Coalfields Expressway Section A

Buchanan County, Virginia

NOISE REPORT ADDENDUM

July 2003

LOCHNER

Current VDOT Project Number: 0121-013-101, PE101

Former VDOT Project Number: R000-961-101, PE101

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1. SUMMARY

The purpose of this study is to determine the effect of the proposed Coalfields Expressway (CFX) Section A on sound levels in the immediate project area. This noise study investigated possible noise impacts along the section of the CFX that extends from existing Route 460, north of the Town of Grundy, to Bull Gap in Buchanan County, Virginia. Approximately twenty-nine properties were initially identified as being noise sensitive which were incorporated into detailed noise modeling. This section of the proposed CFX will result in an impact to one noise-sensitive property.

2. PROJECT DESCRIPTION

The CFX is planned for designation as a four-lane facility. The study area, which begins at Route 23 near Pound, Virginia and ends near the West Virginia State line, is approximately 97 kilometers (60 miles) in length and up to 16 kilometers (10 miles) wide. The study area is located in Wise, Dickenson, and Buchanan counties and comprises a portion of the Cumberland Mountain section of the Appalachian Plateau physiographic region, which is characterized by steep slopes, V-shaped valleys, and narrow floodplains. The Route 460 Connector would interchange with the CFX near Bull Gap and extend northwest 4.9 kilometers (3.1 miles) to link with Kentucky's Route 460 project near Breaks, Virginia.

The noise studies for the CFX and Route 460 Connector projects were completed in March 1999 and May 2001, respectively. Under the provisions of the Virginia Public-Private Partnership Act of 1995, Kellogg, Brown & Root, Inc. (KBR) has entered into an agreement with the Virginia Department of Transportation (VDOT) to construct a 7-mile portion of CFX and a 0.5 mile portion of the Route 460 Connector, designated as Section A (see Exhibit 1).

The roadway's design speed has been increased from 50 to 55 mph and, to reduce impacts from this design change, the proposed median width has been reduced, generally reducing the original footprint studied during the EIS. However, the revised construction limits differ from, and in some areas extend outside of, the limits originally studied as part of the EIS. Section A also includes two connector roads at Section A's termini. On the west end, the Route 609 connector would link Section A with Route 609. At the eastern terminus, Ramp 2 would carry traffic between Section A and existing Route 460 north of Grundy.

To account for these design changes, KBR is currently preparing re-evaluations of the original National Environmental Policy Act (NEPA) documents for the CFX and Rt. 460 Connector. VDOT will prepare the addendum to the Route 460 Connector noise report. This report serves as an addendum to the original CFX Noise Study Technical Report.

3. GUIDELINES

The noise impacts for the build alternative have been assessed in accordance with Federal Highway Administration (FHWA) guidelines published in 23 Code of Federal Regulations, Part 772. In order to determine the degree of impact of highway traffic noise on human activity, the Noise Abatement Criteria (NAC) established by Part 772 are used. The NAC, listed in Table 1 for various activities, represent the upper limit of acceptable traffic noise conditions as well as a measure of that which may be desirable with that which may be achievable. The NAC apply to areas having regular human use and where lowered noise levels are desired. They do not apply to the entire tract of land on which the activity is based, but only to that portion where the activity takes place.

The NAC are given in terms of the hourly, A-weighted, equivalent sound level in decibels or dB(A). The A-weighted sound level is a single number measure of sound intensity with weighted frequency characteristics that correspond to human subjective response to noise. However, since most environmental noise fluctuates from moment to moment, it is common practice to condense all of this information into a single number called the equivalent sound level (Leq). The Leq is the value of a steady sound level that would represent the same sound energy as the actual time-varying sound levels evaluated over the same time period. For highway traffic noise assessment, Leq is typically evaluated over a one hour period, and is denoted as Leq(h).

