TRAFFIC NOISE TECHNICAL REPORT
for the
Proposed Improvements of US Route 51
(Route FA 322)
Counties of Jefferson, Washington, Clinton, Marion, Fayette, Shelby, and Christian, Illinois

Prepared for

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HDR, Inc.

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Huff & Huff, Inc.
2013

TABLE OF CONTENTS

Page

1. INTRODUCTION 1

2. NOISE BACKGROUND AND REGULATIONS 4
   - 2.1 Noise Background 4
   - 2.2 Federal Regulations 4
   - 2.3 IDOT Policy 6

3. NOISE ANALYSIS METHODOLOGY 7
   - 3.1 Noise Analysis Sections (Urban and Rural) 7
   - 3.2 Receptor Locations 7
   - 3.3 Noise Monitoring 15
   - 3.4 TNM Noise Level Predictions 23
   - 3.5 Noise Abatement Evaluation Methodology 24

4. TRAFFIC NOISE AND ABATEMENT ANALYSIS 27
   - 4.1 Section 1: South Limit to Wamac (Rural) 27
   - 4.2 Section 2: Wamac, Centralia, Central City, Junction City, and Sandoval (Urban) 29
   - 4.3 Section 3: Sandolval to Patoka (Rural) 32
   - 4.4 Section 4: Patoka and Vernon (Urban) 34
   - 4.5 Section 5: Vernon to Shobonier (Rural) 36
   - 4.6 Section 6: Shobonier and Vandalia (Urban) 38
   - 4.7 Section 7: Vandalia to Ramsey (Rural) 44
   - 4.8 Section 8: Ramsey (Urban) 45
   - 4.9 Section 9: Ramsey to Oconee (Rural) 47
   - 4.10 Section 10: Oconee (Urban) 49
   - 4.11 Section 11: Oconee to North Limit (Rural) 51

5. CONSTRUCTION NOISE 54

6. SUMMARY 55

LIST OF TABLES

TABLES

2.2-1 NOISE ABATEMENT CRITERIA – HOURLY WEIGHTED SOUND LEVEL.....5
3.1-1 NOISE ANALYSIS SECTIONS.....7
3.2-1 NOISE RECEPTOR LOCATIONS.....14
3.3-1 NOISE MONITORING RESULTS, L_{eq}.....22
4.1-1 SECTION 1 NOISE RECEPTOR LOCATIONS.....27
4.1-2 SECTION 1 NOISE MONITORING RESULTS.....27
4.1-3 SECTION 1 NOISE MODELING RESULTS.....28
4.2-1 SECTION 2 NOISE RECEPTOR LOCATIONS.....29
4.2-2 SECTION 2 NOISE MONITORING RESULTS.....30
4.2-3 SECTION 2 NOISE MODELING RESULTS.....31
4.3-1 SECTION 3 NOISE RECEPTOR LOCATIONS.....32
4.3-2 SECTION 3 NOISE MONITORING RESULTS.....32
4.3-3 SECTION 3 NOISE MODELING RESULTS.....33
4.4-1 SECTION 4 NOISE RECEPTOR LOCATIONS.....34
4.4-2 SECTION 4 NOISE MONITORING RESULTS.....34
4.4-3 SECTION 4 NOISE MODELING RESULTS.....35
4.5-1 SECTION 5 NOISE RECEPTOR LOCATIONS.....36
4.5-2 SECTION 5 NOISE MONITORING RESULTS.....36
4.5-3 SECTION 5 NOISE MODELING RESULTS.....37
4.6-1 SECTION 6 NOISE RECEPTOR LOCATIONS.....38
4.6-2 SECTION 6 NOISE MONITORING RESULTS.....39
4.6-3 SECTION 6 NOISE MODELING RESULTS.....40
4.6-4 SECTION 6 ADJUSTED ALLOWABLE COST PER BENEFITTED RECEPTOR SUMMARY.....41
4.6-5 SECTION 6 NOISE WALL COST REASONABLENESS EVALUATION.....41
4.7-1 SECTION 7 NOISE RECEPTOR LOCATIONS.....44
4.7-2 SECTION 7 NOISE MONITORING RESULTS.....44
4.7-3 SECTION 7 NOISE MODELING RESULTS.....45
4.8-1 SECTION 8 NOISE RECEPTOR LOCATIONS.....46
4.8-2 SECTION 8 NOISE MONITORING RESULTS.....46
4.8-3 SECTION 8 NOISE MODELING RESULTS.....47
4.9-1 SECTION 9 NOISE RECEPTOR LOCATIONS.....48
4.9-2 SECTION 9 NOISE MONITORING RESULTS.....48
4.9-3 SECTION 9 NOISE MODELING RESULTS.....49
4.10-1SECTION 10 NOISE RECEPTOR LOCATIONS.....49
4.10-2SECTION 10 NOISE MONITORING RESULTS.....50
4.10-3SECTION 10 NOISE MODELING RESULTS.....51
4.11-1SECTION 11 NOISE RECEPTOR LOCATIONS.....51
4.11-2SECTION 11 NOISE MONITORING RESULTS.....52
4.11-3SECTION 11 NOISE MODELING RESULTS.....52

LIST OF FIGURES

FIGURES

1 PROJECT LOCATION MAP....2
2 PROJECT SECTIONS....8
3 LAND USE....10
4 NOISE RECEPTORS....16
5 ANALYZED NOISE WALL LOCATION MAP....43

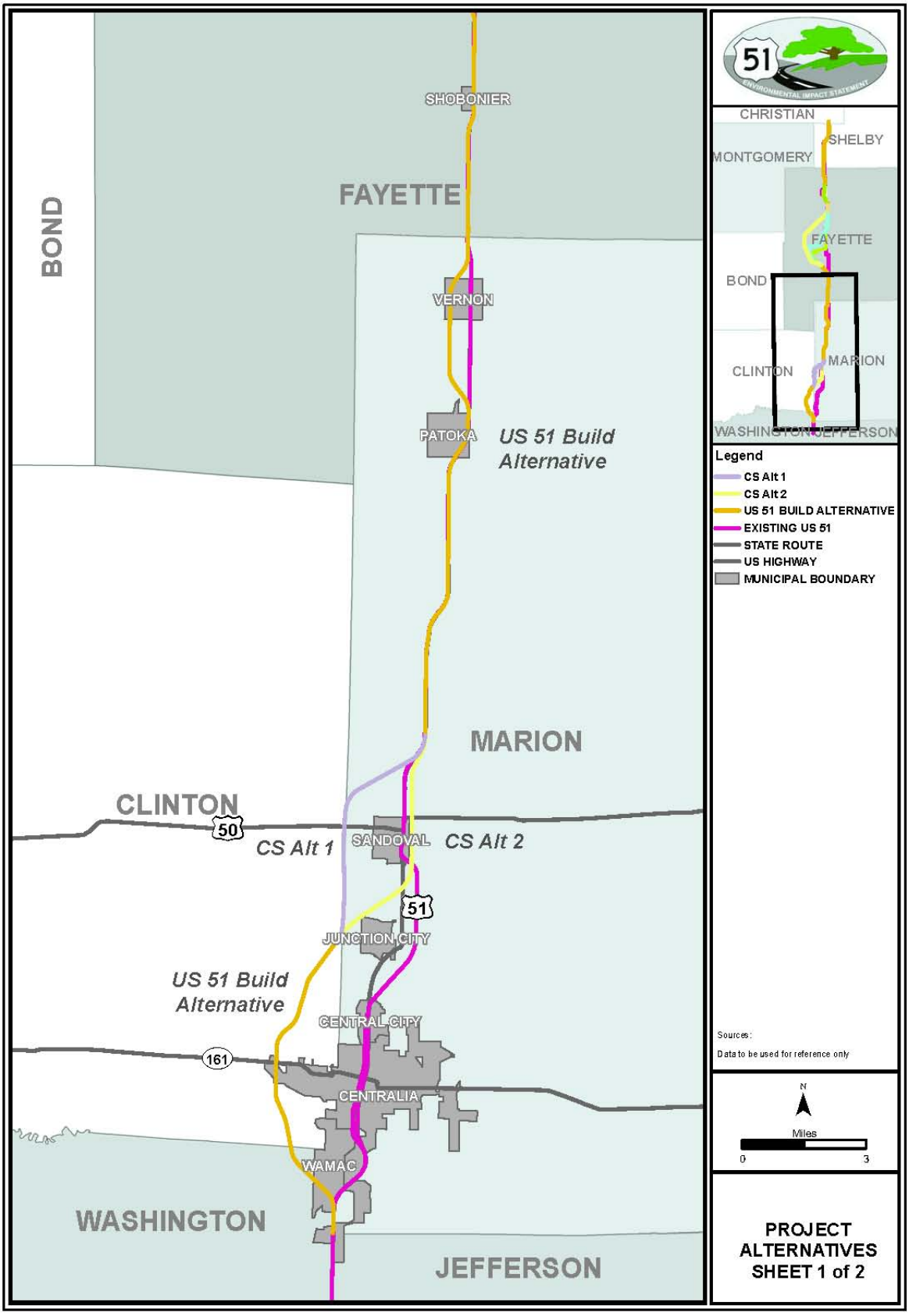
LIST OF APPENDICES

APPENDIX A: CONTOUR ANALYSIS

1. INTRODUCTION

US Route 51 is a highway extending the length of Illinois from Rockford to Cairo. One portion of US 51 between Pana and Centralia is currently two lanes, while the rest of US Route 51 in Illinois is either currently four lanes or planned to become four lanes. This project proposes the expansion of US Route 51 from two lanes to four lanes from south of Pana to south of Centralia, Illinois, on both existing and new alignments. The study area, shown in Figure 1, is within Jefferson, Washington, Clinton, Marion, Fayette, Shelby, and Christian counties. Within these counties, US Route 51 passes through or is in close proximity to the communities of Pana, Oconee, Ramsey, Vandalia, Shobonier, Vernon, Patoka, Sandoval, Central City, Junction City, Centralia, and Wamac.

This report presents the Federal and state noise regulations (Section 2), a description of the noise analysis methodology, noise sensitive receptors, field noise monitoring, and abatement analysis methodology (Section 3), the analysis of the existing and future noise levels, the noise abatement analysis, and coordination with local officials for undeveloped lands (Section 4), construction noise (Section 5), and the noise analysis conclusion (Section 6). Each section is broken down into sections of the project, divided by community.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SANDOVAL
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JUNCTION CITY
US 51 Build Alternative
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CENTRALIA
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WASHINGTON
JEFFERSON
CHRISTIAN
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MONTGOMERY
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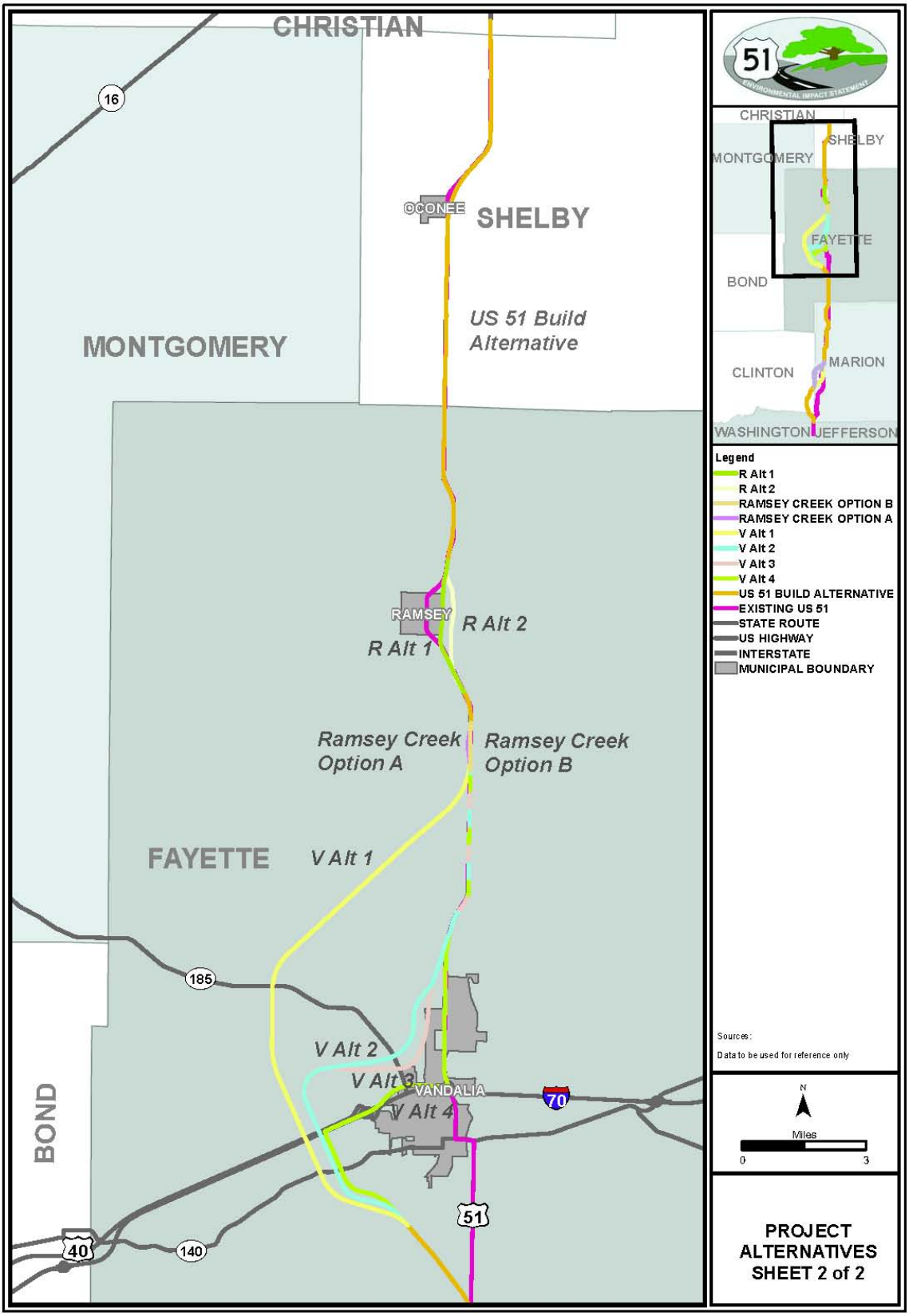
PROJECT ALTERNATIVES
SHEET 1 of 2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US 51 Build Alternative
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R Alt 1
Ramsey Creek Option A
Ramsey Creek Option B
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RAMSEY CREEK OPTION B
RAMSEY CREEK OPTION A
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PROJECT ALTERNATIVES SHEET 2 of 2

