TRAFFIC NOISE MANUAL - NCDOT Traffic Noise and Air Quality Group

# APPENDIX D. NOISE ANALYSIS PROCEDURE FOR NOISE STUDY AREAS WITH EXISTING NOISE WALLS

of the

# **TRAFFIC NOISE MANUAL**

North Carolina Department of Transportation Traffic Noise and Air Quality Group





## NCDOT TRAFFIC NOISE MANUAL

### **APPENDIX D**

# Noise analysis procedure for noise study areas with existing noise walls

This appendix describes the procedures for evaluating traffic noise impacts, assessing traffic noise abatement, and reporting results when there is an existing noise wall (or an acoustically dependent noise wall system) in a project area. This guidance applies to Traffic Noise Reports (TNRs) and Design Noise Reports (DNRs).

This guidance includes the following sections:

- 1. Where to obtain information on existing noise walls
- 2. Modeling the existing noise environment and design year no-build scenario in TNM
- 3. Modeling the build scenario(s) in TNM
  - 3.1. Situation #1 Existing noise wall remains entirely intact
  - 3.2. Situation #2 Existing noise wall is entirely removed
  - 3.3. Situation #3 Existing noise wall is partially removed
- 4. Reporting results in the Traffic Noise Report (TNR) or Design Noise Report (DNR)
  - 4.1. Report text, graphics, and appendices
  - 4.2. Project examples

FHWA guidance regarding this topic can be found in FHWA-HEP-12-051, "Consideration of Existing Noise Barrier in a Type I Noise Analysis".

If a proposed project area includes existing noise walls, analysts shall consult with the NCDOT Noise and Air Quality Group during initial scoping for guidance on the appropriate analysis process; and the process shall be included in the Noise Analysis Work Plan.

This guidance covers most situations likely to be encountered when there are existing noise walls in a project area, but there may be other variations or situations not specifically described here. Consult with the NCDOT Noise and Air Quality Group to determine the appropriate analysis process.

## 1. Where to obtain information on existing noise walls

Information on existing noise wall alignments and top-of-wall profile elevations should be obtained from as-built plans and electronic final survey files. If these resources are not available, then noise wall horizontal alignment coordinates may be estimated from topographic survey data, North Carolina county GIS databases, or other online resources such as Google Earth.

If as-built plans or electronic survey files are not available or do not define existing top-of-wall profile elevations (vertical coordinates), noise wall top-of-wall elevations may be calculated by adding the ground elevations along the noise wall horizontal alignment to noise wall panel heights. Noise wall panel heights may be obtained by field measurements, field observations, or available electronic street view information (e.g., Google Street View).

For concrete noise walls, the heights of individual noise wall panels comprising a wall section can vary from noise wall to noise wall. In general, individual precast concrete panels for NCDOT noise walls are typically 4 feet, 5 feet, or 6 feet tall.

# 2. Modeling the existing noise environmental and design year no-build scenario in TNM

Existing noise walls are part of the environment, like other existing structures (buildings, houses, concrete median barriers, etc.). Model existing noise walls in the existing and design-year no-build TNM models as static walls with no perturbations.

### 3. Modeling the design year build scenario in TNM

When modeling the design year build scenario in TNM, three situations can arise when there is an existing noise wall in an NSA. Each of these situations are described in this section.

- Section 3.1 Situation #1 The existing noise wall remains entirely intact. It does not need to be physically altered by the proposed build alternative(s).
- Section 3.2 Situation #2 The existing noise wall must be entirely removed to construct the proposed build alternative(s).
- Section 3.3 Situation #3 The existing noise wall must be partially removed to construct the proposed build alternative(s).

### 3.1. Situation #1 – Existing noise wall remains entirely intact

In this situation, the existing noise wall does not need to be physically altered by the proposed build alternative(s). The procedure varies depending on whether the project creates traffic noise impacts behind the wall, or at, or near, either wall terminus, as described below.

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a. Either no traffic noise impact or a single (isolated) noise impact is predicted to occur behind the existing noise wall (i.e., approaches or exceeds the Noise Abatement Criteria or experiences a substantial increase in noise levels):

In this situation, consideration of additional traffic noise abatement is not warranted because it would not be able to meet the NCDOT feasibility criteria of achieving a noise level reduction of 5 dB(A) for at least two impacted receptors. Document the results for these receptors behind the existing noise wall the same as for any other area where there are no impacts or only isolated impacts.

b. Two or more traffic noise impacts are predicted to occur behind the existing noise wall:

In this situation, additional TNM modeling is needed to determine if the noise wall is providing adequate benefits to the receptors behind the noise wall (see definition in text box).

Create an additional model scenario in TNM that evaluates the build alternative with no existing noise wall in place (Build with No Existing Wall). Using the TNM Build Model, set the height of the existing noise wall segments to zero and calculate what the noise levels are without the existing noise wall. Do not delete the existing noise wall from the TNM model because the horizontal alignment of the noise wall helps define the ground surface in the model.

### **Definition - Adequate Benefits**

As defined by NCDOT Traffic Noise Policy, a noise wall provides adequate benefits if it provides at least 5 dB(A) of noise level reduction (NLR) to at least two impacted receptors and at least 7 dB(A) of NLR to at least one benefited receptor.

Next, identify the receptors benefitting from the existing noise wall. Calculate the noise level reduction (NLR) at each receptor as follows:

### NLR = TNM Build with No Existing Noise Wall Model results – TNM Build Model results

If the existing noise wall provides adequate benefits, no further analysis is required, even if some of the benefited receptors are impacted from the project. A calculation of noise wall area per benefit is not required.

If the results of the calculation show that the existing noise wall does not provide adequate benefits, then the existing noise wall must be reassessed to determine if additional wall area (by adding height and/or length to the existing noise wall) can provide adequate new benefits within feasibility and reasonableness criteria per the following formula:

### Area/Benefit = Area added to existing noise wall ÷ New benefits resulting from area added to existing noise wall

### New Benefits = Benefits provided by the existing noise wall and the additional noise wall area – Benefits provided by just the existing noise wall

For example, an existing 500-foot long, 10-foot high noise wall is reassessed as a 600-foot long 12-foot high noise wall in order to provide adequate benefits. The larger noise wall results in two new benefits that the existing noise wall did not provide: one impacted receptor with 7 dB(A) NLR and one impacted receptor at 5 dB(A) NLR. To calculate the area/benefit, only the additional 2,200 square feet (( $600 \times 12$ ) - ( $500 \times 10$ )) is used, along with only the additional two newly benefited receptors. The area/benefit of the larger wall is 2,200 square feet  $\div 2$  benefits = 1,100 square feet/benefit, and the revised existing noise wall with the increased length and/or height is recommended.