The noise impact assessment is made using the guidelines listed in Table 1. If, for a given activity, the design year noise levels “approach or exceed the NAC”, then the activity is impacted and a series of abatement measures must be considered. The Commonwealth of Virginia has defined approach as one decibel less than the NAC. A second criterion for assessing impact is provided in the Federal guidelines. For some locations a project may impose a large increase in noise levels over existing levels, even though the levels may not reach the NAC. Virginia’s policy defines an increase of 10 dB(A) or more as a “substantial increase” that justifies consideration of noise abatement measures. The final decision to recommend abatement measures along a project corridor will take

into account the feasibility of the design and the construction cost per protected receptor weighed against the environmental benefit.

4. METHODS

The primary task in determining noise impacts is to identify activity areas within the project limits that are sensitive to noise. These areas are then represented by a specific site (typically a building or residence) chosen because of its proximity to the roadway in question. The areas are defined not only by differing activities, but also by traffic changes or spatial groupings that clearly separate land use.

Preliminary noise modeling of the worst case situation showed no impacts would occur outside a corridor 250 feet wide. An analysis of the 250 foot wide corridor revealed twenty-nine properties which may be impacted by noise and were therefore represented in the noise modeling by twenty analysis sites. Twenty-eight of the properties are residences and one is a church. Exhibit 2 shows the approximate locations of these noise modeling sites.

A FHWA-approved highway noise prediction computer model (FHWA Traffic Noise Model, Version 2.0) was used to determine the traffic generated noise for build conditions. The model accounts for such factors as terrain, atmospheric absorption, ground absorption, intervening barriers, roadway geometry, receptor distance, vehicle volumes and speeds, and volumes of medium trucks (vehicles with 2 axles/6 tires) and heavy trucks (3 axles or more). Noise levels have been predicted for that hour of the day when the vehicle volume, operating speed and number of heavy trucks combine to produce the worst traffic noise conditions.

Existing traffic data was only available for US Route 460. Existing (1997) noise levels in that area were determined by modeling and were assumed to be the same for the No-build (2025) condition due to very low growth. Existing and No-Build noise levels in all other areas were assumed to be the same as were determined in the previous study (CFX Environmental Impact Statement, 2001) for the entire project corridor.

The assessment of traffic noise impacts requires three comparisons:

1) The noise levels under existing conditions must be compared to those under build conditions. This comparison shows the change in noise level that will occur between the present time and the design year if the project is built.

2) The noise levels under design year no-build conditions must be compared to those under build conditions. This comparison shows how much of the change in levels will be attributed to the proposed project.

3) The noise levels under build conditions must be compared to the applicable NAC. This comparison determines the compatibility of noise levels under build conditions and present land use.

Table 2 summarizes the noise prediction results. Included for each site are the applicable NAC and the highest hourly equivalent sound levels for the existing, no-build, and build conditions.

5. IMPACT ASSESSMENT

The results of the noise study, as presented in Table 2, indicate that the proposed improvements will have a varying effect on traffic noise levels for noise sensitive properties. For reference purposes, an increase of 3 decibels is considered barely perceptible, and an increase of 10 decibels is considered to double the loudness.

Comparing Design Year No- Build with the Existing Condition

Noise levels can be expected to remain the same as existing year (1997) levels for the design year (2025) no-build condition due to the lack of any projected increase in traffic or development.

Comparing Design Year Build with the Existing Condition

Comparing the design year build alternative noise levels with existing indicates a small range in noise level differences. Traffic noise levels are predicted to be one to five dB(A) higher than existing levels except at one site north of the proposed Ramp 2, which is predicted to be three dB(A) lower than existing levels. The increases are due to the new CFX and the decrease is due to the diversion of traffic onto the new facility.

Comparing Design Year Build with No-Build

Since design year no-build noise levels are the same as existing levels, a comparison between the design year build alternatives and the no-build is identical to that of the design year build alternatives and the existing condition.

Comparing Design Year Build with NAC

A comparison of the design year build noise levels with the applicable NAC reveals that one property will experience noise levels from the CFX, ramps, connectors or US 460 that will approach or exceed the NAC. The one impacted property is a church located at the end of Ramp 2.