2. NOISE BACKGROUND AND REGULATIONS

2.1 Noise Background

Sound is caused by the vibration of air molecules, and is measured on a logarithmic scale using units of decibels (dB). Sound is composed of a wide range of frequencies; however, the human ear is not uniformly sensitive to all frequencies. Therefore, the "A" weighted scale was devised to correspond with the ear's sensitivity. The A-weighting generally weights more heavily noise levels in the humanly audible range and screens out noise levels that cannot be heard but are still generated, such as a high frequency dog whistle. The A-weighted unit is used because:

1) It is easily measured.
2) It approximates the human ear's sensitivity to sounds of different frequencies.
3) It matches attitudinal surveys of noise annoyance better than other noise measurements.
4) It has been adopted as the basic unit of environmental noise by many agencies around the world in dealing with community noise issues.

The equivalent sound level is the steady-state, A-weighted sound level, which contains the same amount of acoustic energy as the actual time-varying, A-weighted sound level over a specified period of time. If the time period is 1 hour, the descriptor is the hourly equivalent sound level or $L_{eq}(h)$, which is widely used by state highway agencies as a descriptor of traffic noise. It is generally the equivalent level of sound (in decibels or dB(A)) which represents the level of sound, held constant over a specified period of time, which reflects the same amount of energy as the actual fluctuating noise over that time period. L_{eq} is based on the energy average, not a noise level average.

2.2 Federal Regulations

Traffic noise analyses are required for all projects considered a Type I project. The Federal regulations define Type I projects as any of the following:

- The construction of a highway on new location
- The physical alteration of an existing highway where there is either:
  - *Substantial Horizontal Alteration*. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition
  - *Substantial Vertical Alteration*. A project that removes shielding, therefore, exposing the line-of-sight between the receptor and the traffic noise source (This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor.)
- The addition of a through-traffic lane(s) (This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane.)
- The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane

- The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange
- Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane
- The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza

This proposed improvement to US Route 51 would be characterized as a Type I noise project as it includes a substantial horizontal alteration and the addition of through-traffic lanes.

The Federal regulations establish noise abatement criteria to establish noise levels where noise abatement should be evaluated. Five separate noise abatement criteria (NAC) based upon land use are used by the FHWA to assess potential noise impacts. A traffic noise impact occurs when noise levels approach or exceed the NAC listed in Table 2.2-1.[1] In determining the applicable noise activity category for the study area, existing land use was reviewed. The applicable NAC for all residential noise receptors evaluated is 67 dB(A).

TABLE 2.2-1
NOISE ABATEMENT CRITERIA - HOURLY WEIGHTED SOUND LEVEL

Activity Category[1]	$L_{eq}(h)$	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	Exterior	Residential.
C	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	---	Undeveloped lands that are not permitted.

[1] Based on 23 Code of Federal Regulations Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (adopted 2010)

2.3 IDOT Policy

Based on the FHWA regulations, State Highway Authorities are allowed to establish the noise level determined to approach the NAC and the increase in noise levels determined to be a substantial increase. The Illinois Department of Transportation (IDOT) defines noise impacts as follows:

- Design-year traffic noise levels approach, meet or exceed the NAC, with approach defined as 1 dB(A) (for example, the approach value for the residential NAC of 67 dB(A) would be 66 dB(A)).

- Design-year traffic noise levels are a substantial increase over existing traffic generated noise levels, defined as an increase greater than 14 dB(A).

3. NOISE ANALYSIS METHODOLOGY

3.1 Noise Analysis Sections (Urban and Rural)

To facilitate with the screening process and the readability of the noise analysis, the project corridor has been divided into sections. The sections were separated roughly into towns and the rural areas between town centers, resulting in eleven sections. Figure 2 details the project sections.

TABLE 3.1-1
Noise Analysis Sections

Section Location	Section Name	Description	Approximate Length, miles	No. of Representative Receptors
South Limit to Wamac	S1	Rural	3	1
Wamac, Centralia, Central City, Junction City, and Sandoval	S2	Urban	9	10
Sandoval to Patoka	S3	Rural	8	1
Patoka and Vernon	S4	Urban	5	4
Vernon to Shobonier	S5	Rural	4	1
Shobonier and Vandalia	S6	Urban	13	18
Vandalia to Ramsey	S7	Rural	4	1
Ramsey	S8	Urban	1	3
Ramsey to Oconee	S9	Rural	9	1
Oconee	S10	Urban	2	4
Oconee to North Limit	S11	Rural	2	1

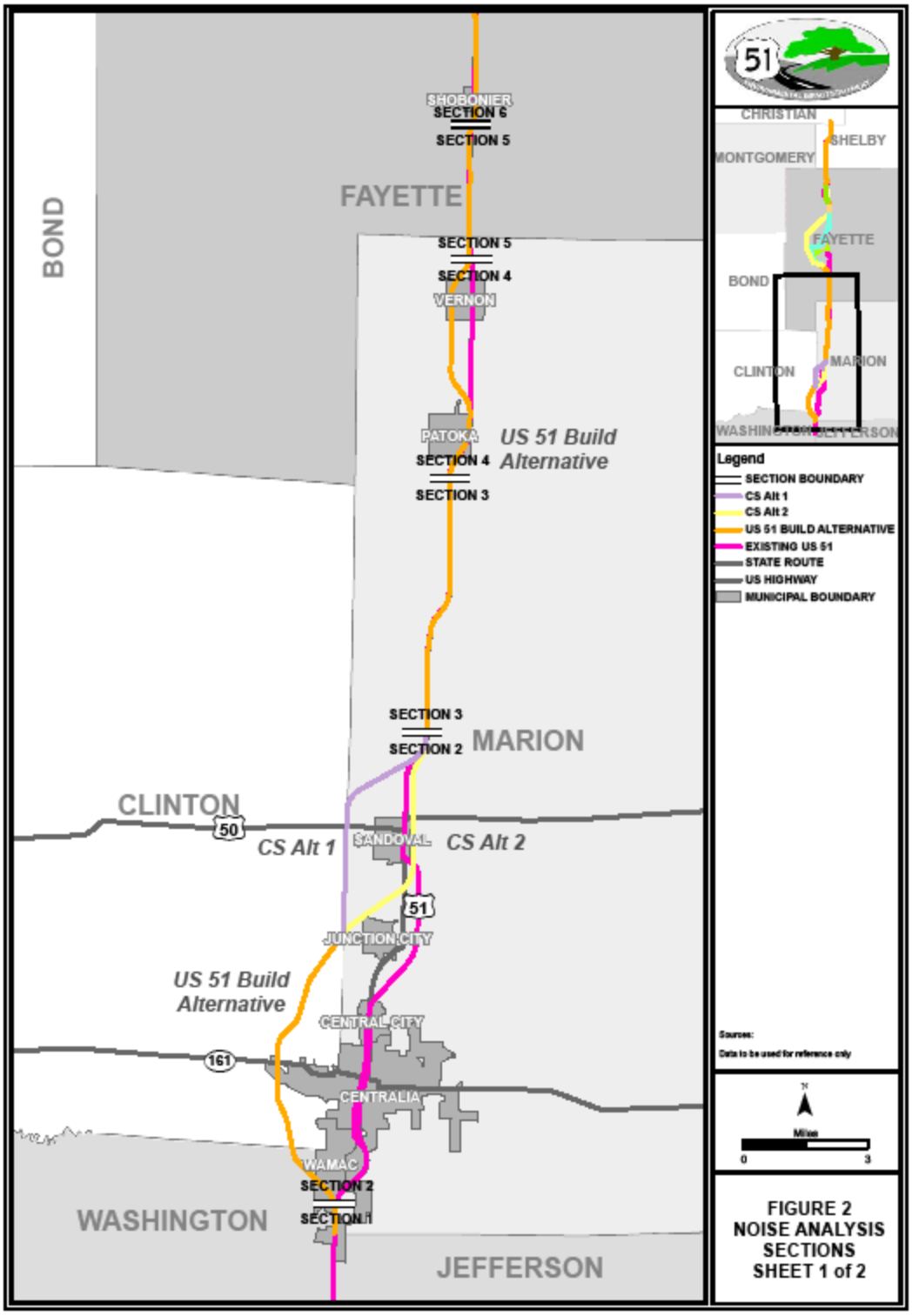
Results of the traffic noise analysis and noise abatement analysis will be reviewed by section.

3.2 Receptor Selections

The land use within the study limits is primarily agricultural with scattered areas of residential, recreational, office, restaurant, industrial, forested/undeveloped land, institutional, hotel, and retail uses. Figure 3 depicts land use (per the NAC in Table 2.2-1) based on field reviews and available aerial photography.

Receptor locations were selected based on land uses generally within 500 feet of the proposed US Route 51 project alternatives, to represent the land uses with established NAC (see Table 2.2-1). Select receptors beyond 500 feet were selected in sensitive areas. For this project, receptors include residential areas (land use activity category B), three churches (land use category C), and one hotel (land use category E). The remaining agricultural areas along the project corridor are characterized as land use activity category F, which does not have an established NAC.

The traffic noise study evaluates the study area using common noise environments (CNEs). Within each of the CNEs, the receptor closest to the proposed US Route 51 alignments was selected to represent the CNE, thereby representing the worst-case traffic noise condition. The represented


