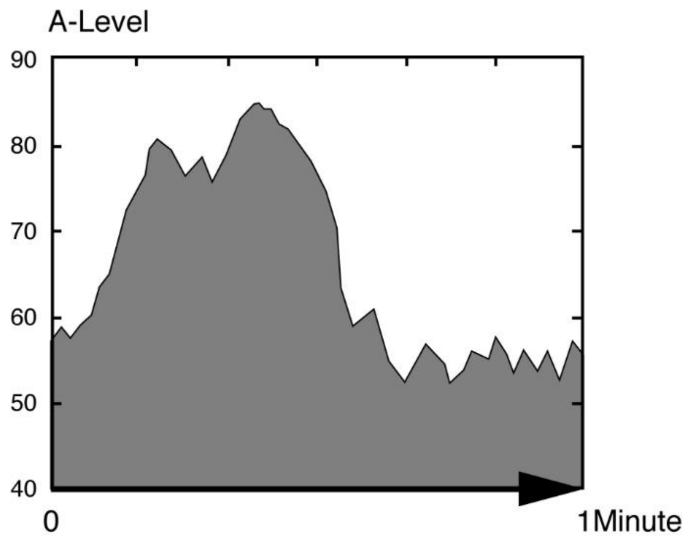


Figure A-2: Variation in the A-Weighted Sound Level Over Time

Because of this variation, it is often convenient to describe a particular noise "event" by its maximum sound level, abbreviated as L_{max}. In Figure A-2, the L_{max} is approximately 85 dBA. However, the maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical maximum levels may produce very different total exposures. One may be of very short duration, while the other may continue for an extended period and be judged much more annoying. The next section introduces a measure that accounts for this concept of a noise "dose."

Equivalent Sound Level, Leq

The Equivalent Sound Level, abbreviated L_{eq}, is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest—for example, an hour, an eight-hour school day, nighttime, or a full 24-hour day. However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric.

The L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level. This is illustrated in **Figure A-3**. The equivalent level is, in a sense, the total sound energy that occurred during the time in question, but spread evenly over the time period. It is a way of assigning a single number to a time-varying sound level. Since L_{eq} includes all sound energy, it is strongly influenced by the louder events that occurred during the period. For the assessment of highway noise, L_{eq} is evaluated over a period of one hour.

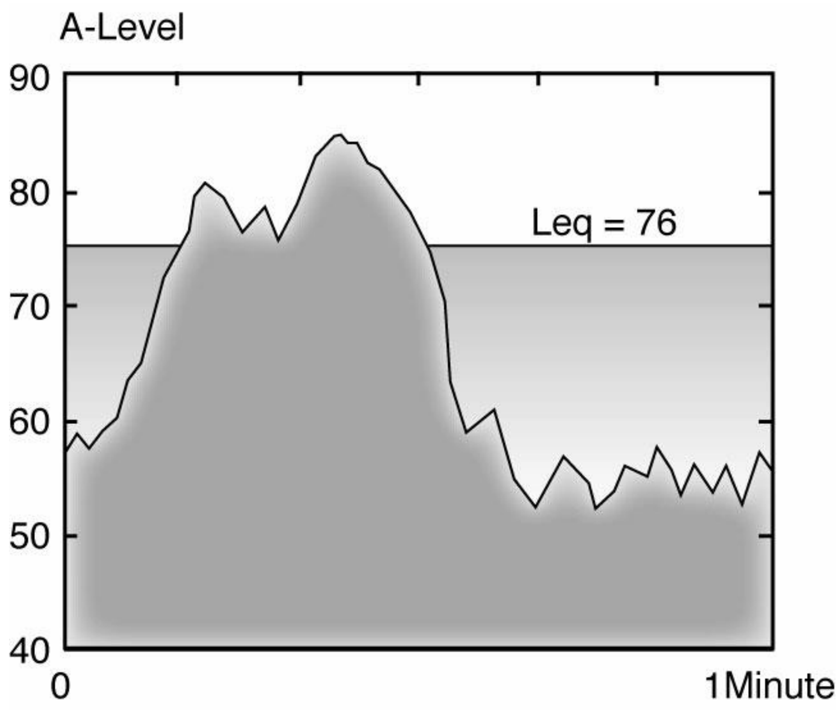


Figure A-3: Example of a 1-Minute Equivalent Sound Level

Receivers and Receptors

A receiver is a point where noise levels are measured and/or modeled. Receivers are discrete locations that represent noise sensitive land use and may represent multiple receptors. Receptors represent individual dwelling units or equivalent dwelling units.

Appendix B: Details of the Noise Measurement Program

Noise Measurement Site M1-1: I-95

Noise Measurement Site M1-2: I-95

Noise Measurement Site M1-3: I-95

Noise Measurement Site M1-4: I-95

Noise Measurement Site M1-5: I-95

Noise Measurement Site M4-1: US-5

Noise Measurement Site M4-2: US-5

Noise Measurement Site M4-3: US-5

Noise Measurement Site M4-4: US-5

Noise Measurement Site M4-5: US-5

Noise Measurement Site M7-1: SR-2 & SR-11

Noise Measurement Site M7-2: SR-2 & SR-11

Noise Measurement Site M7-3: SR-2 & SR-11

Noise Measurement Site M7-4: SR-2 & SR-11

Noise Measurement Site M9-1: I-84

Noise Measurement Site M9-2: I-84

Noise Measurement Site M9-3: I-84

Noise Measurement Site M9-4: I-84

Noise Measurement Site M12-1: I-95

Noise Measurement Site M12-2: I-95

Noise Measurement Site M12-3: I-95

Noise Measurement Site M12-4: I-95

Noise Measurement Site M15-1: US-7

Noise Measurement Site M15-2: US-7

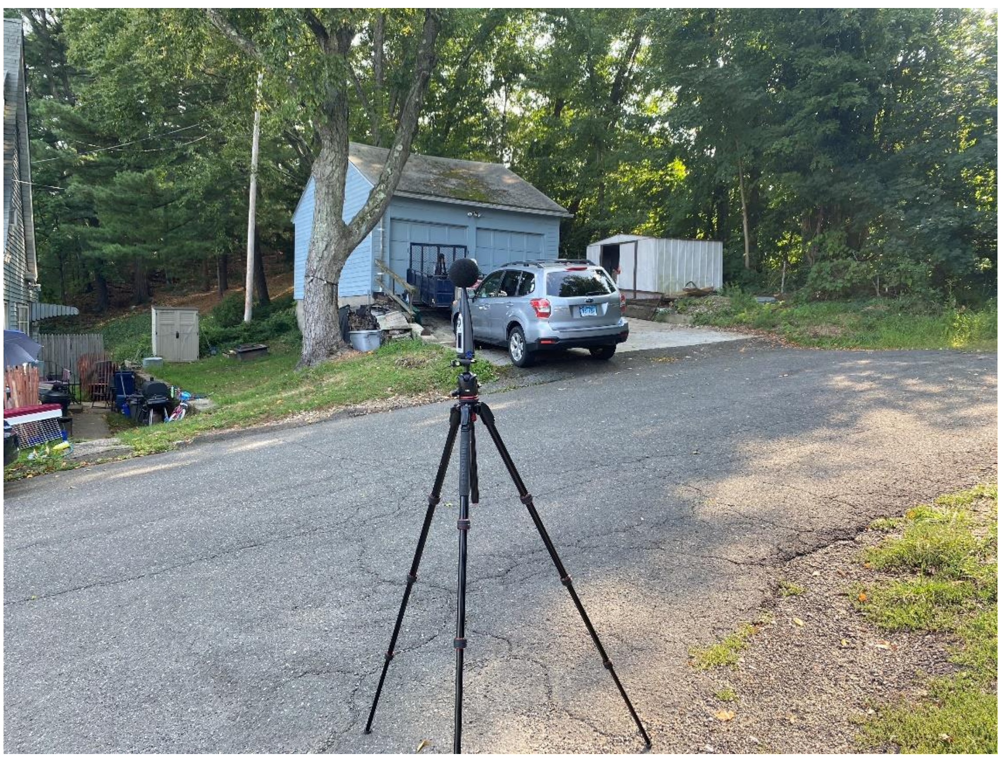
Noise Measurement Site M15-3: US-7

Noise Measurement Site M15-4: US-7

Noise Measurement Site M15-5: US-7

Noise Measurement Site M16-1: SR-8

Noise Measurement Site M16-2: SR-8



Noise Measurement Site M16-3: SR-8

Noise Measurement Site M16-4: SR-8

Noise Measurement Site M21-1: I-84

Noise Measurement Site M21-2: I-84

Noise Measurement Site M21-3: I-84

Noise Measurement Site M21-4: I-84

Noise Measurement Site M21-5: I-84

Appendix C: Traffic Data for Model Validation

Table C-1: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M1

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M1-1	I-95 NB	9:30 AM - 10:00 AM	55	1,264	70	74
	I-95 SB	10:15 AM - 10:45 AM	55	1,364	68	132
	Coleman St	9:30 AM - 10:00 AM	25	596	20	4
	I-95 NB On ramp from S Frontage	9:30 AM - 10:00 AM	40	180	4	0
	N Frontage Rd	10:15 AM - 10:45 AM	40	254	14	0
M1-2	I-95 NB	9:30 AM - 10:00 AM	55	1,264	70	74
	I-95 SB	10:15 AM - 10:45 AM	55	1,364	68	132
	Coleman St	9:30 AM - 10:00 AM	25	596	20	4
	I-95 NB On ramp from S Frontage	9:30 AM - 10:00 AM	40	180	4	0
	N Frontage Rd	10:15 AM - 10:45 AM	40	254	14	0
M1-3	I-95 NB	11:25 AM - 11:40 AM	55	1552	100	96
	I-95 SB	11:10 AM - 11:25 AM	55	1688	20	176
	Briggs St EB/WB	11:10 AM - 11:25 AM	25	208	16	8
	N Frontage Rd SB	11:10 AM - 11:25 AM	40	1212	20	20
	S Frontage Rd On Ramp NB-SB	11:25 AM - 11:40 AM	40	212	4	4
M1-4	I-95 NB	1:15 PM - 1:30 PM	55	1620	72	72
	I-95 SB	1:00 PM - 1:15 PM	55	1688	84	124
	Briggs St NB	1:00 PM - 1:15 PM	25	208	8	0
	Briggs St on Ramp NB Rt 32 on ramp NB SB	1:00 PM - 1:15 PM	40	652	16	20
M1-5	I-95 NB	2:00 PM - 2:15 PM	55	1940	68	104
	I-95 SB	1:45 PM - 2:00 PM	55	1616	92	108
	Briggs St NB	1:45 PM - 2:00 PM	25	320	8	0
	Briggs St on Ramp NB Rt 32 on ramp NB SB	1:45 PM - 2:00 PM	40	800	28	0

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-2: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M4

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M4-1	RT-5 & 15 WB	9:20 AM - 9:50 AM	55	952	60	48
	RT-5 & 15 EB	9:20 AM - 9:50 AM	55	1020	36	54
M4-2	RT-5 & 15 WB	10:25 AM - 10:55 AM	55	844	34	28
	RT-5 & 15 EB	10:25 AM - 10:55 AM	55	818	38	36
M4-3	RT-5 & 15 WB	11:05 AM - 11:35 AM	55	868	32	42
	RT-5 & 15 EB	11:05 AM - 11:35 AM	55	778	26	40
M4-4	RT-5 & 15 WB	11:55 AM - 12:15 PM	55	1000	24	38
	RT-5 & 15 EB	11:55 AM - 12:15 PM	55	892	24	40
M4-5	RT-5 & 15 WB	12:25 PM - 12:55 PM	55	1060	38	30
	RT-5 & 15 EB	12:25 PM - 12:55 PM	55	1192	46	36

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-3: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M7

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M7-1	RT-2 WB	9:15 AM - 9:30 AM	69	916	40	36
	RT-2 EB	9:00 AM - 9:15 AM	64	792	84	48
	Dr Foote Rd NB	9:00 AM - 9:30 AM	35	64	2	0
M7-2	RT-2 WB	10:05 AM - 10:20 AM	67	584	44	48
	RT-2 EB	9:50 AM - 10:05 AM	65	920	104	28
	Dr Foote Rd NB	9:50 AM - 10:20 AM	35	34	0	0
M7-3	RT-2 WB	10:45 AM - 11:00 AM	70	732	44	44
	RT-2 EB	10:30 AM - 10:45 AM	68	844	64	36
	Dr Foote Rd NB	10:30 AM - 11:00 AM	35	78	0	0
M7-4	RT-2 WB	11:35 AM - 11:50 AM	69	728	56	40
	RT-2 EB	11:20 AM - 11:35 AM	69	836	96	52
	Dr Foote Rd NB	11:20 AM - 11:50 AM	35	72	0	0

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-4: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M9

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M9-1	I-84 WB	01:15 PM - 01:35 PM	55	1815	156	354
	I-84 EB	01:15 PM - 01:35 PM	50	1749	168	222
	I-84 Off-Ramp WB	01:30 PM - 01:40 PM	25	888	24	6
	I-84 On-Ramp EB	01:30 PM - 01:40 PM	35	594	6	0
M9-2	I-84 WB	01:50 PM - 02:10 PM	55	2253	159	267
	I-84 EB	01:50 PM - 02:10 PM	50	1686	96	189
	I-84 Off-Ramp WB	02:10 PM - 02:20 PM	25	942	42	6
	I-84 On-Ramp EB	02:10 PM - 02:20 PM	35	789	18	6
M9-3	I-84 WB	02:30 PM - 02:50 PM	55	2298	150	369
M9-3	I-84 EB	02:30 PM - 02:50 PM	50	2514	150	288
M9-3	I-84 Off-Ramp WB	02:50 PM - 03:00 PM	25	1068	42	12
M9-3	I-84 On-Ramp EB	02:50 PM - 03:00 PM	35	252	12	18
M9-4	I-84 WB	03:05 PM - 03:25 PM	55	2253	111	312
M9-4	I-84 EB	03:05 PM - 03:25 PM	50	2523	165	240
M9-4	I-84 Off-Ramp WB	03:20 PM - 03:30 PM	6	1068	6	6
M9-4	I-84 On-Ramp EB	03:20 PM - 03:30 PM	35	984	18	24

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-5: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M12

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M12-1	I-95 NB	9:30 AM - 10:00 AM	66	3016	206	266
	I-95 SB	9:30 AM - 10:00 AM	66	2780	306	320
M12-2	I-95 NB	10: 15 AM - 10:45 AM	65	3070	310	332
	I-95 SB	10: 15 AM - 10:45 AM	65	3756	246	434
M12-3	I-95 NB	11:00 - 11:30 AM	68	2860	270	434
	I-95 SB	11:00 - 11:30 AM	68	3354	328	366
M12-4	I-95 NB	11: 45 AM - 12:15 AM	64	2148	250	388
	I-95 SB	11: 45 AM - 12:15 AM	64	3626	216	428

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-6: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M15

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M15-1	RT7 NB	8:35 AM - 9:05 AM	55	1902	170	12
	RT7 SB	8:35 AM - 9:05 AM	55	2826	140	20
M15-2	RT7 NB	9:15 AM - 9:45 AM	55	1626	120	20
	RT7 SB	9:15 AM - 9:45 AM	55	2142	114	14
M15-3	RT7 NB	10:00 AM - 10:30 AM	55	1522	114	36
	RT7 SB	10:00 AM - 10:30 AM	55	1678	116	8
M15-4	RT7 NB	11:25 AM - 11:55 AM	55	1374	70	26
	RT7 SB	11:25 AM - 11:55 AM	55	1656	88	14
M15-5	RT7 NB	12:00 PM - 12:30 PM	55	1382	58	20
	RT7 SB	12:00 PM - 12:30 PM	55	1858	96	20

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-7: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M16

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M16-1	RT 8 NB	1:35 PM - 2:05 PM	67	1292	68	40
	RT 8 SB	1:35 PM - 2:05 PM	68	1554	104	34
M16-2	RT 8 NB	2:20 PM - 2:50 PM	68	1968	122	32
	RT 8 SB	2:20 PM - 2:50 PM	68	1774	94	36
M16-3	RT 8 NB	3:05 PM - 3:55 PM	67	3090	100	30
	RT 8 SB	3:05 PM - 3:55 PM	67	1986	76	52
M16-4	RT 8 NB	3:50 PM - 4:20 PM	64	2854	46	58
	RT 8 SB	3:50 PM - 4:20 PM	64	2246	92	42

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Table C-8: Traffic Count Data Normalized to 1 Hour and Used in Model Validation of Site M21

Site	Road (Direction)	Times of Count	Average Speed (MPH)	Vehicles per Hour[1]		
				Auto	MT[2]	HT[3]
M21-1	I-84 WB	9:55 AM - 10:25 AM	65	1974	150	306
	I-84 EB	9:55 AM - 10:25 AM	65	2370	196	220
M21-2	I-84 WB	10:40 AM - 11:10 AM	65	2254	210	278
	I-84 EB	10:40 AM - 11:10 AM	65	2216	158	206
M21-3	I-84 WB	9:15 AM - 9:45 AM	65	2192	228	310
	I-84 EB	9:15 AM - 9:45 AM	65	2582	214	178
M21-4	I-84 WB	8:40 AM - 9:10 AM	65	2394	216	286
	I-84 EB	8:40 AM - 9:10 AM	65	3732	224	214
M21-5	I-84 NB	11:25 AM - 11:55 AM	65	2294	176	284
	I-84 SB	11:25 AM - 11:55 AM	65	2280	212	142

Notes:
1. Hourly volumes in vehicles per hour (vph) derived by extrapolation of counts taken during measurement period to a one-hour value
2. Medium Trucks
3. Heavy Trucks

Appendix D: CTDOT Historic and Active Type I Projects

Table D-1: Historic Type I Noise Barriers

County	Town	Location Description	Route	Direction	Latitude	Longitude
Fairfield	Bridgeport	Orange Street	I-95	S	41.175292	-73.165199
Fairfield	Danbury	Prince Street	I-84	E	41.402092	-73.464799
Fairfield	Danbury	Christopher Columbus Ave	I-84	E	41.389092	-73.505099
Fairfield	Darien	Warner Drive	I-95	N	41.070492	-73.484499
Fairfield	Darien	Wakeman Road	I-95	N	41.087092	-73.457799
Fairfield	Darien	River View Drive	I-95	S	41.062292	-73.509499
Fairfield	Darien	Glenwood Drive	I-95	N	41.066892	-73.503999
Fairfield	Darien	Maple Street	I-95	N	41.067792	-73.495099
Fairfield	Darien	Old Kings Hwy S/Locust Hill Rd	I-95	N	41.073692	-73.469999
Fairfield	Darien	Route 1 Overpass	I-95	N	41.072592	-73.473999
Fairfield	Darien	Norton/Hecker Ave	I-95	N	41.068392	-73.489199
Fairfield	Fairfield	Edge Hill Road	I-95	S	41.152292	-73.246899
Fairfield	Fairfield	Grasmere School	US 1/I-95	S	41.156892	-73.245499
Fairfield	Greenwich	Rich Avenue West	I-95	N	41.012292	-73.641099
Fairfield	Greenwich	Weigh Station	I-95	N	41.016792	-73.635699
Fairfield	Greenwich	Field Point Road	I-95	N	41.018892	-73.632099
Fairfield	Norwalk	Dairy Farm Road	I-95	S	41.114492	-73.389499
Fairfield	Norwalk	Broad Street	US 7	N	41.130392	-73.427999
Fairfield	Stamford	Taylor Street	I-95	S	41.045792	-73.548699
Fairfield	Stratford	Warwick Ave	I-95	N	41.195292	-73.127199
Fairfield	Stratford	Homestead Ave	I-95	N	41.196492	-73.121699
Fairfield	Stratford	Riverview Place	I-95	N	41.197592	-73.119399
Fairfield	Stratford	Route 1 Overpass	I-95	N	41.200692	-73.115699
Hartford	Berlin	Skinner Road	SR 9	S	41.635192	-72.753399
Hartford	Bristol	East Main Street	SR 72	N	41.671992	-72.889299
Hartford	East Hartford	Shady Lane	I-384	E	41.768291	-72.578699
Hartford	East Hartford	Stone Creek Apartments	I-84	E	41.763291	-72.641399
Hartford	East Hartford	Summer Street	I-84	E	41.764991	-72.649199
Hartford	East Hartford	Morris Court	I-84	W	41.771691	-72.605799
Hartford	East Hartford	Clement Road	I-84	E	41.765491	-72.624499
Hartford	East Hartford	Carroll Road	I-84	W	41.765991	-72.649799
Hartford	East Hartford	Nutmeg Lane	I-84	E	41.768391	-72.613999
Hartford	East Hartford	Ridgewood Rd.	I-84/I-384	E	41.771791	-72.597199
Hartford	East Hartford	Chester Street	I-84/I-384	W	41.773191	-72.592699
Hartford	East Hartford	Silver Lane (15 Southbound)	SR 15	S	41.761191	-72.637299
Hartford	East Hartford	Plain Drive	SR 15	N	41.759491	-72.640199
Hartford	East Hartford	Silver Lane (15 Northbound)	SR 15	N	41.761091	-72.636899
Hartford	East Windsor	Main Street	I-91	S	41.918591	-72.617099
Hartford	Enfield	Post Rd. Ext.	I-91	S	41.971191	-72.588199

Table D-1: Historic Type I Noise Barriers

County	Town	Location Description	Route	Direction	Latitude	Longitude
Hartford	Enfield	SE of Pleasant Rd.	I-91	N	41.937391	-72.606999
Hartford	Enfield	NE of Pleasant Rd.	I-91	N	41.939491	-72.606599
Hartford	Enfield	SW of Pleasant Rd.	I-91	S	41.937391	-72.607799
Hartford	Enfield	NW of Pleasant Rd.	I-91	S	41.939191	-72.607399
Hartford	Enfield	Lynch Ter.	I-91	S	41.995291	-72.586699
Hartford	Enfield	First Avenue	I-91	N	42.011091	-72.585799
Hartford	Enfield	Belmont Ave.	I-91	S	42.002491	-72.585399
Hartford	Enfield	Foxcroft Road	I-91	S	42.013091	-72.586599
Hartford	Farmington	Maple Ridge Drive	SR 9	N	41.721092	-72.770399
Hartford	Farmington	Orchard Road	SR 9	S	41.719792	-72.771199
Hartford	Farmington/West Hartford	Oak Ridge Lane	I-84	W	41.727192	-72.761999
Hartford	Glastonbury	Putnam Blvd.	SR 3	S	41.723291	-72.625699
Hartford	Glastonbury	Risley Road	SR2	W	41.725591	-72.609299
Hartford	Manchester	Bryan Drive	I-84	W	41.815191	-72.513799
Hartford	Manchester	Macintosh St.	I-84	W	41.812091	-72.520999
Hartford	New Britain	Robindale Drive	I-84	E	41.679492	-72.817799
Hartford	New Britain	Woodruff Court	SR 72	N	41.664592	-72.801899
Hartford	New Britain	Sherwood Road	SR 72	S	41.664292	-72.800699
Hartford	New Britain	Black Rock Avenue	SR 72	S	41.663892	-72.811299
Hartford	New Britain	Target	SR 9	S	41.711792	-72.763099
Hartford	New Britain	Fairview Cemetery	SR 9	N	41.681292	-72.761399
Hartford	New Britain/Farmington	Kenyon Circle	I-84	E	41.689692	-72.813399
Hartford	Plainville	Ledge Road	I-84	E	41.666792	-72.845399
Hartford	Plainville	Arcadia Avenue	I-84	W	41.661692	-72.848799
Hartford	Plainville	Sunset Avenue	I-84	E	41.659192	-72.849499
Hartford	Plainville	Woodford Ave Ext	I-84	E	41.669592	-72.838799
Hartford	Plainville	Colonial Court	SR 72	N	41.674292	-72.848299
Hartford	Rocky Hill	Elm Commons Dr.	I-91	S	41.659692	-72.671399
Hartford	Rocky Hill	Tumblebrook Rd.	I-91	S	41.665592	-72.666899
Hartford	Rocky Hill	Raymond Road	I-91	S	41.673192	-72.661699
Hartford	Rocky Hill	Orchard Street	I-91	S	41.676492	-72.657899
Hartford	Rocky Hill	Christiana Drive	I-91	N	41.662592	-72.667699
Hartford	Rocky Hill	Century Hills Road	I-91	S	41.631792	-72.688199
Hartford	Rocky Hill	Pheasant Drive	I-91	N	41.670192	-72.662199
Hartford	South Windsor	King Street	I-291	E	41.807091	-72.621699
Hartford	South Windsor	North King Street	I-291	W	41.807691	-72.622799
Hartford	Southington	Rahlene Dr/Orchard Ln	I-691	W	41.554392	-72.853299
Hartford	Southington	Atwater Street	I-84	E	41.583392	-72.898499
Hartford	Southington	Wonx Spring Road	I-84	W	41.583492	-72.899499
Hartford	Southington	Jordan Court	I-84	W	41.642692	-72.863899
Hartford	West Hartford	Saint Charles Street	I-84	W	41.750391	-72.725499
Hartford	West Hartford	Dermont Lane	I-84	E	41.740392	-72.736199

Table D-1: Historic Type I Noise Barriers

County	Town	Location Description	Route	Direction	Latitude	Longitude
Hartford	West Hartford	Wilfred Street	I-84	E	41.749791	-72.724899
Hartford	West Hartford	Overbrook Road	I-84	W	41.743291	-72.735699
Hartford	West Hartford	Shadow Lane	I-84	E	41.733792	-72.748999
Hartford	Wethersfield	Ezekial Porter Rd.	I-91	S	41.721192	-72.650899
Hartford	Wethersfield	Casey Lane	I-91	S	41.689292	-72.649099
Hartford	Wethersfield	Morris Street	SR 3	N	41.703392	-72.647299
Hartford	Windsor	Lepage Road	I-291	E	41.818891	-72.661799
Hartford	Windsor	Saville Street	I-291	E	41.814691	-72.651099
Hartford	Windsor	Bellflower Road	I-291	W	41.819791	-72.663699
Hartford	Windsor	Pine Lane Ext.	I-91	S	41.830791	-72.665899
Hartford	Windsor	Otee Circle	I-91	S	41.895791	-72.642199
Hartford	Windsor	West Service Road	I-91	S	41.807691	-72.661799
Hartford	Windsor	Matianuck Ave	I-91	S	41.811591	-72.664199
Hartford	Windsor	Cook Hill Road	I-91	N	41.844091	-72.664599
Hartford	Windsor	Morris Drive	I-91	S	41.843891	-72.665399
Hartford	Windsor	Becker Circle	I-91	N	41.811791	-72.663299
Hartford	Windsor	East Service Road	I-91	N	41.807991	-72.661199
Hartford	Windsor	Grande Avenue	I-91	N	41.829091	-72.665199
Hartford	Windsor	Dunfey Lane	I-91	S	41.857691	-72.663599
Hartford	Windsor	Dewey Avenue	I-91	N	41.866391	-72.661999
Hartford	Windsor	Lee Lane	I-91/I-291	S/W	41.815891	-72.668699
Middlesex	Old Lyme	Sands Drive	I-95	N	41.321092	-72.336999
Middlesex	Old Saybrook	Boston Post Road	I-95	N	41.313792	-72.362099
Middlesex	Old Saybrook	Spring Brook Road	I-95	S	41.314592	-72.361899
New Haven	Ansonia	Westfield Ave	SR 8	N	41.343592	-73.092699
New Haven	Branford	Gould Lane	I-95	N	41.294692	-72.765199
New Haven	Branford	Ramona Way	I-95	N	41.286492	-72.829699
New Haven	Branford	Greenfield Avenue	I-95	S	41.287092	-72.829999
New Haven	Branford	Obrien Road	I-95	S	41.287892	-72.824999
New Haven	Branford	East of Todds Hill Rd.	I-95	S	41.288192	-72.822799
New Haven	Cheshire	Marion Ave (West Side)	I-84	W	41.556392	-72.926899
New Haven	Cheshire	Marion Ave (East Side)	I-84	W	41.557292	-72.924899
New Haven	East Haven	Estelle Road	I-95	N	41.281692	-72.865299
New Haven	Hamden	Worth Avenue	SR 15	S	41.377492	-72.906399
New Haven	Milford	Elbon Street	I-95	N	41.207192	-73.098499
New Haven	New Haven	Chapel Street	I-91	S	41.304792	-72.914499
New Haven	New Haven	Bradley Street	I-91	S	41.308692	-72.914799
New Haven	New Haven	Bailey Street	I-91	N	41.319092	-72.893599
New Haven	New Haven	Franklin Street	I-91	N	41.309492	-72.914199
New Haven	New Haven	Sixth Street (East of Bridge)	I-95	N	41.284592	-72.929299
New Haven	New Haven	Fifth Street (East of Bridge)	I-95	S	41.285092	-72.929199
New Haven	New Haven	Fifth Street (West of Bridge)	I-95	S	41.284692	-72.932099
New Haven	New Haven	Sixth Street (West of Bridge)	I-95	N	41.284192	-72.931799
New Haven	New Haven	Allen Place	I-95	N	41.289092	-72.895599

Table D-1: Historic Type I Noise Barriers

County	Town	Location Description	Route	Direction	Latitude	Longitude
New Haven	Southbury	Rochambeau Middle School	I-84	W	41.466492	-73.221899
New Haven	Wallingford	Saw Mill Drive	I-91	S	41.433192	-72.804799
New Haven	Waterbury	North side of I-84 Vicinity of Pierpont Road (NBW-14)	I-84	W	41.542992	-72.979999
New Haven	Waterbury	North side of I-84 West of Pierpont Road (NBW-16)	I-84	W	41.542392	-72.990899
New Haven	Waterbury	South of I-84 over the Mad River Crossing (NBW-23E)	I-84	E	41.539592	-73.017299
New Haven	Waterbury	North side of I-84, East of Harpers Ferry Road (NBW-20)	I-84	W	41.539092	-73.007399
New Haven	Waterbury	South of I-84 West of Hamilton Avenue (NBW-23W)	I-84	E	41.542792	-73.025599
New Haven	Waterbury	Charles Street	SR 8	S	41.542892	-73.044899
New Haven	West Haven	Hall Street	I-95	N	41.282192	-72.953799
New Haven	West Haven	Greta Street	I-95	S	41.274692	-72.969699
New London	Montville	Cedar Lane Ext.	SR 2A	W	41.485492	-72.105199
New London	Montville	Pollys Lane	SR 2A	E	41.485692	-72.106299
New London	Norwich	Gifford Lane Ext.	SR 2	E	41.562692	-72.129999
New London	Norwich	Yantic Lane	SR 2	E	41.560692	-72.126799
New London	Norwich	Chapel Hill Rd.	SR 2	W	41.559292	-72.124099
Tolland	Tolland	Cora Road	I-84	W	41.871891	-72.344499
Tolland	Tolland	Old Kent Rd South	I-84	E	41.854691	-72.395999
Tolland	Tolland	Ann Drive	I-84	E	41.854391	-72.421199
Tolland	Vernon	Cemetery Road	I-84	W	41.837791	-72.457099
Tolland	Vernon	Forest Drive	I-84	W	41.849091	-72.438799
Tolland	Vernon	W of Dobson Rd.	I-84	E	41.824891	-72.491599
Tolland	Vernon	Tankerhoosen Rd.	I-84	E	41.828091	-72.478499
Tolland	Vernon	Maxwell Drive	I-84	E	41.841491	-72.448499
Tolland	Vernon	Main Street	I-84	E	41.823191	-72.497899
Tolland	Willington	Doratzak Road	I-84	W	41.936091	-72.235399

Notes:

1- CTDOT provided a GIS shapefile of existing noise barriers with county, town, location, and route descriptions. The shapefile also included latitude and longitude representative of an approximate center point along each existing noise barrier.