No properties will experience a substantial increase in traffic noise levels.

Summarizing the impact assessment – It would be reasonable to assume that a project of this magnitude (8+ miles of roadway) which skirts several developed areas would generate enough noise to impact several properties adjacent to the proposed roadway. Modeling, however, has indicated that at only one location would the noise criteria be approached or exceeded. Upon close examination of the noise analyses, it is apparent that there are two major reasons why so few properties will be impacted. They are: (1) Due to the rugged terrain of the area, cut and fill sections will require considerable right of way. This required right of way width would result in the acquisition of most of those properties that are close enough to a build alternative to be in violation of VDOT noise level criteria and (2) Low projected traffic volumes on the CFX.

6. POTENTIAL NOISE ABATEMENT MEASURES

The potential for the construction of a sound barrier and other traffic noise mitigation features for the impacted property are discussed below.

The Federal Aid Policy Guide (FAPG), Part 772 identifies certain noise abatement measures that may be incorporated in the project design to reduce traffic noise impacts. These abatement measures include: traffic management, alteration of vertical and/or horizontal alignments, and the construction of sound barriers.

Traffic Management

Traffic management measures that are considered effective to reduce traffic noise include speed reduction and the restriction of heavy truck traffic. Speed reduction along this project is not considered applicable. One purpose of this project is to provide a limited access, high-speed facility. Restricting heavy truck traffic would also not be effective since another purpose of this project is to provide a strategic route for truck traffic.

Vertical Alignment Alteration

Altering the vertical alignment is only effective for traffic noise reduction when there is truck traffic present and the roadway gradient can be sufficiently altered

(2% or more change). The noise impact occurs in an area where the gradient of the roadway is relatively flat, and modifying the vertical alignment will not have any effect on noise levels.

Horizontal Alignment Alteration

Altering the horizontal alignment can be an effective measure for reducing traffic noise but is difficult to accomplish. The impacted church is located at a point where the proposed roadway meets the existing alignment of Route 460. Moving the roadway to avoid the noise impact would require extensive additional right of way and acquisition of other properties.

Sound Barriers

The construction of a sound barrier has been considered for the impacted receptor. Sound barriers are only effective when there are no openings for pedestrian or vehicular access. In order for a barrier to be effective it must be continuous along the roadway adjacent to the impacted site or sites. The impacted church is located in an area where access is provided from Route 460. Any sound barrier constructed to protect the church would need a break for an access driveway which would render the barrier ineffective. Therefore, a barrier is not considered feasible at this location.

7. CONSTRUCTION NOISE

Land uses that would be sensitive to traffic noise would also be sensitive to construction noise. A method of controlling construction noise is to establish the maximum level of noise that construction operations can generate. In view of this, the Department has developed, and the FHWA has approved, a specification that establishes construction noise limits. This specification can be found in VDOT's Road and Bridge Specifications, 2002, Section 107.14 (b.3), Page 80, "Pollution, Noise". The contractor will be required to conform to this specification to reduce the impact of construction noise on the surrounding community.