If increasing the existing noise wall area cannot achieve adequate benefits within the allowable area per benefit criterion, then the existing wall shall remain in place without modification.

c. Two or more traffic noise impacts are predicted to occur at or near the termini of an existing noise wall that provides adequate benefits:

If there are two or more predicted traffic noise impacts at or just outside the terminus of an existing noise wall, then an extension of the existing noise wall length must be considered even if the existing noise wall has been determined to provide adequate new benefits. First check if extending the noise wall is feasible to construct. If an extension is not feasible to construct, then no additional analysis is needed. Document the reason(s) why a noise wall extension is not feasible to construct in the TNR or DNR.

If extending the existing noise wall length is feasible to construct, design the extended existing noise wall in TNM in accordance with the latest NCDOT Traffic Noise Policy and determine the new benefits provided. If the noise wall extension cannot provide adequate benefits, then it is not acoustically feasible and reasonable. Document this conclusion in the TNR or DNR.

If the noise wall extension provides adequate new benefits, then calculate the area per benefit using the following formula. Do not include the existing noise wall area in the calculation below, nor receptors already benefited by the existing wall.

# Area/Benefit = Area of noise wall extension ÷ New benefits resulting from noise wall extension

If the area/benefit achieved by the noise wall extension is within the allowable area/benefit, then the existing noise wall extension shall be recommended as feasible and reasonable. If the

existing noise wall extension cannot provide adequate new benefits within the allowable area per benefit, then the existing noise wall extension will not be recommended.

For example, there are two impacted receptors near one terminus of an existing noise wall. A 200-foot long, 18-foot tall extension of an existing noise wall would provide 7 dB(A) of noise level reduction to two additional impacted receptors, which are adequate benefits. The existing noise wall extension is 3,600 square feet ( $200 \times 18$ ). The area/benefit is then 1,800 square feet/benefit. This is more than the allowable 1,500 square feet/benefit, and the noise wall extension would not be recommended. If there was a third receptor benefited by the noise wall extension, then the noise wall extension would be recommended (1,200 square feet/benefit).

### 3.2. Situation #2 – Existing noise wall is entirely removed

If an existing noise wall must be entirely removed to construct a project and at least one receptor behind the existing noise wall will remain in the Build condition (whether predicted to be impacted or not), a replacement noise wall must be analyzed. A replacement noise wall is not needed if all receptors behind an existing noise wall will be acquired for project right of way or otherwise would not be present in the Build condition.

Two scenarios are discussed below, depending on the number of predicted noise impacts behind the existing noise wall and whether the replacement noise wall provides adequate benefits.

a. There are two or more predicted traffic noise impacts in the area behind the existing noise wall.

Proceed with TNM modeling and design of the replacement noise wall per applicable NCDOT Traffic Noise Manual guidance. The replacement noise wall must maximize the benefits to impacted receptors per the latest NCDOT Traffic Noise Policy within the allowable area per benefit. If the evaluation determines that the replacement noise wall would be feasible and reasonable, the new replacement noise wall would be recommended.

b. The replacement noise wall cannot provide adequate benefits within the allowable area per benefit or there are either no predicted traffic noise impacts or a single (isolated) traffic noise impact.

In these cases, the existing noise wall must be replaced "in-kind." Replacement "in-kind" means providing a replacement noise wall with a similar acoustical profile compared to the existing noise wall. Construction-related feasibility considerations (e.g., utility constraints, engineering constraints, etc.) shall apply to the in-kind replacement noise wall, but acoustic feasibility and reasonableness and cost reasonableness criteria shall not apply. Although acoustic feasibility and reasonableness do not apply to an in-kind replacement noise wall, the in-kind replacement noise wall must be modeled in TNM and the results reported in the TNR or DNR.

For example, an existing noise wall has a consistent vertical top elevation of 1,050 feet above mean sea level (MSL) for all wall panels. A replacement noise wall was evaluated and could not achieve adequate benefits within the allowable area per benefit. Therefore, an in-kind replacement noise wall must be provided. The panels of the replacement noise wall, whether they move up or down slope, should provide the same consistent top elevation (in this case, 1,050 ft MSL) as the existing noise wall panels so that there is a similar acoustic profile, even if the noise wall base elevations change to accommodate the proposed project. This may result in replacement noise wall panels taller or shorter than the existing noise wall panels. The in-kind replacement noise wall would still be subject to construction-related feasibility considerations.

### 3.3. Situation #3 – Existing noise wall is partially removed

In some instances, one or more portions of an existing noise wall need to be removed to construct a proposed project. One example of this is when the segment of an existing noise wall along the roadway shoulder is removed to accommodate a roadway widening project, but the portion of this same noise wall that is on a cut slope farther from the roadway remains intact.

Two scenarios are discussed below, depending on the number of predicted noise impacts behind the existing noise wall and whether the existing noise wall provides adequate benefits.

a. There are either no predicted traffic noise impacts or a single (isolated) traffic noise impact in the area behind the original extent of the existing noise wall.

In this situation, only an in-kind replacement noise wall section(s) of similar acoustical profile must be evaluated, using the same procedure described in **Section 3.2b**.

b. There are two or more traffic noise impacts predicted to occur in the area behind the original extent of the existing noise wall.

Determine if the remaining portion of the existing noise wall is providing adequate benefits. Create an additional model scenario in TNM that evaluates the build alternative with no remaining existing noise wall in place (Build with No Existing Wall). Using the TNM Build Model, set the height of the remaining portion of the existing noise wall to zero and calculate what the noise levels are without the remaining portion of the existing noise wall. Do not delete the remaining portion of the existing noise wall from the TNM model because the horizontal alignment of the noise wall helps define the ground surface in the model.

Next, identify the receptors benefited by the remaining portion of the existing noise wall and determine if adequate benefits are provided. Calculate the noise level reduction (NLR) at each receptor as follows:

### NLR = TNM Build with No Existing Noise Wall Model results – TNM Build Model results

The next steps in the analysis vary depending on whether the remaining portion of the existing noise wall provides adequate benefits. If the results of the NLR calculation show that the remaining portion of the existing noise wall is providing adequate benefits, then analyze the remaining portion of the existing noise wall, as is, and add a replacement noise wall section for each location where the existing noise wall is partially removed.