Table D-2: Active Type I Projects

CTDOT Project No.	County	Town	Location Description
0079-0245	New Haven/Middlesex	Meriden/Middletown	I-691 EB to I-91 NB
0082-0316	Middlesex	Middletown	Route 17 On-Ramp to Route 9 Northbound
0135-0346	Fairfield	Stamford	I-95 over West Avenue to I-95 over Greenwich Avenue

Appendix E: Summary of Evaluated Noise Barriers

Table E-1: Tolland County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefited Receptor ($)	Status
Vernon_1	Vernon	I-81 westbound between Tunnel Rd. and Vernon Rails-To-Trails.	10	2382	$ 1,429,081.77	38	36	94.7%	36	17	47.2%	$ 39,696.72	F&NR
			15		$ 2,143,622.66	38	35	92.1%	36	17	48.6%	$ 59,545.07	F&NR
			20		$ 2,858,163.55	38	37	97.4%	37	31	83.8%	$ 77,247.66	F&NR
			25		$ 3,572,704.44	38	37	97.4%	37	32	86.5%	$ 96,559.58	F&NR
Vernon_2	Vernon	I-84 eastbound between Dobson Rd. and Vernon Rails-To-Trails.	10	2171	$ 1,302,519.03	23	10	43.5%	10	8	80.0%	$ 130,251.90	NF&NR
			15		$ 1,953,778.55	23	19	82.6%	23	12	52.2%	$ 84,946.89	F&NR
			20		$ 2,605,038.07	23	21	91.3%	29	19	65.5%	$ 89,828.90	F&NR
			25		$ 3,256,297.59	23	21	91.3%	29	22	75.9%	$ 112,286.10	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two-thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-2: Windham County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
Killingly_1	Killingly	I395 southbound between Westcott Rd. and Gauthier Ave.	10	2732	$ 1,639,143.38	13	0	0.0%	0	0	0.0%	$ -	NF&NR
			15		$ 2,458,715.08	13	13	100.0%	37	20	54.1%	$ 66,451.76	F&NR
			20		$ 3,278,286.77	13	13	100.0%	39	33	84.6%	$ 84,058.64	F&NR
			25		$ 4,097,858.46	13	13	100.0%	39	34	87.2%	$ 105,073.29	F&NR
Killingly_2	Killingly	I395 southbound between Main St and Dog Hill Rd.	10	2039	$ 1,223,103.92	23	14	60.9%	14	6	42.9%	$ 87,364.57	NF&NR
			15		$ 1,834,655.87	23	21	91.3%	28	26	92.9%	$ 65,523.42	F&NR
			20		$ 2,446,207.83	23	21	91.3%	29	28	96.6%	$ 84,351.99	F&NR
			25		$ 3,057,759.79	23	21	91.3%	29	28	96.6%	$ 105,439.99	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-3: New London County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
EastLyme_1	East Lyme	I-95 southbound between W Society Rd. and N Bridebrook Rd.	10	3008	$ 1,804,891.93	12	8	66.7%	8	0	0.0%	$ 225,611.49	F&NR
			15		$ 2,707,337.89	12	12	100.0%	21	19	90.5%	$ 128,920.85	F&NR
			20		$ 3,609,783.85	12	12	100.0%	21	20	95.2%	$ 171,894.47	F&NR
			25		$ 4,512,229.82	12	12	100.0%	21	20	95.2%	$ 214,868.09	F&NR
EastLyme-Waterford_2	East Lyme - Waterford	I-95 northbound between Rt 1 and Oil Mill Rd.	10	3118	$ 1,870,610.88	17	8	47.1%	8	8	100.0%	$ 233,826.36	NF&NR
			15		$ 2,805,916.32	17	17	100.0%	27	20	74.1%	$ 103,922.83	F&NR
			20		$ 3,741,221.75	17	17	100.0%	29	24	82.8%	$ 129,007.65	F&NR
			25		$ 4,676,527.19	17	17	100.0%	29	27	93.1%	$ 161,259.56	F&NR
Waterford_3	Waterford	I-95 northbound between SR-85 and Vauxhall St.	10	1416	$ 849,471.90	14	8	57.1%	8	4	50.0%	$ 106,184.00	NF&NR
			15		$ 1,274,208.00	14	14	100.0%	36	18	50.0%	$ 35,394.66	F&NR
			20		$ 1,698,944.00	14	14	100.0%	38	28	73.7%	$ 44,709.05	F&R
			25		$ 2,123,680.00	14	14	100.0%	39	31	79.5%	$ 54,453.33	F&R
NewLondon_4	New London	I-95 northbound between Coleman St. and Briggs St.	10	1625	$ 974,757.50	14	14	100.0%	14	6	42.9%	$ 69,625.54	F&NR
			15		$ 1,462,136.24	14	14	100.0%	43	15	34.9%	$ 34,003.17	F&NR
			20		$ 1,949,514.99	14	14	100.0%	66	29	43.9%	$ 29,538.11	F&NR
			25		$ 2,436,893.74	14	14	100.0%	71	46	64.8%	$ 34,322.45	F&NR
Groton_5	Groton	I-95 southbound between SR-12 and Fairview Ave.	10	4293	$ 2,575,765.17	36	32	88.9%	32	17	53.1%	$ 80,492.66	F&NR
			15		$ 3,863,647.76	36	36	100.0%	48	41	85.4%	$ 80,492.66	F&NR
			20		$ 5,151,530.35	36	36	100.0%	48	48	100.0%	$ 107,323.55	F&NR
			25		$ 6,439,412.94	36	36	100.0%	48	48	100.0%	$ 134,154.44	F&NR
Groton_6	Groton	I-95 northbound between Kings Hwy and SR-349.	10	3850	$ 2,310,222.67	31	26	83.9%	10	4	44.4%	$ 85,563.80	F&NR
			15		$ 3,465,334.01	31	31	100.0%	82	33	40.2%	$ 42,260.17	F&NR
			20		$ 4,620,445.35	31	31	100.0%	125	40	32.0%	$ 36,963.56	F&NR
			25		$ 5,775,556.68	31	31	100.0%	162	47	29.0%	$ 35,651.58	F&NR
NorthStonington_7	North Stonington	I-95 soutbound near Pendleton Hill Rd.	10	2454	$ 1,472,651.90	14	10	71.4%	10	0	0.0%	$ 147,265.19	F&NR
			15		$ 2,208,977.86	14	14	100.0%	62	20	32.3%	$ 35,628.68	F&NR
			20		$ 2,945,303.81	14	14	100.0%	86	39	45.3%	$ 34,247.72	F&NR
			25		$ 3,681,629.76	14	14	100.0%	99	63	63.6%	$ 37,188.18	F&NR
Waterford_8	Waterford	I-395 northbound near Vauxhall Street Ext.	10	1646	$ 987,472.56	8	8	100.0%	8	4	50.0%	$ 123,434.07	F&NR
			15		$ 1,481,208.84	8	8	100.0%	12	8	66.7%	$ 123,434.07	F&NR
			20		$ 1,974,945.13	8	8	100.0%	15	8	53.3%	$ 131,663.01	F&NR
			25		$ 2,468,681.41	8	8	100.0%	15	8	53.3%	$ 164,578.76	F&NR
Montville_9	Montville	I-395 soutbound near Raymond Hill Rd. and parallel to Fielding Dr.	10	3231	$ 1,938,615.59	18	16	88.9%	16	16	100.0%	$ 121,163.47	F&NR
			15		$ 2,907,923.39	18	17	94.4%	36	26	72.2%	$ 80,775.65	F&NR
			20		$ 3,877,231.18	18	17	94.4%	36	36	100.0%	$ 107,700.87	F&NR
			25		$ 4,846,538.98	18	17	94.4%	36	36	100.0%	$ 134,626.08	F&NR
Montville_10	Montville	I-395 southbound between Trading Cove Brook and Leffingwell Rd.	10	1595	$ 957,299.60	43	19	44.2%	19	0	0.0%	$ 50,384.19	NF&NR
			15		$ 1,435,949.00	43	43	100.0%	74	13	17.6%	$ 19,404.72	F&NR
			20		$ 1,914,599.00	43	43	100.0%	74	55	74.3%	$ 25,872.96	F&R
			25		$ 2,393,249.00	43	43	100.0%	74	62	83.8%	$ 32,341.20	F&R
Norwich_11	Norwich		10	2339	$ 1,403,533.78	13	9	69.2%	9	0	0.0%	$ 155,948.20	F&NR

Table E-3: New London County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		I-395 northbound near Wawecus Hill Rd.	15		$ 2,105,300.67	13	12	92.3%	25	18	72.0%	$ 84,212.03	F&NR
			20		$ 2,807,067.56	13	12	92.3%	25	20	80.0%	$ 112,282.70	F&NR
			25		$ 3,508,834.44	13	12	92.3%	25	22	88.0%	$ 140,353.38	F&NR
Colchester_12	Colchester	SR-2 westbound parallel to Linwood Cemetery Rd. to Wall St.	10	2298	$ 1,378,659.46	6	6	100.0%	7	6	85.7%	$ 196,951.35	F&NR
			15		$ 2,067,989.18	6	6	100.0%	16	8	50.0%	$ 129,249.32	F&NR
			20		$ 2,757,318.91	6	6	100.0%	16	13	81.3%	$ 172,332.43	F&NR
			25		$ 3,446,648.64	6	6	100.0%	16	16	100.0%	$ 215,415.54	F&NR
Colchester_13	Colchester	SR-2 westbound between Chestnut Hill Rd. and Parum Rd.	10	1498	$ 898,857.74	19	18	94.7%	18	18	100.0%	$ 49,936.54	F&R
			15		$ 1,348,286.62	19	19	100.0%	38	18	47.4%	$ 35,481.23	F&NR
			20		$ 1,797,715.49	19	19	100.0%	38	25	65.8%	$ 47,308.30	F&NR
			25		$ 2,247,144.36	19	19	100.0%	38	25	65.8%	$ 59,135.38	F&NR
New London_14	New London	I-95 southbound between Lewis St. and Williams St.	10	2594	$ 1,556,590.44	27	24	88.9%	24	12	50.0%	$ 64,857.93	F&NR
			15		$ 2,334,885.65	27	27	100.0%	34	28	82.4%	$ 68,673.11	F&NR
			20		$ 3,113,180.87	27	27	100.0%	35	34	97.1%	$ 88,948.02	F&NR
			25		$ 3,891,476.09	27	27	100.0%	35	35	100.0%	$ 111,185.03	F&NR
Colchester_M7	Colchester	SR-2 between Dr Foote Rd and SR-11	10	2068	$ 1,240,666.18	8	8	100.0%	12	1	8.3%	$ 103,388.85	F&NR
			15		$ 1,860,999.27	8	8	100.0%	17	12	70.6%	$ 109,470.55	F&NR
			20		$ 2,481,332.36	8	8	100.0%	23	12	52.2%	$ 107,884.02	F&NR
			25		$ 3,101,665.46	8	8	100.0%	26	13	50.0%	$ 119,294.83	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-4: Middlesex County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
Clinton_1	Clinton	I-95 northbound between Nod Rd. and Cow Hill Rd.	10	3667	$ 2,200,431.51	19	12	63.2%	12	9	75.0%	$ 183,369.29	NF&NR
			15		$ 3,300,647.27	19	19	100.0%	39	32	82.1%	$ 84,631.98	F&NR
			20		$ 4,400,863.03	19	19	100.0%	40	37	92.5%	$ 110,021.58	F&NR
			25		$ 5,501,078.79	19	19	100.0%	40	39	97.5%	$ 137,526.97	F&NR
Clinton_2	Clinton	I-95 northbound between Indian Lake and Long Hill Rd.	10	3008	$ 1,804,899.33	17	14	82.4%	14	12	85.7%	$ 128,921.38	F&NR
			15		$ 2,707,348.99	17	17	100.0%	37	18	48.6%	$ 73,171.59	F&NR
			20		$ 3,609,798.65	17	17	100.0%	37	34	91.9%	$ 97,562.13	F&NR
			25		$ 4,512,248.31	17	17	100.0%	37	36	97.3%	$ 121,952.66	F&NR
Clinton_3	Clinton	I-95 northbound near Long Hill Rd. and parallel to Nutmeg Dr.	10	2078	$ 1,247,082.64	12	8	66.7%	8	0	0.0%	$ 155,885.33	F&NR
			15		$ 1,870,623.96	12	10	83.3%	10	9	90.0%	$ 187,062.40	F&NR
			20		$ 2,494,165.28	12	12	100.0%	21	9	42.9%	$ 118,769.78	F&NR
			25		$ 3,117,706.61	12	12	100.0%	22	17	77.3%	$ 141,713.94	F&NR
Clinton_4	Clinton	I-95 southbound near Long Hill Rd. and parallel to Whitewood Rd.	10	2741	$ 1,644,308.74	14	10	71.4%	10	5	50.0%	$ 164,430.87	F&NR
			15		$ 2,466,463.11	14	13	92.9%	13	11	84.6%	$ 189,727.93	F&NR
			20		$ 3,288,617.48	14	13	92.9%	19	12	63.2%	$ 173,085.13	F&NR
			25		$ 4,110,771.85	14	13	92.9%	26	12	46.2%	$ 158,106.61	F&NR
OldSaybrook_5	Old Saybrook	I-95 northbound between Spencer Plains Rd. and School House Rd.	10	4654	$ 2,792,564.07	13	9	69.2%	9	8	88.9%	$ 310,284.90	F&NR
			15		$ 4,188,846.10	13	13	100.0%	25	23	92.0%	$ 167,553.84	F&NR
			20		$ 5,585,128.14	13	13	100.0%	25	25	100.0%	$ 223,405.13	F&NR
			25		$ 6,981,410.17	13	13	100.0%	25	25	100.0%	$ 279,256.41	F&NR
OldSaybrook_6	Old Saybrook	I-95 southbound between Rt 1 and Middlesex Tpke.	10	2524	$ 1,514,287.53	10	4	40.0%	4	4	100.0%	$ 378,571.88	NF&NR
			15		$ 2,271,431.29	10	10	100.0%	22	16	72.7%	$ 103,246.88	F&NR
			20		$ 3,028,575.06	10	10	100.0%	22	18	81.8%	$ 137,662.50	F&NR
			25		$ 3,785,718.82	10	10	100.0%	22	18	81.8%	$ 172,078.13	F&NR
Middletown_7	Middletown	Hwy 9 northbound near Randolph Rd.	10	2557	$ 1,534,411.97	19	19	100.0%	19	15	78.9%	$ 80,758.52	F&NR
			15		$ 2,301,617.95	19	19	100.0%	32	23	71.9%	$ 71,925.56	F&NR
			20		$ 3,068,823.93	19	19	100.0%	43	26	60.5%	$ 71,368.00	F&NR
			25		$ 3,836,029.92	19	19	100.0%	43	29	67.4%	$ 89,210.00	F&NR
Middletown_8	Middletown	Hwy 9 southbound between Bow Ln. and Saybrook Rd.	10	1536	$ 921,584.29	8	8	100.0%	12	7	58.3%	$ 76,798.69	F&NR
			15		$ 1,382,376.43	8	8	100.0%	27	13	48.1%	$ 51,199.13	F&NR
			20		$ 1,843,168.58	8	8	100.0%	29	18	62.1%	$ 63,557.54	F&NR
			25		$ 2,303,960.72	8	8	100.0%	30	22	73.3%	$ 76,798.69	F&NR
Middletown_9	Middletown	Hwy 9 southbound between Roberts St. and Bow Ln.	10	1356	$ 813,378.87	5	4	80.0%	10	4	40.0%	$ 81,337.89	F&NR
			15		$ 1,220,068.31	5	4	80.0%	34	10	29.4%	$ 35,884.36	F&NR
			20		$ 1,626,757.75	5	4	80.0%	39	17	43.6%	$ 41,711.74	F&NR
			25		$ 2,033,447.19	5	4	80.0%	41	26	63.4%	$ 49,596.27	F&NR
Middletown_10	Middletown	Hwy 9 northbound between Eastern Dr. and Walnut St.	10	840	$ 504,008.38	39	13	33.3%	13	0	0.0%	$ 38,769.88	NF&NR
			15		$ 756,012.57	39	39	100.0%	65	39	60.0%	$ 11,630.96	F&NR
			20		$ 1,008,016.76	39	39	100.0%	78	39	50.0%	$ 12,923.29	F&NR

Table E-4: Middlesex County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
			25		$ 1,260,020.95	39	39	100.0%	78	52	66.7%	$ 16,154.11	F&R
Middletown_11-12	Middletown	Hwy 9 southbound between Walnut St. and Silver St.	10	1796	$ 1,077,854.47	5	4	80.0%	7	2	28.6%	$ 153,979.21	F&NR
			15		$ 1,616,781.70	5	4	80.0%	20	9	45.0%	$ 80,839.09	F&NR
			20		$ 2,155,708.94	5	4	80.0%	23	11	47.8%	$ 93,726.48	F&NR
			25		$ 2,694,636.17	5	4	80.0%	24	14	58.3%	$ 112,276.51	F&NR
Middletown_13	Middletown	SR-17 soutbound between Randolph Rd. and Brown St.	10	1295	$ 776,909.42	7	5	71.4%	8	7	87.5%	$ 97,113.68	F&NR
			15		$ 1,165,364.13	7	5	71.4%	10	8	80.0%	$ 116,536.41	F&NR
			20		$ 1,553,818.84	7	5	71.4%	11	7	63.6%	$ 141,256.26	F&NR
			25		$ 1,942,273.55	7	5	71.4%	12	10	83.3%	$ 161,856.13	F&NR
Middletown_14	Middletown	SR-17 southbound between Wesleyan Hills Rd. and Brush Hill Rd.	10	2976	$ 1,785,713.69	15	14	93.3%	57	33	57.9%	$ 31,328.31	F&NR
			15		$ 2,678,570.53	15	14	93.3%	93	58	62.4%	$ 28,801.83	F&NR
			20		$ 3,571,427.37	15	14	93.3%	96	75	78.1%	$ 37,202.37	F&R
			25		$ 4,464,284.22	15	14	93.3%	99	89	89.9%	$ 45,093.78	F&R
Cromwell_15	Cromwell	SR-9 northbound between Kristen Ln. and West St.	10	7026	$ 4,215,601.20	33	33	100.0%	33	25	75.8%	$ 127,745.49	F&NR
			15		$ 6,323,401.80	33	33	100.0%	48	36	75.0%	$ 131,737.54	F&NR
			20		$ 8,431,202.40	33	33	100.0%	68	41	60.3%	$ 123,988.27	F&NR
			25		$ 10,539,003.00	33	33	100.0%	71	54	76.1%	$ 148,436.66	F&NR
Cromwell_16	Cromwell	SR-9 southbound between Evergreen Rd. and Shunpike Rd.	10	1711	$ 1,026,613.12	23	13	56.5%	13	4	30.8%	$ 78,970.24	NF&NR
			15		$ 1,539,919.68	23	23	100.0%	43	16	37.2%	$ 35,812.09	F&NR
			20		$ 2,053,226.25	23	23	100.0%	78	30	38.5%	$ 26,323.41	F&NR
			25		$ 2,566,532.81	23	23	100.0%	92	40	43.5%	$ 27,897.10	F&NR
Cromwell_17	Cromwell	SR-9 northbound between Evergreen Rd. and Coles Rd.	10	3605	$ 2,162,913.57	23	14	60.9%	14	13	92.9%	$ 154,493.83	NF&NR
			15		$ 3,244,370.36	23	23	100.0%	74	15	20.3%	$ 43,842.84	F&NR
			20		$ 4,325,827.15	23	23	100.0%	85	57	67.1%	$ 50,892.08	F&R
			25		$ 5,407,283.94	23	23	100.0%	112	74	66.1%	$ 48,279.32	F&R
Cromwell_18	Cromwell	I-95 southbound between Evergreen Rd. and Berlin Rd.	10	4821	$ 2,892,752.94	21	14	66.7%	14	12	85.7%	$ 206,625.21	F&NR
			15		$ 4,339,129.42	21	21	100.0%	23	20	87.0%	$ 188,657.80	F&NR
			20		$ 5,785,505.89	21	21	100.0%	23	23	100.0%	$ 251,543.73	F&NR
			25		$ 7,231,882.36	21	21	100.0%	23	23	100.0%	$ 314,429.67	F&NR
Middletown_19	Middletown	I-95 northbound between Smith St. and Berlin Rd.	10	6262	$ 3,756,951.00	323	145	44.9%	145	0	0.0%	$ 25,910.01	NF&NR
			15		$ 5,635,426.00	323	323	100.0%	631	304	48.2%	$ 8,930.95	NF&NR
			20		$ 7,513,902.00	323	323	100.0%	741	501	67.6%	$ 10,140.22	F&R
			25		$ 9,392,377.00	323	323	100.0%	808	631	78.1%	$ 11,624.23	F&R

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-5: Hartford County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
WindsorLocks_1	Windsor Locks	I-91 southbound between Belaire Park and Center St.	10	3968	$ 2,381,095.92	63	55	87.3%	58	21	36.2%	$ 41,053.38	F&NR
			15		$ 3,571,643.88	63	63	100.0%	68	64	94.1%	$ 52,524.17	F&R
			20		$ 4,762,191.84	63	63	100.0%	68	67	98.5%	$ 70,032.23	F&NR
			25		$ 5,952,739.80	63	63	100.0%	68	68	100.0%	$ 87,540.29	F&NR
Windsor_2	Windsor	I-91 southbound between SR-75 and Farmington River	10	1976	$ 1,185,812.49	21	11	52.4%	11	10	90.9%	$ 107,801.14	NF&NR
			15		$ 1,778,718.74	21	21	100.0%	22	11	50.0%	$ 80,850.85	F&NR
			20		$ 2,371,624.98	21	21	100.0%	22	15	68.2%	$ 107,801.14	F&NR
			25		$ 2,964,531.23	21	21	100.0%	23	19	82.6%	$ 128,892.66	F&NR
Manchester_3	Manchester	I-84 eastbound between Slater St and SR-30	10	2498	$ 1,498,726.95	32	13	40.6%	13	5	38.5%	$ 115,286.69	NF&NR
			15		$ 2,248,090.42	32	32	100.0%	39	20	51.3%	$ 57,643.34	F&NR
			20		$ 2,997,453.90	32	32	100.0%	40	33	82.5%	$ 74,936.35	F&NR
			25		$ 3,746,817.37	32	32	100.0%	40	36	90.0%	$ 93,670.43	F&NR
Manchester_4	Manchester	I-384 eastbound between Bidwell St. and Keeney St.	10	2405	$ 1,443,097.40	24	24	100.0%	27	21	77.8%	$ 53,448.05	F&R
			15		$ 2,164,646.10	24	24	100.0%	41	26	63.4%	$ 52,796.25	F&NR
			20		$ 2,886,194.80	24	24	100.0%	48	33	68.8%	$ 60,129.06	F&NR
			25		$ 3,607,743.51	24	24	100.0%	54	35	64.8%	$ 66,810.06	F&NR
Manchester_5	Manchester	I-384 westbound between Bidwill St and Hillstown Rd	10	3698	$ 2,219,023.80	20	20	100.0%	24	15	62.5%	$ 92,459.32	F&NR
			15		$ 3,328,535.70	20	20	100.0%	27	22	81.5%	$ 123,279.10	F&NR
			20		$ 4,438,047.60	20	20	100.0%	27	25	92.6%	$ 164,372.13	F&NR
			25		$ 5,547,559.49	20	20	100.0%	27	26	96.3%	$ 205,465.17	F&NR
EastHartford_6	East Hartford	SR-2 westbound bwtween Sutton Ave and Maple St	10	2060	$ 1,235,927.75	15	11	73.3%	14	5	35.7%	$ 88,280.55	F&NR
			15		$ 1,853,891.63	15	14	93.3%	37	13	35.1%	$ 50,105.18	F&NR
			20		$ 2,471,855.50	15	14	93.3%	48	21	43.8%	$ 51,496.99	F&NR
			25		$ 3,089,819.38	15	14	93.3%	50	25	50.0%	$ 61,796.39	F&NR
WestHartford_7	West Hartford	I-84 westbound between Quaker Ln. and Trout Brook Dr.	10	1531	$ 918,681.58	32	22	68.8%	22	21	95.5%	$ 41,758.25	F&R
			15		$ 1,378,022.37	32	26	81.3%	42	22	52.4%	$ 32,810.06	F&NR
			20		$ 1,837,363.16	32	28	87.5%	44	34	77.3%	$ 41,758.25	F&R
			25		$ 2,296,703.94	32	29	90.6%	53	35	66.0%	$ 43,334.04	F&R
WestHartford_8	West Hartford	I-84 eastbound between S Main St and Mayflower St	10	1600	$ 960,117.79	21	12	57.1%	12	6	50.0%	$ 80,009.82	F&NR
			15		$ 1,440,176.68	21	15	71.4%	18	13	72.2%	$ 80,009.82	F&NR
			20		$ 1,920,235.57	21	15	71.4%	26	14	53.8%	$ 73,855.21	F&NR
			25		$ 2,400,294.47	21	15	71.4%	36	15	41.7%	$ 66,674.85	F&NR
WestHartford_9	West Hartford	I-84 westbound between S Main St and Mayflower St	10	1391	$ 834,335.23	21	7	33.3%	7	0	0.0%	$ 119,190.75	NF&NR
			15		$ 1,251,502.85	21	12	57.1%	12	7	58.3%	$ 104,291.90	NF&NR
			20		$ 1,668,670.46	21	14	66.7%	15	10	66.7%	$ 111,244.70	F&NR
			25		$ 2,085,838.08	21	17	81.0%	22	11	50.0%	$ 94,810.82	F&NR
WestHartford_10	West Hartford	I-84 westbound between S. Main	10	4434	$ 2,660,524.17	63	52	82.5%	52	43	82.7%	$ 51,163.93	F&R
			15		$ 3,990,786.25	63	62	98.4%	87	62	71.3%	$ 45,871.11	F&R
			20		$ 5,321,048.33	63	62	98.4%	90	83	92.2%	$ 59,122.76	F&NR