TABLES

TABLE 1

FHWA NOISE ABATEMENT CRITERIA

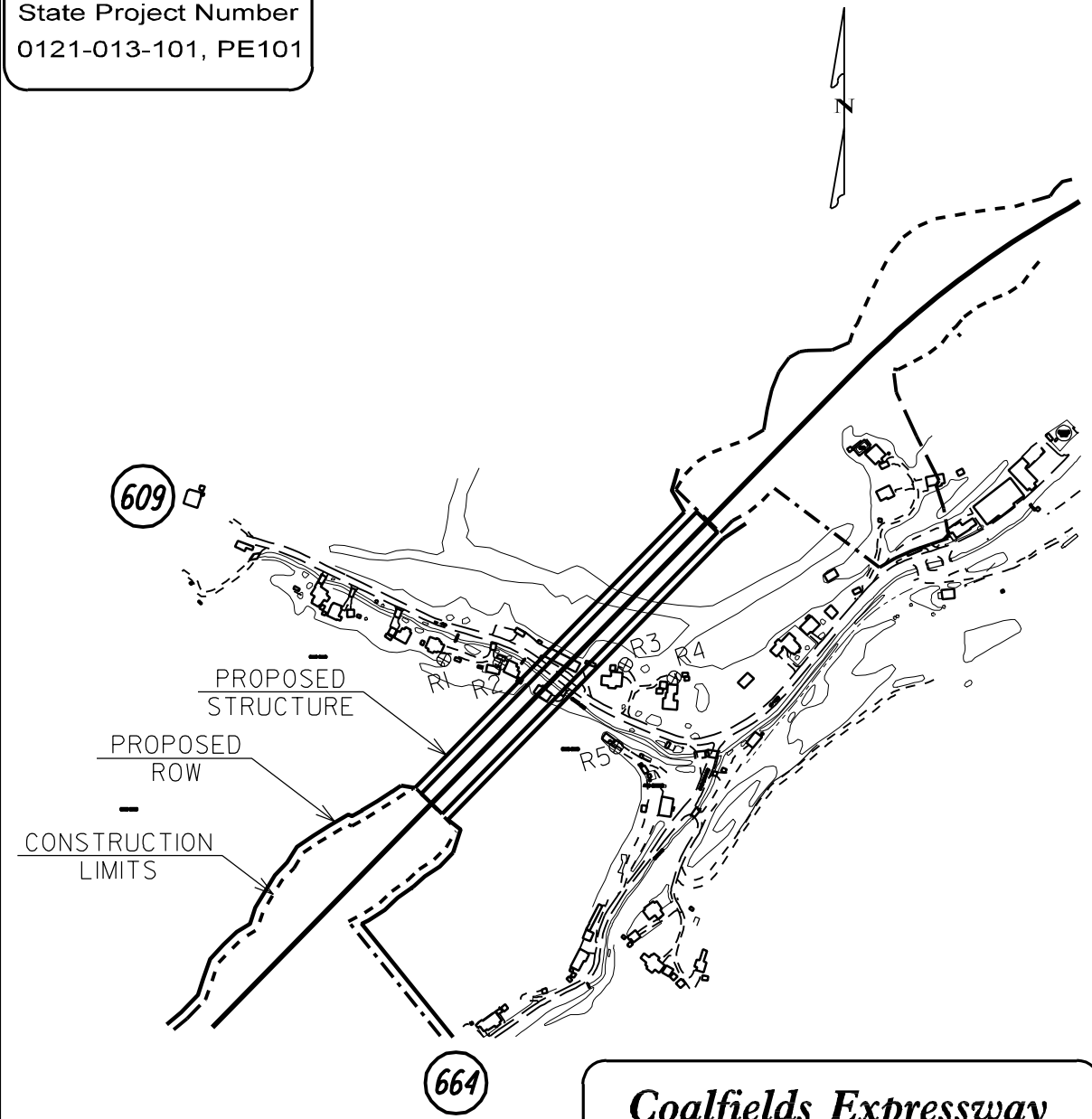
Activity Category	Leq (h) dB(A)	Description of Activity
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreational areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed land, properties or activities not included in Categories A or B above.
D	----	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Table 2
Noise Analysis Locations and Results