SHOBONIER
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US 51 Build Alternative
SECTION 3
SECTION 2
MARION
CLINTON
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CS Alt 1
SANDOVAL
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JUNCTION CITY
US 51 Build Alternative
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SECTION BOUNDARY
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US 51 BUILD ALTERNATIVE
EXISTING US 51
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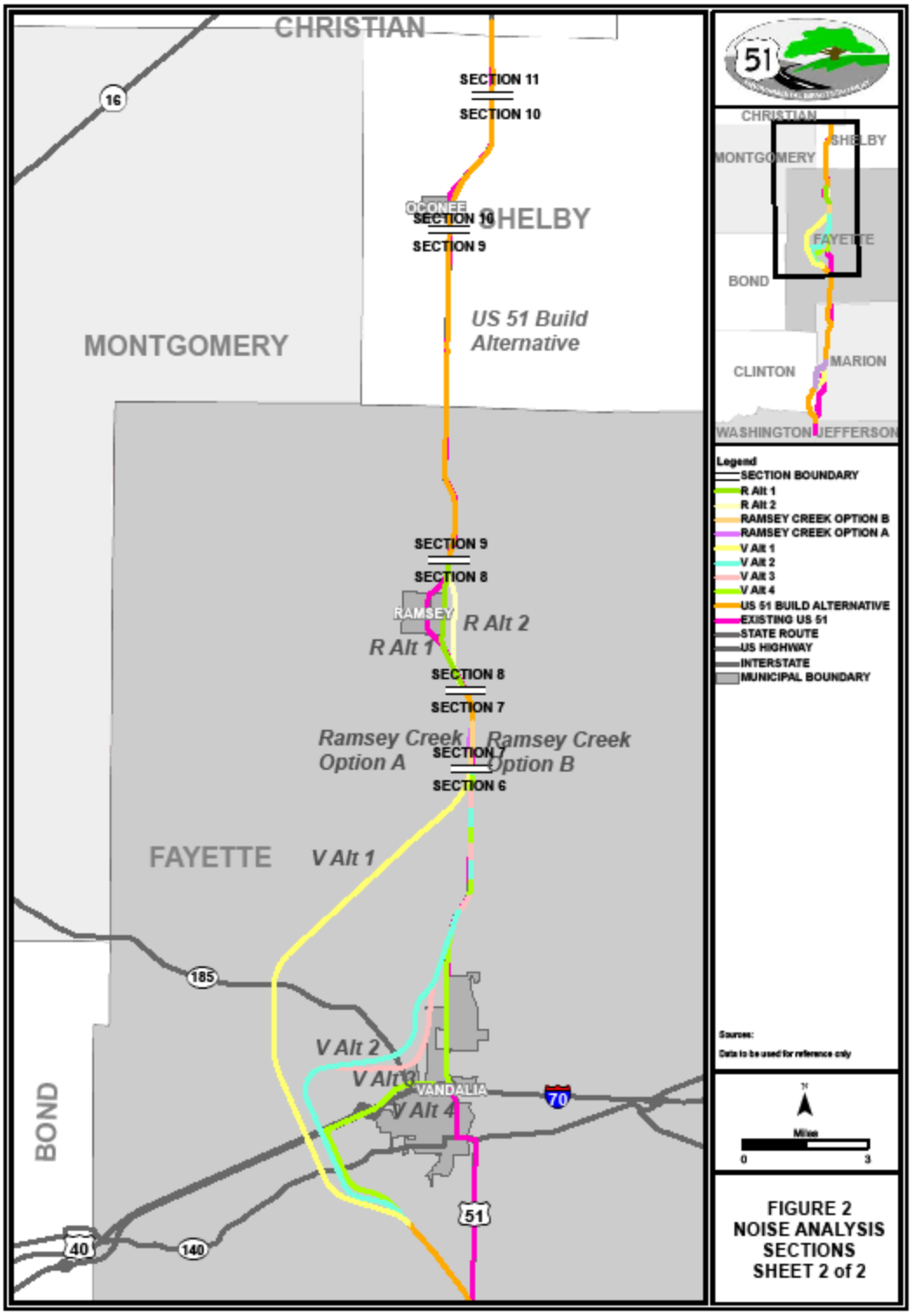
FIGURE 2
NOISE ANALYSIS
SECTIONS
SHEET 1 of 2


CHRISTIAN
SECTION 11
SECTION 10
16
OCONEE
SECTION 10
SHELBY
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MONTGOMERY
US 51 Build Alternative
SECTION 9
SECTION 8
RAMSEY
R Alt 2
R Alt 1
SECTION 8
SECTION 7
Ramsey Creek Option A
Ramsey Creek Option B
SECTION 7
SECTION 6
FAYETTE
V Alt 1
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V Alt 2
V Alt 3
VANDALIA
V Alt 4
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BOND
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CHRISTIAN
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MARION
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Legend
SECTION BOUNDARY
R Alt 1
R Alt 2
RAMSEY CREEK OPTION B
RAMSEY CREEK OPTION A
V Alt 1
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US 51 BUILD ALTERNATIVE
EXISTING US 51
STATE ROUTE
US HIGHWAY
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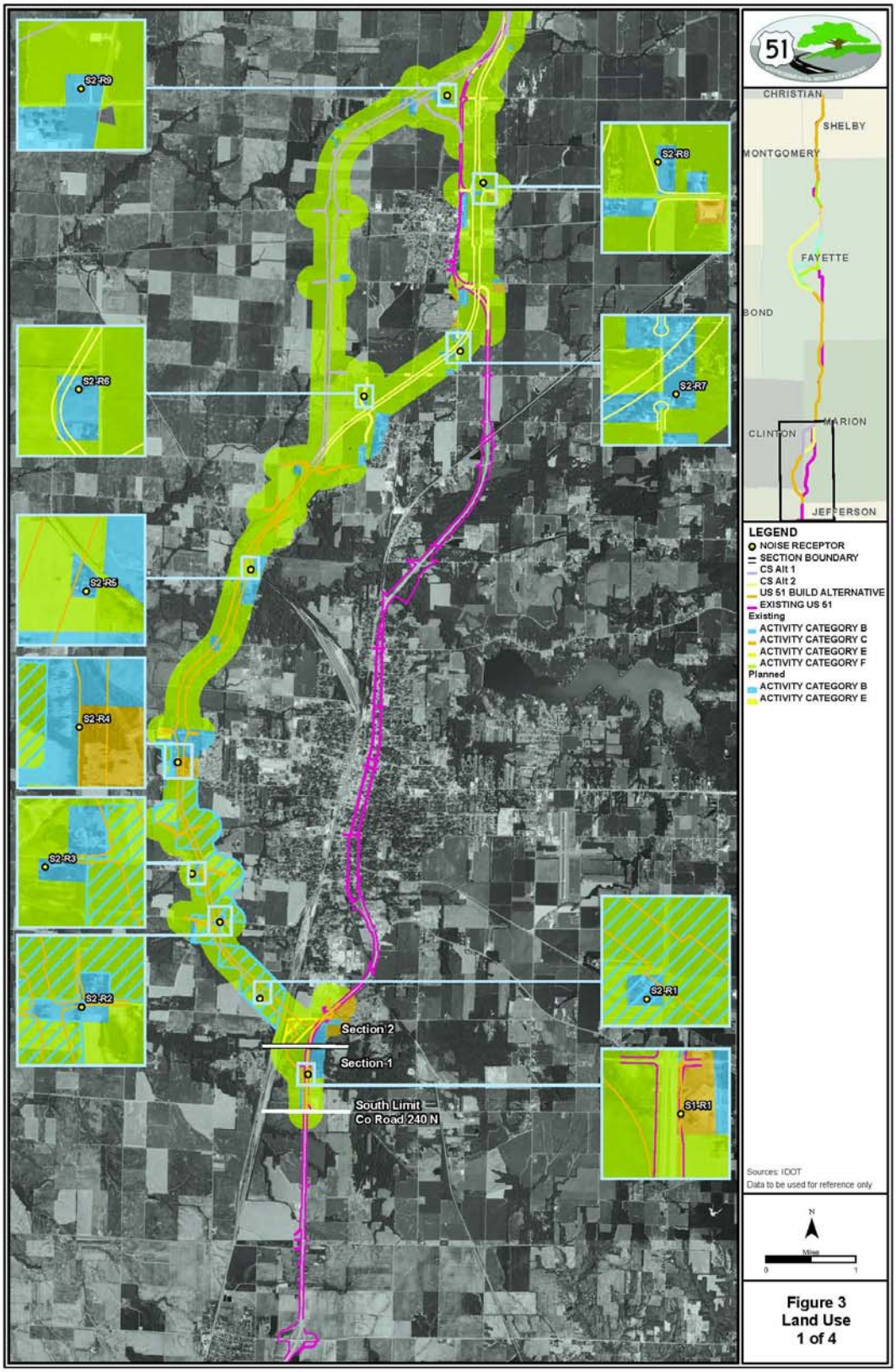
FIGURE 2
NOISE ANALYSIS
SECTIONS
SHEET 2 of 2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S2-R8
S2-R6
S2-R7
S2-R5
S2-R4
S2-R3
S2-R2
S2-R1
S1-R1
Section 2
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NOISE RECEPTOR
SECTION BOUNDARY
CS Alt 1
CS Alt 2
US 51 BUILD ALTERNATIVE
EXISTING US 51
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ACTIVITY CATEGORY B
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ACTIVITY CATEGORY B
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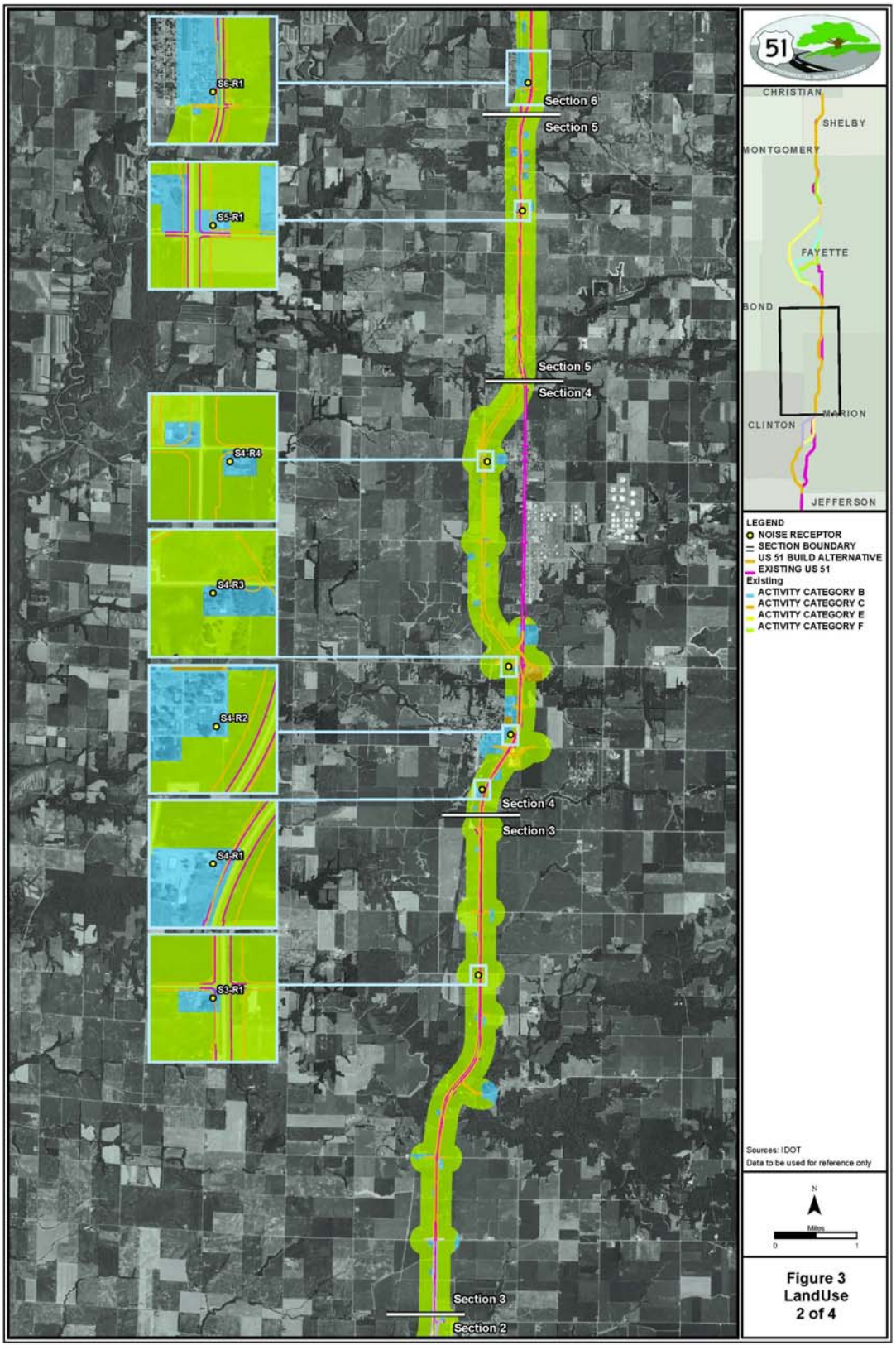
Figure 3
Land Use
1 of 4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S3-R1
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Section 4
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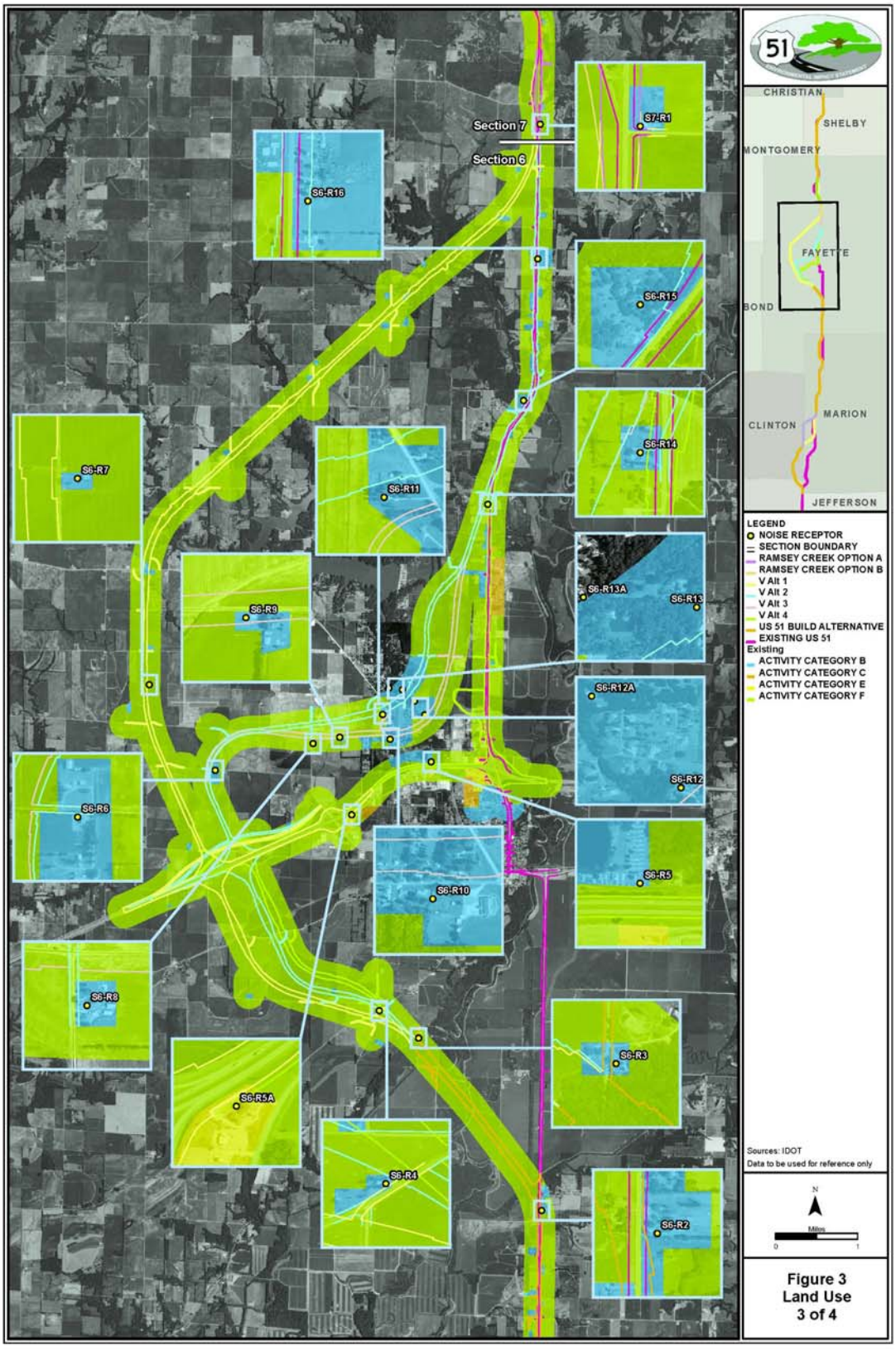
2 of 4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S6-R12A
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S6-R8
S6-R3
S6-R5A
S6-R4
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Land Use
3 of 4