Table E-5: Hartford County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		St. and Ridgewood Rd.	25		$ 6,651,310.41	63	62	98.4%	92	88	95.7%	$ 72,296.85	F&NR
Southington_11	Southington	I-84 eastbound between Jude Ln and W Center St	10	2377	$ 1,426,134.59	26	18	69.2%	18	16	88.9%	$ 79,229.70	F&NR
			15		$ 2,139,201.88	26	24	92.3%	34	18	52.9%	$ 62,917.70	F&NR
			20		$ 2,852,269.17	26	24	92.3%	38	30	78.9%	$ 75,059.72	F&NR
			25		$ 3,565,336.46	26	24	92.3%	40	34	85.0%	$ 89,133.41	F&NR
Southington_12	Southington	I-84 westbound between Prospect St and W Center St	10	1537	$ 922,085.56	18	8	44.4%	8	5	62.5%	$ 115,260.70	NF&NR
			15		$ 1,383,128.34	18	15	83.3%	15	8	53.3%	$ 92,208.56	F&NR
			20		$ 1,844,171.13	18	16	88.9%	16	9	56.3%	$ 115,260.70	F&NR
			25		$ 2,305,213.91	18	16	88.9%	18	13	72.2%	$ 128,067.44	F&NR
Plainville_13	Plainville	I-84 westbound between Shuttle Meadow Rd and Sunset Ave	10	3025	$ 1,814,865.06	44	26	59.1%	29	18	62.1%	$ 62,581.55	NF&NR
			15		$ 2,722,297.59	44	43	97.7%	58	36	62.1%	$ 46,936.17	F&NR
			20		$ 3,629,730.12	44	43	97.7%	62	43	69.4%	$ 58,544.03	F&NR
			25		$ 4,537,162.65	44	43	97.7%	64	54	84.4%	$ 70,893.17	F&NR
Enfield_14	Enfield	I-91 southbound between South Rd and SR-190 interchange	10	1839	$ 1,103,142.98	30	6	20.0%	6	0	0.0%	$ 183,857.16	NF&NR
			15		$ 1,654,714.47	30	30	100.0%	48	0	0.0%	$ 34,473.22	F&NR
			20		$ 2,206,285.96	30	30	100.0%	48	24	50.0%	$ 45,964.29	F&NR
			25		$ 2,757,857.45	30	30	100.0%	48	30	62.5%	$ 57,455.36	F&NR
Manchester_15	Manchester	I-84 eastbound between Slater St and Buckland St ramp	10	2848	$ 1,708,622.00	308	224	72.7%	224	140	62.5%	$ 7,627.78	F&NR
			15		$ 2,562,933.00	308	308	100.0%	335	308	91.9%	$ 7,650.55	F&R
			20		$ 3,417,244.00	308	308	100.0%	335	308	91.9%	$ 10,200.73	F&R
			25		$ 4,271,555.00	308	308	100.0%	335	308	91.9%	$ 12,750.91	F&R
Wethersfield_16	Wethersfield	US-5 southbound between Folly Brook Blvd and Ridge Rd	10	3718	$ 2,230,801.89	29	23	79.3%	23	16	69.6%	$ 96,991.39	F&NR
			15		$ 3,346,202.83	29	27	93.1%	34	24	70.6%	$ 98,417.73	F&NR
			20		$ 4,461,603.78	29	27	93.1%	63	29	46.0%	$ 70,819.11	F&NR
			25		$ 5,577,004.72	29	27	93.1%	87	48	55.2%	$ 64,103.50	F&NR
Wethersfield_17	Wethersfield	US-5 northbound between Folly Brook Blvd and Ridge Rd	10	3317	$ 1,990,047.13	35	31	88.6%	31	28	90.3%	$ 64,195.07	F&NR
			15		$ 2,985,070.70	35	35	100.0%	51	31	60.8%	$ 58,530.80	F&NR
			20		$ 3,980,094.27	35	35	100.0%	82	37	45.1%	$ 48,537.73	F&NR
			25		$ 4,975,117.83	35	35	100.0%	99	53	53.5%	$ 50,253.72	F&NR
Wethersfield_18	Wethersfield	SR-15 northbound between Goff Rd. and Ridge Rd.	10	2700	$ 1,620,061.02	26	26	100.0%	32	22	68.8%	$ 50,626.91	F&R
			15		$ 2,430,091.53	26	26	100.0%	55	40	72.7%	$ 44,183.48	F&R
			20		$ 3,240,122.04	26	26	100.0%	63	53	84.1%	$ 51,430.51	F&R
			25		$ 4,050,152.55	26	26	100.0%	63	53	84.1%	$ 64,288.14	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-6: New Haven County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
Branford_1	Branford	I-95 southbound between N Ivy St and Cedar St	10	1211	$ 726,702.90	16	0	0.0%	0	0	0.0%	N/A	NF&NR
			15		$ 1,090,054.00	16	16	100.0%	16	1	6.3%	$68,128.39	F&NR
			20		$ 1,453,406.00	16	16	100.0%	29	16	55.2%	$50,117.44	F&NR
			25		$ 1,816,757.00	16	16	100.0%	29	16	55.2%	$62,646.80	F&NR
Milford_2	Milford	I-95 southbound between High St and Ford St	10	2567	$ 1,540,476.00	31	13	41.9%	13	7	53.8%	$ 118,498.20	NF&NR
			15		$ 2,310,715.00	31	25	80.6%	28	15	53.6%	$ 82,525.52	F&NR
			20		$ 3,080,953.00	31	27	87.1%	34	18	52.9%	$ 90,616.26	F&NR
			25		$ 3,851,191.00	31	27	87.1%	45	24	53.3%	$ 85,582.02	F&NR
Milford_3	Milford	I-95 northbound between High St and Ford St	10	1613	$ 967,532.80	22	12	54.5%	12	0	0.0%	$ 80,627.73	NF&NR
			15		$ 1,451,299.00	22	13	59.1%	13	12	92.3%	$ 111,638.40	NF&NR
			20		$ 1,935,066.00	22	20	90.9%	20	12	60.0%	$ 96,753.28	F&NR
			25		$ 2,418,832.00	22	21	95.5%	23	13	56.5%	$ 105,166.60	F&NR
Milford_4	Milford	I-95 northbound between Milford Pkwy. And River St.	10	2093	$ 1,255,663.00	34	18	52.9%	18	17	94.4%	$ 69,759.05	NF&NR
			15		$ 1,883,494.00	34	34	100.0%	46	25	54.3%	$ 40,945.53	F&NR
			20		$ 2,511,326.00	34	34	100.0%	48	41	85.4%	$ 52,319.29	F&R
			25		$ 3,139,157.00	34	34	100.0%	48	43	89.6%	$ 65,399.11	F&NR
Milford_5	Milford	I-95 northbound between River St and Orange Ave	10	3074	$ 1,844,544.00	53	18	34.0%	18	11	61.1%	$ 102,474.70	NF&NR
			15		$ 2,766,817.00	53	39	73.6%	46	26	56.5%	$ 60,148.19	F&NR
			20		$ 3,689,089.00	53	51	96.2%	73	42	57.5%	$ 50,535.46	F&NR
			25		$ 4,611,361.00	53	51	96.2%	74	46	62.2%	$ 62,315.69	F&NR
Milford_6	Milford	I-95 northbound between Forest Rd and US-1 interchange	10	640	$ 384,201.70	28	2	7.1%	2	2	100.0%	$ 192,100.80	NF&NR
			15		$ 576,302.50	28	8	28.6%	8	4	50.0%	$ 72,037.82	NF&NR
			20		$ 768,403.40	28	10	35.7%	10	5	50.0%	$ 76,840.34	NF&NR
			25		$ 960,504.20	28	11	39.3%	11	5	45.5%	$ 87,318.57	NF&NR
Milford_7	Milford	I-95 southbound between North St and Orange Ave	10	1731	$ 1,038,622.00	17	9	52.9%	9	8	88.9%	$ 115,402.40	NF&NR
			15		$ 1,557,933.00	17	9	52.9%	9	9	100.0%	$ 173,103.60	NF&NR
			20		$ 2,077,244.00	17	11	64.7%	11	9	81.8%	$ 188,840.30	NF&NR
			25		$ 2,596,555.00	17	17	100.0%	17	9	52.9%	$ 152,738.50	F&NR
WestHaven_8	West Haven	I-95 southbound between Morgan Ln and Allings Crossing Rd	10	3176	$ 1,905,315.00	38	21	55.3%	21	15	71.4%	$ 90,729.30	NF&NR
			15		$ 2,857,973.00	38	35	92.1%	51	28	54.9%	$ 56,038.69	F&NR
			20		$ 3,810,631.00	38	35	92.1%	51	44	86.3%	$ 74,718.25	F&NR
			25		$ 4,763,288.00	38	35	92.1%	51	47	92.2%	$ 93,397.81	F&NR
WestHaven_9	West Haven	I-95 northbound between Oleander St. and Stevens Ave.	10	963	$ 578,091.00	30	9	30.0%	9	2	22.2%	$ 64,232.34	NF&NR
			15		$ 867,136.50	30	27	90.0%	31	12	38.7%	$ 27,972.15	F&NR
			20		$ 1,156,182.00	30	27	90.0%	32	17	53.1%	$ 36,130.69	F&NR
			25		$ 1,445,228.00	30	27	90.0%	32	22	68.8%	$ 45,163.36	F&R

Table E-6: New Haven County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
WestHaven_10	West Haven	I-95 northbound between Campbell Ave and Stevens Ave	10	1733	$ 1,039,831.00	36	14	38.9%	14	0	0.0%	$ 74,273.67	NF&NR
			15		$ 1,559,747.00	36	31	86.1%	35	15	42.9%	$ 44,564.20	F&NR
			20		$ 2,079,663.00	36	31	86.1%	35	27	77.1%	$ 59,418.94	F&NR
			25		$ 2,599,579.00	36	31	86.1%	37	33	89.2%	$ 70,258.88	F&NR
WestHaven_11	West Haven	I-95 southbound between Campbell Ave and Stevens Ave	10	1539	$ 923,524.80	56	11	19.6%	11	3	27.3%	$ 83,956.80	NF&NR
			15		$ 1,385,287.00	56	21	37.5%	21	12	57.1%	$ 65,966.06	NF&NR
			20		$ 1,847,050.00	56	36	64.3%	38	14	36.8%	$ 48,606.57	NF&NR
			25		$ 2,308,812.00	56	38	67.9%	44	21	47.7%	$ 52,473.00	F&NR
WestHaven_12-13	West Haven	I-95 northbound from south of the SR-122 interchange to the railroad tracks east of Mix Ave	10	1966	$ 1,179,806.00	29	5	17.2%	5	3	60.0%	$ 235,961.20	NF&NR
			15		$ 1,769,709.00	29	19	65.5%	20	11	55.0%	$ 88,485.46	NF&NR
			20		$ 2,359,612.00	29	19	65.5%	20	15	75.0%	$ 117,980.60	NF&NR
			25		$ 2,949,515.00	29	20	69.0%	21	17	81.0%	$ 140,453.10	F&NR
Milford_14	Milford	Milford Parkway (SR-796) southbound between E Rutland Rd and the SR-15 interchange	10	1413	$ 847,969.10	13	11	84.6%	11	0	0.0%	$ 77,088.10	F&NR
			15		$ 1,271,954.00	13	12	92.3%	12	11	91.7%	$ 105,996.10	F&NR
			20		$ 1,695,938.00	13	13	100.0%	20	11	55.0%	$ 84,796.91	F&NR
			25		$ 2,119,923.00	13	13	100.0%	23	11	47.8%	$ 92,170.56	F&NR
Madison_15	Madison	I-95 northbound between New Rd and W Sussex Place	10	1309	$ 785,401.10	10	2	20.0%	2	0	0.0%	$ 392,700.50	NF&NR
			15		$ 1,178,102.00	10	9	90.0%	22	7	31.8%	$ 53,550.07	F&NR
			20		$ 1,570,802.00	10	10	100.0%	27	14	51.9%	$ 58,177.86	F&NR
			25		$ 1,963,503.00	10	10	100.0%	27	22	81.5%	$ 72,722.32	F&NR
NewHaven_16	New Haven	I-91 northbound between SR-17 (Middletown Ave) and Gando Dr commercial area	10	1217	$ 730,353.10	122	46	37.7%	46	21	45.7%	$ 15,877.24	NF&NR
			15		$ 1,095,530.00	122	105	86.1%	105	44	41.9%	$ 10,433.62	F&NR
			20		$ 1,460,706.00	122	122	100.0%	122	45	36.9%	$ 11,973.00	F&NR
			25		$ 1,825,883.00	122	122	100.0%	123	46	37.4%	$ 14,844.58	F&NR
NorthHaven_17	North Haven	I-91 northbound between Bassett Rd and Pool Rd	10	2029	$ 1,217,244.00	20	12	60.0%	12	3	25.0%	$ 101,437.00	NF&NR
			15		$ 1,825,867.00	20	20	100.0%	27	15	55.6%	$ 67,624.69	F&NR
			20		$ 2,434,489.00	20	20	100.0%	37	16	43.2%	$ 65,796.99	F&NR
			25		$ 3,043,111.00	20	20	100.0%	37	21	56.8%	$ 82,246.24	F&NR
NorthHaven_18	North Haven	I-91 northbound between Quinnipiac University - North Haven and Bassett Rd	10	4424	$ 2,654,197.00	23	22	95.7%	24	5	20.8%	$ 110,591.50	F&NR
			15		$ 3,981,296.00	23	23	100.0%	47	22	46.8%	$ 84,708.42	F&NR
			20		$ 5,308,394.00	23	23	100.0%	47	38	80.9%	$ 112,944.60	F&NR
			25		$ 6,635,493.00	23	23	100.0%	47	41	87.2%	$ 141,180.70	F&NR
Meriden_19	Meriden	I-91 southbound between Murdock Ave and SR-15 interchange	10	2227	$ 1,336,236.00	33	20	60.6%	20	17	85.0%	$ 66,811.81	NF&NR
			15		$ 2,004,354.00	33	31	93.9%	37	24	64.9%	$ 54,171.74	F&NR
			20		$ 2,672,472.00	33	31	93.9%	46	29	63.0%	$ 58,097.22	F&NR

Table E-6: New Haven County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
			25		$ 3,340,590.00	33	32	97.0%	50	33	66.0%	$ 66,811.81	F&NR
Meriden_20-22	Meriden	NH_Wall-20: I-691 westbound betweebn Wall St and SR-15	10	2916	$ 1,749,432.00	24	13	54.2%	13	6	46.2%	$ 134,571.70	NF&NR
			15		$ 2,624,148.00	24	22	91.7%	22	14	63.6%	$ 119,279.40	F&NR
			20		$ 3,498,864.00	24	24	100.0%	27	17	63.0%	$ 129,587.50	F&NR
			25		$ 4,373,579.00	24	24	100.0%	36	21	58.3%	$ 121,488.30	F&NR
Meriden_21	Meriden	I-691 westbound between Wall St. and US-5	10	1813	$ 1,087,590.00	25	22	88.0%	22	19	86.4%	$ 49,435.90	F&R
			15		$ 1,631,385.00	25	25	100.0%	25	22	88.0%	$ 65,255.39	F&NR
			20		$ 2,175,180.00	25	25	100.0%	37	23	62.2%	$ 58,788.64	F&NR
			25		$ 2,718,975.00	25	25	100.0%	61	25	41.0%	$ 44,573.36	F&NR
Meriden_23	Meriden	I-691 eastbound between Wall St and US-5	10	1763	$ 1,058,007.00	19	8	42.1%	8	0	0.0%	$ 132,250.90	NF&NR
			15		$ 1,587,011.00	19	19	100.0%	19	7	36.8%	$ 83,526.90	F&NR
			20		$ 2,116,015.00	19	19	100.0%	23	19	82.6%	$ 92,000.64	F&NR
			25		$ 2,645,018.00	19	19	100.0%	44	21	47.7%	$ 60,114.06	F&NR
Meriden_24	Meriden	I-691 eastbound between Wall St and SR-15	10	2178	$ 1,306,972.00	19	10	52.6%	10	5	50.0%	$ 130,697.20	NF&NR
			15		$ 1,960,458.00	19	16	84.2%	18	7	38.9%	$ 108,914.30	F&NR
			20		$ 2,613,943.00	19	18	94.7%	28	15	53.6%	$ 93,355.12	F&NR
			25		$ 3,267,429.00	19	18	94.7%	37	17	45.9%	$ 88,308.90	F&NR
Meriden_25	Meriden	I-691 eastbound between SR-71 and Hubbard Park Dr	10	4403	$ 2,641,906.00	32	23	71.9%	23	10	43.5%	$ 114,865.50	F&NR
			15		$ 3,962,859.00	32	31	96.9%	56	32	57.1%	$ 70,765.33	F&NR
			20		$ 5,283,811.00	32	31	96.9%	59	43	72.9%	$ 89,556.13	F&NR
			25		$ 6,604,764.00	32	31	96.9%	60	56	93.3%	$ 110,079.40	F&NR
NorthHaven_26	North Haven	SR-40 southbound between SR-15 and SR-22	10	1915	$ 1,149,240.00	12	10	83.3%	10	0	0.0%	$ 114,924.00	F&NR
			15		$ 1,723,861.00	12	10	83.3%	10	6	60.0%	$ 172,386.10	F&NR
			20		$ 2,298,481.00	12	10	83.3%	10	6	60.0%	$ 229,848.10	F&NR
			25		$ 2,873,101.00	12	10	83.3%	10	7	70.0%	$ 287,310.10	F&NR
NorthHaven_27	North Haven	SR-15 northbound between SR-40 and the Hartford Turnpike	10	2547	$ 1,528,370.00	11	9	81.8%	10	8	80.0%	$ 152,837.00	F&NR
			15		$ 2,292,555.00	11	9	81.8%	11	8	72.7%	$ 208,414.10	F&NR
			20		$ 3,056,740.00	11	10	90.9%	17	8	47.1%	$ 179,808.30	F&NR
			25		$ 3,820,925.00	11	10	90.9%	19	10	52.6%	$ 201,101.30	F&NR
NorthHaven_28	North Haven	SR-15 southbound between Toelles Rd and Leighton Ct	10	4868	$ 2,920,663.00	31	31	100.0%	60	27	45.0%	$ 48,677.71	F&NR
			15		$ 4,380,994.00	31	30	96.8%	62	48	77.4%	$ 70,661.19	F&NR
			20		$ 5,841,325.00	31	30	96.8%	63	60	95.2%	$ 92,719.45	F&NR
			25		$ 7,301,656.00	31	30	96.8%	63	60	95.2%	$ 115,899.30	F&NR
Milford_29	Milford	Milford Parkway (SR-796) southbound between E Rutland Rd	10	1340	$ 803,984.70	17	10	58.8%	10	9	90.0%	$ 80,398.47	NF&NR
			15		$ 1,205,977.00	17	17	100.0%	25	10	40.0%	$ 48,239.08	F&NR
			20		$ 1,607,969.00	17	17	100.0%	31	17	54.8%	$ 51,869.98	F&NR

Table E-6: New Haven County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		and Wheelers Farms Rd	25		$ 2,009,962.00	17	17	100.0%	31	17	54.8%	$ 64,837.48	F&NR
Milford_30	Milford	Milford Parkway (SR-796) northbound from E Rutland Rd to SR-15 interchange	10	1303	$ 782,038.60	60	24	40.0%	24	0	0.0%	$ 32,584.94	NF&NR
			15		$ 1,173,058.00	60	60	100.0%	60	48	80.0%	$ 19,550.96	F&R
			20		$ 1,564,077.00	60	60	100.0%	72	48	66.7%	$ 21,723.29	F&R
			25		$ 1,955,096.00	60	60	100.0%	84	60	71.4%	$ 23,274.96	F&R
Waterbury_31	Waterbury	I-84 eastbound between Pierpont Rd and Scott Rd	10	1643	$ 985,822.50	171	44	25.7%	44	0	0.0%	$ 22,405.06	NF&NR
			15		$ 1,478,734.00	171	158	92.4%	158	44	27.8%	$ 9,359.07	F&NR
			20		$ 1,971,645.00	171	158	92.4%	158	88	55.7%	$ 12,478.77	F&NR
			25		$ 2,464,556.00	171	158	92.4%	158	88	55.7%	$ 15,598.46	F&NR
Naugatuck_32	Naugatuck	SR-8 northbound between Calvin St. and Smith St.	10	2140	$ 1,284,167.00	30	26	86.7%	34	22	64.7%	$ 37,769.62	F&NR
			15		$ 1,926,251.00	30	29	96.7%	58	34	58.6%	$ 33,211.22	F&NR
			20		$ 2,568,334.00	30	29	96.7%	61	46	75.4%	$ 42,103.84	F&R
			25		$ 3,210,418.00	30	29	96.7%	61	47	77.0%	$ 52,629.81	F&R
Seymour_33	Seymour	SR-8 northbound between West St and Derby Ave intersection	10	3138	$ 1,882,824.00	40	39	97.5%	51	32	62.7%	$ 36,918.12	F&NR
			15		$ 2,824,236.00	40	39	97.5%	51	51	100.0%	$ 55,377.18	F&NR
			20		$ 3,765,648.00	40	39	97.5%	51	51	100.0%	$ 73,836.23	F&NR
			25		$ 4,707,060.00	40	39	97.5%	51	51	100.0%	$ 92,295.29	F&NR
Ansonia_34	Ansonia	SR-8 northbound to the north and south of Hull St	10	1247	$ 748,068.60	14	7	50.0%	7	1	14.3%	$ 106,866.90	NF&NR
			15		$ 1,122,103.00	14	13	92.9%	13	6	46.2%	$ 86,315.60	F&NR
			20		$ 1,496,137.00	14	13	92.9%	15	9	60.0%	$ 99,742.48	F&NR
			25		$ 1,870,171.00	14	13	92.9%	15	10	66.7%	$ 124,678.10	F&NR
Ansonia_35	Ansonia	SR-8 southbound between Hull St. and Division St.	10	3697	$ 2,218,472.00	40	38	95.0%	66	30	45.5%	$ 33,613.22	F&NR
			15		$ 3,327,709.00	40	40	100.0%	82	75	91.5%	$ 40,581.81	F&R
			20		$ 4,436,945.00	40	40	100.0%	84	77	91.7%	$ 52,820.77	F&R
			25		$ 5,546,181.00	40	40	100.0%	85	82	96.5%	$ 65,249.19	F&NR
Derby_36	Derby	SR-8 southbound between Division St and Bluff St	10	642	$ 385,215.90	20	10	50.0%	10	9	90.0%	$ 38,521.59	NF&NR
			15		$ 577,823.90	20	17	85.0%	17	10	58.8%	$ 33,989.64	F&NR
			20		$ 770,431.90	20	19	95.0%	26	13	50.0%	$ 29,632.00	F&NR
			25		$ 963,039.90	20	19	95.0%	27	15	55.6%	$ 35,668.14	F&NR
Derby_37	Derby	SR-8 southbound between Bluff St. and Hawkins St.	10	2072	$ 1,243,244.00	38	31	81.6%	31	21	67.7%	$ 40,104.64	F&R
			15		$ 1,864,866.00	38	36	94.7%	59	32	54.2%	$ 31,607.89	F&NR
			20		$ 2,486,487.00	38	36	94.7%	74	43	58.1%	$ 33,601.18	F&NR
			25		$ 3,108,109.00	38	36	94.7%	74	52	70.3%	$ 42,001.48	F&R
Derby_38	Derby	SR-8 northbound between Bluff St and Hawkins St	10	1341	$ 804,771.00	26	14	53.8%	14	10	71.4%	$ 57,483.64	NF&NR
			15		$ 1,207,157.00	26	19	73.1%	19	12	63.2%	$ 63,534.55	F&NR
			20		$ 1,609,542.00	26	22	84.6%	27	15	55.6%	$ 59,612.67	F&NR

Table E-6: New Haven County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
			25		$ 2,011,928.00	26	22	84.6%	31	18	58.1%	$ 64,900.89	F&NR
Waterbury_M9	Waterbury	I-84 eastbound between I-84 eastbound on-ramp from Chase Parkway and Highland Ave.	10	1250	$ 750,065.64	21	15	71.4%	15	9	60.0%	$ 50,004.38	F&NR
			15		$ 1,125,098.46	21	21	100.0%	25	18	72.0%	$ 45,003.94	F&R
			20		$ 1,500,131.27	21	21	100.0%	33	20	60.6%	$ 45,458.52	F&NR
			25		$ 1,875,164.09	21	21	100.0%	42	23	54.8%	$ 44,646.76	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Table E-7: Fairfield County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
Norwalk_M15	Norwalk	US-7 northbound between Belden Ave. and SR-123	10	2774	$ 1,664,179.00	33	33	100.0%	55	33	60.0%	$ 30,257.80	F&NR
			15		$ 2,496,269.00	33	33	100.0%	76	51	67.1%	$ 32,845.64	F&R
			20		$ 3,328,358.00	33	33	100.0%	81	59	72.8%	$ 41,090.84	F&R
			25		$ 4,160,448.00	33	33	100.0%	98	73	74.5%	$ 42,453.55	F&R
Norwalk_2	Norwalk	US-7 northbound between Butler Ln and Union Park	10	1739	$ 1,043,638.00	27	27	100.0%	34	22	64.7%	$ 30,695.25	F&NR
			15		$ 1,565,458.00	27	27	100.0%	35	32	91.4%	$ 44,727.36	F&R
			20		$ 2,087,277.00	27	27	100.0%	36	34	94.4%	$ 57,979.91	F&NR
			25		$ 2,609,096.00	27	27	100.0%	37	35	94.6%	$ 70,516.11	F&NR
Shelton_3	Shelton	SR-8 southbound between Long Hill Cross Rd and Beard Sawmill Rd	10	2936	$ 1,761,562.00	20	20	100.0%	21	0	0.0%	$ 83,883.91	F&NR
			15		$ 2,642,343.00	20	20	100.0%	64	23	35.9%	$ 41,286.61	F&NR
			20		$ 3,523,124.00	20	20	100.0%	109	58	53.2%	$ 32,322.24	F&NR
			25		$ 4,403,905.00	20	20	100.0%	127	64	50.4%	$ 34,676.42	F&NR
Shelton_4	Shelton	SR-8 northbound between Prospect Ave and Long Hill Ave	10	1896	$ 1,137,327.00	35	18	51.4%	18	6	33.3%	$ 63,184.85	NF&NR
			15		$ 1,705,991.00	35	31	88.6%	36	18	50.0%	$ 47,388.64	F&NR
			20		$ 2,274,655.00	35	32	91.4%	46	26	56.5%	$ 49,449.02	F&NR
			25		$ 2,843,318.00	35	33	94.3%	55	35	63.6%	$ 51,696.70	F&NR
Shelton_5	Shelton	SR-8 southbound between Prospect Ave and Constitution Blvd	10	3137	$ 1,882,065.00	36	24	66.7%	35	14	40.0%	$ 53,773.28	F&NR
			15		$ 2,823,097.00	36	32	88.9%	64	34	53.1%	$ 44,110.89	F&NR
			20		$ 3,764,130.00	36	33	91.7%	81	48	59.3%	$ 46,470.74	F&NR
			25		$ 4,705,162.00	36	34	94.4%	92	66	71.7%	$ 51,143.06	F&R
Bridgeport_6	Bridgeport	SR-8 southbound between Old Town Rd. and Sylvan Ave.	10	4905	$ 2,942,870.00	83	83	100.0%	131	75	57.3%	$ 22,464.65	F&NR
			15		$ 4,414,304.00	83	83	100.0%	162	131	80.9%	$ 27,248.79	F&R
			20		$ 5,885,739.00	83	83	100.0%	163	159	97.5%	$ 36,108.83	F&R
			25		$ 7,357,174.00	83	83	100.0%	164	160	97.6%	$ 44,860.82	F&R
Bridgeport_7	Bridgeport	SR-8 southbound between Lindley St. and Parallel St.	10	1876	$ 1,125,757.00	32	30	93.8%	40	21	52.5%	$ 28,143.92	F&NR
			15		$ 1,688,635.00	32	32	100.0%	75	43	57.3%	$ 22,515.13	F&NR
			20		$ 2,251,513.00	32	32	100.0%	89	54	60.7%	$ 25,297.90	F&NR
			25		$ 2,814,392.00	32	32	100.0%	93	64	68.8%	$ 30,262.28	F&R
Greenwich_8	Greenwich	I-95 northbound between the Byram River and Byram Shore Rd	10	3303	$ 1,981,697.00	50	25	50.0%	25	2	8.0%	$ 79,267.86	NF&NR
			15		$ 2,972,545.00	50	47	94.0%	60	34	56.7%	$ 49,542.41	F&NR
			20		$ 3,963,393.00	50	50	100.0%	67	54	80.6%	$ 59,155.12	F&NR
			25		$ 4,954,241.00	50	50	100.0%	67	63	94.0%	$ 73,943.90	F&NR
Greenwich_10-11-41	Greenwich	I-95 southbound between Hartford Ave. and Richard St.	10	3860	$ 2,315,707.00	64	27	42.2%	27	14	51.9%	$ 85,766.92	NF&NR
			15		$ 3,473,560.00	64	56	87.5%	105	41	39.0%	$ 33,081.53	F&NR
			20		$ 4,631,414.00	64	62	96.9%	115	92	80.0%	$ 40,273.16	F&R
			25		$ 5,789,267.00	64	62	96.9%	117	112	95.7%	$ 49,480.91	F&R
Greenwich_12	Greenwich	I-95 northbound between the	10	2438	$ 1,462,546.00	16	9	56.3%	9	0	0.0%	$ 162,505.10	NF&NR
			15		$ 2,193,818.00	16	11	68.8%	11	8	72.7%	$ 199,438.00	F&NR