	Location						NAC	Noise Levels dB(A)				
	Existing		Proposed		Residences	Churches	Land Use	Existing	Build	No Build	Build-Ex	Impacted
Receptor	Roadway	Offset	Roadway	Offset	Represented	Represented	Category	(2001)	(2020)	(2020)	dB(A)	Properties
1	609	90'	Coalfields	265'	1		B	51	54	51	3	
2	609	50'	Coalfields	145'	1		B	51	52	51	1	
3	609	130'	Coalfields	120'	1		B	51	52	51	1	
4	609	160'	Coalfields	245'	1		B	51	53	51	2	
5	609	90'	Coalfields	265'	1		B	51	55	51	4	
6	601	50'	Coalfields	270'	2		B	51	54	51	3	
7	601	175'	Coalfields	250'	3		B	51	54	51	3	
8	601	65'	Coalfields	120'	2		B	51	53	51	2	
9	601	245'	Coalfields	135'	4		B	51	54	51	3	
10	601	365'	Coalfields	200'	1		B	51	56	51	5	
11	601	30'	Coalfields	270'	1		B	51	53	51	2	
12	604	125'	Coalfields	265'	1		B	51	55	51	4	
13	604	85'	Coalfields	130'	1		B	51	52	51	1	
14	604	115'	Coalfields	220'	1		B	51	54	51	3	
15	604	130'	Coalfields	310'	1		B	51	55	51	4	
16	US 460	70'	US 460	385'	2		B	65	62	65	-3	
17	US 460	85'	US 460	85'	1		B	64	65	64	1	
18	US 460	85'	US 460	85'	2		B	63	65	63	2	
19	US 460	125'	US 460	125'	1		B	63	64	63	2	
20	US 460	40'	US 460	40'		1	B	67	68	67	1	1
Total					**28**	**1**						**1**