If the results of the NLR calculation show that the remaining portion of the existing noise wall does not provide adequate benefits, then the analysis should consider increasing the area of the remaining portion of the existing noise wall as well as including the replacement noise wall section(s).

# If the remaining portion of the existing noise wall provides adequate benefits, apply the following procedure:

Model the remaining portion of the existing noise wall (static) and replacement noise wall section(s) (with perturbations) in TNM. The replacement noise wall section(s) should start with a similar acoustic profile to what is being replaced. Determine whether adequate new benefits (benefits that are not already provided by just the remaining portion of the existing noise wall) can be provided by the replacement noise wall section(s).

If the replacement noise wall section(s) provides adequate new benefits, then calculate the area per benefit using the following formula. Do not include the area of the remaining portion of the existing noise wall in the calculation below, nor receptors already benefited by the remaining portion of the existing noise wall.

### Area/Benefit = Area of noise wall replacement section ÷ New benefits resulting from noise wall replacement section

If the area/benefit achieved by the replacement noise wall section is within the allowable area/benefit and can be constructed, then the replacement noise wall section shall be recommended as feasible and reasonable.

If the noise wall replacement section cannot provide adequate new benefits within the allowable area per benefit, then an in-kind noise wall replacement section must be evaluated using the procedure described in **Section 3.2b**.

If the remaining portion of the existing noise wall does not provide adequate benefits, apply the following procedure:

Model the remaining portion of the existing noise wall (with perturbations) and a replacement noise wall section(s) (with perturbations) in TNM in accordance with the latest NCDOT Traffic Noise Policy. Determine whether adequate new benefits can be provided by a combination of modifying the remaining portion of the existing noise wall and the replacement noise wall section(s).

If the combined modified remaining portion of the existing noise wall and the replacement noise wall section(s) provide adequate new benefits, then calculate the area per benefit using the following formula. Do not include the original remaining portion existing noise wall area in the calculation below, nor receptors already benefited by the original remaining portion of the existing noise wall.

### Area/Benefit = Area of noise wall replacement section(s) and new area added to the remaining portion of the existing noise wall ÷ New benefits resulting from the combined noise wall replacement section(s) and modified remaining portion of existing noise wall

If the area/benefit achieved by the combined modified remaining portion of existing noise wall and replacement noise wall section(s) is within the allowable area/benefit, and can be constructed, then the combined modified remaining portion of existing noise wall and replacement noise wall section(s) shall be recommended.

If the noise wall replacement section cannot provide adequate new benefits within the allowable area per benefit, then an in-kind noise wall replacement section(s) must be evaluated for each location where the existing noise wall is partially removed using the procedure described in **Section 3.2b**.

## 4. Reporting results in the Traffic Noise Report or Design Noise Report

### 4.1. Report text, graphics, and appendices

<u>Report text</u>. The presence of existing noise walls must be stated in the TNR and DNR report text when describing an NSA. The report also must state what information sources were used to estimate the existing noise wall horizontal alignment and vertical profile.

The effects to an existing noise wall under each evaluated build alternative must be described in the TNR or DNR (existing noise wall remains, is removed, or is partially removed) in the description of the applicable NSA. The procedure used to evaluate noise abatement for areas with existing noise walls also must be described in the noise abatement discussion for the applicable NSA.

<u>Graphics</u>. Existing noise walls must be shown and labeled on graphics. As applicable, the following note is recommended to be included on graphics:

Graphics Note: The color-coding for receptors in this NSA assumes the existing noise wall is part of the existing modeled environment. Receptors are shown as benefits (blue or green) only if a new noise wall or modifications to the existing noise wall are proposed because only benefits resulting from the proposed project are shown.

<u>Appendix B – Hourly Equivalent Traffic Noise Tables</u>. Existing, no-build, and design-year build noise levels shall be reported in this appendix in the TNR or DNR as the noise levels with the existing noise

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wall(s) in place. The predicted design-year build noise levels reported in Appendix B are those from the TNM design-year build model that includes only the portions of the existing noise wall(s) that would remain with the project in place.

<u>Appendix D – Noise Barrier Analysis</u>. Normally, in this appendix, predicted noise level information reported for a noise wall (when there is no existing noise wall involved) includes the following:

Build Condition with No Barrier	Build Condition with Barrier	Noise Level Reduction (NLR) values
noise levels	noise levels	

Evaluating noise abatement measures where there are additions or extensions to existing noise walls that wholly or partially remain requires additional information to be reported in Appendix D – Noise Barrier Analysis to differentiate between benefits attributable to the existing noise wall, or remaining portion of the existing noise walls, and benefits attributable to the addition or extension being evaluated. In these situations, the additional information to be included in the appendix table is shown below.

NLR with just existing	Build noise levels with	Build noise levels with	Build noise levels with	NLR with the existing
noise wall in Build	just existing noise wall	no existing noise wall	existing wall,	wall and proposed
Condition	(or section of wall		replacement wall,	addition or extension
	remaining)		and/or proposed	of wall
			addition or extension	
			of wall	

If an existing noise wall would be entirely or partially removed with a build alternative and the replacement noise wall design cannot meet acoustic feasibility or reasonableness criteria, then an in-kind replacement wall or wall section that is similar in acoustic profile to the removed wall or wall section needs to be provided. The results of this modeling should be reported in the Noise Barrier Analysis appendix.

### 4.2. Examples from actual projects

The following examples of report text, graphics, and entries in appendices are from an actual DNR in North Carolina. The following examples are not inclusive of every possible situation.

<u>Project Example 1</u>. Situation #1 – Existing noise wall remains entirely intact but there are some impacted receptors behind the existing noise wall. There are also impacted receptors at/near the end of the existing noise wall and a noise wall extension is evaluated.

<u>Project Example 2</u>. Situation #3 – Existing noise wall is partially removed and a replacement noise wall section is evaluated.

### PROJECT EXAMPLE #1

In Project Example #1, the existing noise wall remains entirely intact but there are impacted receptors behind the existing noise wall. There are also impacted receptors at/near the end of the existing noise wall and a noise wall extension was evaluated. This example illustrates two situations, Situation 1(b) and Situation 1(c) described in **Section 3.1** of this guidance.

The project in this example is the DNR for Project U-2719 (July 2021 – subject to the 2016 Traffic Noise Policy), the widening of I-440 from Walnut Street to Wade Avenue in Cary and Raleigh, North Carolina. There is an existing noise wall located in NSA 1 along southbound US-1/US-64 providing noise level reduction to homes in the area of Bloomingdale Drive and Kingston Ridge Road. Figure 2 Sheets 1 and 2 from the U-2719 DNR that show this area are included following the text for this project example.