Table E-7: Fairfield County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		northern and southern intersections of Ritch Ave and I-95	20		$ 2,925,091.00	16	15	93.8%	15	11	73.3%	$ 195,006.10	F&NR
			25		$ 3,656,364.00	16	16	100.0%	16	12	75.0%	$ 228,522.80	F&NR
Greenwich_13	Greenwich	I-95 southbound between Ritch Ave and Field Point Rd	10	4135	$ 2,481,120.00	22	6	27.3%	6	0	0.0%	$ 413,520.00	NF&NR
			15		$ 3,721,680.00	22	22	100.0%	53	42	79.2%	$ 70,220.38	F&NR
			20		$ 4,962,240.00	22	22	100.0%	56	47	83.9%	$ 88,611.44	F&NR
			25		$ 6,202,801.00	22	22	100.0%	56	50	89.3%	$ 110,764.30	F&NR
Greenwich_14	Greenwich	I-95 southbound between Indian Field Rd. and Steamboat Rd.	10	5701	$ 3,420,748.00	76	41	53.9%	41	21	51.2%	$ 83,432.88	NF&NR
			15		$ 5,131,122.00	76	75	98.7%	117	98	83.8%	$ 43,855.74	F&R
			20		$ 6,841,496.00	76	76	100.0%	119	114	95.8%	$ 57,491.56	F&NR
			25		$ 8,551,870.00	76	76	100.0%	119	116	97.5%	$ 71,864.45	F&NR
Greenwich_15	Greenwich	I-95 southbound between River Rd. and Sound Shore Dr.	10	4454	$ 2,672,588.00	67	32	47.8%	32	20	62.5%	$ 83,518.37	NF&NR
			15		$ 4,008,882.00	67	67	100.0%	92	85	92.4%	$ 43,574.80	F&R
			20		$ 5,345,176.00	67	67	100.0%	93	90	96.8%	$ 57,475.01	F&NR
			25		$ 6,681,470.00	67	67	100.0%	93	91	97.8%	$ 71,843.76	F&NR
Greenwich_16-39-40	Greenwich	I-95 northbound between the Mianus River Bridge and the US-1 interchange	10	4139	$ 2,483,441.00	79	28	35.4%	28	13	46.4%	$ 88,694.34	NF&NR
			15		$ 3,725,162.00	79	76	96.2%	103	40	38.8%	$ 36,166.62	F&NR
			20		$ 4,966,883.00	79	78	98.7%	105	53	50.5%	$ 47,303.65	F&NR
			25		$ 6,208,604.00	79	78	98.7%	106	72	67.9%	$ 58,571.73	F&NR
Greenwich_17	Greenwich	I-95 northbound between Peters Rd. and Laddins Rock Rd.	10	3756	$ 2,253,349.00	69	27	39.1%	27	11	40.7%	$ 83,457.37	NF&NR
			15		$ 3,380,023.00	69	69	100.0%	106	88	83.0%	$ 31,887.01	F&R
			20		$ 4,506,698.00	69	69	100.0%	106	105	99.1%	$ 42,516.02	F&R
			25		$ 5,633,372.00	69	69	100.0%	106	106	100.0%	$ 53,145.02	F&R
Stamford_18	Stamford	I-95 northbound between Myrtle Ave. and Maher St	10	2631	$ 1,578,347.00	86	32	37.2%	32	14	43.8%	$ 49,323.35	NF&NR
			15		$ 2,367,521.00	86	79	91.9%	97	66	68.0%	$ 24,407.43	F&R
			20		$ 3,156,695.00	86	82	95.3%	100	79	79.0%	$ 31,566.95	F&R
			25		$ 3,945,868.00	86	85	98.8%	103	83	80.6%	$ 38,309.40	F&R
Stamford_19	Stamford	I-95 northbound between Blachley Rd. and Seaside Ave.	10	1284	$ 770,485.10	22	11	50.0%	11	3	27.3%	$ 70,044.10	NF&NR
			15		$ 1,155,728.00	22	22	100.0%	32	11	34.4%	$ 36,116.49	F&NR
			20		$ 1,540,970.00	22	22	100.0%	32	25	78.1%	$ 48,155.32	F&R
			25		$ 1,926,213.00	22	22	100.0%	32	30	93.8%	$ 60,194.15	F&NR
Norwalk_20	Norwalk	I-95 northbound between Scribner Ave. and Taylor Ave.	10	1963	$ 1,177,778.00	42	4	9.5%	4	4	100.0%	$ 294,444.60	NF&NR
			15		$ 1,766,667.00	42	33	78.6%	49	12	24.5%	$ 36,054.44	F&NR
			20		$ 2,355,557.00	42	36	85.7%	55	28	50.9%	$ 42,828.30	F&NR
			25		$ 2,944,446.00	42	36	85.7%	55	37	67.3%	$ 53,535.38	F&R
Norwalk_21	Norwalk	I-95 northbound between East Ave	10	1569	$ 941,106.40	30	7	23.3%	7	2	28.6%	$ 134,443.80	NF&NR
			15		$ 1,411,660.00	30	19	63.3%	19	9	47.4%	$ 74,297.87	NF&NR

Table E-7: Fairfield County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		and Strawberry Hill Ave	20		$ 1,882,213.00	30	24	80.0%	24	15	62.5%	$ 78,425.53	F&NR
			25		$ 2,352,766.00	30	26	86.7%	36	22	61.1%	$ 65,354.61	F&NR
Norwalk_22	Norwalk	I-95 southbound between East Ave and Strawberry Hill Ave	10	2149	$ 1,289,465.00	48	17	35.4%	17	7	41.2%	$ 75,850.87	NF&NR
			15		$ 1,934,197.00	48	33	68.8%	33	19	57.6%	$ 58,612.03	F&NR
			20		$ 2,578,929.00	48	40	83.3%	64	26	40.6%	$ 40,295.77	F&NR
			25		$ 3,223,662.00	48	41	85.4%	69	33	47.8%	$ 46,719.74	F&NR
Westport_23	Westport	I-95 southbound between SR-33 and the Westport-Norwalk town line	10	2427	$ 1,456,052.00	29	13	44.8%	13	6	46.2%	$ 112,004.00	NF&NR
			15		$ 2,184,078.00	29	23	79.3%	26	24	92.3%	$ 84,003.00	F&NR
			20		$ 2,912,104.00	29	26	89.7%	29	27	93.1%	$ 100,417.40	F&NR
			25		$ 3,640,130.00	29	25	86.2%	28	26	92.9%	$ 130,004.60	F&NR
Westport_24	Westport	I-95 southbound between Hales Rd and the Saugatuck River	10	4267	$ 2,560,442.00	46	18	39.1%	18	4	22.2%	$ 142,246.80	NF&NR
			15		$ 3,840,663.00	46	42	91.3%	66	49	74.2%	$ 58,191.87	F&NR
			20		$ 5,120,884.00	46	43	93.5%	68	60	88.2%	$ 75,307.12	F&NR
			25		$ 6,401,105.00	46	43	93.5%	69	61	88.4%	$ 92,769.64	F&NR
Fairfield_25	Fairfield	I-95 northbound from Center St to south of Westway Rd	10	1948	$ 1,168,511.00	17	7	41.2%	7	5	71.4%	$ 166,930.20	NF&NR
			15		$ 1,752,767.00	17	17	100.0%	30	13	43.3%	$ 58,425.56	F&NR
			20		$ 2,337,022.00	17	17	100.0%	32	22	68.8%	$ 73,031.95	F&NR
			25		$ 2,921,278.00	17	17	100.0%	33	26	78.8%	$ 88,523.58	F&NR
Fairfield_26	Fairfield	I-95 northbound between Mill Hill Rd and Bronson Rd	10	1029	$ 617,125.60	31	12	38.7%	2	0	0.0%	$ 308,562.80	NF&NR
			15		$ 925,688.40	31	23	74.2%	12	12	100.0%	$ 77,140.70	F&NR
			20		$ 1,234,251.00	31	23	74.2%	12	12	100.0%	$ 102,854.30	F&NR
			25		$ 1,542,814.00	31	23	74.2%	12	12	100.0%	$ 128,567.80	F&NR
Fairfield_M12	Fairfield	I-95 southbound between Mill Plain Rd. and Bronson Rd.	10	3455	$ 2,073,208.00	74	37	50.0%	37	30	81.1%	$ 56,032.66	NF&NR
			15		$ 3,109,813.00	74	74	100.0%	98	78	79.6%	$ 31,732.78	F&R
			20		$ 4,146,417.00	74	74	100.0%	98	94	95.9%	$ 42,310.38	F&R
			25		$ 5,183,021.00	74	74	100.0%	98	97	99.0%	$ 52,887.97	F&R
Fairfield_28	Fairfield	I-95 northbound between Mill Plain Rd and Unquowa Rd	10	1813	$ 1,087,736.00	54	20	37.0%	21	19	90.5%	$ 51,796.97	NF&NR
			15		$ 1,631,604.00	54	54	100.0%	61	53	86.9%	$ 26,747.61	F&R
			20		$ 2,175,473.00	54	54	100.0%	62	55	88.7%	$ 35,088.27	F&R
			25		$ 2,719,341.00	54	54	100.0%	64	57	89.1%	$ 42,489.70	F&R
Fairfield_29-37	Fairfield	I-95 southbound between Grasmere Rd and the US-1 interchange	10	3302	$ 1,980,985.00	34	17	50.0%	17	12	70.6%	$ 116,528.60	NF&NR
			15		$ 2,971,478.00	34	34	100.0%	60	34	56.7%	$ 49,524.64	F&NR
			20		$ 3,961,971.00	34	34	100.0%	62	52	83.9%	$ 63,902.76	F&NR
			25		$ 4,952,464.00	34	34	100.0%	63	56	88.9%	$ 78,610.53	F&NR
Fairfield_30	Fairfield	I-95 southbound between Ash Creek and Chambers St.	10	3226	$ 1,935,595.00	60	31	51.7%	31	16	51.6%	$ 62,438.55	NF&NR
			15		$ 2,903,393.00	60	60	100.0%	84	75	89.3%	$ 34,564.20	F&R
			20		$ 3,871,190.00	60	60	100.0%	85	84	98.8%	$ 45,543.41	F&R
			25		$ 4,838,988.00	60	60	100.0%	87	84	96.6%	$ 55,620.55	F&NR

Table E-7: Fairfield County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
Bridgeport_31	Bridgeport	I-95 southbound between I-95 southbound on-ramp from Seaview Ave. and I-95 southbound on-ramp from SR-127	10	2148	$ 1,289,052.00	38	24	63.2%	24	11	45.8%	$ 53,710.50	NF&NR
			15		$ 1,933,578.00	38	38	100.0%	47	40	85.1%	$ 41,139.96	F&R
			20		$ 2,578,104.00	38	38	100.0%	48	45	93.8%	$ 53,710.50	F&R
			25		$ 3,222,630.00	38	38	100.0%	48	47	97.9%	$ 67,138.13	F&NR
Stratford_32-33	Stratford	I-95 northbound between I-95 northbound off-ramp to Honeyspot Rd. and Stratford Ave.	10	3466	$ 2,079,894.00	65	25	38.5%	25	12	48.0%	$ 83,195.75	NF&NR
			15		$ 3,119,840.00	65	55	84.6%	95	38	40.0%	$ 32,840.43	F&NR
			20		$ 4,159,787.00	65	65	100.0%	123	76	61.8%	$ 33,819.41	F&NR
			25		$ 5,199,734.00	65	65	100.0%	130	92	70.8%	$ 39,997.95	F&R
Stratford_34	Stratford	I-95 southbound between Honeyspot Rd and Corinthian Ave	10	1671	$ 1,002,716.00	32	5	15.6%	5	0	0.0%	$ 200,543.20	NF&NR
			15		$ 1,504,074.00	32	16	50.0%	16	8	50.0%	$ 94,004.63	NF&NR
			20		$ 2,005,432.00	32	21	65.6%	21	12	57.1%	$ 95,496.76	NF&NR
			25		$ 2,506,790.00	32	27	84.4%	27	16	59.3%	$ 92,844.08	F&NR
Danbury_35	Danbury	I-84 eastbound between Beckett St. and Kohanza St.	10	3151	$ 1,890,467.00	73	22	30.1%	22	8	36.4%	$ 85,930.33	NF&NR
			15		$ 2,835,701.00	73	62	84.9%	87	58	66.7%	$ 32,594.26	F&R
			20		$ 3,780,934.00	73	63	86.3%	91	75	82.4%	$ 41,548.73	F&R
			25		$ 4,726,168.00	73	63	86.3%	91	79	86.8%	$ 51,935.91	F&R
Danbury_36	Danbury	I-84 eastbound between SR-37 and Germantown Rd.	10	5354	$ 3,212,222.00	100	48	48.0%	48	26	54.2%	$ 66,921.28	NF&NR
			15		$ 4,818,332.00	100	97	97.0%	131	116	88.5%	$ 36,781.16	F&R
			20		$ 6,424,443.00	100	98	98.0%	135	125	92.6%	$ 47,588.47	F&R
			25		$ 8,030,554.00	100	99	99.0%	137	128	93.4%	$ 58,617.18	F&NR
Norwalk_38	Norwalk	I-95 northbound from the CyrusOne Norwalk technology park to before Exit 17	10	1842	$ 1,105,034.00	36	22	61.1%	22	0	0.0%	$ 50,228.81	NF&NR
			15		$ 1,657,551.00	36	36	100.0%	80	34	42.5%	$ 20,719.38	NF&NR
			20		$ 2,210,068.00	36	36	100.0%	80	44	55.0%	$ 27,625.84	NF&NR
			25		$ 2,762,584.00	36	36	100.0%	80	50	62.5%	$ 34,532.31	NF&NR
Greenwich_8-W	Greenwich	I-95 northbound between the Byram River and James St	10	2147	$ 1,288,189.41	30	14	46.7%	15	6	40.0%	$ 85,879.29	NF&NR
			15		$ 1,932,284.11	30	11	36.7%	12	7	58.3%	$ 161,023.68	NF&NR
			20		$ 2,576,378.81	30	30	100.0%	35	33	94.3%	$ 73,610.82	F&NR
			25		$ 3,220,473.52	30	30	100.0%	35	35	100.0%	$ 92,013.53	F&NR
Greenwich_8-E	Greenwich	1-95 northbound between James St and Byram Shore Rd	10	1609	$ 965,117.58	19	15	78.9%	15	13	86.7%	$ 64,341.17	F&NR
			15		$ 1,447,676.37	19	19	100.0%	25	24	96.0%	$ 57,907.05	F&NR
			20		$ 1,930,235.15	19	19	100.0%	25	24	96.0%	$ 77,209.41	F&NR
			25		$ 2,412,793.94	19	19	100.0%	25	24	96.0%	$ 96,511.76	F&NR
Greenwich_8system	Greenwich	I-95 northbound between the Byram	10	3756	$ 2,253,306.98	49	29	59.2%	30	19	63.3%	$ 75,110.23	NF&NR
			15		$ 3,379,960.48	49	30	61.2%	37	31	83.8%	$ 91,350.28	NF&NR

Table E-7: Fairfield County Evaluated Noise Barriers

Name	Town	Description	Height (ft)	Length (ft)	Cost ($)	Impacted Receptors	No. of Impacted Receptors that Benefit	AFG %	Total Benefited Receptors	No. of Benefited Receptors that Achieve NRDG	NRDG %	Cost per Benefit ($)	Status
		River and Byram Shore Rd	20		$ 4,506,613.97	49	49	100.0%	60	57	95.0%	$ 75,110.23	F&NR
			25		$ 5,633,267.46	49	49	100.0%	60	59	98.3%	$ 93,887.79	F&NR
Greenwich_9v2	Greenwich	I-95 southbound between the Byram River and James St	10	2063	$ 1,237,859.68	36	13	36.1%	13	7	53.8%	$ 95,219.98	NF&NR
			15		$ 1,856,789.53	36	12	33.3%	12	2	16.7%	$ 154,732.46	NF&NR
			20		$ 2,475,719.37	36	32	88.9%	43	21	48.8%	$ 57,574.87	F&NR
			25		$ 3,094,649.21	36	33	91.7%	47	30	63.8%	$ 65,843.60	F&NR

AFG – Acoustic Feasibility Goal. CTDOT requires that at least two thirds of the *impacted* receptors receive 5 decibels or more reduction in noise levels with the proposed abatement measure (i.e., insertion loss) for it to be considered acoustically feasible.
NRDG – Noise Reduction Design Goal. CTDOT requires a 7 dB(A) reduction for a minimum of two-thirds of the *benefited* receptors.
Status – 'F&R' = Feasible and Reasonable. 'NF&NR' = Not Feasible and Not Reasonable.

Appendix F: Priority Equation Requirements and Type II Policy Research

Pursuant to 23 CFR 772.7(e), highway agencies shall develop a priority ranking system, based on a variety of factors, to rank projects included in a Type II program. Requirements include (1) identifying that a highway traffic noise impact exists, (2) demonstrating that proposed abatement measures will reduce the traffic noise impact, and (3) determining that the overall abatement benefits outweigh adverse social, economic, and environmental effects as well as the costs of the abatement measures. The ranking system is also required to ''allow for consistent and uniform application throughout the State."[27] The priority system shall be submitted to and approved by FHWA prior to using federal-aid funds for any project included in the program. FHWA's guidance document includes a list of factors for consideration in the development of the priority ranking equation.

Existing Type II program development studies from various states were reviewed, and key factors included in the priority ranking systems in those studies were identified. Type II development studies reviewed include:

1) CTDOT's *Guidelines for Establishing Priorities for Type II Noise Abatement Projects*, revised February 1986
2) Massachusetts Turnpike Authority's (MTA) *Pilot Noise Barrier Program*, June 1992
3) *District of Columbia Government Freeway Noise Barrier Feasibility Study*, 2000
4) New Hampshire Department of Transportation's (NHDOT) *Statewide Type II Noise Barrier Screening Analysis*, March 2017
5) *Study of Statewide Type II Noise Abatement Programs for the Texas Department of Transportation*, February 2000. Prepared by the Center for Transportation Research at the University of Texas at Austin.

Key factors included in each of these priority ranking systems are described below.

<u>CTDOT</u>

CTDOT's 1986 priority equation included the following factors:

- Number of receivers benefited
    - One receiver for each residence that predates highway
    - 1/3 receiver for each residence that postdates highway
    - Usage-based weighting factor for all nonresidential land use categories
      (number of families) x (hours per day/24) x (days per week/7) x (months per year/12)
- Project effectiveness index (PI)
    - Based on existing noise level

[27] FHWA-HEP-10-025. *Highway Traffic Noise: Analysis and Abatement Guidance*, December 2011.

    - PI determined from graph of PI vs. existing noise level, whereby PI increases exponentially with noise level (e.g. L_{10} of 69 dBA has a PI of 9.5, and an L_{10} of 79 dBA has a PI of 29.5, which is 3.1 times the PI at 69 dBA L_{10})
- Total Project Cost

While CTDOT's 1986 priority equation included several of FHWA's suggested factors, it did not account for achievable noise reduction by the proposed abatement measure. In other words, not considering all other factors, an abatement measure that provides the minimum level of noise reduction meeting CTDOT feasibility and reasonableness criteria would be weighted equally with an abatement measure that provides substantial reductions (i.e., on the order of 10 to 15 decibels at several receivers).

MTA and D.C.DOT

HMMH prepared the MTA's June 1992 *Pilot Noise Barrier Program* and developed a priority equation based on the following factors:

- Schultz curve used for determining human annoyance to noise both with and without abatement
    - Number of benefited receptors
    - Degree of noise impact based on:
        (a) Existing noise level
        (b) Usage factor
            (i) Each dwelling unit equals one receptor
            (ii) Shared-use facilities and outdoor recreational area facility receivers are based on number of occupants and space-dependent usage factors
    - Degree of benefit by abatement, based on reduction in human annoyance provided by barrier
- Cost of barrier construction

The MTA's priority equation is the most complex of all policies reviewed; however, it incorporates many of FHWA's most critical suggested factors. D.C.DOT's Type II priority system mimics the approach taken for MTA's priority ranking system.

NHDOT

The scope prepared for CTDOT's Type II priority study was largely based on NHDOT's 2017 *Statewide Type II Noise Barrier Screening Analysis* prepared by VHB. It should be noted, however, that NHDOT's study does not include development of a priority ranking system, which is a requirement of 23 CFR 772.7(e). Rather, NHDOT's study includes a list of potentially eligible barrier areas throughout the state, organized by municipality in which the abatement measures are proposed. Factors considered for Type II eligibility include:

- Dimensional Effectiveness Index (similar to cost-effectiveness index but based on square feet of barrier rather than cost)

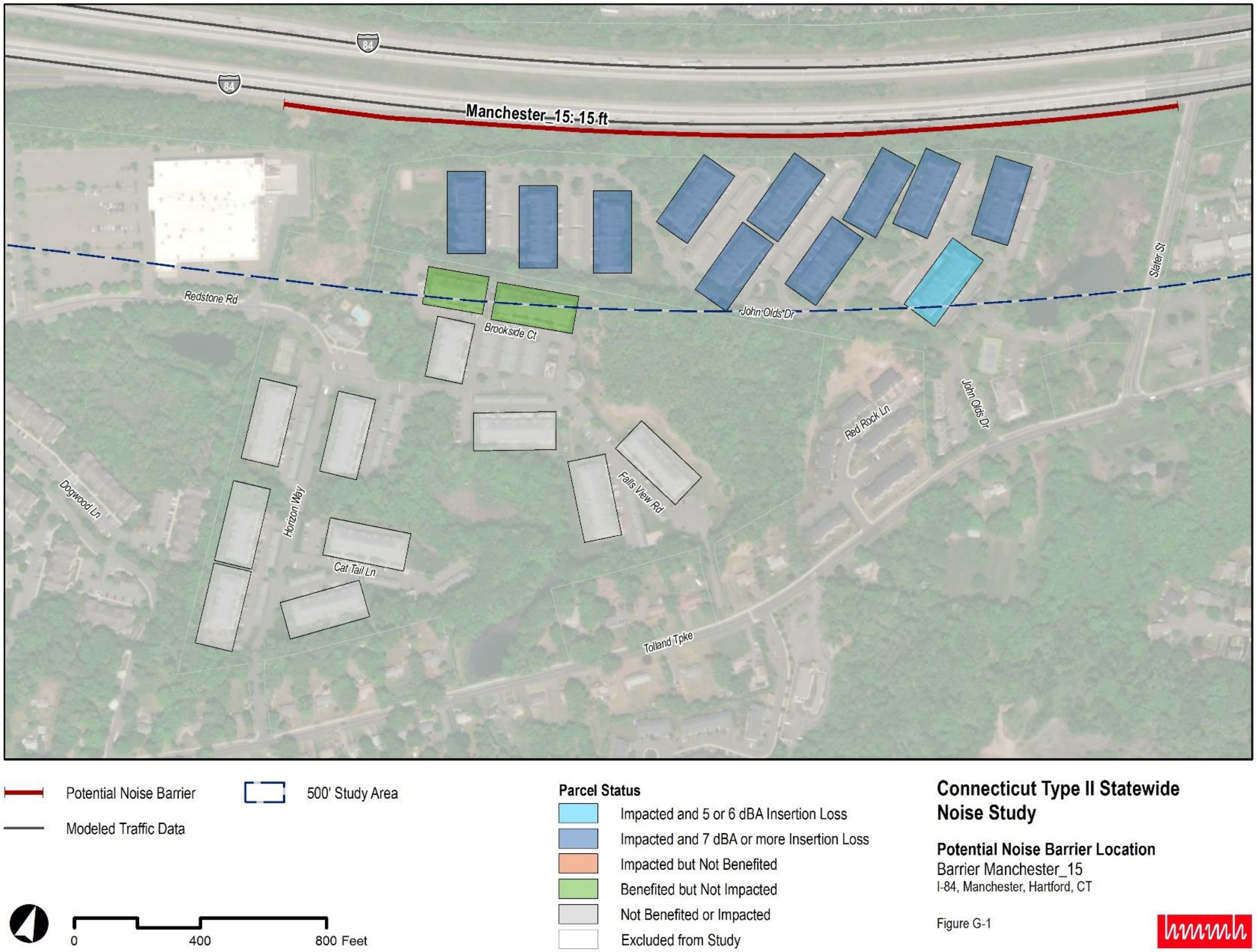
- Development date, relative to highway construction date
- Noise impact
- Noise reduction provided by the abatement measure
- Distance from highway
- State highway classification

Texas Department of Transportation (TxDOT)

The Center for Transportation Research at the University of Texas at Austin performed a comprehensive review of Type II programs for the Texas Department of Transportation (TxDOT), which is presented in *Study of Statewide Type II Noise Abatement Programs for the Texas Department of Transportation*, February 2000. This study summarizes the following factors for consideration in TxDOT's Type II program:

- Number of benefited receptors
- Abatement cost
- Existing noise level
- Noise reduction achieved by abatement measure
- Dollar value of relief per receiver
    - $833 to yield a cost-effectiveness factor of 1 for noise abatement, with an existing noise level of 66 dBA, 5 dBA noise level reduction, and a cost-effectiveness index (CEI) of $25,000, per TxDOT policy

Appendix G: Type II Noise Barrier Figures



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

Parcel Status

- 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
- Excluded from Study

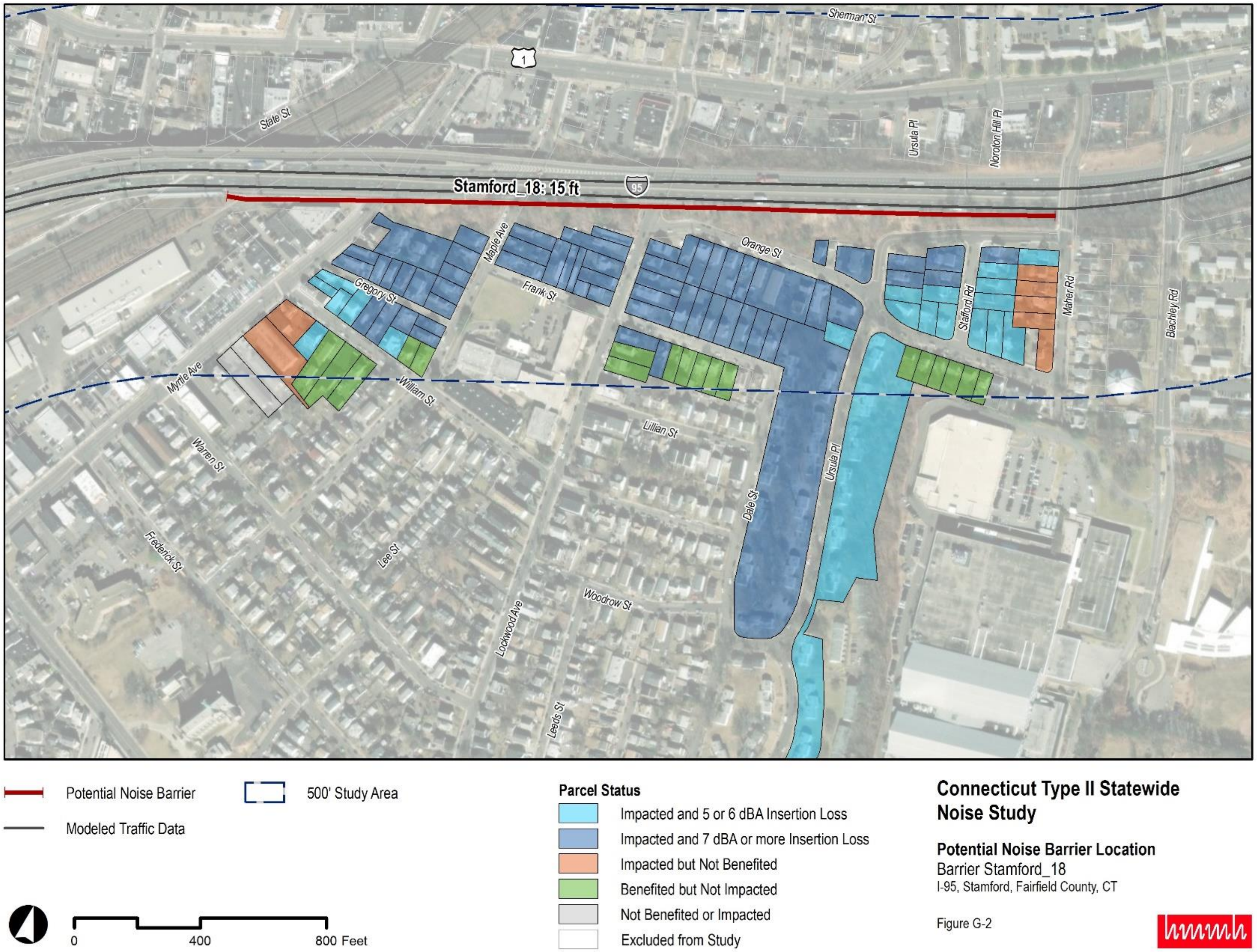
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Manchester_15