EXHIBITS

State Project Number
0121-013-101, PE101

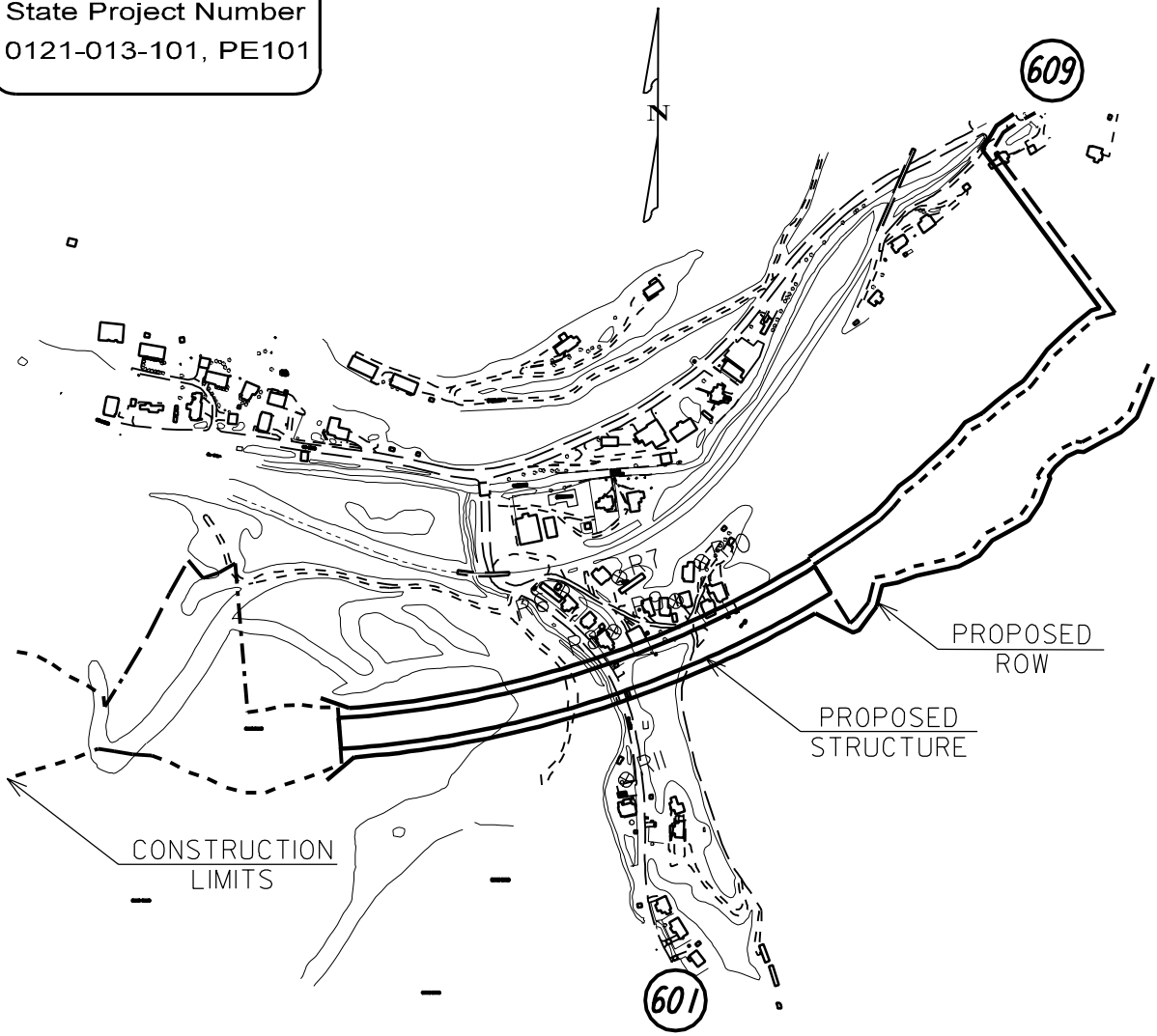


Coalfields Expressway
Noise Study Addendum

Analysis Locations

Exhibit 2, Sheet 1 of 4

State Project Number
0121-013-101, PE101



0 2,500 ft 5,000 ft

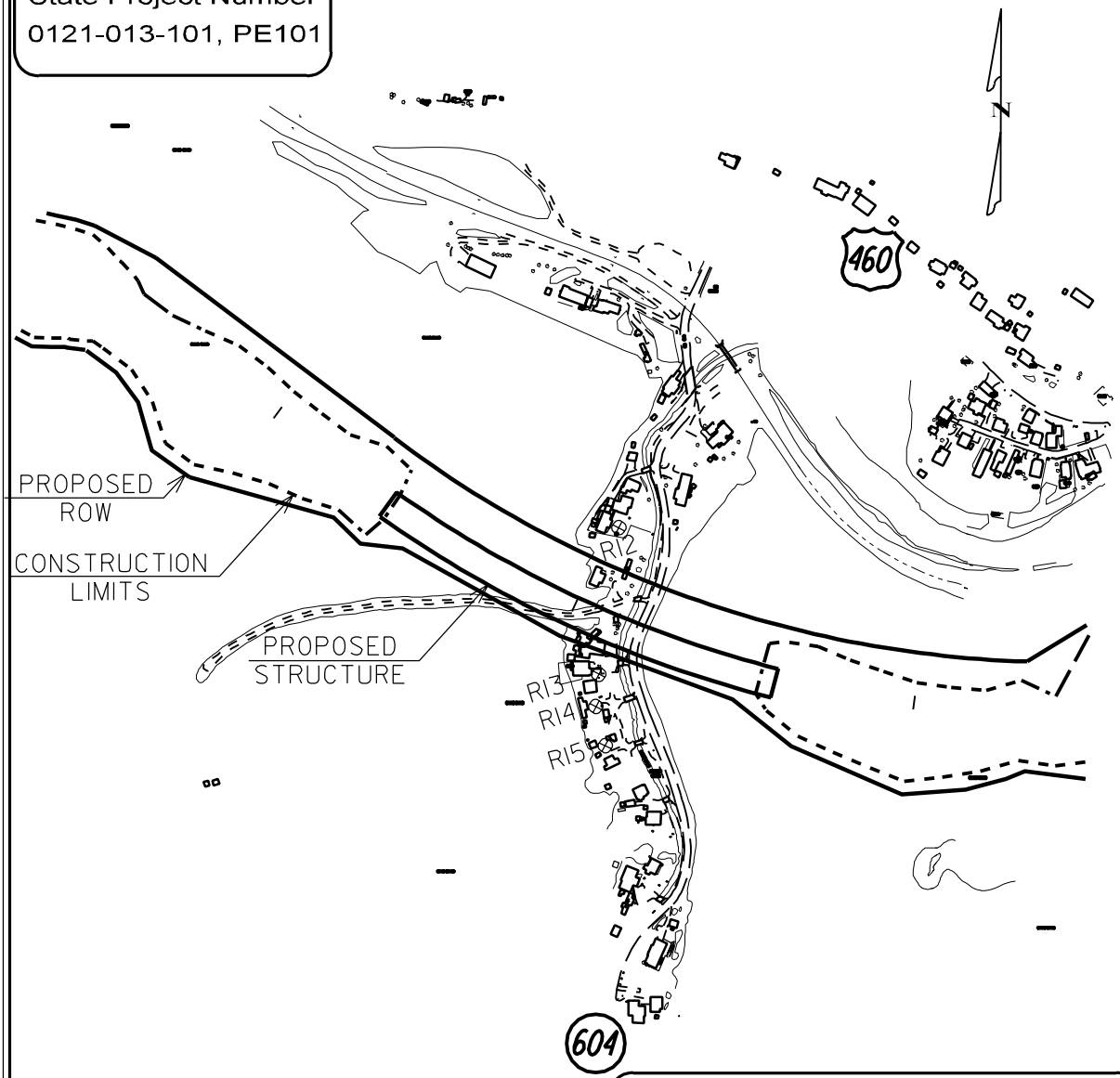
0 50 m 100 m 150 m

Coalfields Expressway Noise Study Addendum

Analysis Locations

Exhibit 2, Sheet 2 of 4

State Project Number
0121-013-101, PE101

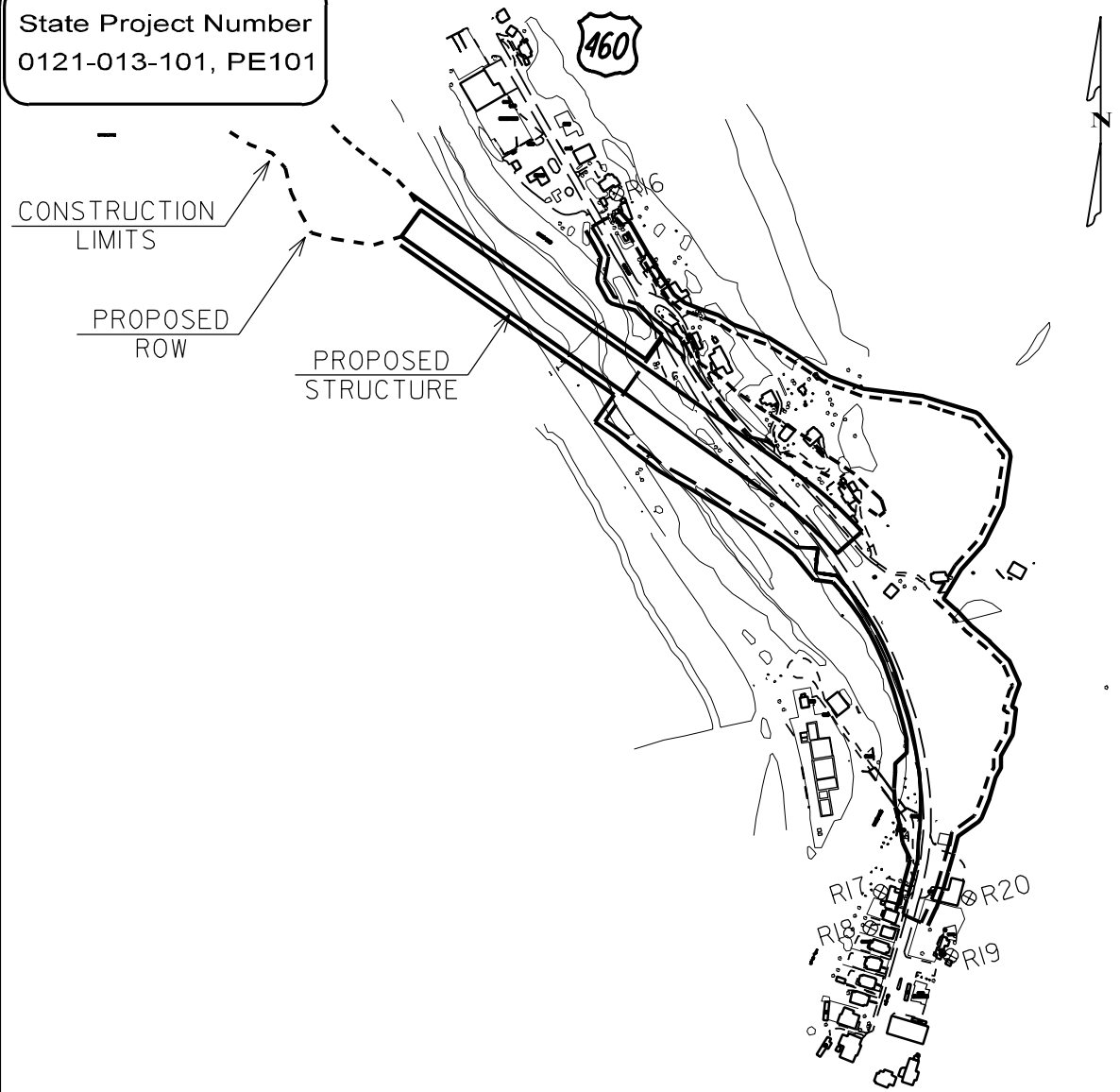


Coalfields Expressway
Noise Study Addendum

Analysis Locations

Exhibit 2, Sheet 3 of 4

State Project Number
0121-013-101, PE101



0 2,500 ft 5,000 ft

0 50 m 100 m 150 m

Coalfields Expressway Noise Study Addendum

Analysis Locations

Exhibit 2, Sheet 4 of 4

APPENDIX

VDOT
Shannon
21 July 2003
TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 1647