As shown in Figure 2 Sheets 1 and 2, there are several receptors behind the existing noise wall that are predicted to be impacted in the design-year build condition, even with the existing noise wall in place. These are receptors 1102, 1014-1017, 1052-1054, and 1056-1062.

There are also impacted receptors at and near the northern end of the existing noise wall. These are receptors 1064-1072, 1119, 1120 and 1101.

The pages from the U-2719 DNR Appendix D that show the results of the evaluation of the existing noise wall and the noise wall extension NW1B are presented following the text and figures for this project example.

The first question to answer is whether the existing noise wall is providing adequate benefits to receptors behind the noise wall even though there are impacted receptors behind the noise wall. Area/benefit is not a criterion for existing noise walls.

As shown on the Appendix D tables, the existing noise wall in NSA 1 does provide adequate benefits. This is determined by looking at the values in the blue arrowed columns, as shown in the excerpt below. Therefore, a redesign of the existing noise wall is not required. Even in the small excerpt below, it can be seen that there are at least two impacted receptors with a 5 dB(A) or more noise level reduction and one receptor with a 7 dB(A) or more noise level reduction. Therefore, the existing noise wall does not need to be altered to provide adequate benefits.

6	Table D.1 - Noise Barrier Performance Noise Wall 1B (NW1B)											
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Existing Wall	Build w/ Existing Wall	Build w/o Existing Wall	Build w/ Existing Wall and New Extension	NLR w/ Existing Wall and New Extension			
1005	1335 BLOOMINGDALE DR	Residential	в	1	( <b>6</b> )	58	64	58	6			
1006	1333 BLOOMINGDALE DR	Residential	B	1	7	60	67	60	1			
1007	1331 BLOOMINGDALE DR	Residential	B	1	6	61	67	61	6			
1008	1329 BLOOMINGDALE DR	Residential	B	1	14	61	68	61	7			
1009	1327 BLOOMINGDALE DR	Residential	B	1	5	63	68	63	5			
1010	1325 BLOOMINGDALE DR	Residential	B	1	5	62	67	62	6			
1011	1323 BLOOMINGDALE DR	Residential	B	1	5	63	68	63	6			
1012	1321 BLOOMINGDALE DR	Residential	B	1	5	65	70	65	5			
1013	1319 BLOOMINGDALE DR	Residential	B	1	7	65	72	65	7			
1014	1317 BLOOMINGDALE DR	Residential	B	1	7	67	74	67	1			
1015	1315 BLOOMINGDALE DR	Residential	B	1	8	67	75	67	8			

The second question to answer is whether an extension of the existing noise wall would provide sufficient noise level reduction to the receptors at/near the end of the existing noise wall. To answer this question, noise wall extension NW1B was evaluated. This noise wall extension is shown on U-2719 Figure 2 Sheet 2.

As shown in the Appendix D tables, noise wall extension NW1B would provide six more benefits than the existing noise wall alone. These are receptors 1064, 1065, 1066, 1067, 1082, and 1083. For these receptors, a benefit is shown in the last column titled "NLR w/ Existing Wall and New Extension", and no benefit is shown in the column titled "NLR w/ Only Existing Wall." Of these six benefited receptors, five are impacted and one is not an impact. There are two that have 7 dB(A) of noise level reduction. The area of noise wall extension NW1B is 8,672 sq ft, and the area/benefit is 1,445 sq ft (8,672 divided by 6). This noise wall extension is acoustically feasible and reasonable.

However, it should be noted that in the U-2719 DNR this noise wall extension was found to not be feasible to construct. In the proposed location of the noise wall extension there are: existing streetlights with underground power feeds that would need to be relocated, curb and gutter with drop inlets at the proposed noise wall area that would need to be relocated, a jurisdictional stream that runs in the same area of the proposed noise wall. A berm would need to be built behind the proposed noise wall due to the existing topography, which would result in additional stream and right of way impacts.









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Table D.1 - Poise Dattiet 1 chofmance for Poise want ib (AWIB)											
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Existing Wall	Build w/ Existing Wall	Build w/o Existing Wall	Build w/ Existing Wall and New Extension	NLR w/ Existing Wall and New Extension		
1078	1314 KINGSTON RIDGE RD	Residential	В	1	6	60	66	60	6		
1079	1312 KINGSTON RIDGE RD	Residential	В	1	5	59	64	59	5		
1080	1310 KINGSTON RIDGE RD	Residential	В	1	5	60	65	60	5		
1081	1304 KINGSTON RIDGE RD	Residential	В	1	3	63	66	62	4		
1082	1302 KINGSTON RIDGE RD	Residential	В	1	4	63	67	62	5		
1083	1300 KINGSTON RIDGE RD	Residential	В	1	4	61	65	58	7		
1084	1252 FAIRLANE RD	Residential	В	1	5	58	63	57	6		
1085	1247 FAIRLANE RD	Residential	В	1	5	60	65	58	7		
1086	1232 KINGSTON RIDGE RD	Residential	В	1	3	56	59	55	4		
1087	1228 KINGSTON RIDGE RD	Residential	В	1	2	53	55	52	3		
1088	1224 KINGSTON RIDGE RD	Residential	В	1	2	54	56	53	3		
1089	1220 KINGSTON RIDGE RD	Residential	В	1	2	55	57	54	3		
1090	1216 KINGSTON RIDGE RD	Residential	В	1	1	58	59	57	2		
1091	1212 KINGSTON RIDGE RD	Residential	В	1	0	60	60	59	1		
1092	1208 KINGSTON RIDGE RD	Residential	В	1	0	59	59	58	1		
1093	1206 KINGSTON RIDGE RD	Residential	В	1	0	60	60	60	0		
1099	1128 LEDSOME LN - Springhill Suites	Hotel/Motel	E	1	0	70	70	70	0		
1100	1722 WALNUT ST - Best Western	Hotel/Motel	E	1	0	73	73	73	0		
1101	1207 KINGSTON RIDGE CT	Residential	В	1	0	67	67	67	0		
1102	1641 Kildonan Pl	Residential	В	1	10	66	76	66	10		
1103	1639 Kildonan Pl	Residential	В	1	6	62	68	62	6		
1104	1637 Kildonan Pl	Residential	В	1	8	61	69	61	8		
1105	1635 Kildonan Pl	Residential	В	1	7	61	68	61	7		
1106a	1611a Seabrook Ave (Pirates Cove Greenway)	Trail	С	0.25	8	62	70	62	8		
1106b	1611b Seabrook Ave (Pirates Cove Greenway)	Trail	С	0.25	7	61	68	61	7		
1106c	1611c Seabrook Ave (Pirates Cove Greenway)	Trail	С	0.25	7	60	67	60	7		
1106d	1611d Seabrook Ave (Pirates Cove Greenway)	Trail	С	0.25	7	59	66	59	7		
1119	1211 Kingston Ridge Rd	Residential	В	1	0	68	68	68	0		
1120	1209 Kingston Ridge Rd	Residential	В	1	0	68	68	67	1		
1121	1718 Walnut St - Hot Point Deli	Restaurant	Е	1	0	65	65	65	0		
1122	1109 Ledsome Ln - Jasmin & Olivz	Restaurant	Е	1	0	68	68	68	0		
1123	1624 Walnut St - The Egg & I	Restaurant	Е	1	0	70	70	70	0		
1124	1401 Buck Jones Rd - Motel 6	Hotel/Motel	Е	1	0	74	74	74	0		
1125 Ledsome Lane - Fairfield Inn Hotel/Motel E 1 0 65 65 65											
Total Benefits from only Existing Noise Wall											
					1	Total Benefits from	Existing Noise Wall	and New Extension	55		