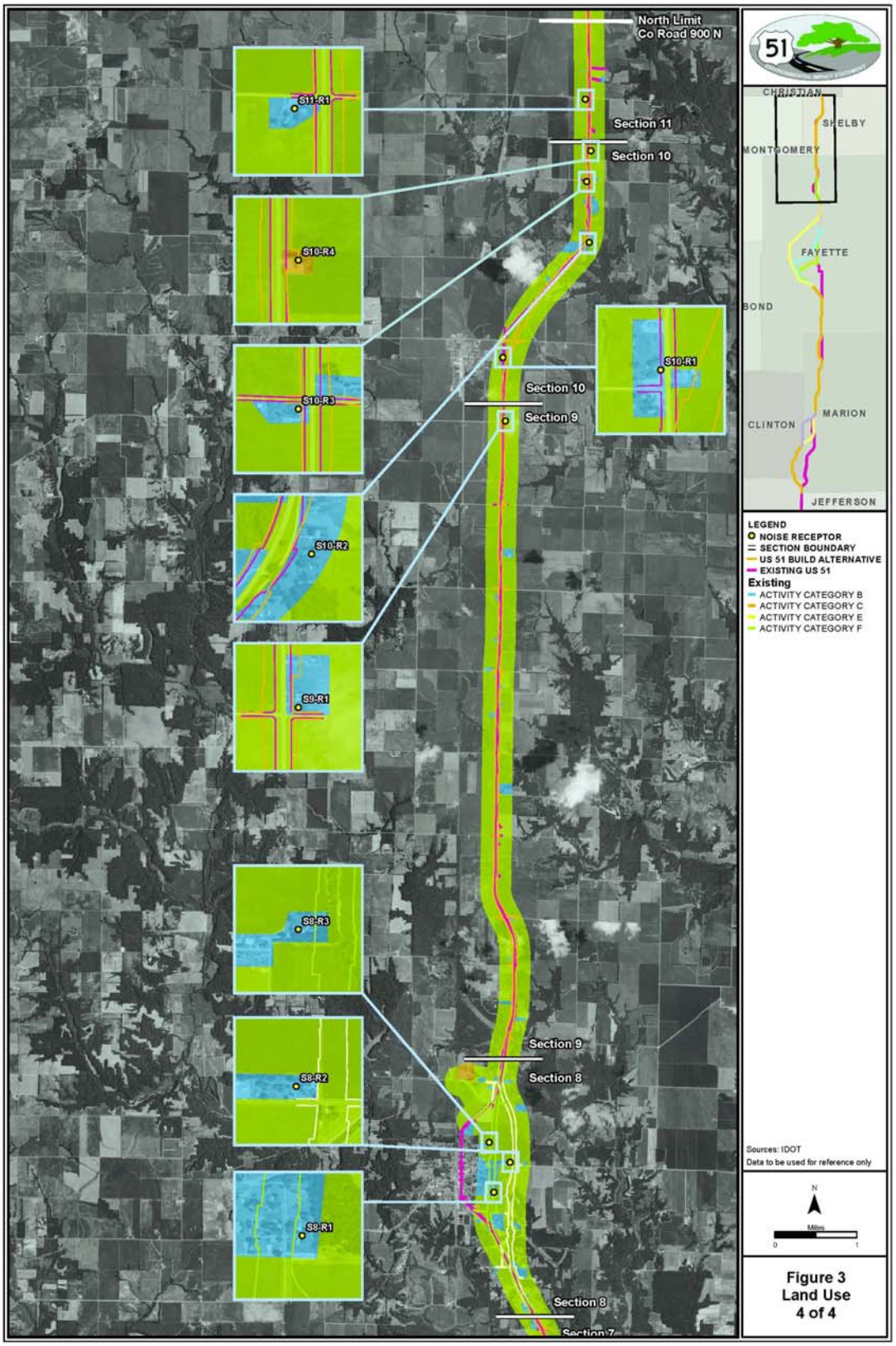
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Figure 3
Land Use
4 of 4

receptors within the CNEs will have similar traffic noise levels as the selected receptor. Within the rural sections, a single receptor will represent the rural areas. The receptor will be the closest to the proposed US Route 51 roadway and will represent the worst case scenario for the rural sections.

Forty-six receptors across the eleven sections have been selected to represent the study area. Each receptor will have an associated CNE that it represents. Table 2 lists the receptor number, the associated CNE and section, the approximate distance to the US Route 51 existing centerline, and approximate distance to the US Route 51 nearest alternative centerline. Figure 2 depicts the aerial photograph of the study area with the receptors. Receptor locations are between 50 feet and 21,700 feet from the existing US Route 51 centerline and between 90 feet and 1,100 feet from the closest proposed US Route 51 alternative. Figure 4 details the receptor locations.

TABLE 3.2-1
NOISE RECEPTOR LOCATIONS

Section Number	Receptor/CNE Number	Receptor Type*	Activity Category/ NAC (dB(A))	Distance to US Route 51 Existing Centerline, ft.	Distance to Closest Alternative Centerline, ft.
S1	S1-R1	Church	C / 67	90	90
S2	S2-R1	SFR	B / 67	3,600	200
	S2-R2	SFR	B / 67	880	350
	S2-R3	SFR	B / 67	9,700	550
	S2-R4	Mobile Home	B / 67	10,900	425
	S2-R5	SFR	B / 67	8,100	250
	S2-R6	SFR	B / 67	7,300	775
	S2-R7	SFR	B / 67	7,250	300
	S2-R8	SFR	B / 67	3,000	640
	S2-R9	SFR	B / 67	1,800	700
S3	S3-R1	SFR	B / 67	90	120
S4	S4-R1	SFR	B / 67	175	175
	S4-R2	SFR	B / 67	375	375
	S4-R3	SFR	B / 67	820	510
	S4-R4	SFR	B / 67	2,500	175
S5	S5-R1	SFR	B / 67	165	200
S6	S6-R1	SFR	B / 67	175	175
	S6-R2	SFR	B / 67	140	225
	S6-R3	SFR	B / 67	7,900	200
	S6-R4	SFR	B / 67	10,500	330
	S6-R5	Mobile Home	B / 67	3,900	160
	S6-R5A	Hotel	E / 72	10,000	250

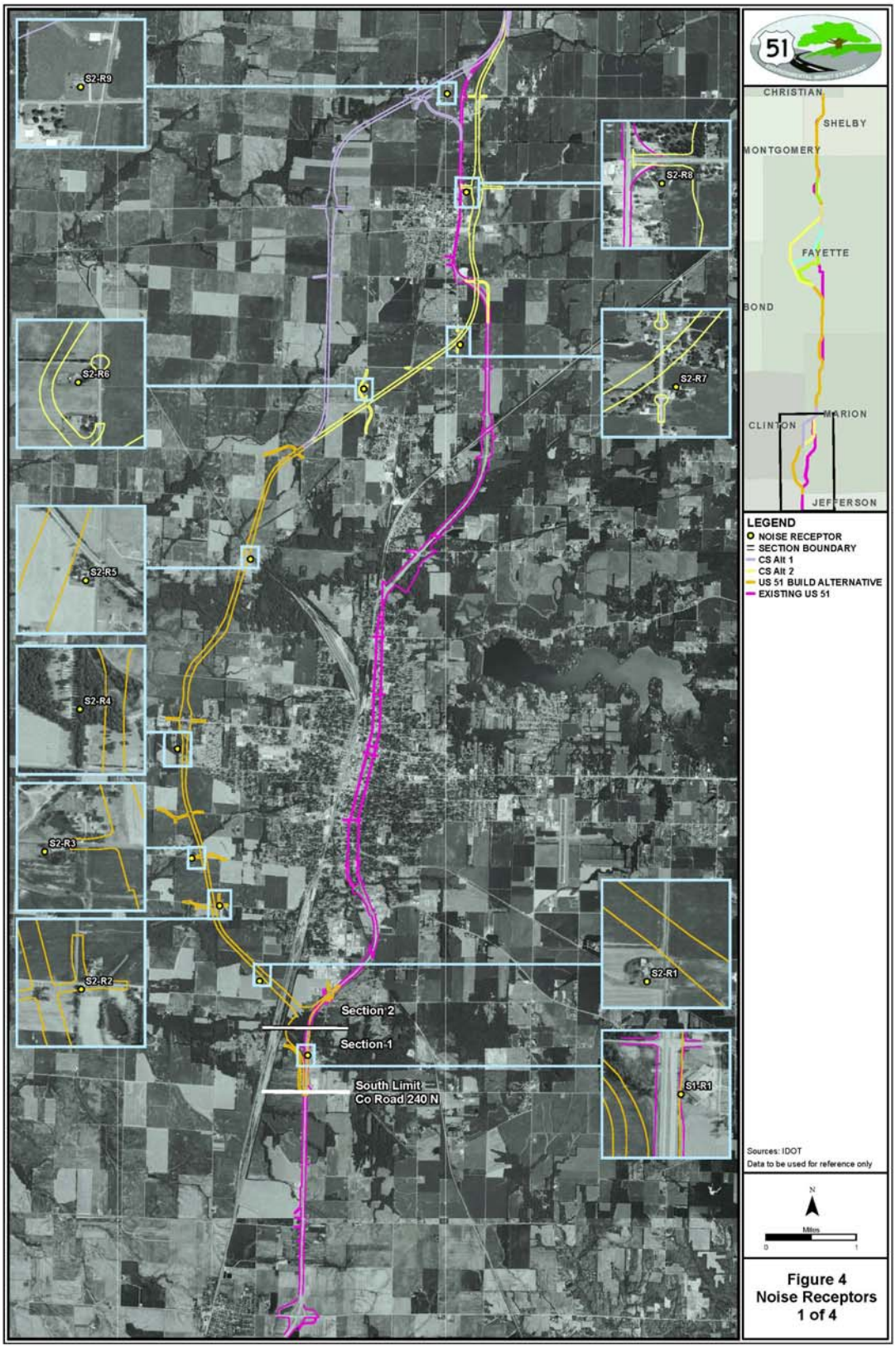
Section Number	Receptor/CNE Number	Receptor Type*	Activity Category/ NAC (dB(A))	Distance to US Route 51 Existing Centerline, ft.	Distance to Closest Alternative Centerline, ft.
S6 Cont.	S6-R6	SFR	B / 67	18,300	375
	S6-R7	SFR	B / 67	21,700	275
	S6-R8	SFR	B / 67	11,200	175
	S6-R9	SFR	B / 67	9,500	1,075
	S6-R10	SFR	B / 67	6,250	375
	S6-R11	SFR	B / 67	6,675	250
	S6-R12	SFR	B / 67	3,800	150
	S6-R12A	SFR	B / 67	4,500	1,000
	S6-R13	SFR	B / 67	5,400	200
	S6-R13A	SFR	B / 67	6,300	1,100
	S6-R14	SFR	B / 67	170	175
	S6-R15	SFR	B / 67	265	265
	S6-R16	SFR	B / 67	120	120
S7	S7-R1	SFR	B / 67	100	130
S8	S8-R1	SFR	B / 67	2,100	215
	S8-R2	SFR	B / 67	3,125	275
	S8-R3	SFR	B / 67	1,800	280
S9	S9-R1	SFR	B / 67	110	140
S10	S10-R1	SFR	B / 67	50	400
	S10-R2	SFR	B / 67	275	200
	S10-R3	SFR	B / 67	100	100
	S10-R4	Church	C / 67	115	115
S11	S11-R1	SFR	B / 67	125	160

*** SFR = Single Family Residential**

3.3 Noise Monitoring

Actual noise level measurements provide a "snapshot" of existing site conditions. The traffic volumes and conditions during the actual noise level measurements need to be considered when evaluating field measurements as typical for the area. The following methodology was used to collect noise level measurements.