I-84, Manchester, Hartford, CT

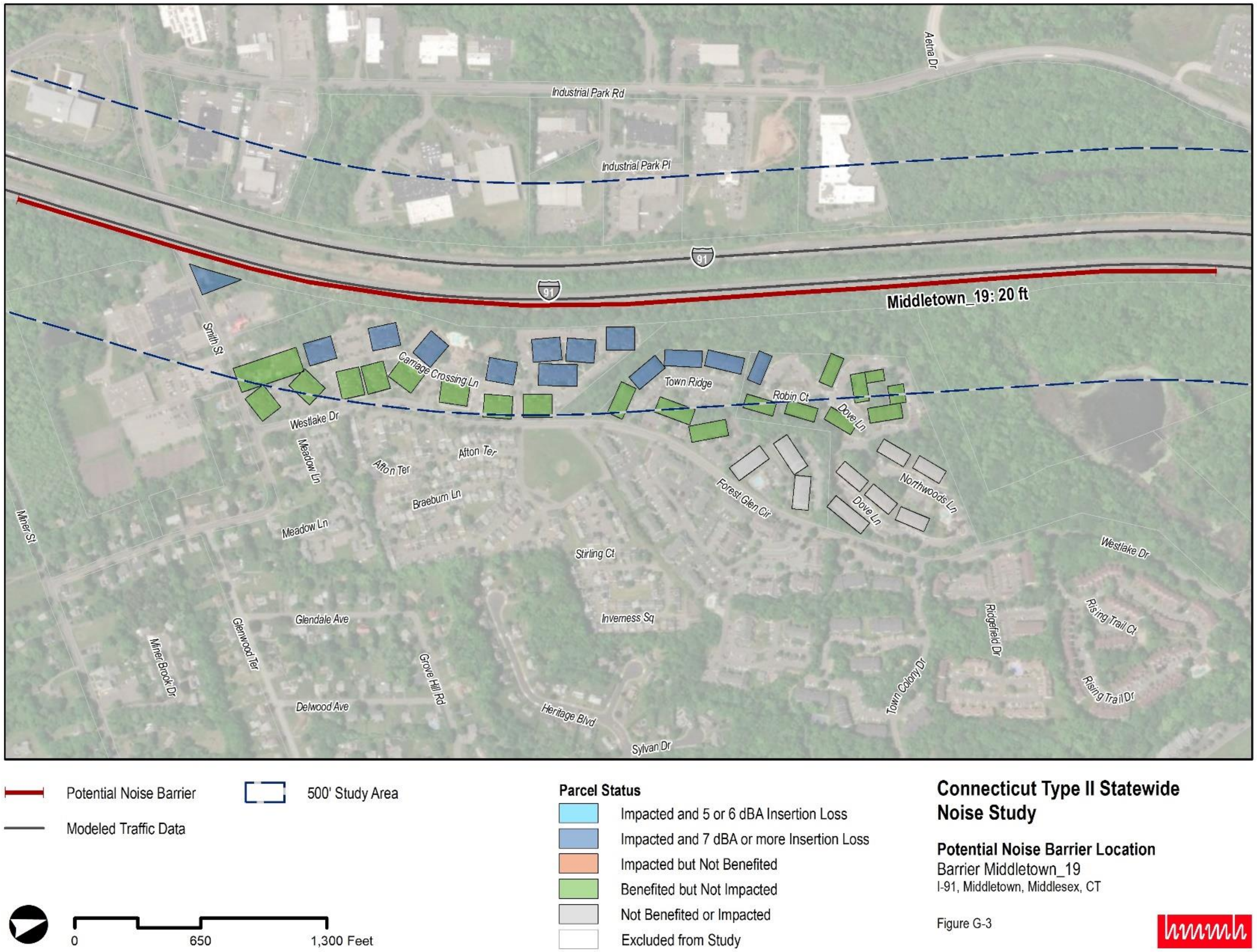
Figure G-1

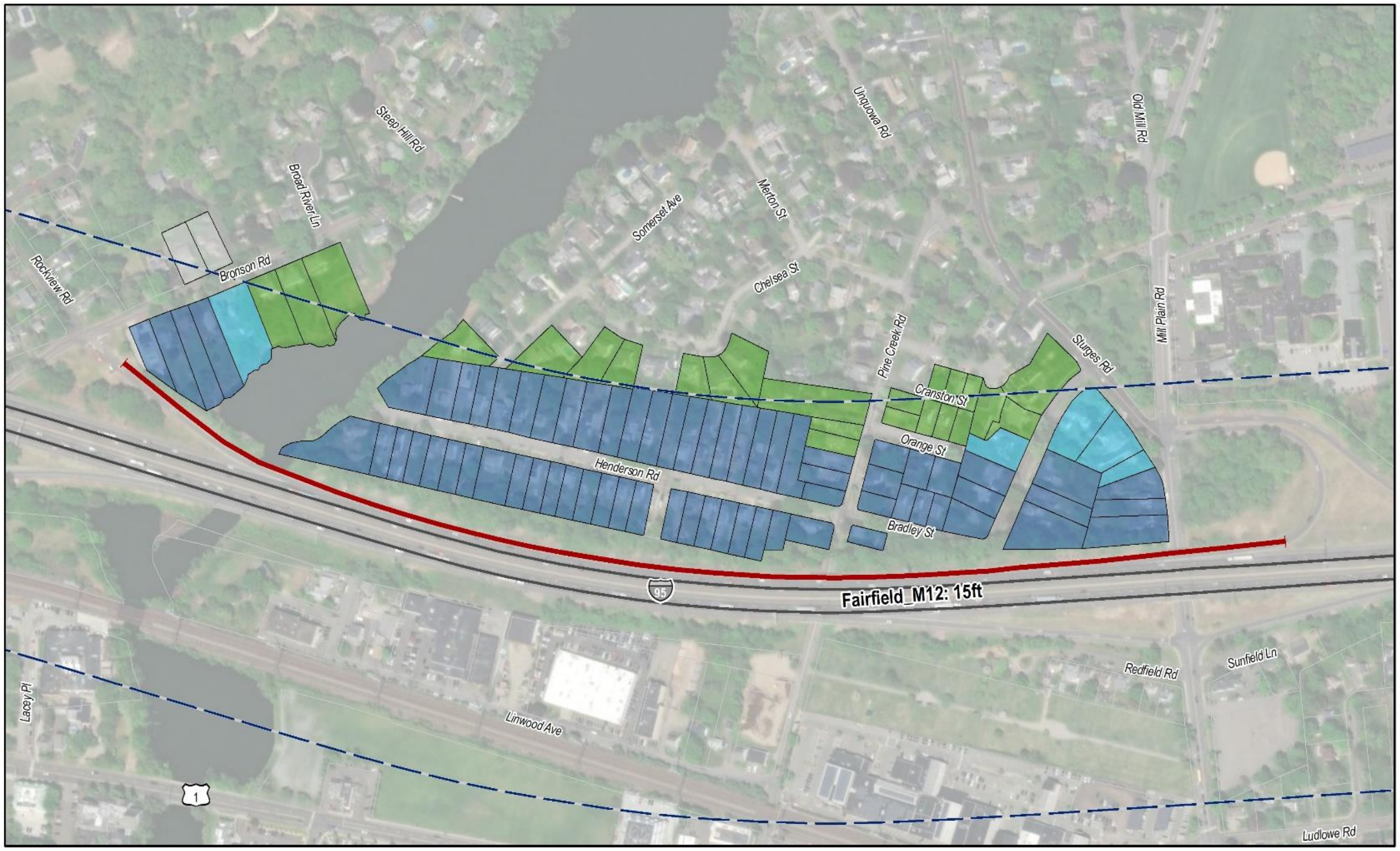


Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Stamford_18
I-95, Stamford, Fairfield County, CT

Figure G-2


Industrial Park Rd
Industrial Park Pl
Aetna Dr
91
Middletown_19: 20 ft
Smith St
Carriage Crossing Ln
Town Ridge
Robin Ct
Dove Ln
Westlake Dr
Meadow Ln
Afton Ter
Braeburn Ln
Forest Glen Cir
Northwoods Ln
Miner St
Stirling Ct
Westlake Dr
Glendale Ave
Inverness Sq
Ridgefield Dr
Rising Trail Ct
Miner Brook Dr
Glenwood Ter
Grove Hill Rd
Town Colony Dr
Rising Trail Dr
Delwood Ave
Heritage Blvd
Sylvan Dr
Potential Noise Barrier
500' Study Area
Modeled Traffic Data
0
650
1,300 Feet
Parcel Status
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
Excluded from Study
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Middletown_19
I-91, Middletown, Middlesex, CT
Figure G-3
hmmh



Potential Noise Barrier

500' Study Area

Modeled Traffic Data

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

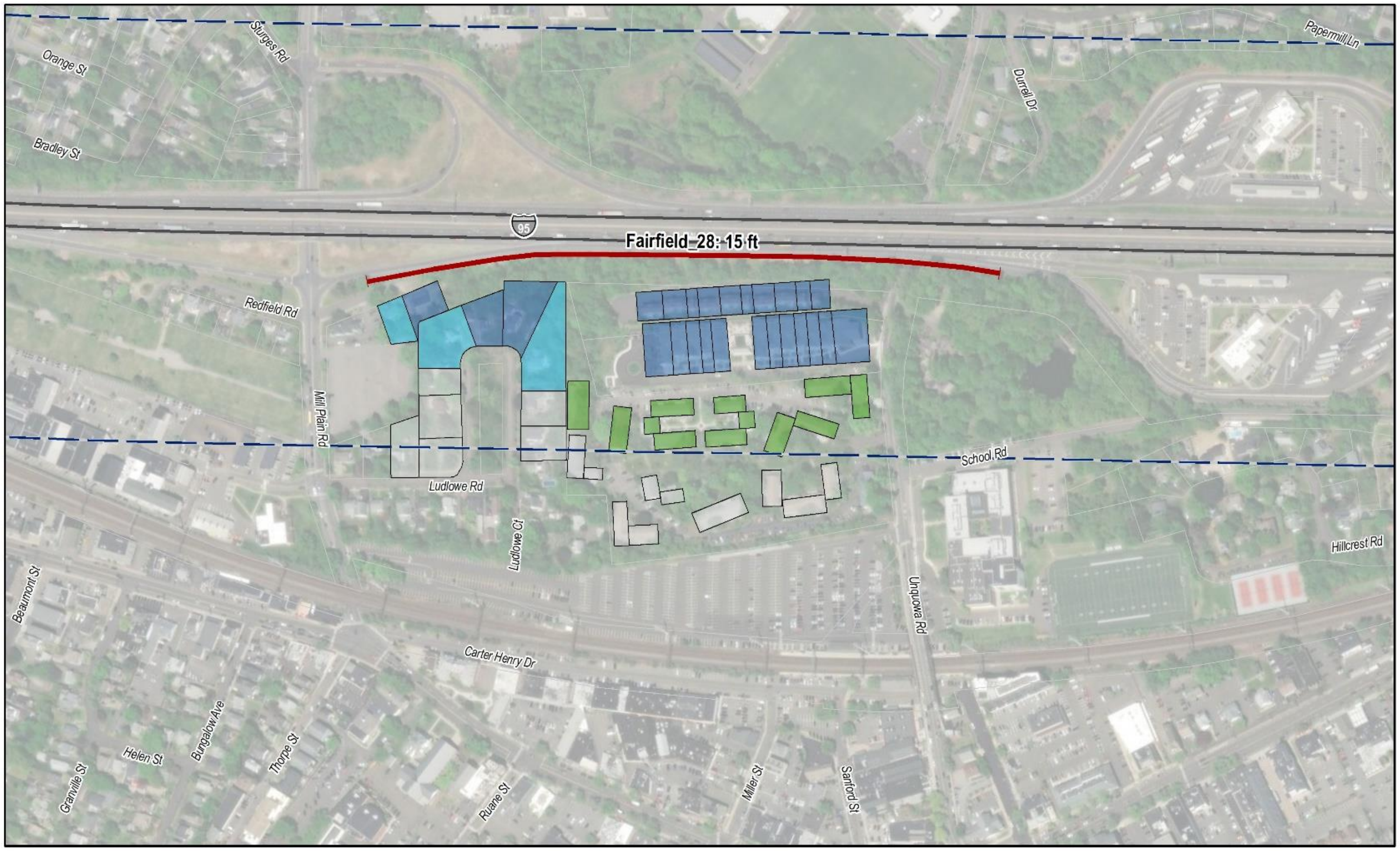
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Fairfield_M12

I-95, Fairfield, Fairfield County, CT

Figure G-4



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

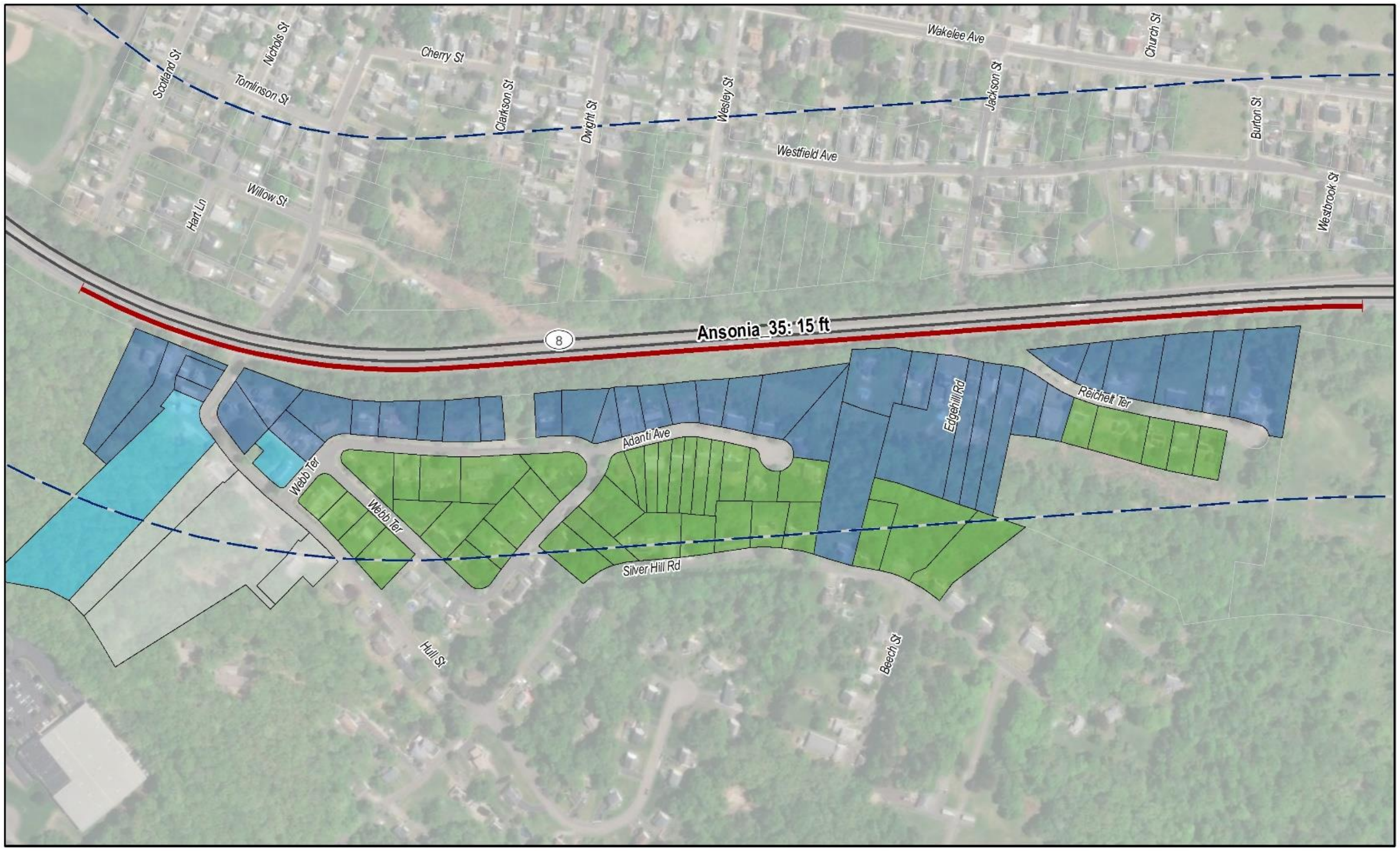
Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Fairfield_28
I-95, Fairfield, Fairfield, CT

Figure G-5



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

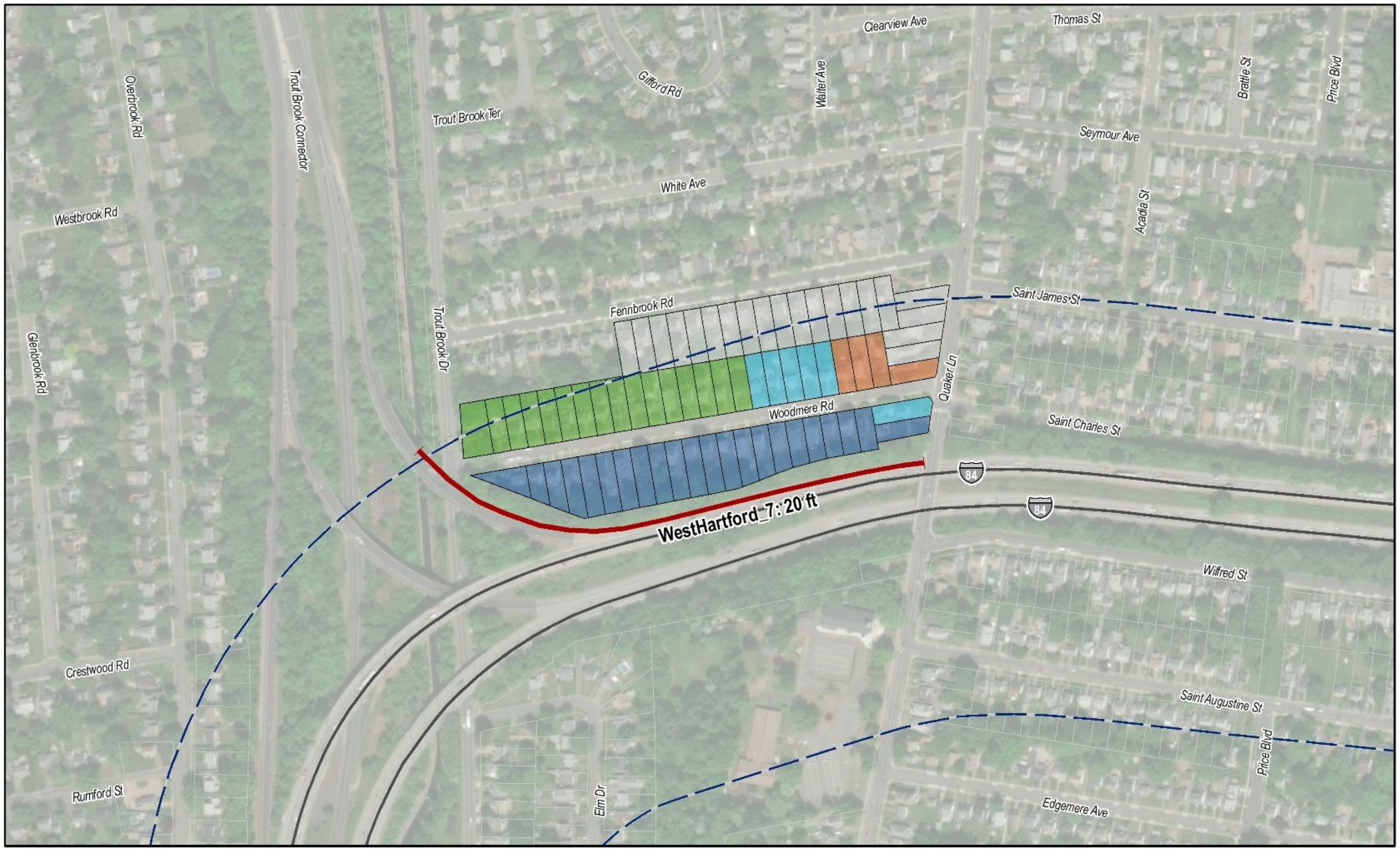
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Ansonia_35

SR-8, Ansonia, New Haven County, CT

Figure G-6



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

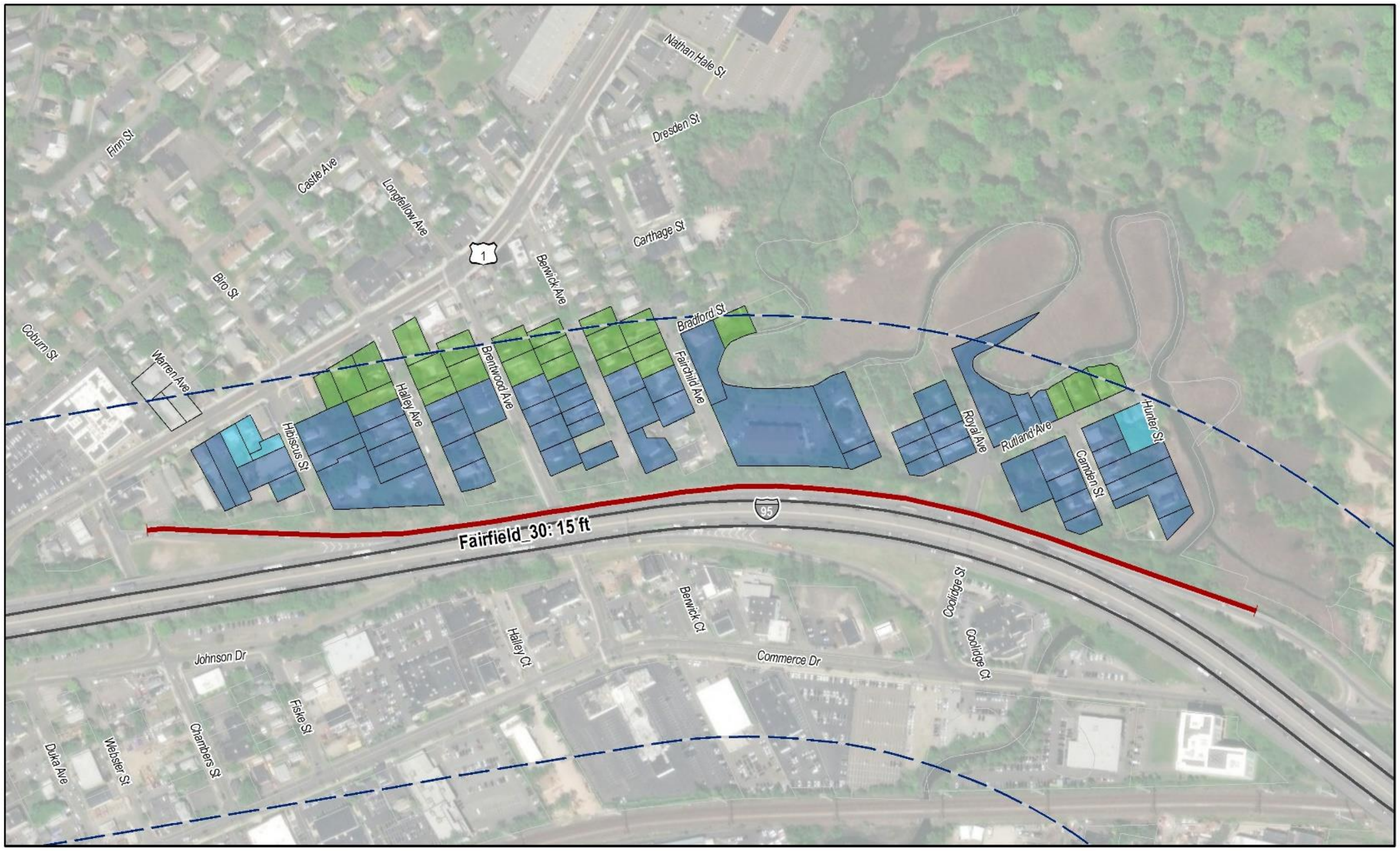
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier WestHartford_7

I-84, West Hartford, Hartford County, CT

Figure G-7



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

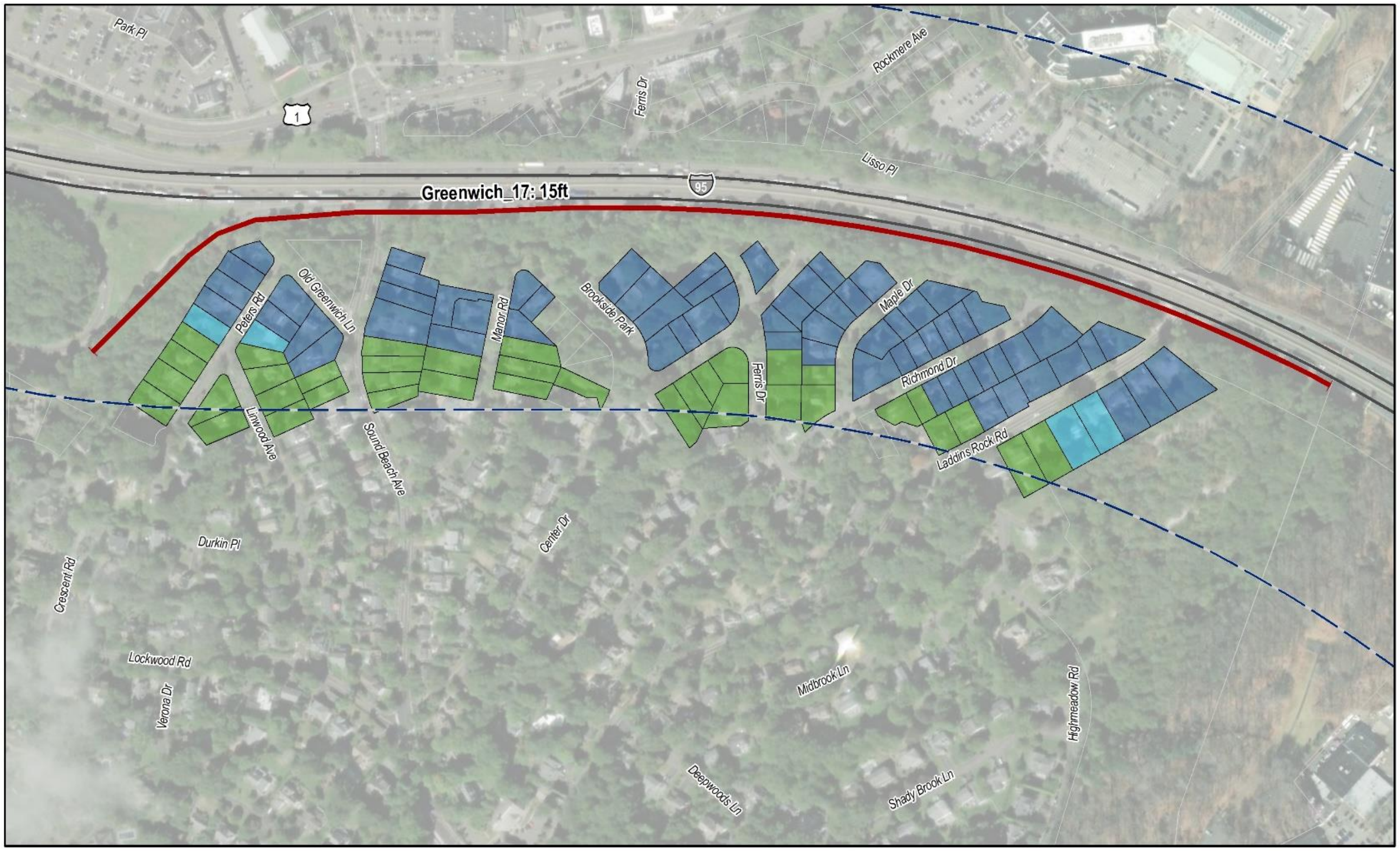
Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Fairfield_30
I-95, Fairfield, Fairfield County, CT

Figure G-8



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

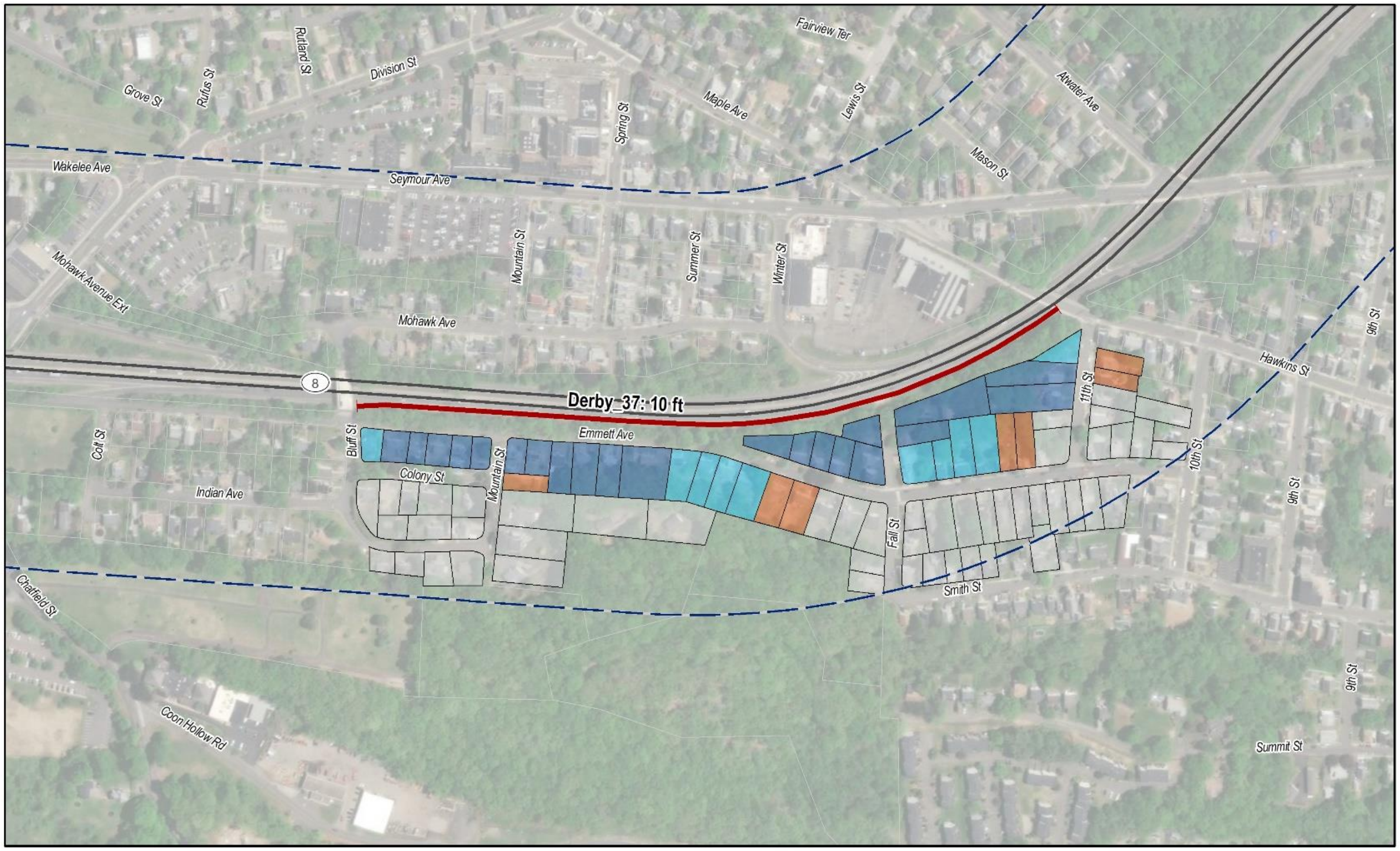
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Greenwich_17