#### Table D 1 - Noise Ba rrier Perfo for Noise Wall 1R (NW1R)

indicates an impacted receptor indicates a 5 to 6 dB(A) noise level reduction Blue highlight with white text Green highlight with white text

indicates at least a 7 dB(A) noise level reduction

<sup>1</sup> A receptor is considered benefited if it has a predicted noise level reduction of at least 5 dB(A)

<sup>2</sup> Noise Level Reduction

### Noise Wall 1B (-NW1B-):

1077 1316 KINGSTON RIDGE RD

Location: Parallel to southbound US 1 and US 1 southbound on-ramp from Walnut Street. Between Walnut Street and SE Cary Parkway. Adjacent to Kingston Ridge Road, extending between the two existing noise walls, one along US 1 and one along the US 1 on-ramp from Walnut Street.

	TNM Run: NSA 1B BARRIER Saved Barrier Analysis: Opt 18													
	NW1B does not meet NCDOT feasibility and reasonableness criteria NW1B is not likely and not recommended to be installed as part of the roadway improvements of STIP Project U-2719													
J	Total Impacts:	29			Terminus (South)	-NW1- 1	0+00.00							
	Impacted Receptors Benefited:	5			Terminus (North)	-NW1- 1	4+65.00							
	Benefited Receptors (at least 7 dB(A) NLR)	2		Δ.	Length (feet) erage Height (feet)	465								
	Total Benefits	6		110	Area (sq. feet)	8,672								
			Area /	Benefit:	1,445 / Benefit: 1 500									
	Ti	able D.1 - Nois	se Barrie	er Perfor	mance for Noise V	Vall 1B (NW1B)								
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Existing Wall	Build w/ Existing Wall	Build w/o Existing Wall	Build w/ Existing Wall and New Extension	NLR w/ Existing Wall and New Extension					
1005	1335 BLOOMINGDALE DR	Residential	В	1	6	58	64	58	6					
1006	1333 BLOOMINGDALE DR	Residential	B	1	7	60	67	60	7					
1007	1329 BLOOMINGDALE DR	Residential	B	1	7	61	68	61	7					
1009	1327 BLOOMINGDALE DR	Residential	B	1	5	63	68	63	5					
1010	1325 BLOOMINGDALE DR	Residential	В	1	5	62	67	62	5					
1011	1323 BLOOMINGDALE DR	Residential	B	1	5	63	68	63	5					
1012	1319 BLOOMINGDALE DR	Residential	B	1	5	65	70	65	5					
1013	1317 BLOOMINGDALE DR	Residential	B	1	7	67	74	67	7					
1015	1315 BLOOMINGDALE DR	Residential	В	1	8	67	75	67	8					
1016	1313 BLOOMINGDALE DR	Residential	В	1	7	67	74	67	7					
1017	1311 BLOOMINGDALE DR	Residential	B	1	8	<u>67</u>	75	67	8					
1018	1307 BLOOMINGDALE DR	Residential	В	1	10	63	73	63	10					
1020	1305 BLOOMINGDALE DR	Residential	В	1	9	62	71	62	9					
1021	1303 BLOOMINGDALE DR	Residential	В	1	8	60	68	60	8					
1022	1331 KINGSTON RIDGE RD	Residential	B	1	7	57	64	57	7					
1023	1326 BLOOMINGDALE DR	Residential	B	1	3	54	58	54	3					
1024	1322 BLOOMINGDALE DR	Residential	B	1	3	55	58	55	3					
1026	1320 BLOOMINGDALE DR	Residential	В	1	4	55	59	55	4					
1027	1318 RICHMOND CT	Residential	В	1	4	56	60	56	4					
1028	1310 BLOOMINGDALE DR	Residential	B	1	5	58	63	58	5					
1029	1308 BLOOMINGDALE DR 1306 BLOOMINGDALE DR	Residential	B	1	7	56	65	58	7					
1050	1329 KINGSTON RIDGE RD	Residential	B	1	5	61	66	61	5					
1051	1327 MELLON CT	Residential	В	1	7	62	69	62	7					
1052	1325 MELLON CT	Residential	В	1	11	67	78	67	11					
1053	1323 MELLON CT	Residential Residential	B	1	11	67	78	67	11					
1054	1321 MILLEON CT 1319 KINGSTON RIDGE RD	Residential	B	1	9	64	73	64	9					
1056	1317 KINGSTON RIDGE RD	Residential	B	1	10	67	77	67	10					
1057	1315 KINGSTON RIDGE RD	Residential	В	1	10	67	77	67	10					
1058	1313 KINGSTON RIDGE RD	Residential	В	1	10	66	76	66	10					
1059	1311 KINGSTON RIDGE RD	Residential Residential	B	1	8	67	75	67	8					
1060	1307 KINGSTON RIDGE RD 1309 KINGSTON RIDGE RD	Residential	B	1	6	68	74	67	7					
1062	1305 KINGSTON RIDGE RD	Residential	В	1	6	66	72	65	7					
1063	1301 KINGSTON RIDGE RD	Residential	В	1	6	65	71	63	8					
1064	1237 KINGSTON RIDGE RD	Residential	В	1	3	67	70	63	7					
1065	1255 KINGSTON RIDGE RD 1231 KINGSTON RIDGE RD	Residential	B	1	2	68	70	65	6					
1067	1227 KINGSTON RIDGE RD	Residential	B	1	1	69	70	65	5					
1068	1223 KINGSTON RIDGE RD	Residential	В	1	1	69	70	67	3					
1069	1221 KINGSTON RIDGE RD	Residential	В	1	1	69	70	67	3					
1070	1217 KINGSTON RIDGE RD	Residential	В	1	0	69	69	68	1					
1071	1215 KINGSTON RIDGE RD	Residential Residential	B	1	0	68	68	67	1					
1072	1330 KINGSTON RIDGE RD	Residential	B	1	6	56	62	56	6					
1074	1328 KINGSTON RIDGE RD	Residential	B	1	4	56	60	56	4					
1075	1324 KINGSTON RIDGE RD	Residential	В	1	5	58	63	58	5					
1076	1219 KINGSTON DIDGE DD	D	р	1	=	(1		(1						