Traffic noise levels measured during monitoring are representative of traffic characteristics (volume, speed and composition) for the time period measured. This may or may not be the peak-hour noise condition. In addition, the noise levels are also influenced by other noise sources in the area other than the traffic noise and the characteristics of the location, such as shielding afforded by existing berms, walls or structures. Consequently, comparison of the noise levels between locations needs to also consider the variations in site characteristics in addition to varying traffic conditions. Noise monitoring was conducted in 31 sessions at 28 receptors, including at least one receptor per section.


S2-R9
S2-R8
S2-R6
S2-R7
S2-R5
S2-R4
S2-R3
S2-R2
S2-R1
S1-R1
Section 2
Section 1
South Limit
Co Road 240 N
CHRISTIAN
SHELBY
MONTGOMERY
FAYETTE
BOND
MARION
CLINTON
JEFFERSON
LEGEND
NOISE RECEPTOR
SECTION BOUNDARY
CS Alt 1
CS Alt 2
US 51 BUILD ALTERNATIVE
EXISTING US 51
Sources: IDOT
Data to be used for reference only
N
Miles
0
1
Figure 4
Noise Receptors
1 of 4

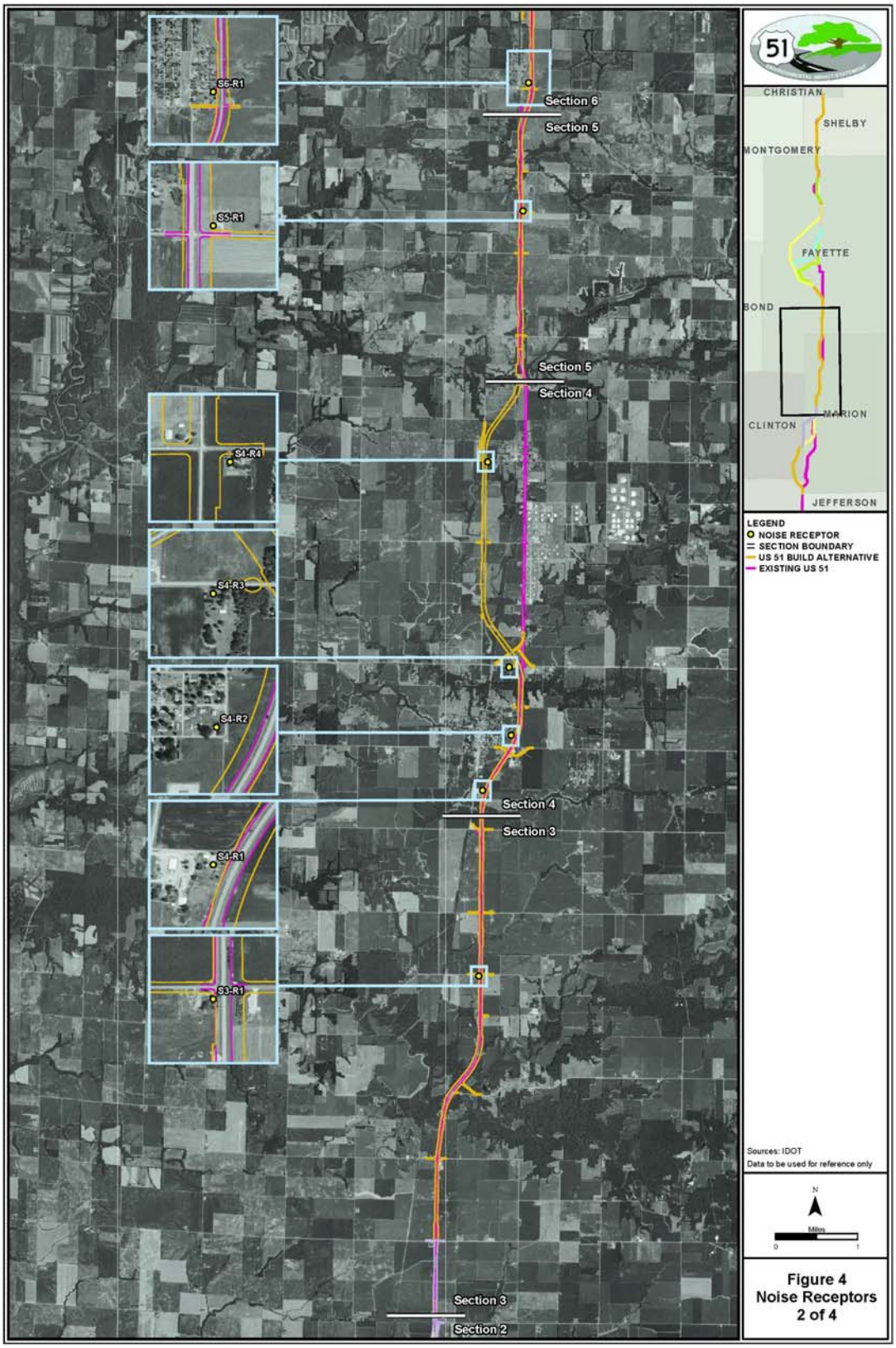
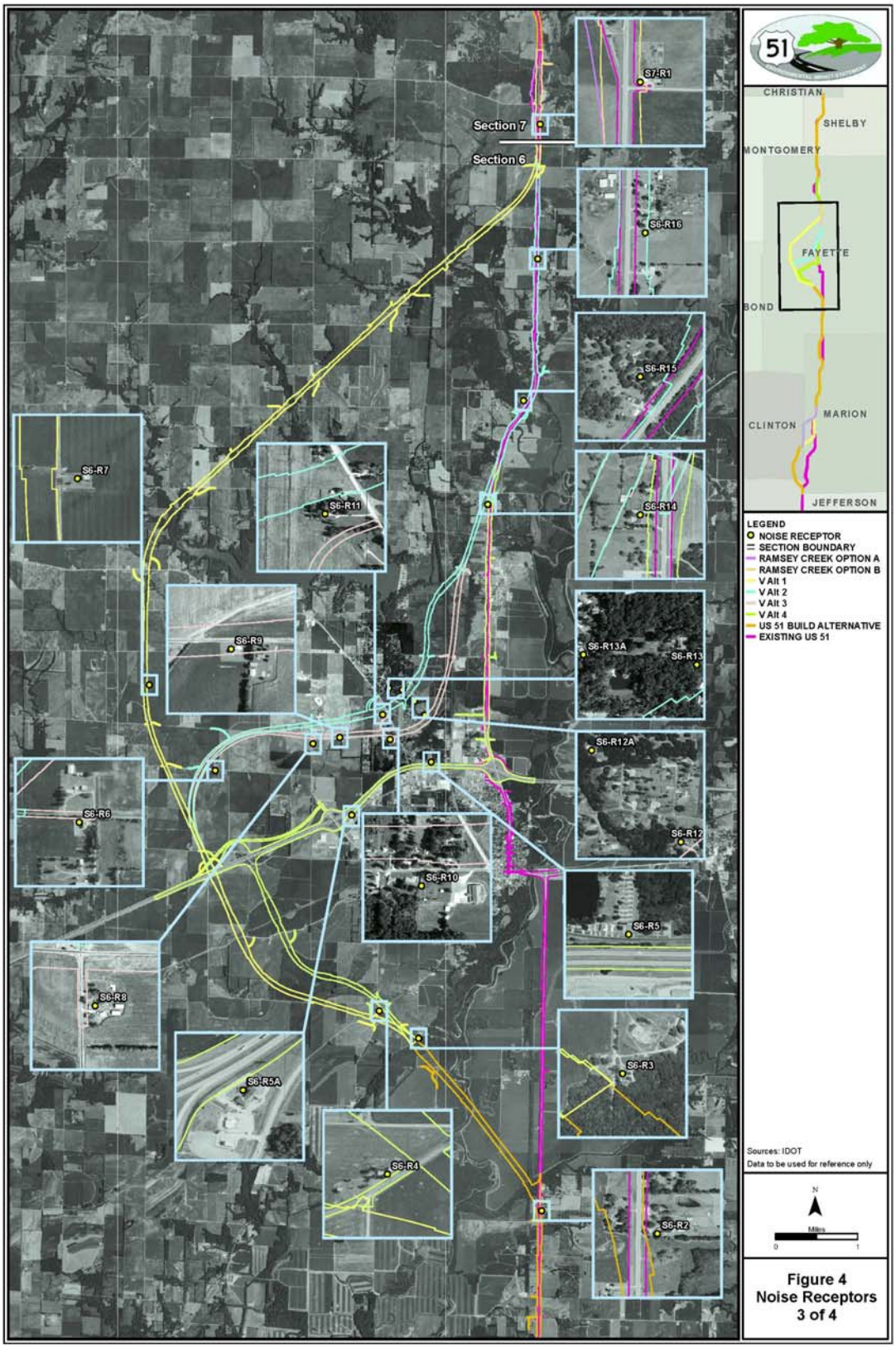
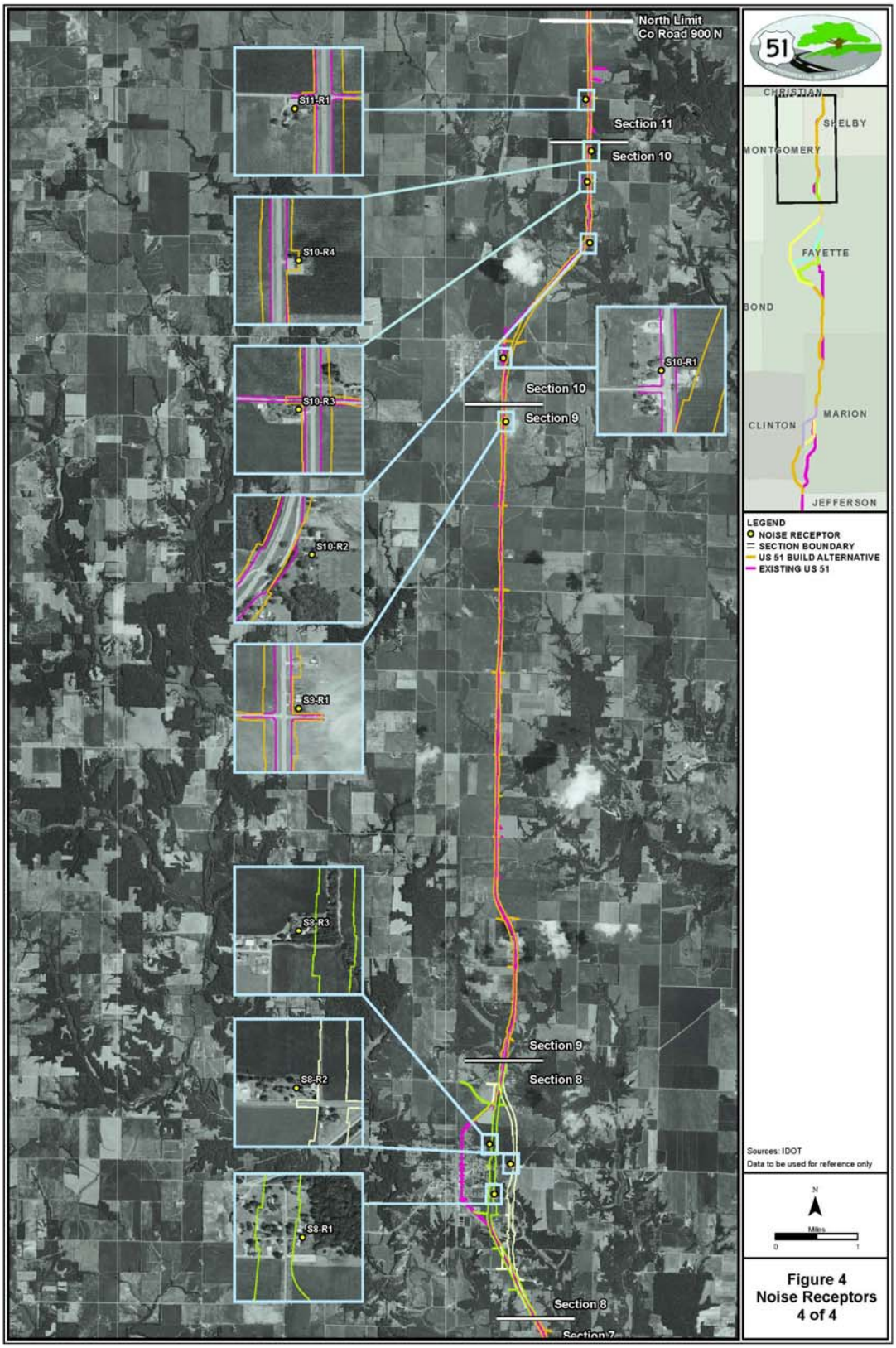