I-95, Greenwich, Fairfield County, CT

Figure G-9



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

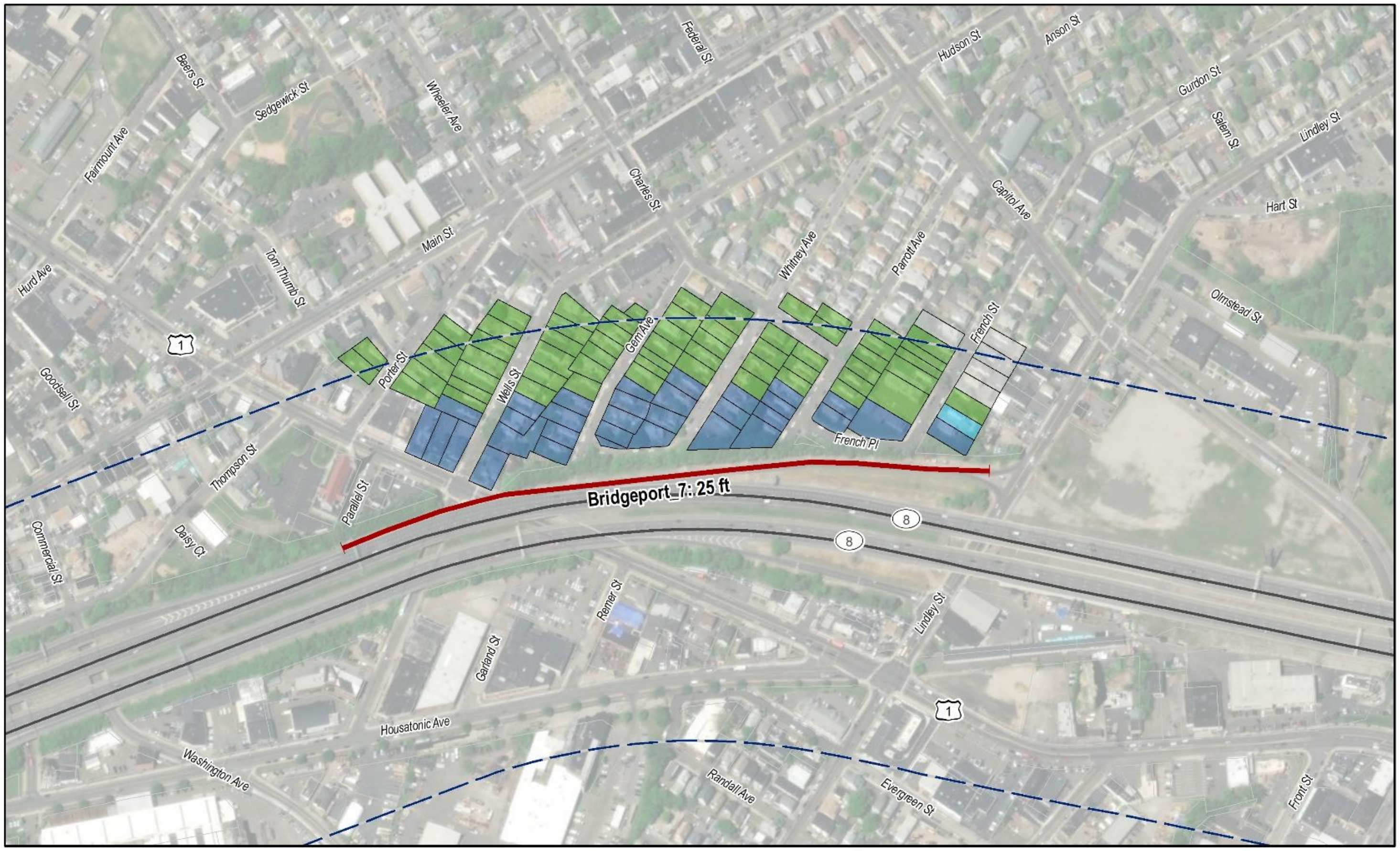
Barrier Derby_37

SR-8, Derby, New Haven County, CT

Figure G-10

hmmh


Davenport St
Hoyt St
Main Ave
Ohio Ave
Main St
Summer St
Jefferson St
School St
Wilton Ave
Catherine St
Grand St
Tindall Ave
Lounsbury Ave
Horton St
Warren St
Fair St
Forest St
123
1
7
Norwalk_M15: 15 ft
Riverside Ave
Belden Ave
Hill Ct
Hill St
Spring Hill Ave
Kellogg St
Grandview Ave
Prospect Ave
Potential Noise Barrier
500' Study Area
Modeled Traffic Data
0
400
800 Feet
Parcel Status
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
Excluded from Study
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Norwalk_M15
US-7, Norwalk, Fairfield County, CT
Figure G-11



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

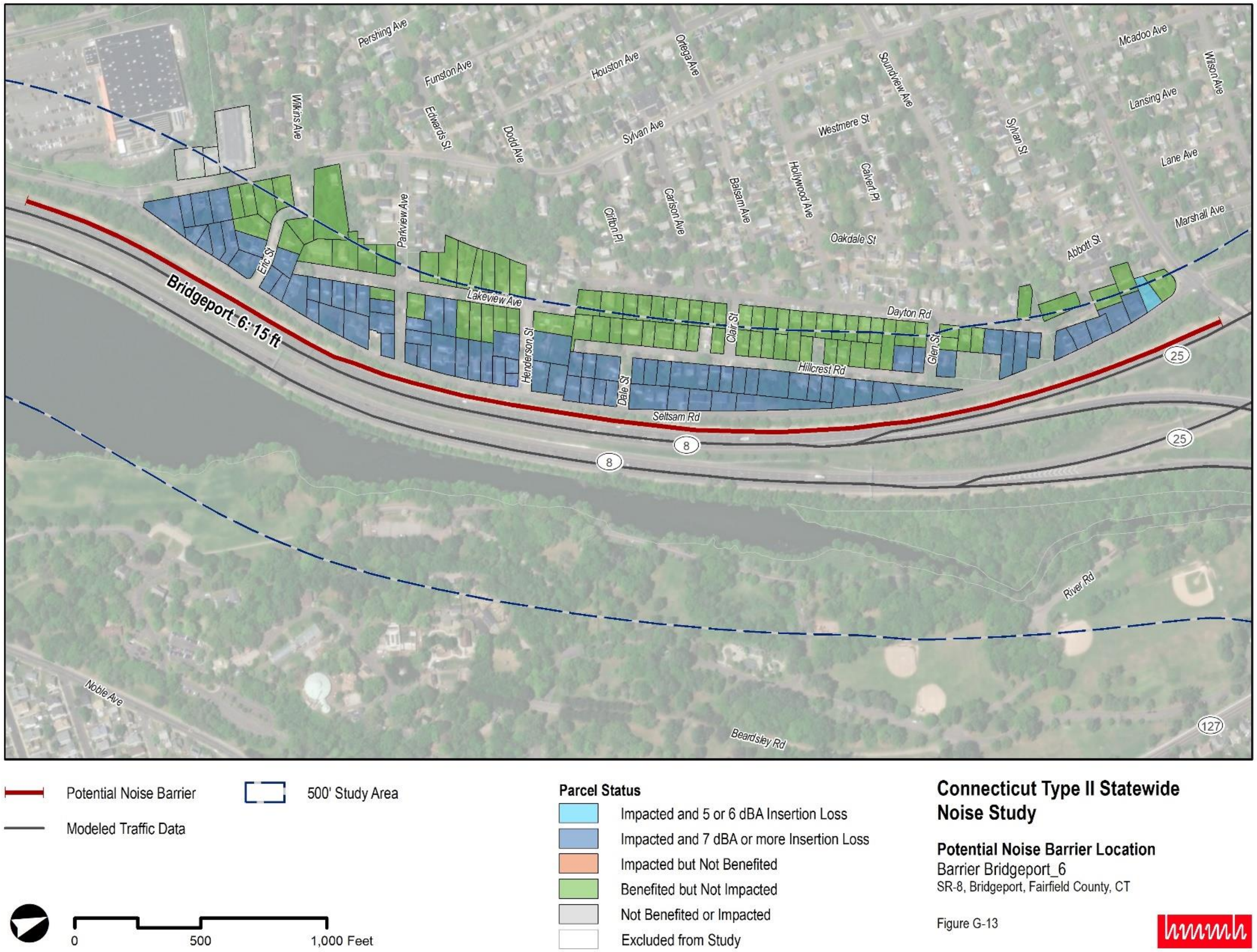
0 400 800 Feet

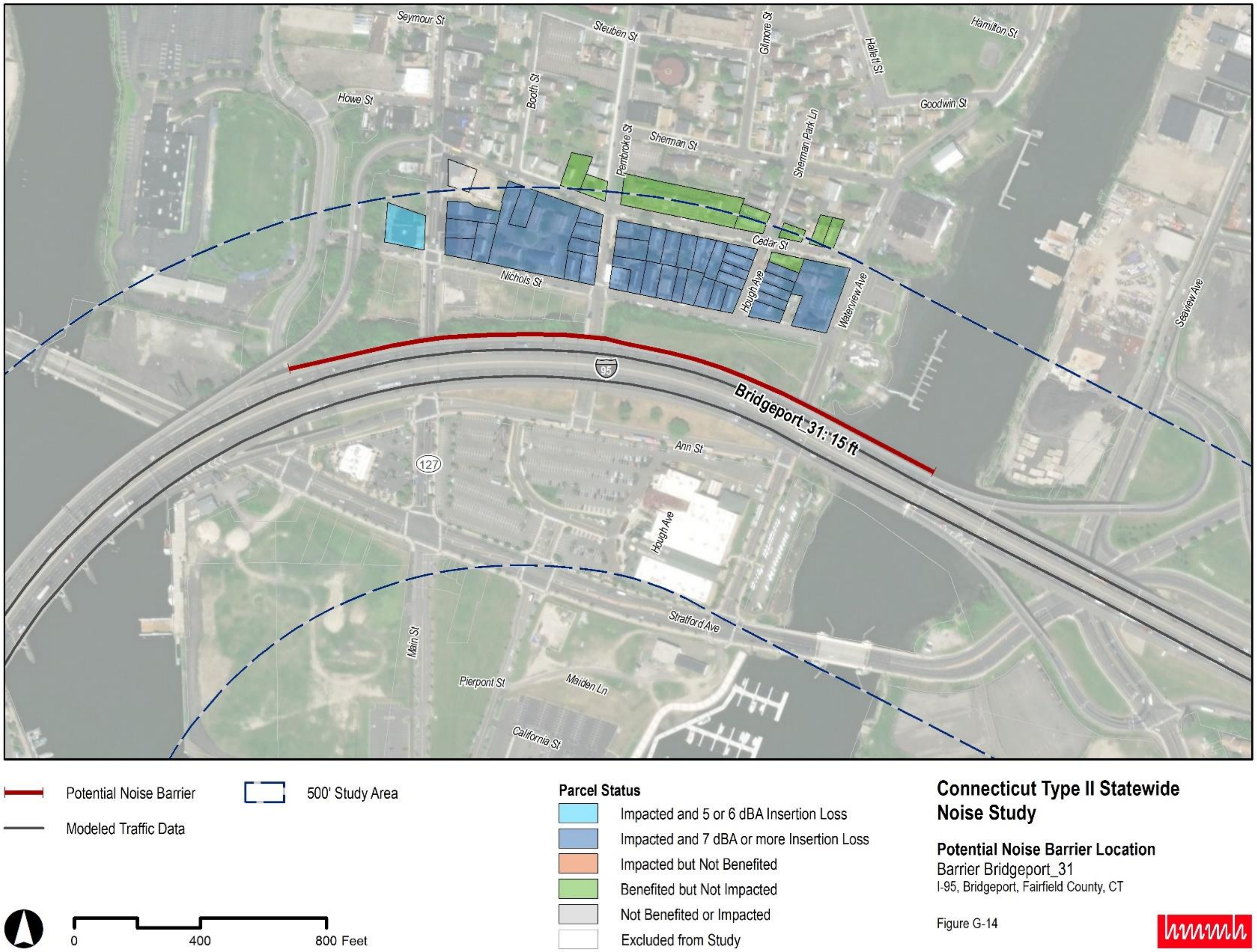
Parcel Status
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Bridgeport_7
SR-8, Bridgeport, Fairfield County, CT

Figure G-12


Bridgeport_6: 15 ft
Pershing Ave
Funston Ave
Houston Ave
Ortega Ave
Soundview Ave
Mcadoo Ave
Wilson Ave
Lansing Ave
Wilkins Ave
Edwards St
Dodd Ave
Sylvan Ave
Westmere St
Sylvan St
Lane Ave
Marshall Ave
Clifton Pl
Carlson Ave
Balsam Ave
Hollywood Ave
Calvert Pl
Oakdale St
Abbott St
Parkview Ave
Eric St
Lakeview Ave
Dayton Rd
Clair St
Glen St
Henderson St
Dale St
Hillcrest Rd
Seltsam Rd
25
8
River Rd
Noble Ave
Beardsley Rd
127
Potential Noise Barrier
500' Study Area
Modeled Traffic Data
0
500
1,000 Feet
Parcel Status
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
Excluded from Study
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Bridgeport_6
SR-8, Bridgeport, Fairfield County, CT
Figure G-13

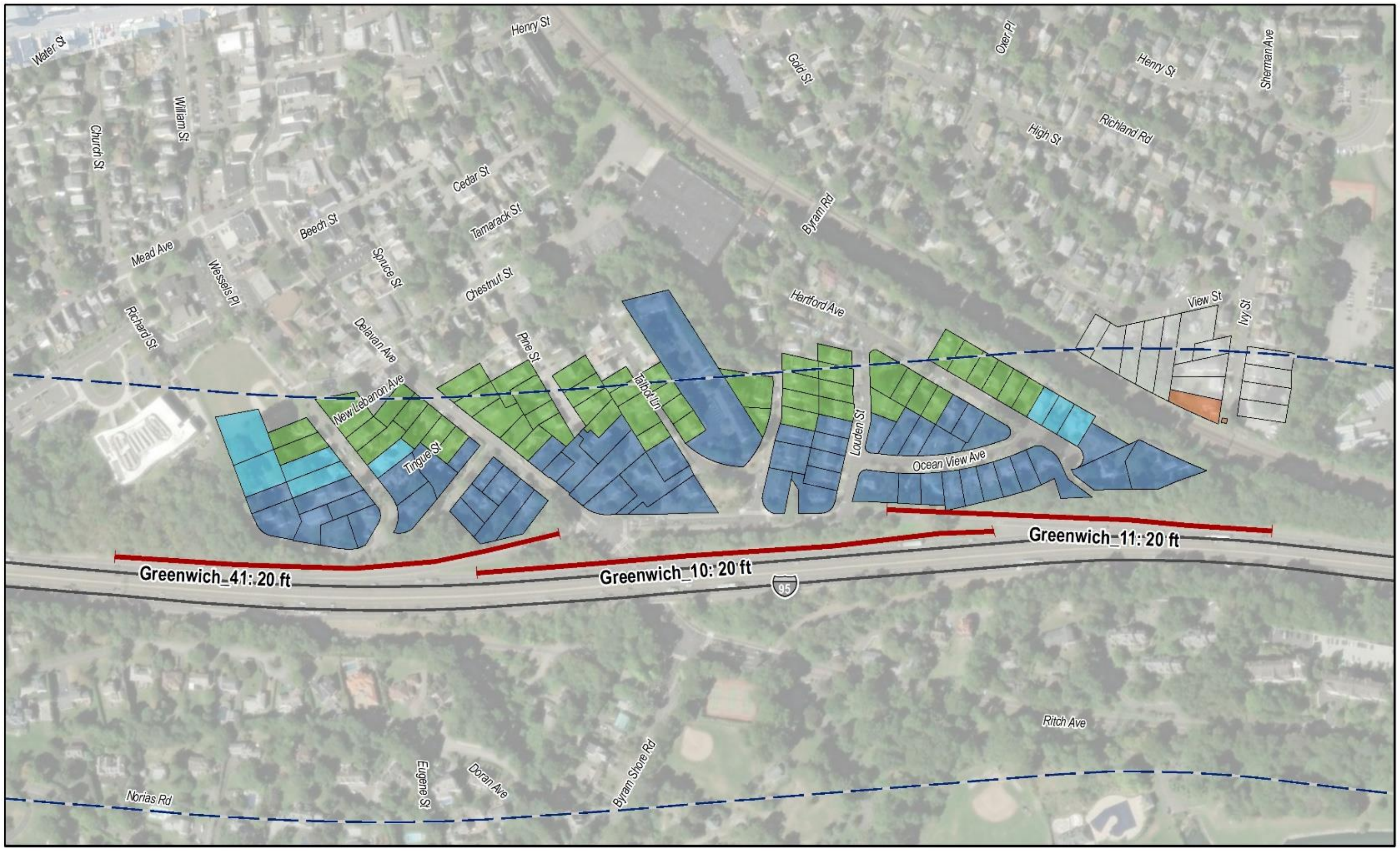


Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Bridgeport_31
I-95, Bridgeport, Fairfield County, CT

Figure G-14

hmmh



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

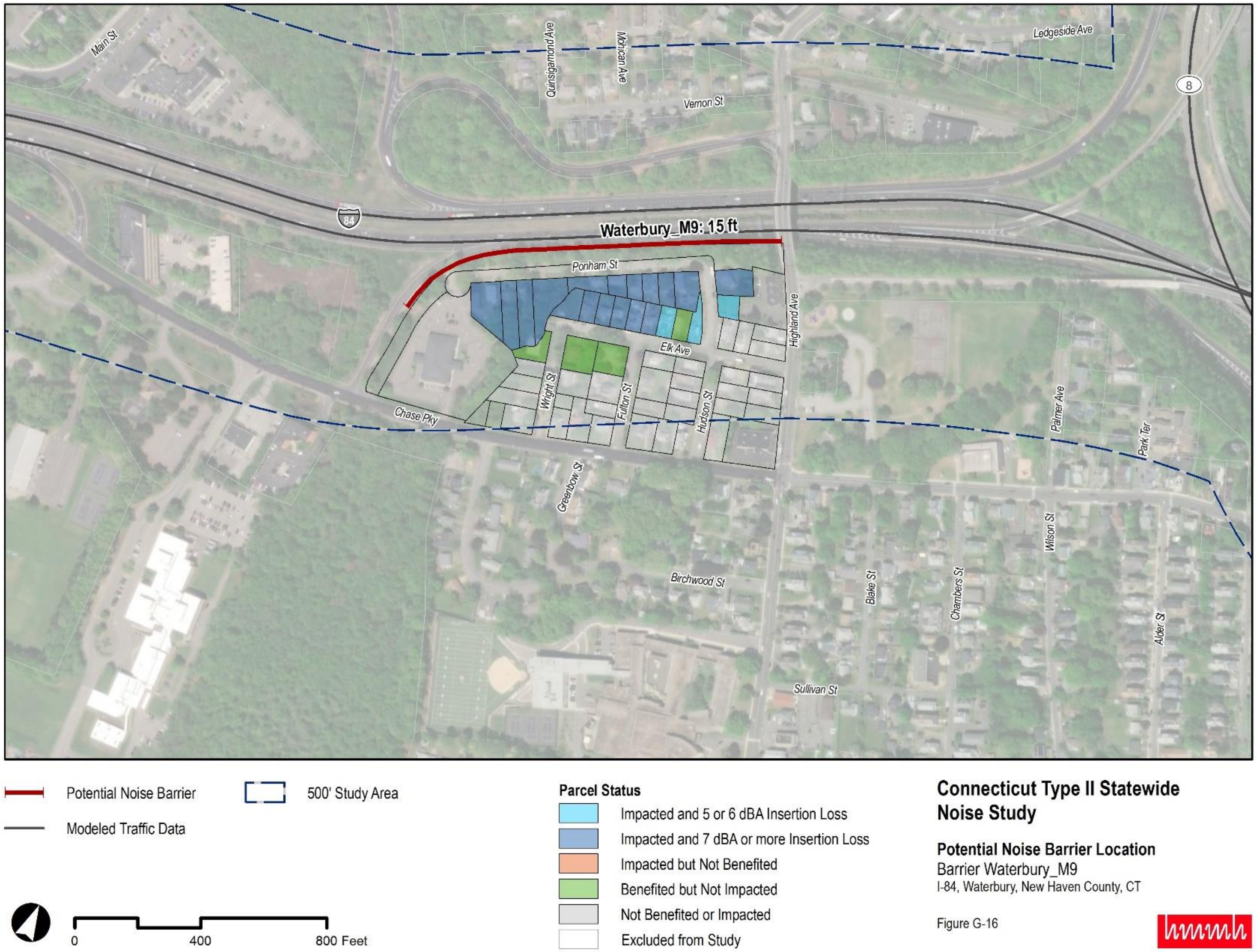
Connecticut Type II Statewide Noise Study

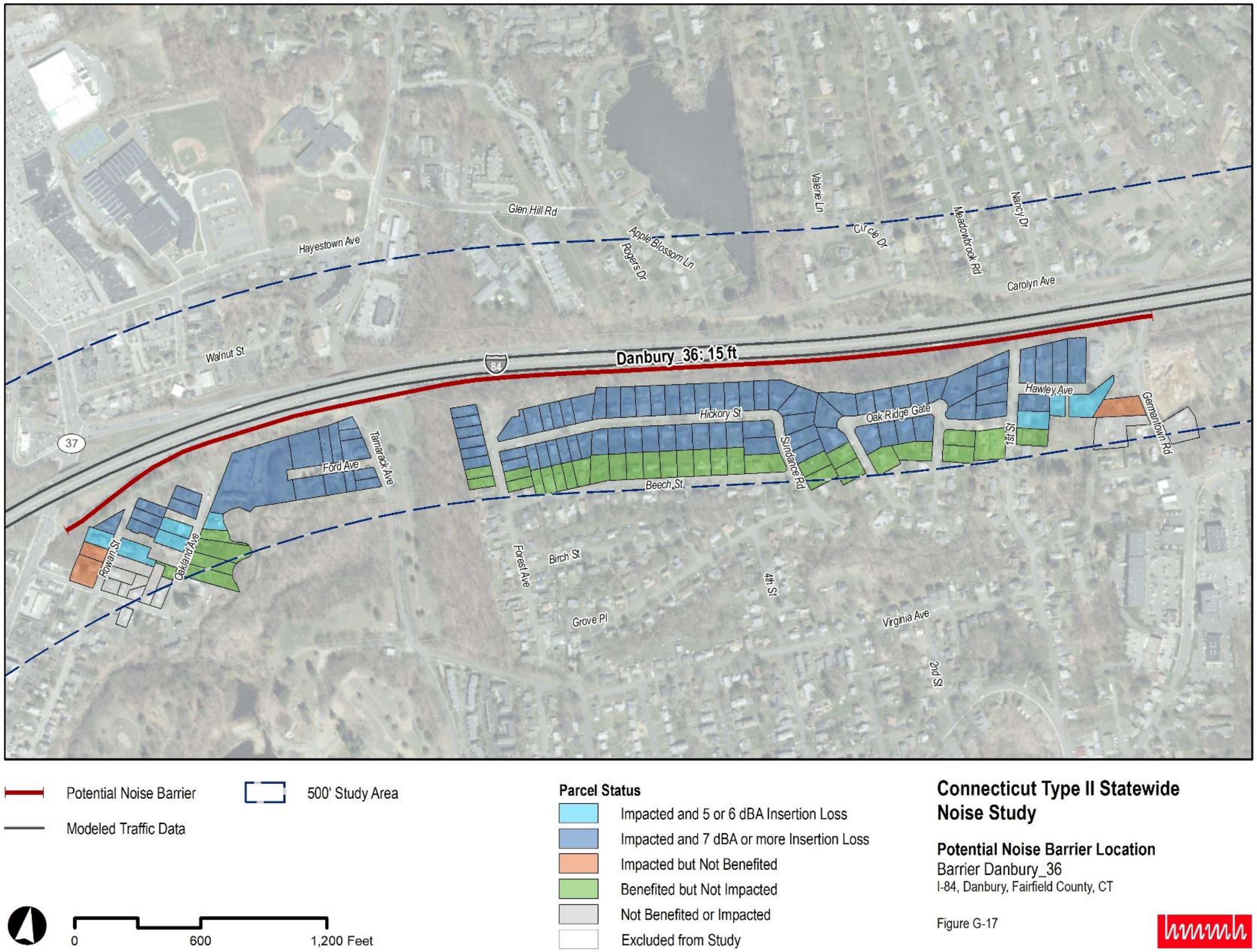
Potential Noise Barrier Location

Barrier Greenwich_10-11-41

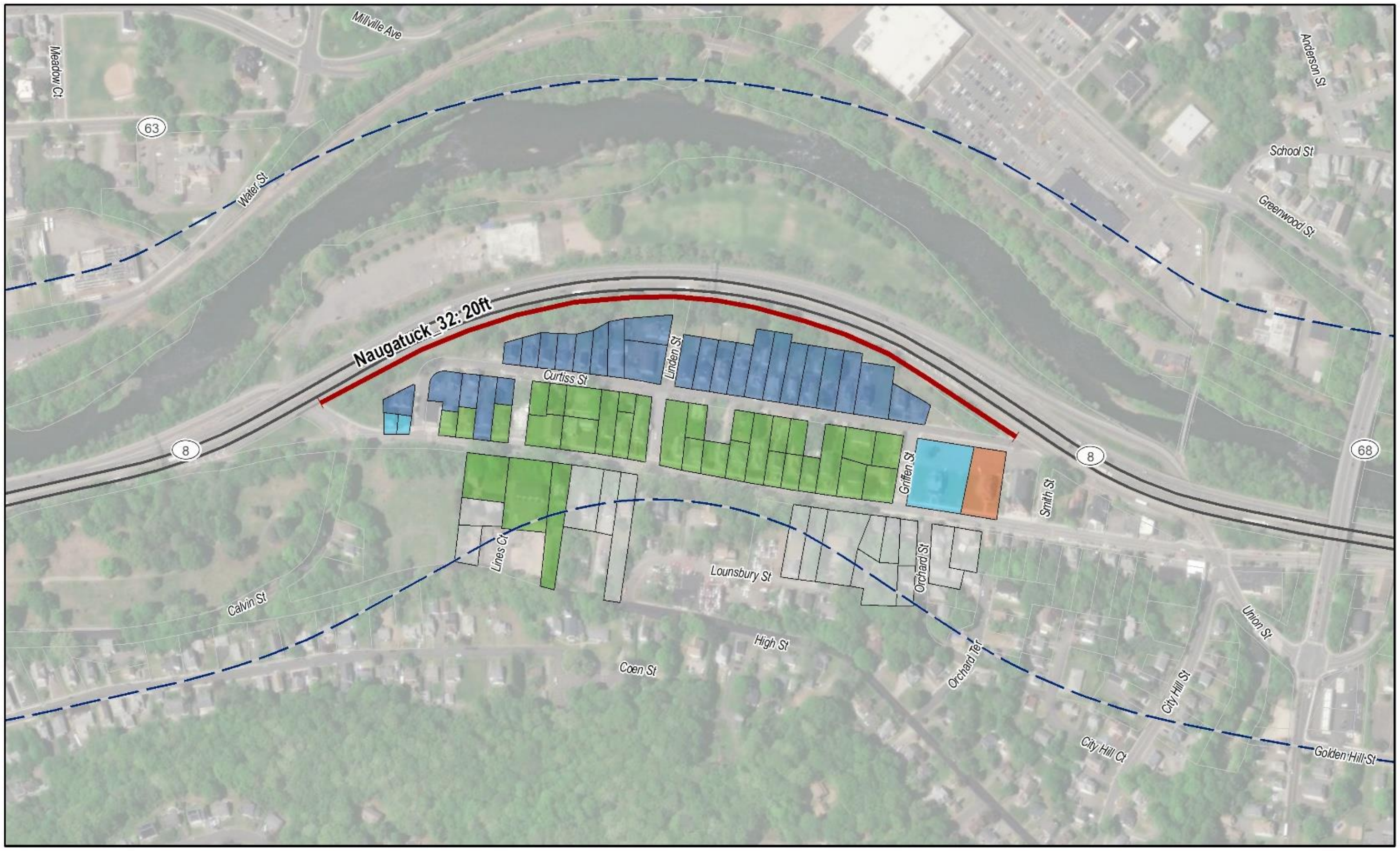
I-95, Greenwich, Fairfield County, CT

Figure G-15


Main St
Quinsigamond Ave
Mohican Ave
Ledgeside Ave
Vernon St
8
84
Waterbury_M9: 15 ft
Ponham St
Highland Ave
Elk Ave
Wright St
Fulton St
Hudson St
Chase Pky
Palmer Ave
Park Ter
Greenbow St
Wilson St
Birchwood St
Blake St
Chambers St
Alder St
Sullivan St
Potential Noise Barrier
500' Study Area
Modeled Traffic Data
0
400
800 Feet
Parcel Status
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
Excluded from Study
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Waterbury_M9
I-84, Waterbury, New Haven County, CT
Figure G-16