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Residential B

### PROJECT EXAMPLE #2

In Project Example #2, the existing noise wall is partially removed and a replacement section is evaluated. There are also impacted receptors behind the existing noise wall. This example illustrates Situation 3(b) described in **Section 3.3** of this guidance.

The project in this example is the DNR for Project U-2719 (July 2021 – subject to the 2016 Traffic Noise Policy), the widening of I-440 from Walnut Street to Wade Avenue in Cary and Raleigh, North Carolina. There is an existing noise wall located in NSA 13 along westbound I-440, providing noise level reduction for homes off Myron Drive and connected cul-de-sacs. Figure 2 Sheets 24 and 25 from the U-2719 DNR that show this area are included following the text for this project example.

As shown in the figures, the western end of the existing noise wall runs along the shoulder of existing westbound I-440, and this section of noise wall along the shoulder must be removed in order to construct the project.

There are several receptors behind the existing wall in NSA 13 that are predicted to be impacted in the design-year build condition, even with the remaining portion of the existing noise wall in place. These are receptors 13020-13024, 13040, 13041, 13047, and 13048.

There are also impacted receptors at and near the western end of the existing noise wall where the existing noise wall must be removed to construct the project. These are receptors 1064-1072, 1119, 1120 and 1101.

The pages from U-2719 DNR Appendix D that show the results of the evaluation of the remaining portion of the existing noise wall and the noise wall replacement section NW13 are presented following the text and figures for this project example.

The first question to answer is whether the remaining portion of the existing noise wall is providing adequate benefits to receptors behind the wall even though there are impacted receptors behind the wall. Area/benefit is not a criterion for existing noise walls.

As shown on the Appendix D table following the figures for this project example, the remaining portion of the existing noise wall in NSA 13 does provide adequate benefits. This is determined by looking at the values in the arrowed columns, as shown in the excerpt below. Even in the small excerpt below, it can be seen there are at least two impacted receptors with a 5 dB(A) or more noise level reduction and one receptor with a 7 dB(A) or more noise level reduction. Therefore, a redesign of the remaining portion of the existing noise wall is not required.

	Table D.13 - No	oise Barrier Po	erforma	nce for N	oise Wa	13)			
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Remaining Wall	Build w/ Remaining Wall	Build w/o Existing Wall	Build w/ Remaining Wall and Replacement Extension	NLR w/ Remaining Wall and Replacement Extension
13050	2109 MYRON DR	Residential	В	1	2	52	54	52	2
13051	2113 MYRON DR	Residential	В	1	2	52	54	52	2
13052	2201 W CHARLOTTE CT	Residential	В	1	3	52	55	52	3
13053	2200 W CHARLOTTE CT	Residential	В	1	6	55	61	55	б
13054	2205 MYRON DR	Residential	В	1	5	57	62	57	5
13055	2209 MYRON DR	Residential	В	1	3	62	65	62	3
13056	2213 MYRON DR	Residential	В	1	3	64	67	64	3
13057	2205 W CHARLOTTE CT	Residential	В	1	4	51	55	51	4
13058	2208 W CHARLOTTE CT	Residential	В	1	2	52	54	52	2
13059	2204 W CHARLOTTE CT	Residential	В	1	2	53	55	53	2
13060	3309 HARDEN RD	Residential	В	1	3	55	58	55	3
13061	3305 HARDEN RD	Residential	В	1	2	62	64	62	2
13062	2104 E Charlotte CT	Residential	В	1	10	64	74	64	10
13063	2216-101 MYRON DR-FL1 - MyronPt	Residential	В	1	8	63	71	63	8

The second question to answer is whether a replacement noise wall section would provide sufficient noise level reduction to the receptors behind the removed noise wall section. To answer this question, replacement Noise Wall NW13 was evaluated. This noise wall is shown on U-2719 Figure 2 Sheet 24.

The Appendix D table for Noise Wall NW13 follows the text and figures for this project example. The table excerpt below shows the noise level reductions for the shorter (in length) remaining portion of the existing noise wall that would remain after project construction (column at blue arrow) and the noise level reductions for the remaining portion of the existing noise wall plus the replacement noise wall section (column at orange arrow).

2	Table D.13 - Noise Barrier Performance for Noise Wa 3 (NW13)												
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Remaining Wall	Build w/ Remaining Wall	Build w/o Existing Wall	Build w/ Remaining Wall and Replacement Extension	NLR w/ Remaining Wall and Replacement Extension				
13050	2109 MYRON DR	Residential	В	1	2	52	54	52	2				
13051	2113 MYRON DR	Residential	В	1	2	52	54	52	2				
13052	2201 W CHARLOTTE CT	Residential	В	1	3	52	55	52	3				
13053	2200 W CHARLOTTE CT	Residential	B	1	б	55	61	55	6				
13054	2205 MYRON DR	Residential	В	1	5	57	62	57	5				
13055	2209 MYRON DR	Residential	В	1	3	62	65	62	3				
13056	2213 MYRON DR	Residential	В	1	3	64	67	64	3				
12057	1105 WOUNDI OTTE OT	Decidential	D	1	A	\$1	CC	51	А				

Comparing the two columns in the full table, there are 13 more benefits when a replacement noise wall section NW13 is included. Of these benefits, there are at least two impacted receptors at 5 dB(A) or more of noise level reduction and one receptor at 7 dB(A) or more of noise level reduction. The area of the replacement noise wall section is 11,702 square feet. The area/benefit is 900 sq ft (11,702 divided by 13). This replacement noise wall NW13 is acoustically feasible and reasonable. The noise analyst should confirm that the noise wall is feasible to construct.