Figure 4
Noise Receptors
2 of 4


Section 7
Section 6
S7-R1
S6-R16
S6-R15
S6-R14
S6-R13A
S6-R13
S6-R12A
S6-R12
S6-R10
S6-R5
S6-R3
S6-R2
S6-R4
S6-R5A
S6-R8
S6-R6
S6-R9
S6-R11
S6-R7
CHRISTIAN
SHELBY
MONTGOMERY
FAYETTE
BOND
CLINTON
MARION
JEFFERSON
LEGEND
NOISE RECEPTOR
SECTION BOUNDARY
RAMSEY CREEK OPTION A
RAMSEY CREEK OPTION B
V Alt 1
V Alt 2
V Alt 3
V Alt 4
US 51 BUILD ALTERNATIVE
EXISTING US 51
Sources: IDOT
Data to be used for reference only
N
Miles
0
1
Figure 4
Noise Receptors
3 of 4


North Limit
Co Road 900 N
S11-R1
Section 11
Section 10
S10-R4
S10-R1
S10-R3
Section 10
Section 9
S10-R2
S9-R1
S9-R3
Section 9
Section 8
S8-R2
S8-R1
Section 8
Section 7
CHRISTIAN
SHELBY
MONTGOMERY
FAYETTE
BOND
CLINTON
MARION
JEFFERSON
LEGEND
NOISE RECEPTOR
SECTION BOUNDARY
US 51 BUILD ALTERNATIVE
EXISTING US 51
Sources: IDOT
Data to be used for reference only
N
Miles
0
1
Figure 4
Noise Receptors
4 of 4

Traffic Volumes

Traffic volumes along US Route 51 were counted during field monitoring at the receptors where existing US Route 51 is the dominant noise source. The number of cars and trucks were recorded separately along with any other noise sources observed during monitoring. The traffic volumes were counted as a total during the 15-minute noise monitoring periods. The traffic volumes counted were extrapolated to an hour (60 minutes) by multiplying the fifteen-minute volumes by four to estimate the hourly traffic.

The traffic volume estimates from the noise monitoring sessions were compared to the peak-hour traffic volumes used for the noise modeling in the areas where existing US Route 51 is the dominant noise source. The automobile volumes counted during the monitoring averaged 92 percent of the estimated peak-hourly volumes used in the existing model and the truck volumes averaged 99 percent of the estimated peak-hourly volumes used in the existing model. Trucks account for 27% of the measured traffic.

Time and Day for Measurements

Noise monitoring is typically conducted during the period representing the worst hourly noise level. This may or may not be during the peak-hour traffic volumes, as traffic may be stop-and go-during this period or at a reduced travel speed. Traffic was moving steadily through the corridor during the measurements. Noise monitoring was conducted at all sites on Tuesday, August 3, 2010 between the hours of 10:30 am and 6:30 pm, Wednesday, August 4, 2010 between the hours of 7:00 am and 12:00 pm, and Thursday, July 28, 2011 between the hours of 8:00 am and 3:00 pm.

Weather Conditions

Weather conditions have some effect on the noise measurement readings. Noise measurements cannot be taken if the wind speed exceeds 12 m.p.h. A wind screen was used at all times during the monitoring to reduce wind noise. The conditions during the monitoring are summarized as follows:

WEATHER CONDITIONS DURING THE NOISE MONITORING

Condition	Required	Actual		
		August 3, 2010	**August 4, 2010**	**July 28, 2011**
Pavement	Dry	Dry	Dry	Dry
Humidity	Less than 90%	65%	70%	76%
Temperature	14 to 112 degrees F	97 degrees F	98 degrees F	81 degrees F
Wind Speed	Less than 12 m.p.h.	10 m.p.h	5 m.p.h.	4 m.p.h.

Source: National Weather Service

The weather conditions during the noise monitoring were within the recommended ranges for all parameters listed.

Instrumentation

A Brüel & Kjaer Type 2236 sound level meter was used for monitoring the actual noise level. The L_{eq} was recorded for the "A" weighted scale. L_{eq} is the equivalent level of sound (in decibels or dB(A)) which represents the level of sound, held constant over a specified period of time. This reflects the same amount of energy as the actual fluctuating noise over that time period. The instrument was calibrated prior to use. The instrument was set up approximately five (5) feet from the ground and the measurement was conducted for 15 minutes. The noise meter was set in a location where human activity typically occurs or in a location representative of that location.

Field Noise Monitoring Results

Table 3.3-1 summarizes the noise monitoring results for the 28 locations monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. Noise monitored levels ranged from 44 dB(A) to 68 dB(A). Certain locations were monitored twice to help ensure the overall accuracy of the monitoring results.

TABLE 3.3-1
NOISE MONITORING RESULTS

Section Number	Receptor/CNE Number	Monitoring Results, dB(A)
S1	S1-R1	64
S2	S2-R1	58
	S2-R3	49
	S2-R4	59
	S2-R5	54
	S2-R6	47
	S2-R7	52 / 51
	S2-R9	50
S3	S3-R1	62
S4	S4-R2	50
	S4-R3	49
	S4-R4	44
S5	S5-R1	57
S6	S6-R3	51
	S6-R5	68
	S6-R6	65
	S6-R9	57
	S6-R10	53
	S6-R12A	52
	S6-R13	53
	S6-R13A	57
	S6-R14	61
S7	S7-R1	64
S8	S8-R1	48 / 48
	S8-R2	55
	S8-R3	51
S9	S9-R1	63
S10	S10-R3	63
S11	S11-R1	58 / 58

3.4 TNM Noise Level Predictions

Modeling of the traffic noise levels within the eleven sections located within the project limits were conducted utilizing the FHWA approved TNM. Prediction of noise levels is one step in assessing potential noise impacts and abatement strategies. Traffic noise levels for the eleven sections were predicted using existing (2011) and future (2040) traffic volumes.

Inputs into TNM include traffic volume, traffic mix (cars, heavy trucks, and medium trucks), receptor distance, elevation, and average speeds during free flowing conditions. Information sources used in the analysis are briefly described in the following subsections.

Traffic Volumes

The project team provided AM and PM peak hour traffic volumes for the years 2011 and 2040 for US Route 51 throughout the project corridor. The US Route 51 traffic volumes were greatest in the PM peak hour in both the existing and future scenarios. The PM peak hour traffic was treated as a worst-case traffic noise scenario because US Route 51 is the dominant noise source for a majority of receptors.

Traffic Composition

Three types of vehicles, including cars, medium trucks, and heavy trucks, are input into TNM. Truck composition for the roadways was determined based on the traffic counts provided by the project team. The percentage of automobiles on US Route 51 is estimated between 75 percent and 100 percent with medium and heavy trucks accounting for between zero and 25 percent. Truck traffic is estimated to be from one percent to eight percent (of overall traffic) medium trucks and seven percent to 21 percent heavy trucks.

Receptor Distance/Elevation

Table 3.2-1 included the distances of the receptors from the US Route 51 existing centerline. The selected representative receptors include single-family residences and churches. The distance and elevation of each receptor directly affects the predicted traffic noise level. The distance from the nearest proposed alignment centerline varied from 90 feet at Receptor S1-R1 to 1,100 feet at Receptor S6-R13A.

Speed Conditions

The average speed during free flow conditions for the individual roadways was used for the noise analysis and has been input into the model as the posted speed limit. The existing posted speed limits in the project limits are 30 m.p.h. for the town centers of Centralia, Ramsey and Vandalia; 35 m.p.h. for Sandoval; 40 m.p.h. for Vernon; and 55 m.p.h. for unincorporated and rural sections of the project corridor. The speed limit for the projected build condition is 65 m.p.h. throughout the project corridor.

3.5 Noise Abatement Evaluation Methodology

Abatement Alternatives

The most feasible approach to abating noise impacts in this area would be to construct a noise barrier. This may include a noise wall, an earth berm or a combination of both. Noise barriers placed adjacent to the roadway will attenuate traffic-related noise and are the most practical measure for this project. An effective noise barrier must be tall enough to break the line-of-sight between the receptor and source and typically extends beyond the last receptor four times the distance between the receptor and noise barrier. Noise barriers have a zone of effectiveness, or shadow zone, which is generally within 200 feet of the noise barrier; therefore, less noise reduction is achieved as the distance between the receptor and the noise barrier increases.

TNM was used to perform the noise barrier feasibility and reasonability evaluation for the thirteen impacted receptors. When determining if an abatement measure is feasible and reasonable, the noise reductions achieved, number of residences benefited, total cost, and total cost per residence benefited are considered.

Feasibility and Reasonability

An analysis of noise abatement measures (noise barriers) was conducted in conformance with FHWA requirements contained in Title 23 *Code of Federal Regulations* Part 772 for each of the impacted receptors. In order for a noise abatement measure to be constructed, it must meet both the feasibility and reasonability criteria, described below.

Feasibility

The feasibility evaluation is a combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure. The acoustical portion of the IDOT policy, as required by FHWA regulations, considers noise abatement to be feasible if it achieves at least a 5 dB(A) traffic noise reduction at an impacted receptor. Factors including but not limited to safety, barrier height, topography, drainage, utilities, maintenance, and access issues are also considered.

Reasonability

As per the FHWA regulations, a noise abatement measure is determined to be reasonable when all three of the following reasonableness evaluation factors are met:

- cost effectiveness of the highway traffic noise abatement measure
- achievement of IDOT's noise reduction design goal
- consideration of the viewpoints of the benefited receptors (property owners and residents) if all other criterion are achieved

A noise abatement measure is considered cost-effective to construct if the noise wall construction cost per benefited receptor is less than the allowable cost per benefited receptor. A benefited receptor is any receptor that is afforded at least a 5 dB(A) traffic noise reduction from the proposed

noise abatement measure. The FHWA regulations allow each State Highway Authority to establish cost criteria for determining cost effectiveness.

IDOT policy establishes the actual cost per benefited receptor shall be based on a noise wall cost of $25 per square foot, which includes engineering, materials, and construction. The base value allowable cost per benefited receptor is $24,000 per benefited receptor, which can be increased based on three factors as summarized below:

- the absolute noise level of the benefited receptors in the design year build scenario before noise abatement
- the incremental increase in noise level between the existing noise level at the benefited receptor and the predicted build noise level before noise abatement
- the date of development compared to the construction date of the highway. These factors are considered for all benefited receptors

Absolute Noise Level Consideration

Predicted Build Noise Level Before Noise Abatement	Dollars Added to Base Value Cost per Benefited Receptor
Less than 70 dB(A)	$0
70 to 74 dB(A)	$1,000
75 to 79 dB(A)	$2,000
80 dB(A) or greater	$4,000

Source: IDOT Highway Traffic Noise Assessment Manual

Increase in Noise Level Consideration

Incremental Increase in Noise Level Between the Existing Noise Level and the Predicted Build Noise Level Before Noise Abatement	Dollars Added to Base Value Cost per Benefited Receptor
Less than 5 dB(A)	$0
5 to 9 dB(A)	$1,000
10 to 14 dB(A)	$2,000
15 dB(A) or greater	$4,000

Source: IDOT Highway Traffic Noise Assessment Manual

New Alignment / Construction Date Consideration

Project is on new alignment OR the receptor existed prior to the original construction of the highway	Dollars Added to Base Value Cost per Benefited Receptor
No for both	$0
Yes for either	$5,000

Note: No single optional reasonableness factor shall be used to determine that a noise abatement measure is unreasonable.
Source: IDOT Highway Traffic Noise Assessment Manual

The IDOT noise reduction design goal is to achieve an 8 dB(A) traffic noise reduction at a minimum of one benefited receptor. If a noise abatement measure is feasible, achieves the cost-effective criterion, and achieves the IDOT noise reduction design goal, the viewpoints of benefited receptors will be solicited on the construction of the noise wall.