Danbury_36: 15 ft
Glen Hill Rd
Hayestown Ave
Apple Blossom Ln
Rogers Dr
Valerie Ln
Circle Dr
Meadowbrook Rd
Nancy Dr
Carolyn Ave
Walnut St
37
84
Ford Ave
Tamarack Ave
Hickory St
Oak Ridge Gate
Hawley Ave
Germantown Rd
Sundance Rd
Beech St
Rowan St
Oakland Ave
Forest Ave
Birch St
4th St
Grove Pl
Virginia Ave
2nd St
1st St
Potential Noise Barrier
Modeled Traffic Data
500' Study Area
Parcel Status
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
Excluded from Study
0
600
1,200 Feet
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Danbury_36
I-84, Danbury, Fairfield County, CT
Figure G-17


Coleman St
Elias St
Spring St
King St
Boylston St
Linda St
Shumway St
King Pl
Ely St
Abner St
Greta St
95
WestHaven_9: 25 ft
Birchwood Pl
Harry Dr
Highland St
Dartwell St
Collis St
Stevens Ave
Highland Ct
Fern St
Oleander St
Prospect St
162
York St
Ivy Cir
Myrtle Ave
Highland Pl
Wharton Pl
Potential Noise Barrier
500' Study Area
Modeled Traffic Data
Parcel Status
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
Excluded from Study
0
400
800 Feet
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier WestHaven_9
I-95, West Haven, New Haven County, CT
Figure G-18
hmmh



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

0 400 800 Feet

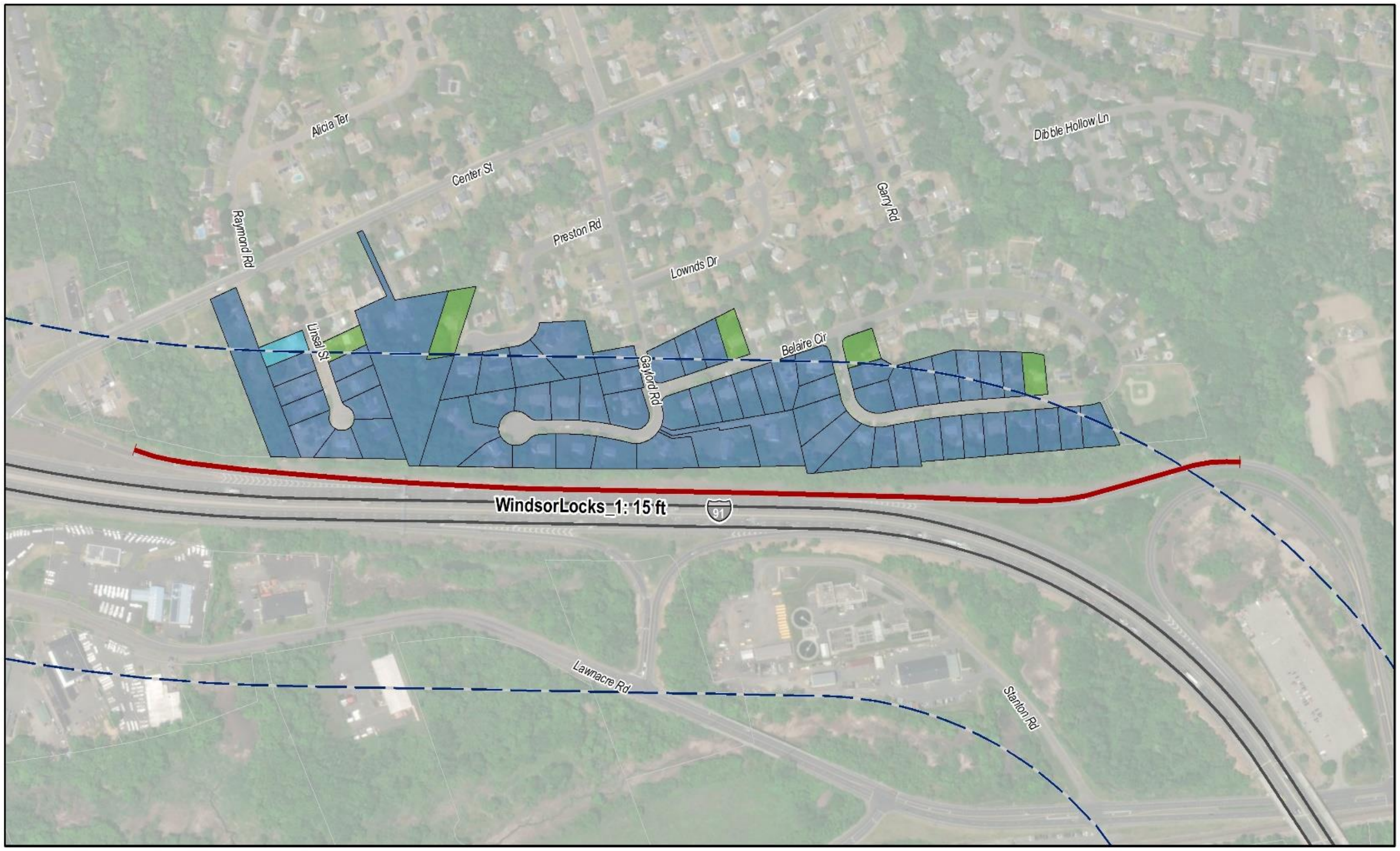
Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Naugatuck_32
SR-8, Naugatuck, New Haven County, CT

Figure G-19



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

0 500 1,000 Feet

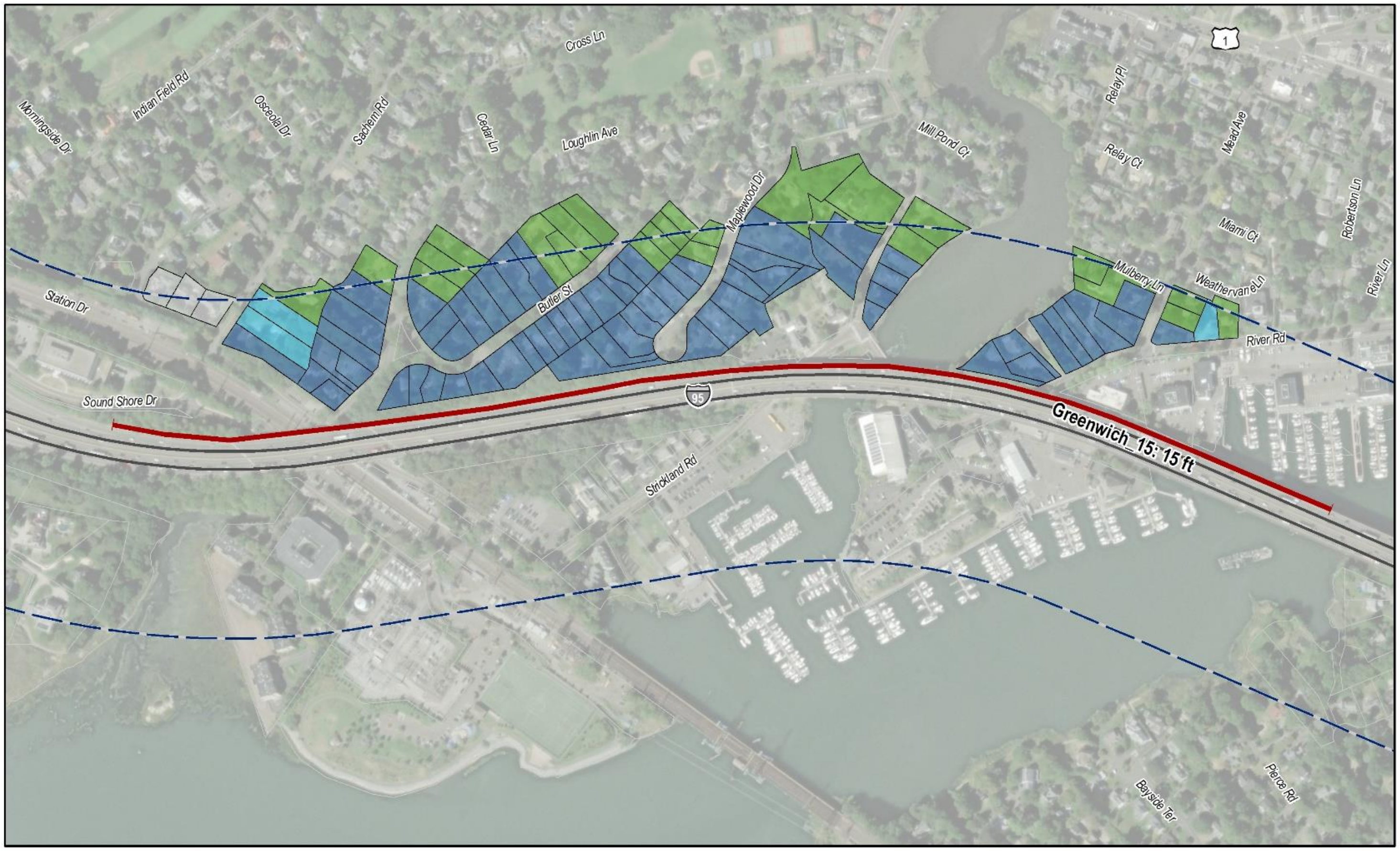
Parcel Status
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier WindsorLocks_1
I-91, Windsor Locks, Hartford County, CT

Figure G-20

hmmh



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

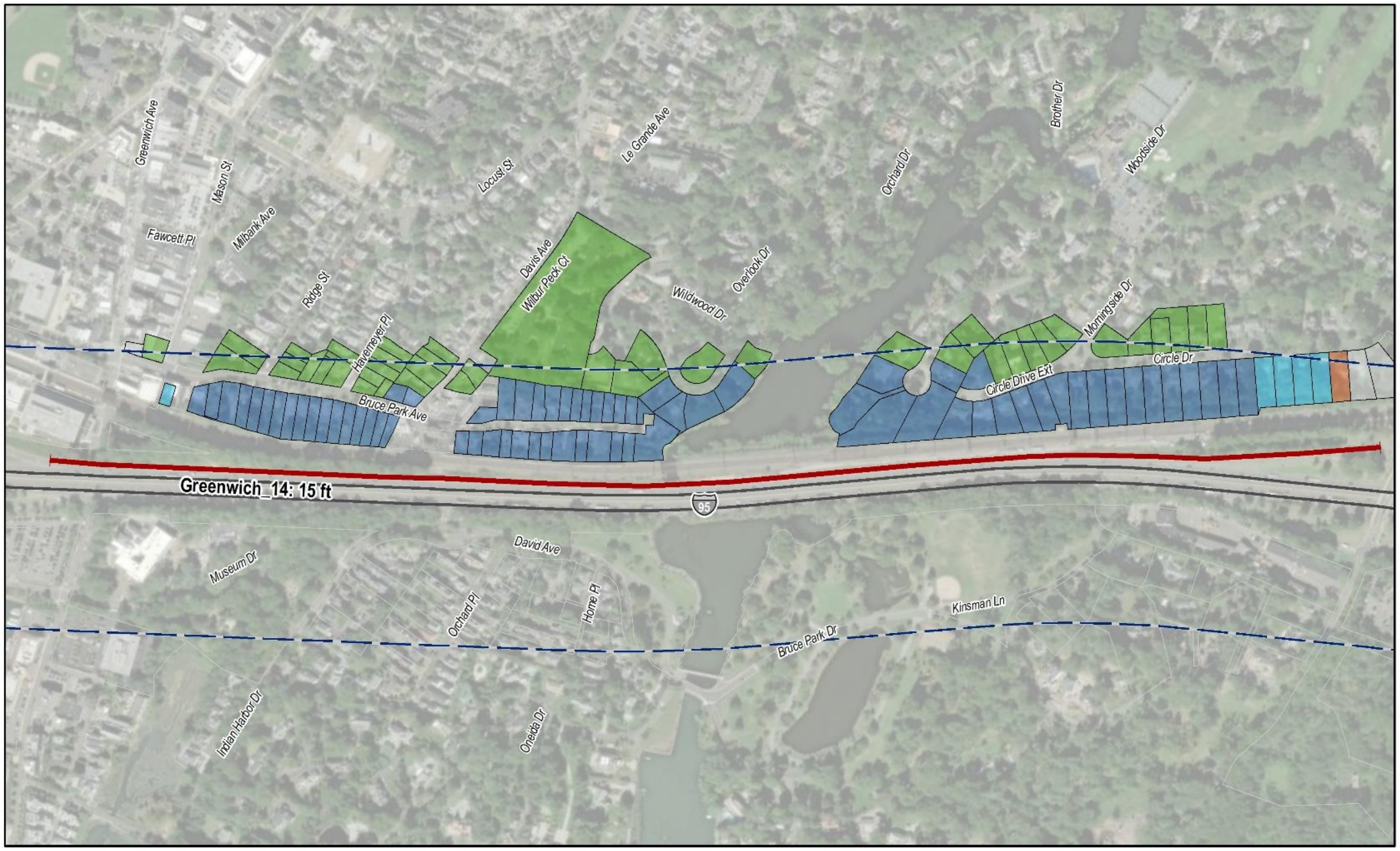
0 500 1,000 Feet

Parcel Status
- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Greenwich_15
I-95, Greenwich, Fairfield County, CT

Figure G-21



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

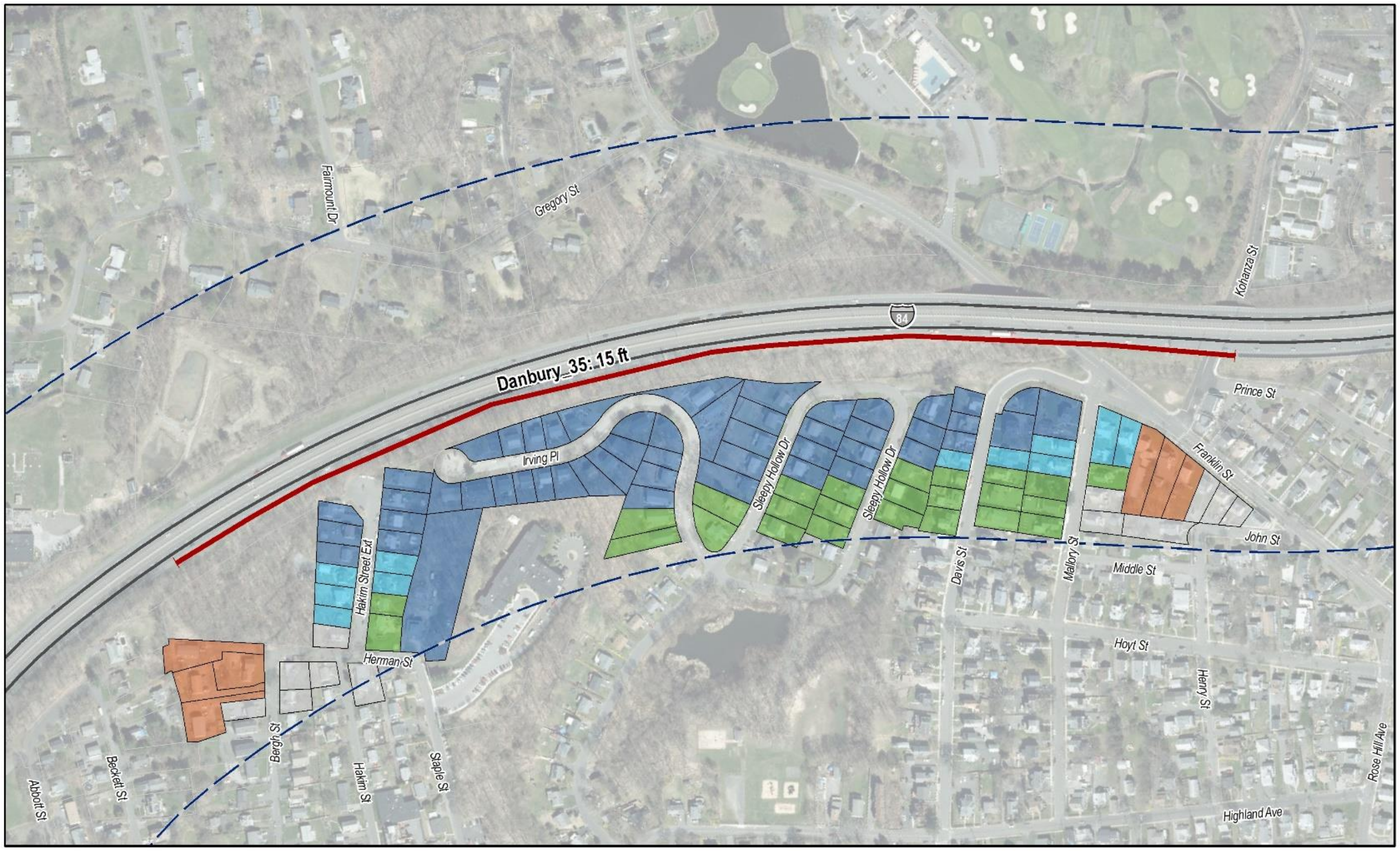
0 600 1,200 Feet

Parcel Status
- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Greenwich_14
I-95, Greenwich, Fairfield County, CT

Figure G-22



Potential Noise Barrier

500' Study Area

Modeled Traffic Data

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

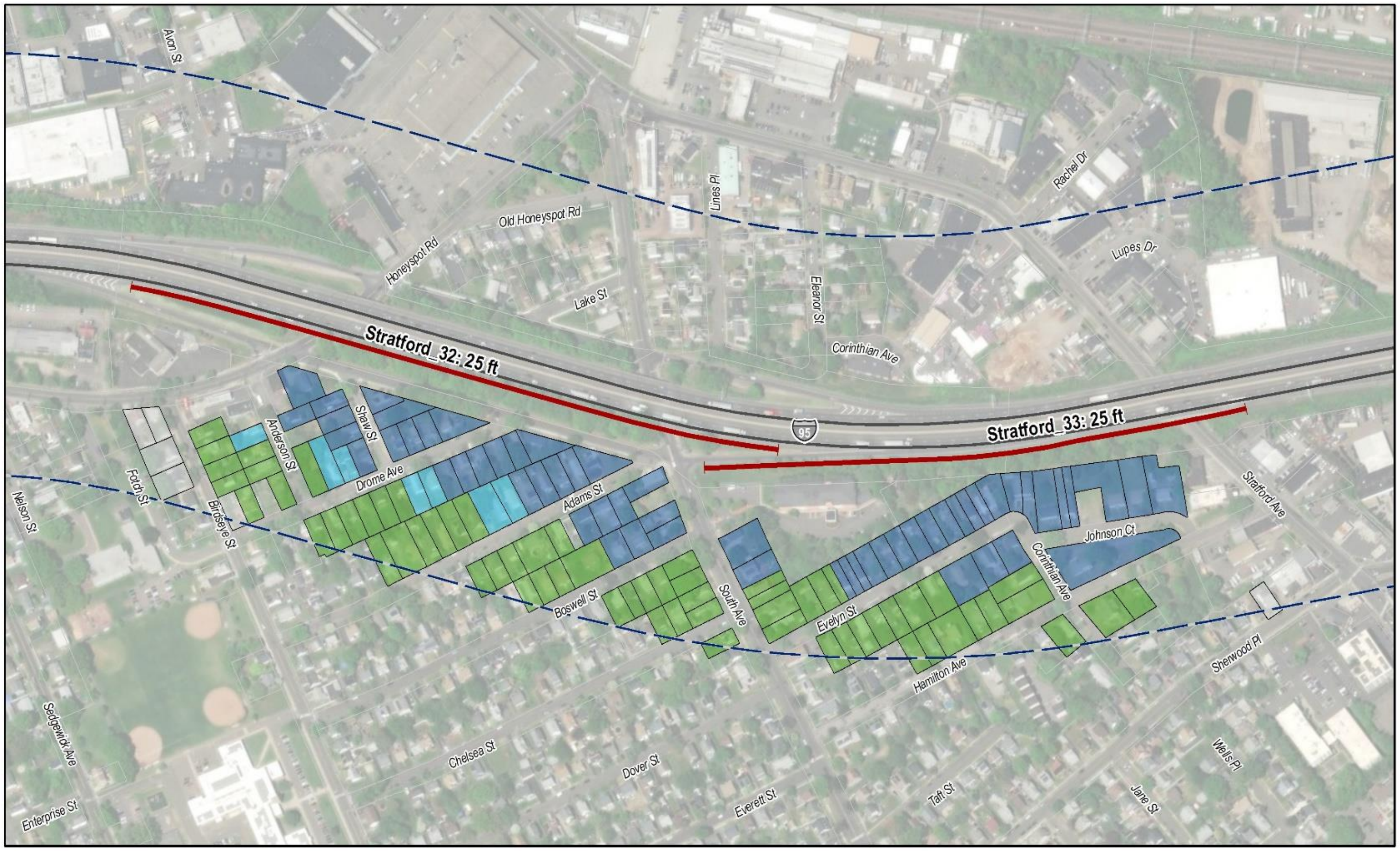
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Danbury_35

I-84, Danbury, Fairfield County, CT

Figure G-23



Potential Noise Barrier

500' Study Area

Modeled Traffic Data

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

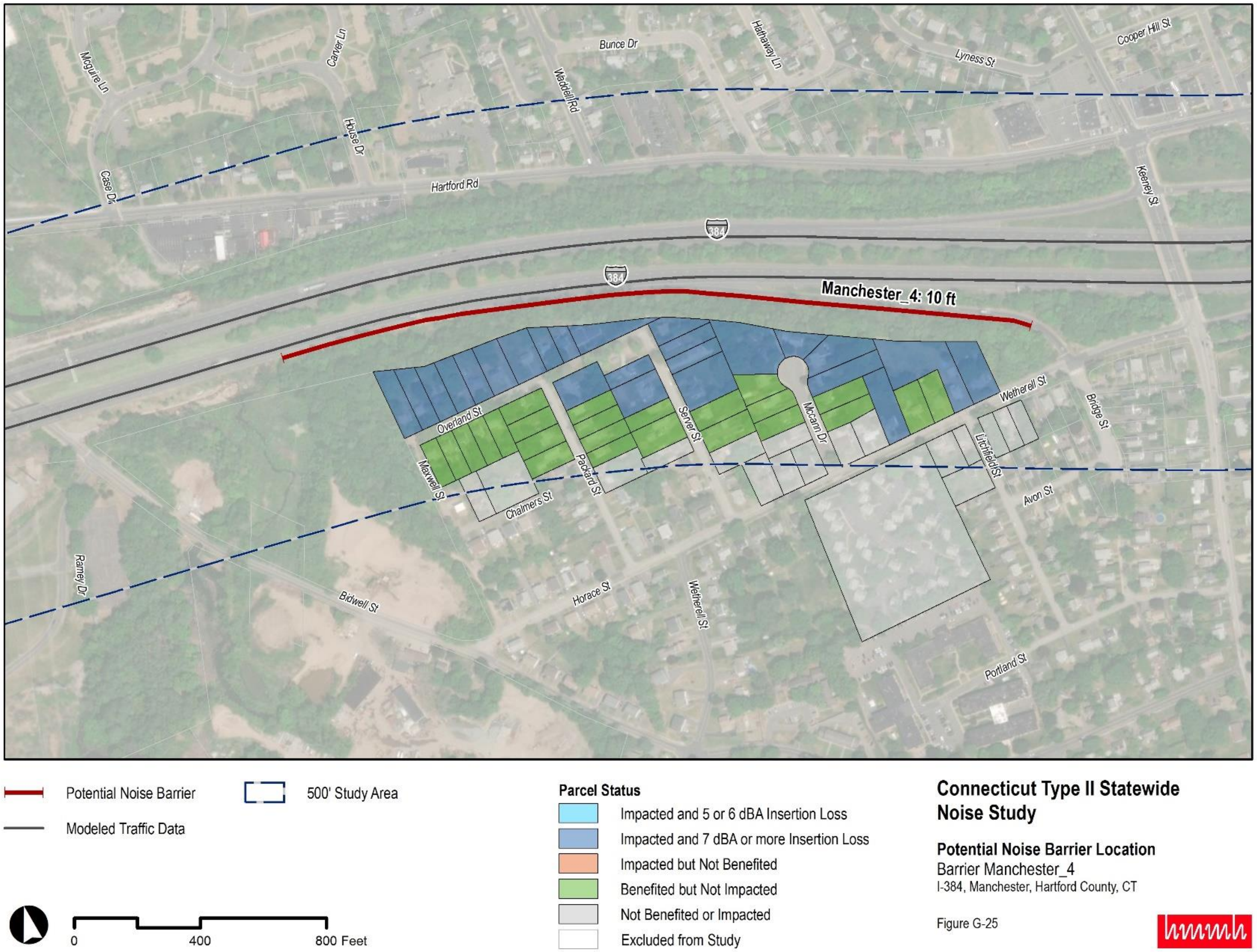
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Stratford_32-33

I-95, Stratford, Fairfield County, CT

Figure G-24



Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Manchester_4
I-384, Manchester, Hartford County, CT

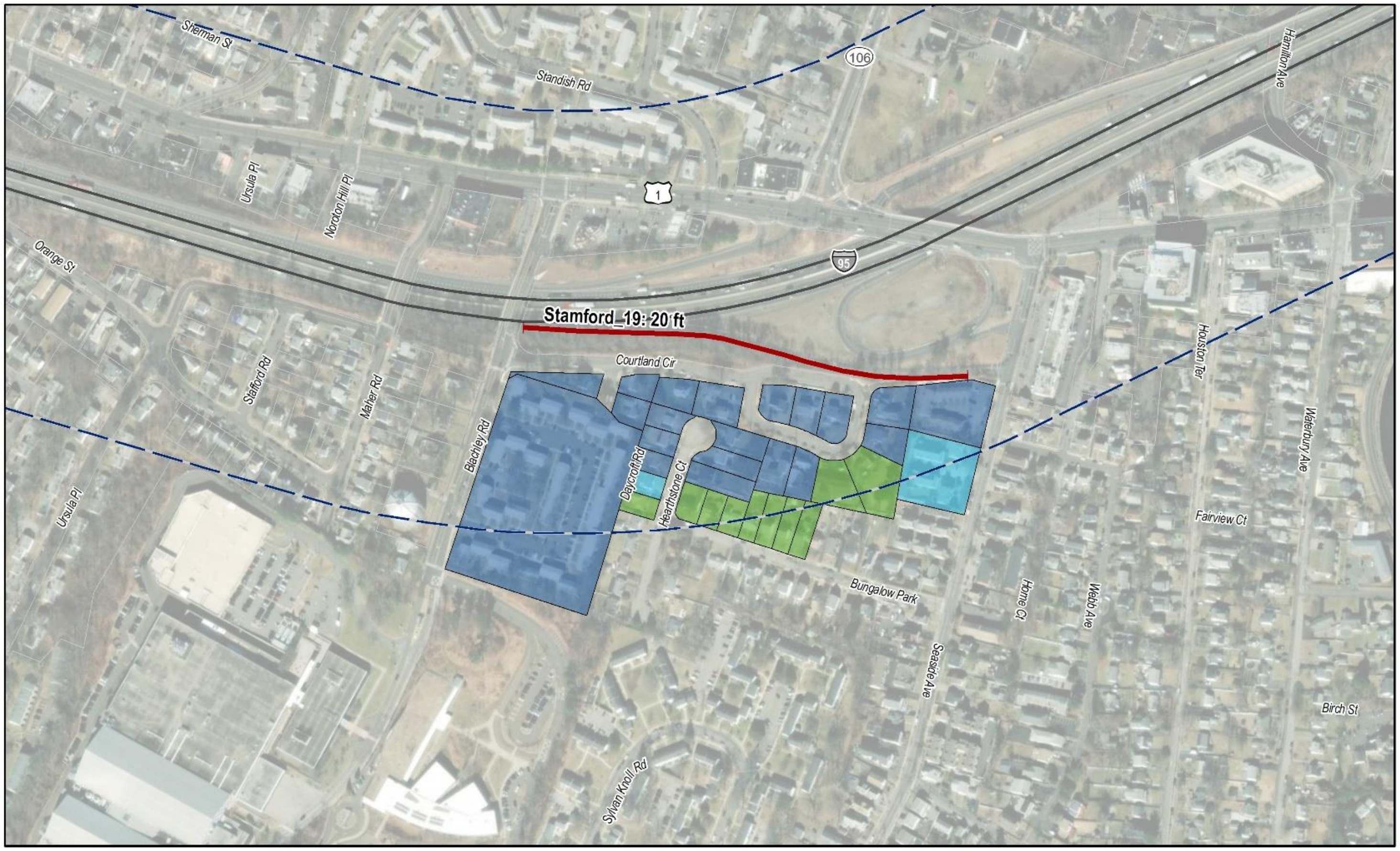
Figure G-25

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Milford_30
SR-796, Milford, New Haven, CT