### Noise Wall 13 (-NW13-):

Location: Parallel to southbound I-440/US 1. Between Lake Boone Trail and Wade Avenue. An extension of the existing noise wall protecting residents on Charlotte Court, Caldwell Dive, and Mesa Court. The extension provides additional length to the existing wall on the southern end, towards the North Carolina Museum of Art.

	INM Kun: NSA 13 BAKKIEK Saved Barrier Analysis: Opt 9													
	NW12 is likely and page	W13 does me	et NCD	OT feasi	bility and reasonal	bleness criteria	TID Ducient II 27	10						
	Total Impacts:	47	be install	ied as pa	Terminus (South)	-NW13- -L3- 430	10+00.00 0+21.66	19						
	Impacted Receptors Benefited: Benefited Receptors (at least 7 dB(A) NLR) Non-Impacted Receptors Benefited: Total Benefits	11 7 2 13		Av	Terminus (North) Length (feet) verage Height (feet) Area (sq. feet)	-NW13- -L3-433 830 14 11,702	18+30.00 3+27.08							
	Area / Benefit: 900 Allowable Area / Benefit: 1,500													
	Table D.13 - Noise Barrier Performance for Noise Wall 13 (NW13)													
Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Remaining Wall	Build w/ Remaining Wall	Build w/o Existing Wall	Build w/ Remaining Wall and Replacement Extension	NLR w/ Remaining Wall and Replacement Extension					
13002a	Museum Park Trail	Trail	С	0.03	0	62	62	60	2					
13002b	Museum Park Trail	Trail	C	0.03	0	63	63	61	2					
13002c 13002d	Museum Park Trail	Trail	C	0.03	0	64	64	61	3					
13002e	Museum Park Trail	Trail	Č	0.03	0	66	66	62	4					
13002f	Museum Park Trail	Trail	С	0.03	0	65	65	62	3					
13002g	Museum Park Trail	Trail	C	0.03	0	65	65	62	3					
13002h 13003	3305 MFSA CT	Residential	B	0.03	0	63	68	62	5					
13004	3301 MESA CT	Residential	B	1	0	70	70	64	6					
13005	3300 MESA CT	Residential	В	1	0	71	71	62	9					
13006	3306 MESA CT	Residential	B	1	0	72	72	63	9					
13007	3309 MESA CT	Residential	B	1	0	68 72	68 72	60	8 0					
13003	3313 MESA CT	Residential	B	1	0	65	65	58	7					
13010	3316 MESA CT	Residential	В	1	0	68	68	60	8					
13011	1920 MYRON DR	Residential	В	1	0	63	63	59	4					
13012	1924 MYRON DR	Residential	B	1	0	62	62	58	4					
13013	1928 M Y RON DR 3320 MESA CT	Residential	B	1	0	60 66	60	55	5					
13015	2006 MYRON DR	Residential	B	1	1	63	64	60	4					
13016	1923 MYRON DR	Residential	В	1	0	52	52	50	2					
13017	1927 MYRON DR	Residential	В	1	1	56	57	54	3					
13018	2001 MYRON DR 3201 CALDWELL DR	Residential	B	1	0	59	59	56	3					
13019	3200 CALDWELL DR	Residential	B	1	6	72	76	67	9					
13021	3204 CALDWELL DR	Residential	В	1	5	70	75	67	8					
13022	3208 CALDWELL DR	Residential	В	1	7	69	76	68	8					
13023	3212 CALDWELL DR	Residential	B	1	6	69	75	69	6					
13024	3205 CALDWELL DR	Residential	B	1	0	70	70	65	5					
13026	3209 CALDWELL DR	Residential	B	1	1	65	66	63	3					
13027	3301 CALDWELL DR	Residential	В	1	2	64	66	63	3					
13028	3304 CALDWELL DR	Residential	B	1	5	62	67	62	5					
13029	2010 MYRON DR 2014 MYRON DR	Residential	B	1	1	64 59	60	58 57	3					
13031	2018 MYRON DR	Residential	B	1	0	59	59	57	2					
13032	2020 MYRON DR	Residential	В	1	0	61	61	60	1					
13033	3308 CALDWELL DR	Residential	B	1	1	60	61	60	1					
13034	2013 MYRON DR	Residential	B	1	0	50	57	55 56	1					
13036	2017 MYRON DR	Residential	B	1	1	61	62	60	2					
13037	3401 CALDWELL DR	Residential	В	1	1	58	59	58	1					
13038	3400 CALDWELL DR	Residential	В	1	0	55	55	54	1					
13039	2105 E CHARLOTTE CT 2101 E CHARLOTTE CT	Residential	B	1	<u> </u>	63	69	63						
13040	2100 E CHARLOTTE CT	Residential	B	1	11	66	77	66	11					
13042	2104 MYRON DR	Residential	В	1	3	59	62	59	3					
13043	2108 MYRON DR	Residential	В	1	3	56	59	56	3					
13044	2109 E CHARLOTTE CT	Residential	B	1	5	59	64	59	5					
13045	2200 WITKON DK 2204 MYRON DR	Residential	В	1	8	59 62	70	59 62	8					
13047	2208 MYRON DR	Residential	B	1	7	66	73	66	7					
13048	2212 MYRON DR	Residential	В	1	7	67	74	67	7					
13049	2105 MYRON DR	Residential	В	1	1	53	54	53	1					

### STIP Project U-2719 Design Noise Report Appendix D

Table D 13 -	Noise Barrier	Performance f	for Noise	Wall 13	(NW13)

Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Remaining Wall	Build w/ Remaining Wall	Build w/o Existing Wall	Build w/ Remaining Wall and Replacement Extension	NLR w/ Remaining Wall and Replacement Extension
13050	2109 MYRON DR	Residential	В	1	2	52	54	52	2
13051	2113 MYRON DR	Residential	В	1	2	52	54	52	2
13052	2201 W CHARLOTTE CT	Residential	В	1	3	52	55	52	3
13053	2200 W CHARLOTTE CT	Residential	B	1	6	55	61	55	6
13054	2205 MYRON DR	Residential	В	1	2	57	62	57	3
13055	2213 MYRON DR	Residential	B	1	3	64	67	64	3
13057	2205 W CHARLOTTE CT	Residential	B	1	4	51	55	51	4
13058	2208 W CHARLOTTE CT	Residential	В	1	2	52	54	52	2
13059	2204 W CHARLOTTE CT	Residential	В	1	2	53	55	53	2
13060	3309 HARDEN RD	Residential	В	1	3	55	58	55	3
13061	3305 HARDEN RD	Residential	B	1	2	62	64	62	2
13062	2104 E Charlotte CT	Residential	В	1	10	64	74	64	10
13063	2216-101 MYRON DR-FL1 - MyronPt 2216-201 MVRON DR FL2 - MyronPt	Residential	B	1	5	63 70	75	63 70	5
13065	2216-201 MTRON DR FL1 - MyronPt	Residential	B	1	5	61	66	61	5
13066	2216-202 MYRON DR FL2 - MyronPt	Residential	В	1	3	69	72	69	3
13067	2300-004 MYRON DR FL1-Myron Pt	Residential	В	1	13	65	78	65	13
13068	2300-104 MYRON DR FL2-Myron Pt	Residential	В	1	9	70	79	70	9
13069	2300-204 MYRON DR FL3-Myron Pt	Residential	В	1	1	79	80	79	1
13070	2300-003 MYRON DR FL1-Myron Pt	Residential	В	1	12	66	78	66	12
13071	2300-103 MYRON DR FL2-Myron Pt	Residential	В	1	6	73	79	73	6
13072	2300-203 MYRON DR FL3 - Myron Pt	Residential	B	1	2	<u>79</u>	80	<u>79</u> 63	1
13073	2300-202 MYRON DR FL1 - Myron Pt	Residential	B	1	5	69	00 74	69	5
13075	2300-101 MYRON DR FL1 -Myron Pt	Residential	B	1	2	60	62	60	2
13076	2300-201 MYRON DR FL2 -Myron Pt	Residential	В	1	1	71	72	71	1
13077	2304-004 MYRON DR FL1-Myron Pt	Residential	В	1	11	66	77	66	11
13078	2304-104 MYRON DR FL2-Myron Pt	Residential	В	1	6	73	79	73	6
13079	2304-204 MYRON DR FL3-Myron Pt	Residential	В	1	0	79	79	79	0
13080	2304-003 MYRON DR FL1-Myron Pt	Residential	В	1	9	68	77	68	9
13081	2304-103 MYRON DR FL2-Myron Pt	Residential	B	1	3	76	79	76	3
13082	2304-205 M FRON DR FL3 - Myron Pt	Residential	B	1	0	61	62	61	0
13084	2304-202 MYRON DR FL 2 - Myron Pt	Residential	B	1	2	69	71	69 69	2
13085	2304-101 MYRON DR FL1 -Myron Pt	Residential	B	1	0	67	67	67	0
13086	2304-201 MYRON DR FL2 -Myron Pt	Residential	В	1	0	73	73	73	0
13087	2308-004 MYRON DR FL1-Myron Pt	Residential	В	1	2	72	74	72	2
13088	2308-104 MYRON DR FL2-Myron Pt	Residential	В	1	1	74	75	74	1
13089	2308-204 MYRON DR FL3-Myron Pt	Residential	B	1	0	76	76	76	0
13090	2308-003 MYRON DR FL1-Myron Pt	Residential	B	1	1	71	72	71	1
13091	2308-203 MVRON DR FL2-Myron Pt	Residential	B	1	1	73	74	73	1
13092	2308-102 MYRON DR FL1 - Myron Pt	Residential	B	1	1	60	61	60	1
13094	2308-202 MYRON DR FL 2 - Myron Pt	Residential	B	1	1	65	66	65	1
13095	2308-101 MYRON DR FL1 -Myron Pt	Residential	В	1	1	61	62	61	1
13096	2308-201 MYRON DR FL2 -Myron Pt	Residential	В	1	2	64	66	64	2
13097	2309-B MYRON DR 1st Flr MeredithWdsManor	Residential	В	1	3	54	57	54	3
13098	2309-F MYRON DR 2nd flr MeredithWdsManor	Residential	B	1	4	59	63	59	4
13099	2309-D MYRON DR 1st FIr MeredithWdsManor	Residential	B	1	3	51	54	51	3
13100	2309-H MYRON DR 2nd Fir Meredith WdsManor	Residential	В	1	4	55	56	55	4
13102	2305-H MYRON DR 2nd Flr MeredithWdsManor	Residential	B	1	2	58	60	58	2
13103	2305-B MYRON DR 1st Flr MeredithWdsManor	Residential	B	1	1	55	56	55	1
13104	2305-F MYRON DR 2nd Flr MeredithWdsManor	Residential	В	1	2	57	59	57	2
13105	2309-A MYRON DR 1st Flr MeredithWdsManor	Residential	В	1	1	65	66	65	1
13106	2309-E MYRON DR 2nd Flr MeredithWdsManor	Residential	В	1	1	66	67	66	1
13107	2309-C MYRON DR 1st Flr MeredithWdsManor	Residential	В	1	1	65	66	65	1
13108	2309-G MYRON DR 2nd Flr MeredithWdsManor	Residential	B	1	1	66	67	66	1
13109	2305-A MYRON DR 1st FIr MeredithWdsManor	Residential	B	1	0	63	63	63	0
13110	2305-C MYRON DR 1st Flr MeredithWdsMapor	Residential	B	1	0	62	62	62	0
13112	2305-E MYRON DR 2nd Flr MeredithWdsManor	Residential	B	1	1	64	65	64	1
13116	3313 Harden Rd	Residential	B	1	2	55	57	55	2
13117	3317 Harden Rd	Residential	В	1	3	52	55	52	3

### Table D.13 - Noise Barrier Performance for Noise Wall 13 (NW13)

Rec. No.	Address	Use	NAC	D/U	NLR <sup>2</sup> w/ Only Remaining Wall	Build w/ Remaining Wall	Build w/o Existing Wall	Build w/ Remaining Wall and Replacement Extension	NLR w/ Remaining Wall and Replacement Extension
13119	3312 Harden Rd	Residential	В	1	1	58	59	58	1
13120	3316 Harden Rd	Residential	В	1	1	59	60	59	1
						Total I	Benefits from only l	Existing Noise Wall <sup>1</sup>	28
					1	<b>Fotal Benefits from I</b>	Existing Noise Wall	and New Extension	41
	Yellow highlight with black text	indicates an impa	acted recep	tor due to	substantial increase				

indicates an impacted receptor indicates a 5 to 6 dB(A) noise level reduction

Blue highlight with white text Green highlight with white text

indicates at least a 7 dB(A) noise level reduction

 $^1$  A receptor is considered benefited if it has a predicted noise level reduction of at least 5 dB(A)  $^2$  Noise Level Reduction