4. TRAFFIC NOISE AND ABATEMENT ANALYSIS

Traffic noise and abatement analyses were completed for each of the eleven sections of the US Route 51 project. Sections 4.1 through 4.11 below detail receptor selection, noise monitoring, traffic noise analysis, noise abatement analysis (if applicable), and an evaluation of undeveloped lands within each of the eleven sections of US Route 51.

4.1 Section 1: South Limit to Wamac (Rural)

Receptor Selection

The land use within this section is generally agricultural with two residences and a church. One receptor has been selected to represent Section 1. The receptor has an associated CNE covering the length of Section 1. The selected receptor represents the worst case traffic noise scenario within the section. The project team is unaware of any recently permitted developments in Section 1. Table 4.1-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor location is 90 feet from the US Route 51 build alternative centerline.

TABLE 4.1-1
SECTION 1 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S1-R1	Church	C / 67	90	3

Noise Monitoring

Table 4.1-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at S1-R1was 64 dB(A). The monitored noise level is within 3 dB(A) of the modeled noise level, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results

TABLE 4.1-2
SECTION 1 NOISE MONITORING RESULTS

Receptor/ CNE Number	Distance to US Route 51 Centerline, ft.	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S1-R1	90	64	61	-3

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 1 utilizing TNM. Table 4.1-3 presents the existing (2012) and projected (2040) noise levels for the receptor, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 61 dB(A) at receptor S1-R1. The projected No-Build 2040 traffic noise level is 62 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level from is 62 dB(A) at receptor S1-R1. The projected Build 2040 noise level increases one dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes with the Build Alternative as the existing roadway is already four lanes at this location.

Under the proposed 2040 Build scenario, receptor S1-R1 does not approach, meet or exceed the FHWA NAC. The receptor is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.1-3
SECTION 1 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S1-R1	61	62	62	1

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 1 is within unincorporated areas of Clinton County and Washington County, as well as portions of the cities of Centralia and Wamac. The unincorporated areas of Section 1 are currently agricultural with scattered residences. The remainder of Section 1 is within municipal boundaries, and consists of agricultural, residential, industrial, and church uses. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 1 were assessed to determine their potential for future development into uses that have an established NAC. Clinton County's future land use plan shows future residential development in the half mile buffer around Centralia and Wamac, with commercial development adjacent to existing US Route 51 in Wamac. Centralia's future land use plan also shows planned residential development outside of the existing municipal boundaries, and also shows commercial land use planned near existing US Route 51 (see Figure 3). The planned residential uses would be in Activity Category B, and the planned commercial uses could be in Activity Category C, E, or F. Activity Categories B, C, and E have established NAC.

The areas of agricultural land in Section 1 planned for residential or commercial development were

screened for potential noise sensitive receptor locations due to new planned development. Per IDOT policy, the planned residential areas were screened to determine where build traffic noise levels would approach the NAC for Activity Category B (66 dB(A)), and the planned commercial areas were screened to determine where build traffic noise levels would approach the NAC for Activity Category C, the most noise sensitive use of the potential commercial uses with NAC (66 dB(A)). Appendix A contains the results of the contour analysis.

4.2 Section 2: Wamac, Centralia, Central City, Junction City, and Sandoval (Urban)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. The densely populated areas of Wamac, Centralia, Central City, Junction City, and Sandoval are generally avoided by the proposed build alternatives. Nine receptors have been selected to represent Section 2. Each receptor will have an associated CNE that it represents. The project team is unaware of any recently permitted developments in Section 2. Table 4.2-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor locations are between 140 feet and 775 feet from the US Route 51 closest alternative centerline.

TABLE 4.2-1
SECTION 2 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S2-R1	SFR	B / 67	200	3
S2-R2	SFR	B / 67	350	5
S2-R3	SFR	B / 67	550	4
S2-R4	Mobile Homes	B / 67	425	54
S2-R5	SFR	B / 67	250	6
S2-R6	SFR	B / 67	775	3
S2-R7	SFR	B / 67	300	23
S2-R8	SFR	B / 67	640	2
S2-R9	SFR	B / 67	700	4

SFR = Single Family Residence

Noise Monitoring

Table 4.2-2 summarizes the noise monitoring result for the receptor locations monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise levels ranged between 49 dB(A) and 59 dB(A). Model validation using monitoring results is not applicable for this section as all receptors are located in areas where traffic noise is not the predominant noise source in the existing condition.

TABLE 4.2-2
SECTION 2 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, L_{eq}
S2-R1	58
S2-R3	49
S2-R4	59
S2-R5	54
S2-R6	47
S2-R7*	51
	52
S2-R9	50

* Noise monitoring was conducted twice at this location

Traffic Noise Analysis

The build alternatives in Section 2 are new alignment located away from existing US 51; therefore data collected during the noise monitoring of existing conditions was used to determine existing noise levels. Modeling the existing condition using TNM would not be appropriate as all receptors are located in areas where traffic noise is not the predominant noise source.

Table 4.2-3 presents the existing (2012) and projected (2040) noise levels for the nine receptor sites, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level ranges from 47 dB(A) at receptor S2-R6 to 59 dB(A) at receptor S2-R4. The projected No-Build 2040 noise levels are not expected to change from the existing condition as traffic noise is not the predominant noise source in the area of the receptors.

The projected build 2040 noise levels range from 49 dB(A) at S2-R3 to 62 dB(A) at S2-R7. For receptors S2-R3 through S2-R9, build condition traffic noise levels either stay the same or increase between 2 dB(A) and 11 dB(A) from the existing scenario. For receptors S2-R1, S2-R2, and S2-R4 the predicted traffic noise levels in the build condition is less than the existing ambient noise levels. None of the receptors approach, meet, or exceed the FHWA NAC, and there is no substantial noise increase (greater than 14 dB(A)) over existing conditions. Therefore a noise abatement analysis is not warranted.

TABLE 4.2-3
SECTION 2 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build, dB(A)**			Increase from Existing to Build, dB(A)
			Build Alternative	CS Alt 1	CS Alt 2	
S2-R1	58	58	55	---	---	-3
S2-R2	58	58	53	---	---	-5
S2-R3	49	49	49	---	---	0
S2-R4	59	59	54	---	---	-5
S2-R5	54	54	56	---	---	2
S2-R6	47	47	---	53	---	6
S2-R7	51	51	---	62	---	11
S2-R8	50	50	---	---	52	2
S2-R9	50	50	---	---	57	7

* Noise monitoring was conducted at S2-R1, S2-R3, S2-R4, S2-R5, S2-R6, S2-R7, and S2-R9. The monitoring conducted at receptors S2-R1 and S2-R9 are representative of receptors S2-R2 and S2-R8, respectively. Monitoring is also anticipated to be representative of no build conditions.

** Build noise levels predicted using TNM and are generated by traffic volumes on proposed US Route 51.

--- Build noise level not applicable for this alternative.

Undeveloped Lands Evaluation

Section 2 is within unincorporated areas of Marion County, Clinton County, and Washington County, as well as portions of the cities of Sandoval, Junction City, Centralia, and Wamac. The unincorporated areas of Section 2 are currently agricultural with scattered residences. The remainder of Section 2 is within municipal boundaries, and consists of agricultural, residential, industrial, retail, church, institutional, or recreational uses. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 2 were assessed to determine their potential for future development into uses that have an established NAC. Marion County and Washington County, as well as the cities of Sandoval, Wamac, and Junction City do not have future land use plans; because of this, it was assumed that there are no official plans for new development in those agricultural areas of Section 2 prior to the US Route 51 design year of 2040. Clinton County's future land use plan shows future residential development in the half mile buffer around Centralia and Wamac, with commercial development adjacent to existing US Route 51 in Wamac. Centralia's future land use plan also shows planned residential development outside of the existing municipal boundaries, and also shows commercial land use planned near existing US Route 51 (see Figure 3). The planned residential uses would be in Activity Category B, and the planned commercial uses could be in Activity Category C, E, or F. Activity Categories B, C, and E have established NAC.

The areas of agricultural land in Section 2 planned for residential or commercial development were screened for potential noise sensitive receptor locations due to new planned development. Per IDOT policy, the planned residential areas were screened to determine where build traffic noise levels would approach the NAC for Activity Category B (66 dB(A)), and the planned commercial areas were screened to determine where build traffic noise levels would approach the NAC for Activity

Category C, the most noise sensitive use of the potential commercial uses with NAC (66 dB(A)). Appendix A contains the results of the contour analysis.

4.3 Section 3: Sandoval to Patoka (Rural)

Receptor Selection

The land use within this section is generally forest or agricultural with scattered residences. One receptor has been selected to represent Section 3. The receptor has an associated CNE covering the length of Section 3. The selected receptor represents the worst case traffic noise scenario within the section. The project team is unaware of any recently permitted developments in Section 3. Table 4.3-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor location is 120 feet from the US Route 51 closest alternative centerline.

TABLE 4.3-1
SECTION 3 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S3-R1	SFR	B / 67	120	13

SFR = Single Family Residence

Noise Monitoring

Table 4.3-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at S3-R1 was 62 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.3-2
SECTION 3 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S3-R1	62	59	-3

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 3 utilizing TNM. Table 4.3-3 presents the existing (2012) and projected (2040) noise levels for the receptor, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 59 dB(A) at receptor S3-R1. The projected No Build 2040 traffic noise level is 60 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level is 62 dB(A) at receptor S3-R1. The projected Build 2040 noise level increases five dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes and a shift of US Route 51 closer to S3-R1 due to the addition of two travel lanes.

Under the proposed 2040 Build scenario, receptor S3-R1 does not approach, meet or exceed the FHWA NAC. The receptor is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.3-3
SECTION 3 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S3-R1	59	60	64	5

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 3 is within unincorporated areas of Marion County. Section 3 is currently agricultural with scattered residences. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 3 were assessed to determine their potential for future development into uses that have an established NAC. Marion County does not have a future land use plan; because of this, it was assumed that there are no official plans for new development in agricultural areas of Section 3 prior to the US Route 51 design year of 2040. For this reason, no agricultural land in Section 3 was screened for potential noise sensitive receptor locations due to new planned development.

4.4 Section 4: Patoka and Vernon (Urban)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. The densely populated areas of Patoka and Vernon are generally avoided by the proposed build alternative. Four receptors have been selected to represent Section 4. Each receptor will have an associated CNE that it represents. The project team is unaware of any recently permitted developments in Section 4. Table 4.4-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor locations are between 175 feet and 510 feet from the US Route 51 closest alternative centerline.

TABLE 4.4-1
SECTION 4 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S4-R1	SFR	B / 67	175	3
S4-R2	SFR	B / 67	375	6
S4-R3	SFR	B / 67	510	2
S4-R4	SFR	B / 67	175	4

SFR = Single Family Residence

Noise Monitoring

Table 4.4-2 summarizes the noise monitoring result for the receptor locations monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise levels ranged between 44 dB(A) and 50 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise level at receptor S4-R2, which validates the TNM model. Model validation is not applicable for receptors S4-R3 and S4-R4 as they are located in area where traffic noise is not the predominant noise source in the existing condition. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results

TABLE 4.4-2
SECTION 4 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S4-R2	50	52	2
S4-R3	49	NA	NA
S4-R4	44	NA	NA

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.
NA = Not applicable as receptor is located where traffic noise is not the predominant existing noise source

Traffic Noise Analysis

Existing noise levels were predicted using TNM only for S4-R1 and S4-R2, because S4-R3 and S4-R4 are located away from existing US Route 51, in a location where traffic is not the predominant noise source. All other receptors were not located in areas where traffic noise was the predominant noise source. Data collected during the noise monitoring of existing conditions was used to determine existing noise levels at S4-R2, S4-R3, and S4-R4. Prediction of noise levels is one step in assessing potential noise impacts and abatement strategies. Traffic noise levels for the four receptor sites were predicted using existing (2012 – S4-R1 only) and future (2040 – all receptors) traffic volumes.

Table 4.4-3 presents the existing (2012) and projected (2040) noise levels for the four receptor sites, as well as the anticipated difference in noise levels for these two time periods. The existing 2012 noise level ranges from 44 dB(A) at receptor S4-R4 to 56 dB(A) at receptor S4-R1. The 2040 No-Build traffic noise levels increase by one dB(A) from the existing scenario at receptors S4-R1 and S4-R2 due to an increase in traffic volumes. The projected No-Build 2040 noise levels are not expected to change from the existing condition for receptors S4-R3 and S4-R4 as traffic noise is not the predominant noise source near these receptors.