Figure G-26


Milford_4: 20 ft
95
Meadow Park Dr
Berry St
Gordon Rd
Lester St
Meadow St
River St
Grassy Ln
Greer Cir
Nutmeg Ln
Walnut St
Wells Dr
Pascip St
Milford Pky
Roller Ter
White Oaks Ter
North St
Potential Noise Barrier
Modeled Traffic Data
500' Study Area
Parcel Status
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
Excluded from Study
0
400
800 Feet
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Milford_4
I-95, Milford, New Haven County, CT
Figure G-27



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

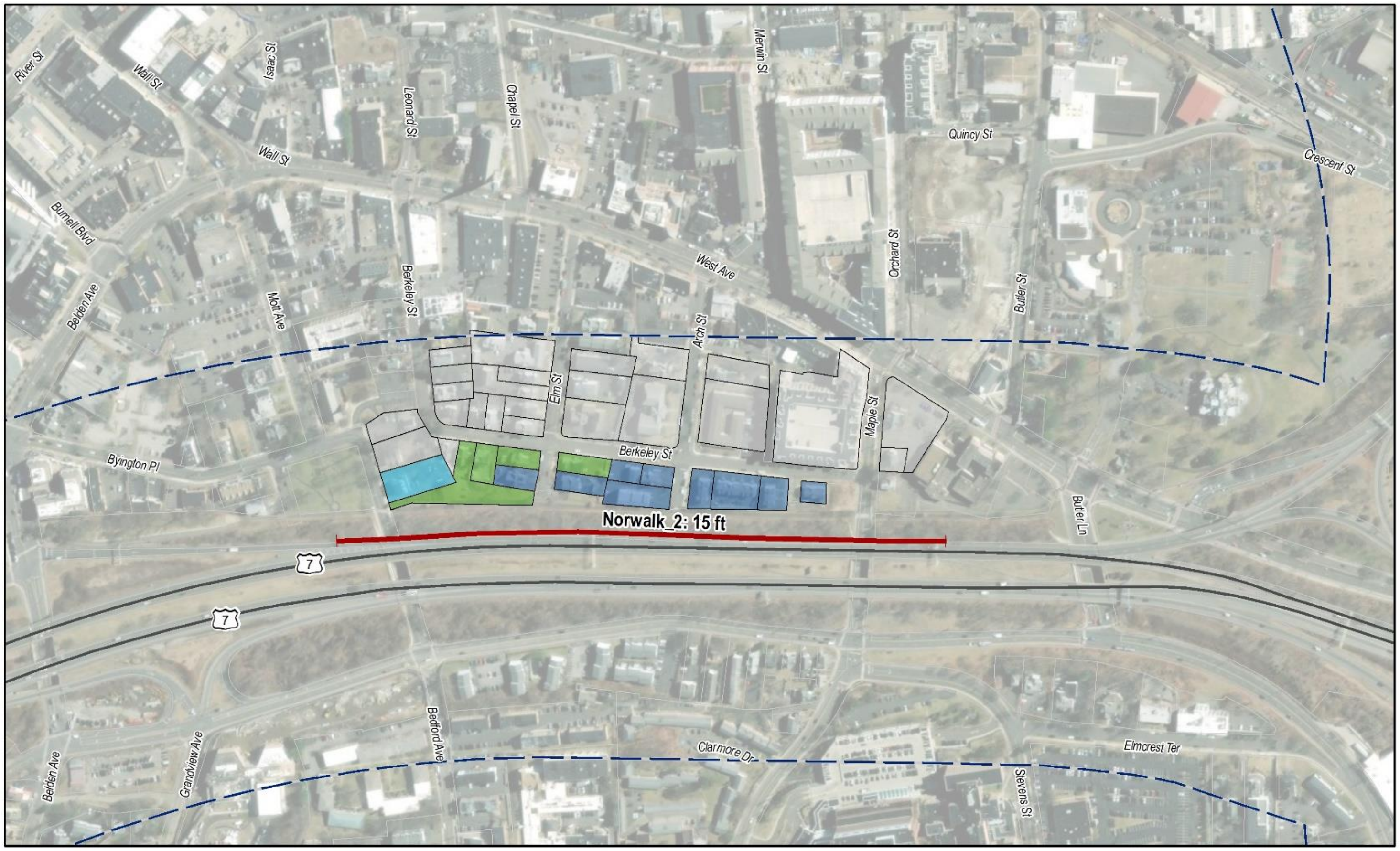
Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Stamford_19

I-95, Stamford, Fairfield County, CT

Figure G-28



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

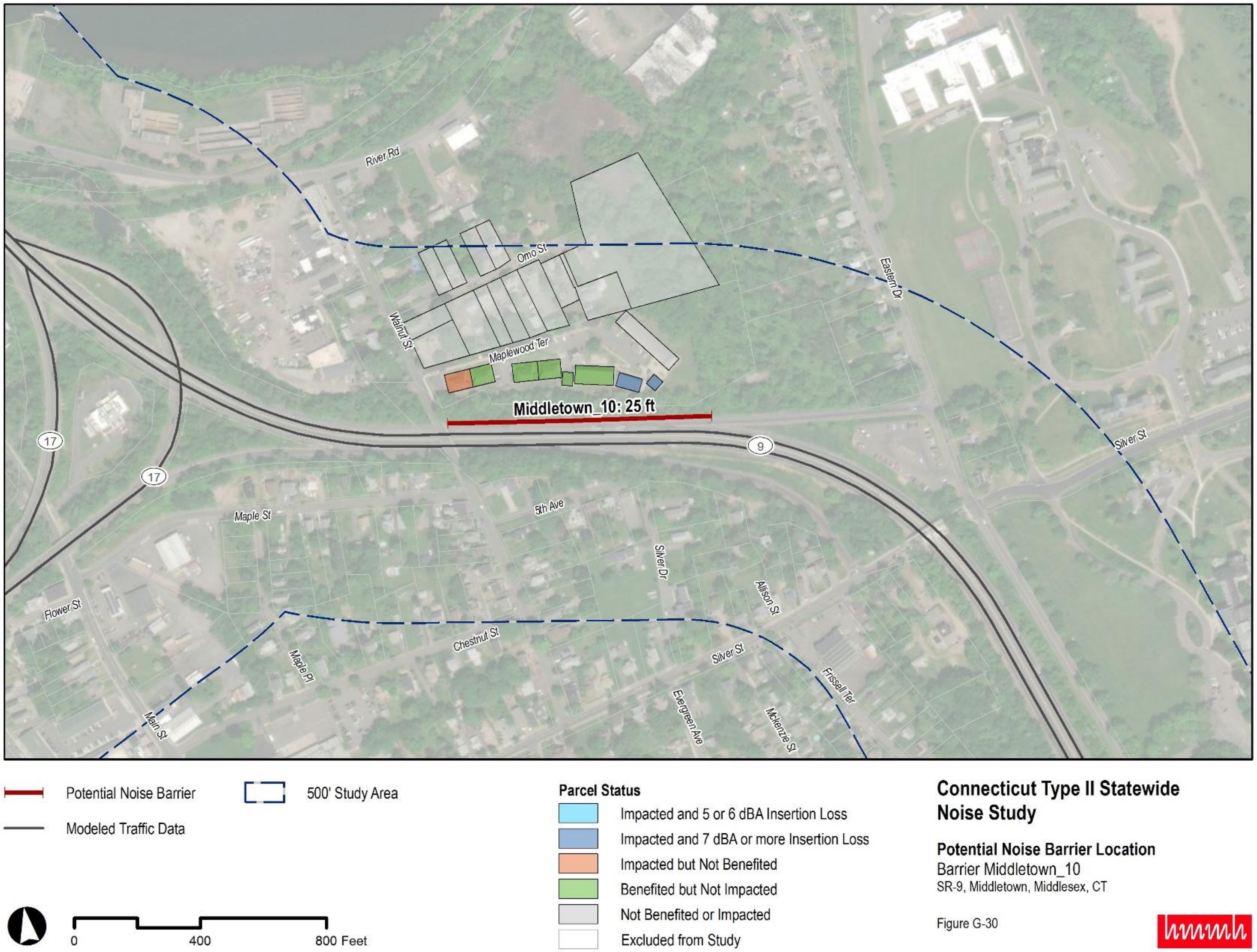
0 400 800 Feet

Parcel Status
- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Norwalk_2
US-7, Norwalk, Fairfield, CT

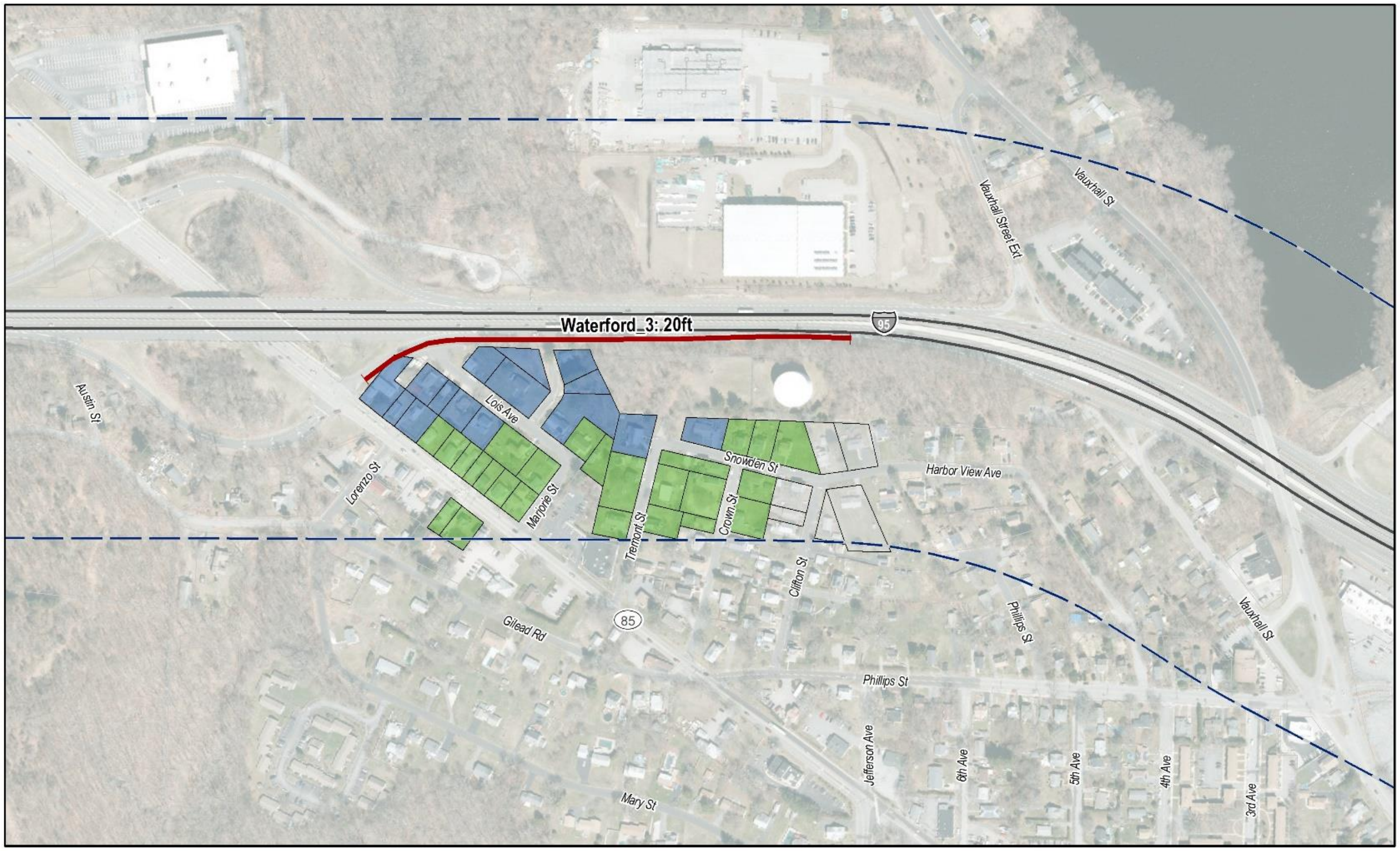
Figure G-29



Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Middletown_10
SR-9, Middletown, Middlesex, CT

Figure G-30



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Waterford_3
I-95, Waterford, New London County, CT

Figure G-31


Norwalk_20: 25 ft
Horizon Dr
Church St
Senga Rd
Richmond Hill Rd
Crown Ave
South St
Cossitt Rd
Chatham Dr
Scribner Ave
Price Ave
Fairview Pl
Cedar St
Ivy Pl
Ferris Ave
Glenwood Ave
Cedar St
Allview Ave
Elmwood Ave
Bayview Ave
Taylor Ave
Morton St
E Ave
D Ave
C Ave
B Ave
A Ave
Summit Ave
Oakledge Cir
Mcallister Ave
Couch St
Golden Hill St
Fairfield Ave
Potential Noise Barrier
Modeled Traffic Data
500' Study Area
Parcel Status
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
Excluded from Study
0
400
800 Feet
Connecticut Type II Statewide Noise Study
Potential Noise Barrier Location
Barrier Norwalk_20
I-95, Norwalk, Fairfield County, CT
Figure G-32

Potential Noise Barrier
Modeled Traffic Data
500' Study Area

0 400 800 Feet

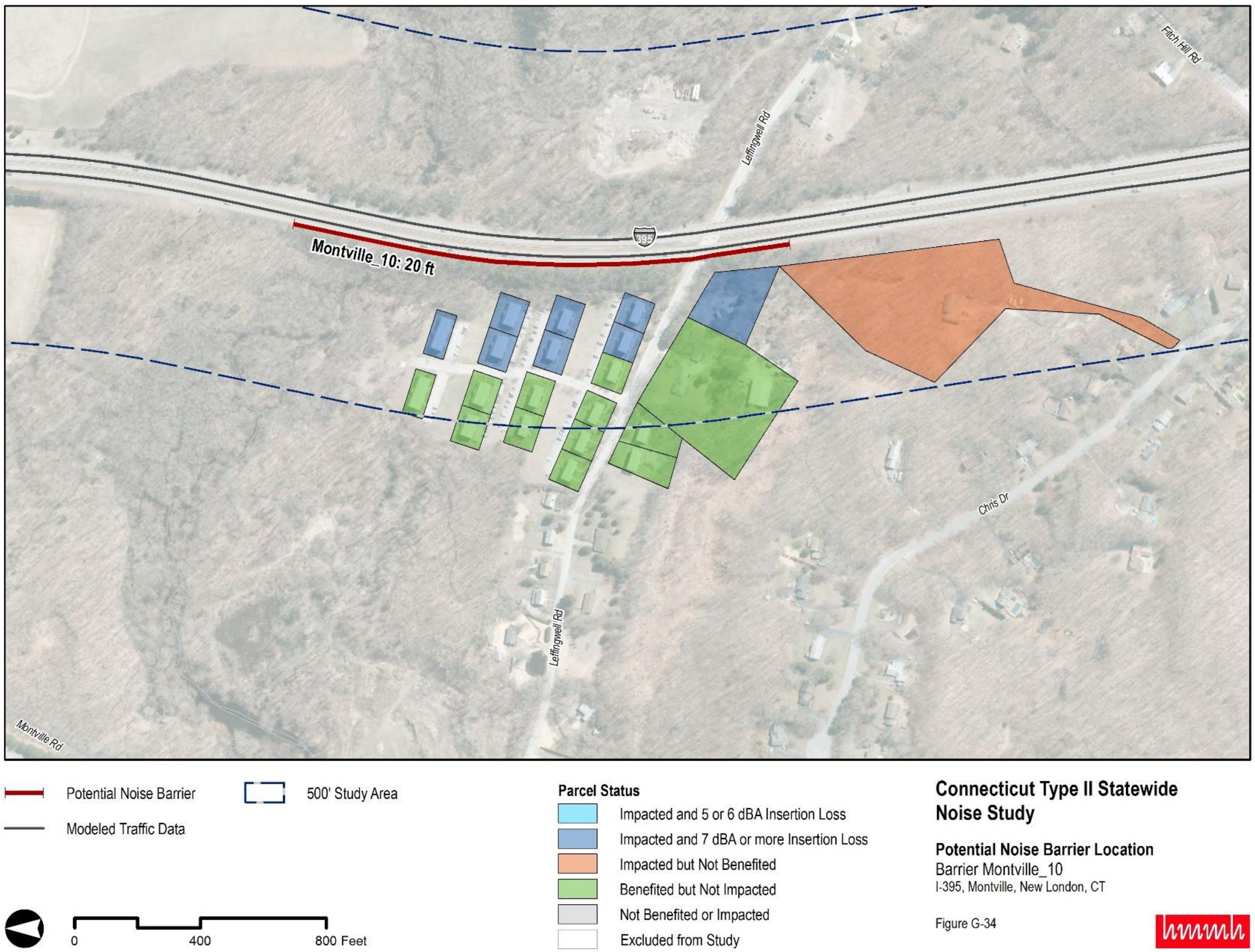
Parcel Status
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Shelton_5
SR-8, Shelton, Fairfield County, CT

Figure G-33

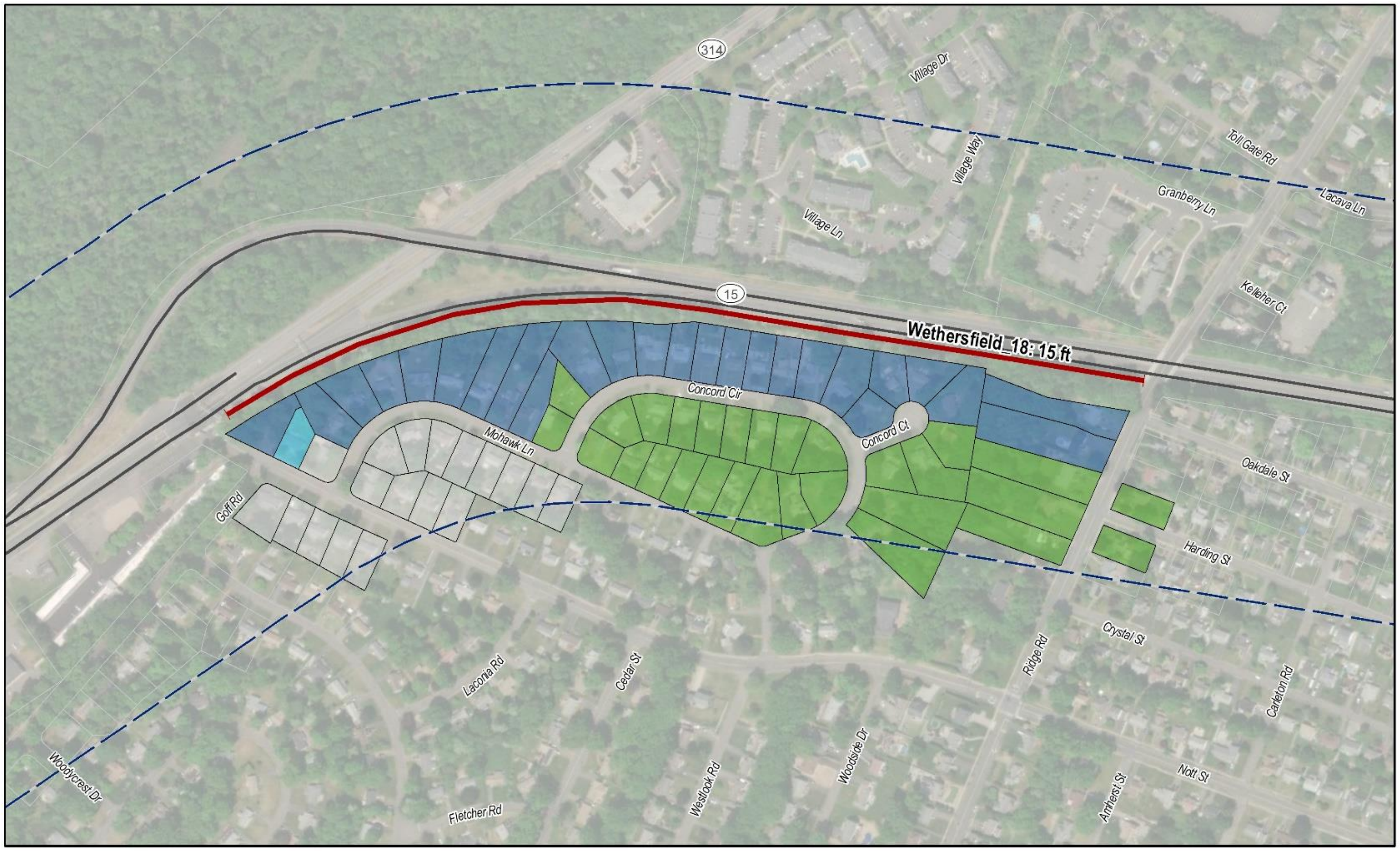
hmmh



Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Montville_10
I-395, Montville, New London, CT

Figure G-34



Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

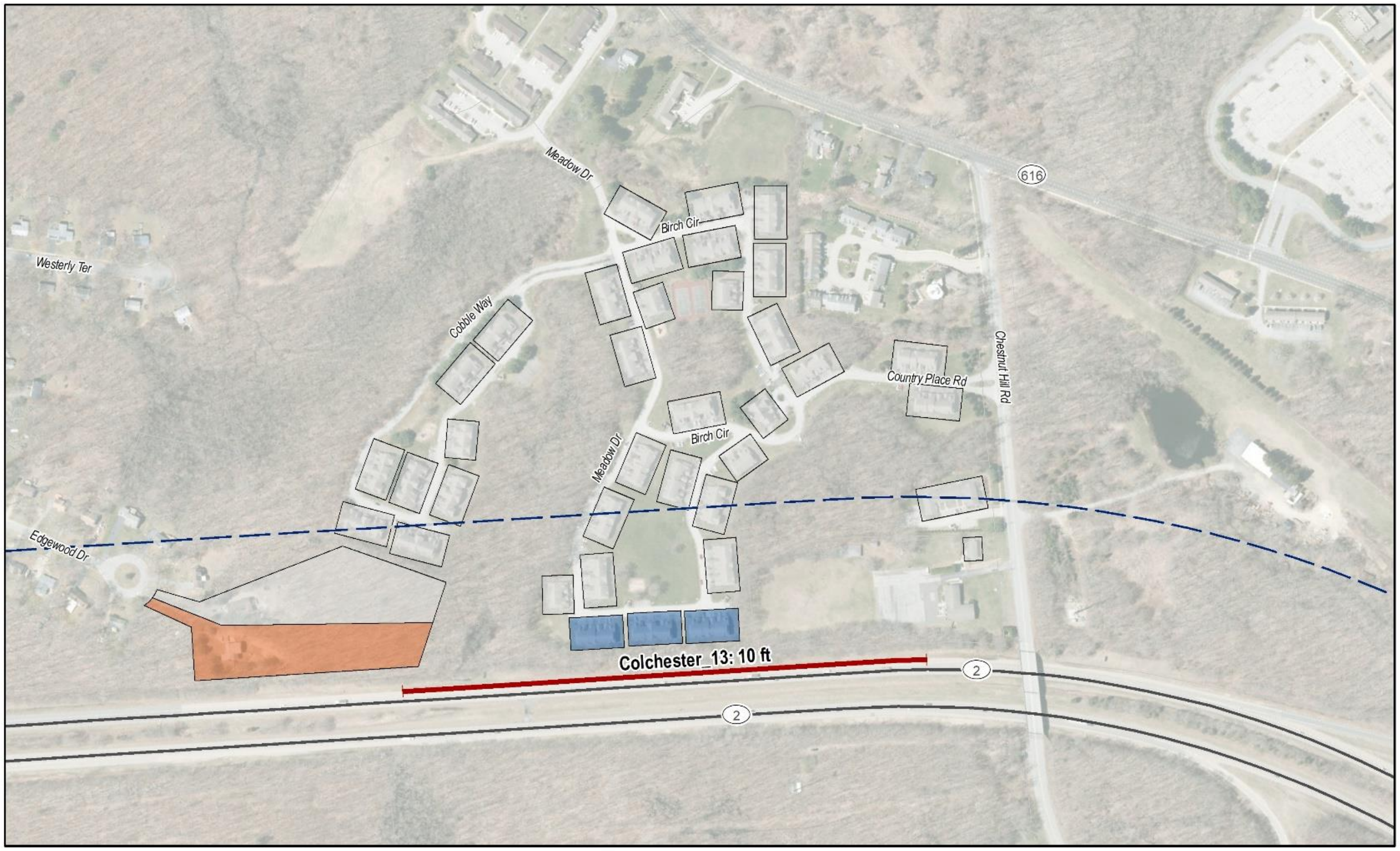
Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Wethersfield_18
SR-15, Wethersfield, Hartford County, CT

Figure G-35



Potential Noise Barrier
Modeled Traffic Data
500' Study Area

0 400 800 Feet

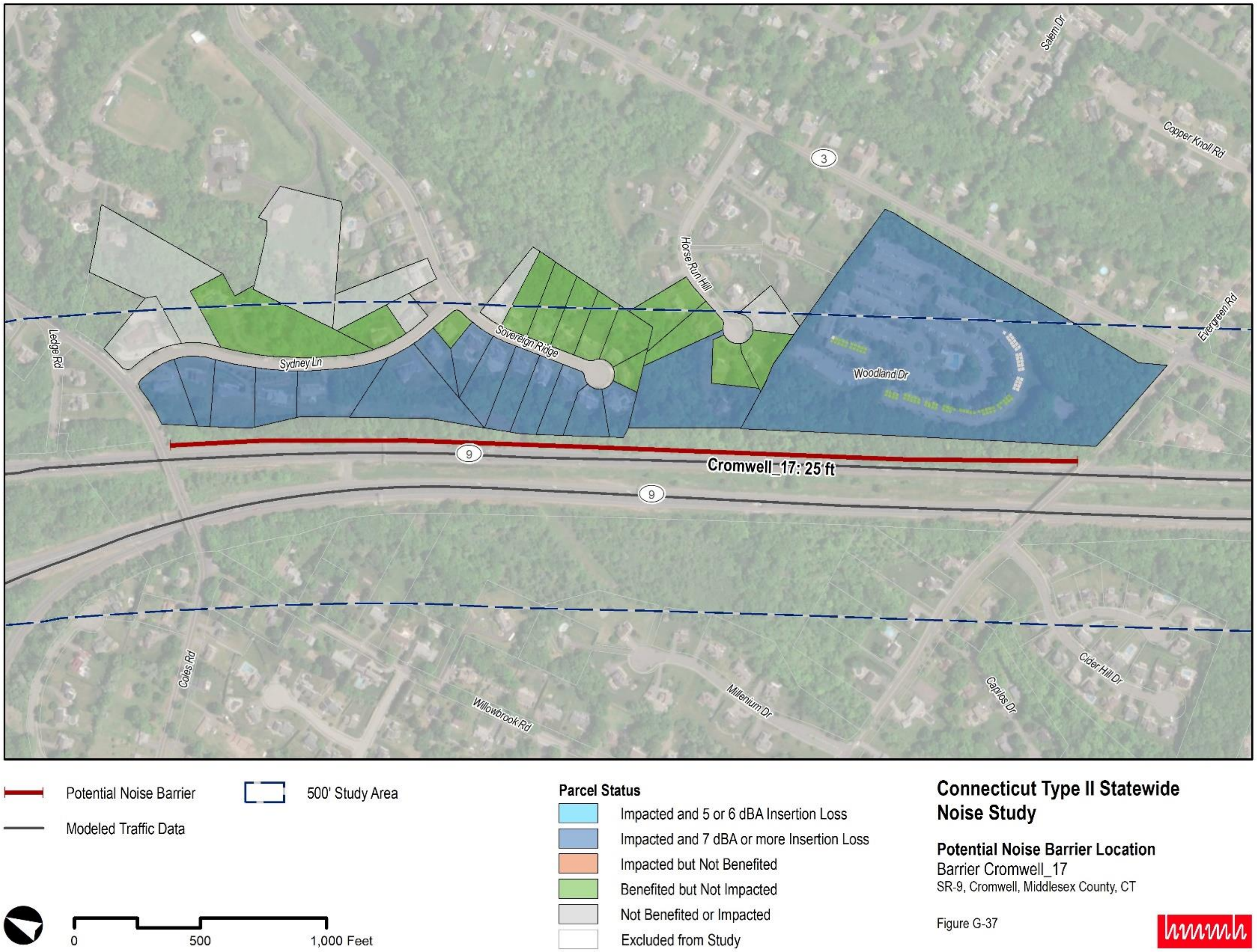
Parcel Status
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Colchester_13
SR-2, Colchester, New London, CT

Figure G-36

hmmh



Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location
Barrier Cromwell_17
SR-9, Cromwell, Middlesex County, CT

Figure G-37

Potential Noise Barrier

Modeled Traffic Data

500' Study Area

0 400 800 Feet

Parcel Status

- 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
- Excluded from Study

Connecticut Type II Statewide Noise Study

Potential Noise Barrier Location

Barrier Middletown_14

SR-17, Middletown, Middlesex County, CT

Figure G-38