RUN: Coalfields Existing No Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R16	17	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R17	18	1	0.0	63.6	66	63.6	10	----	63.6	0.0	8	-8.0
R18	19	1	0.0	62.9	66	62.9	10	----	62.9	0.0	8	-8.0
R19	21	1	0.0	62.5	66	62.5	10	----	62.5	0.0	8	-8.0
R20	23	1	0.0	67.1	66	67.1	10	Snd Lvl	67.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

VDOT 21 July 2003
Shannon TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 1647
RUN: Coalfields Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	1	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
R2	2	1	0.0	52.1	66	52.1	10	----	52.1	0.0	8	-8.0
R3	3	1	0.0	51.9	66	51.9	10	----	51.9	0.0	8	-8.0
R4	4	1	0.0	53.1	66	53.1	10	----	53.1	0.0	8	-8.0
R5	5	1	0.0	54.5	66	54.5	10	----	54.5	0.0	8	-8.0
R6	6	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
R7	7	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
R8	8	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R9	9	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
R10	10	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R11	11	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R12	12	1	0.0	54.8	66	54.8	10	----	54.8	0.0	8	-8.0
R13	13	1	0.0	52.1	66	52.1	10	----	52.1	0.0	8	-8.0
R14	14	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
R15	15	1	0.0	54.7	66	54.7	10	----	54.7	0.0	8	-8.0
R16	17	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
R17	18	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
R18	19	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
R19	21	1	0.0	63.5	66	63.5	10	----	63.5	0.0	8	-8.0
R20	23	1	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB

All Selected		20	0.0	0.0	0.0						
All Impacted		1	0.0	0.0	0.0						
All that meet NR Goal		0	0.0	0.0	0.0						