The projected build 2040 noise levels range from 50 dB(A) at S4-R3 to 57 dB(A) at S4-R1. The build condition traffic noise levels increase between 1 dB(A) and 12 dB(A) from the existing scenario. None of the receptors approach, meet, or exceed the FHWA NAC, and there is no substantial noise increase (greater than 14 dB(A)) over existing conditions. Therefore a noise abatement analysis is not warranted.

TABLE 4.4-3
SECTION 4 NOISE MODELING RESULTS

Receptor	Existing, dB(A)	No Build, dB(A)	Build Alternative, dB(A)**	Increase from Existing to Build, dB(A)
S4-R1	56**	57**	57	1
S4-R2	52**	53**	55	3
S4-R3	49*	49*	50	1
S4-R4	44*	44*	56	12

* Noise monitoring was conducted at S4-R3 and S2-R4 to represent the existing scenario. Monitoring is anticipated to be representative of no-build conditions also.

** Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 4 is within unincorporated areas of Marion County, as well as portions of the cities of Vernon and Patoka. The unincorporated areas of Section 4 are currently agricultural with scattered residences. The remainder of Section 4 is within Vernon or Patoka, and consists of agricultural, residential, industrial, retail, school, or recreational uses. Agricultural land is in Activity Category

F, and there are no NAC applicable to this activity category. The agricultural sections of Section 4 were assessed to determine their potential for future development into uses that have an established NAC. Marion County and the cities of Vernon and Patoka do not have future land use plans; because of this, it was assumed that there are no official plans for new development in agricultural areas of Section 4 prior to the US Route 51 design year of 2040. For this reason, no agricultural land in Section 4 was screened for potential noise sensitive receptor locations due to new planned development.

4.5 Section 5: Vernon to Shobonier (Rural)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. One receptor has been selected to represent Section 5. The receptor has an associated CNE covering the length of Section 5. The selected receptor represents the worst case traffic noise scenario within the section. The project team is unaware of any recently permitted developments in Section 5. Table 4.5-1 lists the receptor number, the associated CNE, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor location is 200 feet from the US Route 51 closest alternative centerline.

TABLE 4.5-1
SECTION 5 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S5-R1	SFR	B / 67	200	11

SFR = Single Family Residence

Noise Monitoring

Table 4.5-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at S5-R1 was 57 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.5-2
SECTION 5 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S5-R1	57	60	3

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 5 utilizing TNM. Table 4.5-3 presents the existing (2012) and projected (2040) noise levels for the receptor site, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 60 dB(A) at receptor S5-R1. The projected No Build 2040 traffic noise level is 61 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level from is 65 dB(A) at receptor S5-R1. The projected Build 2040 noise level increases five dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes and a shift of US Route 51 closer to S5-R1 due to the addition of two travel lanes.

Under the proposed 2040 Build scenario, receptor S5-R1 does not approach, meet or exceed the FHWA NAC. The receptors is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.5-3
SECTION 5 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S5-R1	60	61	65	5

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 5 is within unincorporated areas of Fayette County and Marion County. Section 5 is currently agricultural with scattered residences. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 5 were assessed to determine their potential for future development into uses that have an established NAC. Fayette County and Marion County do not have future land use plans; because of this, it was assumed that there are no official plans for new development in agricultural areas of Section 5 prior to the US Route 51 design year of 2040. For this reason, no agricultural land in Section 5 was screened for potential noise sensitive receptor locations due to new planned development.

4.6 Section 6: Shobonier and Vandalia (Urban)

Receptor Selection

The land use within this section is varied, consisting of agricultural, forest, commercial, industrial, and residential areas. Nineteen receptors have been selected to represent Section 6. Each receptor will have an associated CNE that it represents. The project team is unaware of any recently permitted developments in Section 6. Table 4.6-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors depicted. The receptor locations are between 120 feet and 1,110 feet from the US Route 51 closest alternative centerline.

TABLE 4.6-1
SECTION 6 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S6-R1	SFR	B / 67	175	15
S6-R2	SFR	B / 67	225	8
S6-R3	SFR	B / 67	200	4
S6-R4	SFR	B / 67	330	4
S6-R5	Mobile Homes	B / 67	160	18
S6-R5A	Hotel	E / 72	250	20
S6-R6	SFR	B / 67	375	3
S6-R7	SFR	B / 67	275	7
S6-R8	SFR	B / 67	175	1
S6-R9	SFR	B / 67	1,075	5
S6-R10	SFR	B / 67	375	10
S6-R11	SFR	B / 67	250	3
S6-R12	SFR	B / 67	150	17
S6-R12A	SFR	B / 67	1,000	12
S6-R13	SFR	B / 67	200	2
S6-R13A	SFR	B / 67	1,100	8
S6-R14	SFR	B / 67	175	11
S6-R15	SFR	B / 67	265	4
S6-R16	SFR	B / 67	120	10

SFR = Single Family Residence

Noise Monitoring

Table 4.6-2 summarizes the noise monitoring result for the receptor locations monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise levels ranged between 51 dB(A) and 68 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise level at receptor S6-R5 and S6-R14, which validates

the TNM model. Model validation is not applicable for the remaining receptors as they are located in area where traffic noise is not the predominant noise source in the existing condition. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.6-2
SECTION 6 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S6-R3	51	NA	NA
S6-R5	68	67	-1
S6-R6	65	NA	NA
S6-R9	57	NA	NA
S6-R10	53	NA	NA
S6-R12A	52	NA	NA
S6-R13	53	NA	NA
S6-R13A	57	NA	NA
S6-R14	61	62	1

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.
NA = Not applicable as receptor is located in area where traffic noise is not the predominant noise source in the existing condition

Traffic Noise Analysis

Existing noise levels were predicted using TNM for receptors S6-R1, S6-R2, S6-R5, S6-R5A, S6-R14, S6-R15, and S6-R16, as these receptors are located near existing roads and traffic is the predominant existing noise source. All other receptors were not located in areas where traffic noise was the predominant noise source. Data collected during the noise monitoring of existing conditions was used to determine existing noise levels at the remaining twelve receptors. Prediction of noise levels is one step in assessing potential noise impacts and abatement strategies. Traffic noise levels for the nineteen receptor sites were predicted using existing (2012 – S6-R1, S6-R2, S6-R5, S6-R5A, S6-R14, S6-R15, and S6-R16 only) and future (2040 – all receptors) traffic volumes.

Table 4.6-3 presents the existing (2012) and projected (2040) noise levels for the nineteen receptors, as well as the anticipated difference in noise levels for these two time periods. The existing 2012 noise level ranges from 51 dB(A) at receptor S6-R3 and S6-R4 to 69 dB(A) at receptor S6-R5A. The 2040 No Build traffic noise levels either remain the same or increase by between one dB(A) and two dB(A) from the existing scenario at receptors S6-R1, S6-R2, S6-R5A, S6-R14, S6-R15, and S6-R16 due to an increase in traffic volumes. The projected No Build 2040 noise levels are not expected to change from the existing condition for the remaining receptors as traffic noise is not the predominant noise source in the area of these receptors.

The projected build 2040 noise levels range from 45 dB(A) at S6-R8 for V Alt 2 to 70 dB(A) at S6-R5A for V Alt 4. The build condition traffic noise levels either stay the same or increase between 1 dB(A) and 12 dB(A) from the existing scenario. One of the receptors (S6-R5) exceeds the FHWA

NAC. This is the only impact in Section 6, as there is no substantial noise increase (greater than 14 dB(A)) over existing conditions for any of the receptors. Therefore, a noise abatement analysis is warranted at S6-R5.

TABLE 4.6-3
SECTION 6 NOISE MODELING RESULTS

Receptor	Existing, dB(A)	No Build, dB(A)	Build, dB(A)**					Increase from Existing to Build, dB(A)
			Build Alternative	V Alt 1	V Alt 2	V Alt 3	V Alt 4	
S6-R1	55**	57**	60	---	---	---	---	3
S6-R2	53**	54**	58	---	---	---	---	4
S6-R3	51*	51*	58	---	---	---	---	7
S6-R4	51*	51*	---	---	63	---	55	12 / 4
S6-R5	67**	67**	---	---	---	---	68	1
S6-R5A	69**	70**	---	---	---	---	70	1
S6-R6	51*	51*	---	---	56	56	---	5 / 5
S6-R7	57*	57*	---	58	---	---	---	1
S6-R8	57*	57*	---	---	45	55	---	-12 / -2
S6-R9	57*	57*	---	---	47	Taken	---	-10
S6-R10	53*	53*	---	---	---	59	---	6
S6-R11	57*	57*	---	---	61	---	---	4
S6-R12	52*	52*	---	---	---	62	---	10
S6-R12A	52*	52*	---	---	58	---	---	6
S6-R13	53*	53*	---	---	60	---	---	7
S6-R13A	57*	57*	---	---	48	---	---	-9
S6-R14	62**	63**	---	---	61	61	64	-1 to 2
S6-R15	54**	55**	57	---	---	---	---	3
S6-R16	64**	65**	---	---	Taken	---	---	Taken

* Noise monitoring was conducted at S6-R3, S6-R5, S6-R9, S6-R10, S6-R12A, S6-R13, S6-R13A, and S6-R14. The monitoring conducted at receptor S6-R9 is representative of receptors S6-R7, S6-R8 and S2-R11. The monitoring conducted at receptor S6-R12A is representative of receptor R6-R12. The monitoring conducted at receptor S6-R3 is representative of receptor R6-R4 and S6-R6. Monitoring is anticipated to be also representative of no build conditions at these locations.

** Noise levels predicted using TNM and are generated by traffic volumes on proposed US Route 51.

--- Build noise level not applicable for this alternative.

Taken – Receptor is removed by the proposed build alternative

Traffic Noise Abatement Evaluation

TNM was used to perform the noise wall feasibility and reasonability check for the impacted receptor S6-R5. When determining if an abatement measure is feasible and reasonable, the noise reductions achieved, number of residences benefited, total cost, and total cost per residence benefited are considered.

A noise wall was evaluated for the impacted receptor. The noise wall was modeled along the

proposed right-of-way. The noise wall Barrier B1 (see Figure 5) could feasibly be built as it provides a 5 dB(A) reduction at a minimum of one receptor. The noise barrier would also be considered acoustically reasonable, as it achieves the IDOT noise reduction design goal of at least an 8 dB(A) traffic noise reduction at one or more benefited receptor locations.

Barrier B1 was then evaluated for cost-effectiveness. Barrier B1 is approximately 911 feet long and 19 feet high, located along the proposed right-of-way adjacent to the mobile homes at receptor S6-R5. This noise wall would cost approximately $432,725 and would benefit 11 receptors, resulting in an actual cost per benefited receptor of $39,339. This noise wall would not be economically reasonable, as the actual cost per benefited receptor exceeds the adjusted allowable cost of $24,000 per benefited receptor per IDOT policy. Table 4.6-4 summarizes the results of the adjusted allowable cost per benefited receptor determination. No adjustments were made for S6-R5, as per IDOT policy, because the mobile home community was developed after the construction of I-70, the existing noise level is less than 70 dB(A), and V Alt 4 is not predicted to substantially increase noise over existing conditions. Table 4.6-5 summarizes the results of the noise abatement evaluation. Figure 5 depicts the analyzed noise wall location.

TABLE 4.6-4
ADJUSTED ALLOWABLE COST PER BENEFITED RECEPTOR SUMMARY

Barrier / CNE	Benefited Receptors	Adjustment Factor	Adjusted Allowable Cost per Benefited Receptors
B1 / S6-R5	11	$0	$24,000

TABLE 4.6-5
NOISE WALL COST REASONABLENESS EVALUATION

Barrier / CNE	Benefited Receptors	Length, ft	Height, ft	Total Noise Wall Cost[1]	Actual Cost per Benefited Receptor	Adjusted Allowable Cost per Benefited Receptor
B1 / S6-R5	11	911	19	$432,725	$39,339	$24,000

[1] Based on the IDOT policy value of $25 per square foot

Undeveloped Lands Evaluation

Section 6 is within unincorporated areas of Fayette County and includes portions of the City of Vandalia. The unincorporated areas of Section 6 are currently agricultural with scattered residences, with agricultural, residential, industrial, office, restaurant, retail, school, and institutional uses in the alignment areas in Vandalia. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 6 were assessed to determine their potential for future development into uses that have an established NAC. Fayette County does not have a future land use plan; because of this, it was assumed that there are no official plans for new development in agricultural areas of Section 6 prior to the US Route 51 design year of 2040. Vandalia does not have a future land use plan, but the city does have maps showing future planned municipal boundaries and zoning districts. One planned growth area of Vandalia will extend west into the US 51 alignments along I-70; all of this growth area is currently zoned as industrial. Additionally, currently undeveloped land adjacent to existing US 51 north of Vandalia is

zoned for industrial use. These planned growth areas of industrial use are shown in Figure 3. Industrial use is in Activity Category F, and there is no NAC applicable to this activity category. For this reason, no agricultural land in Section 6 was screened for potential noise sensitive receptor locations due to new planned development.

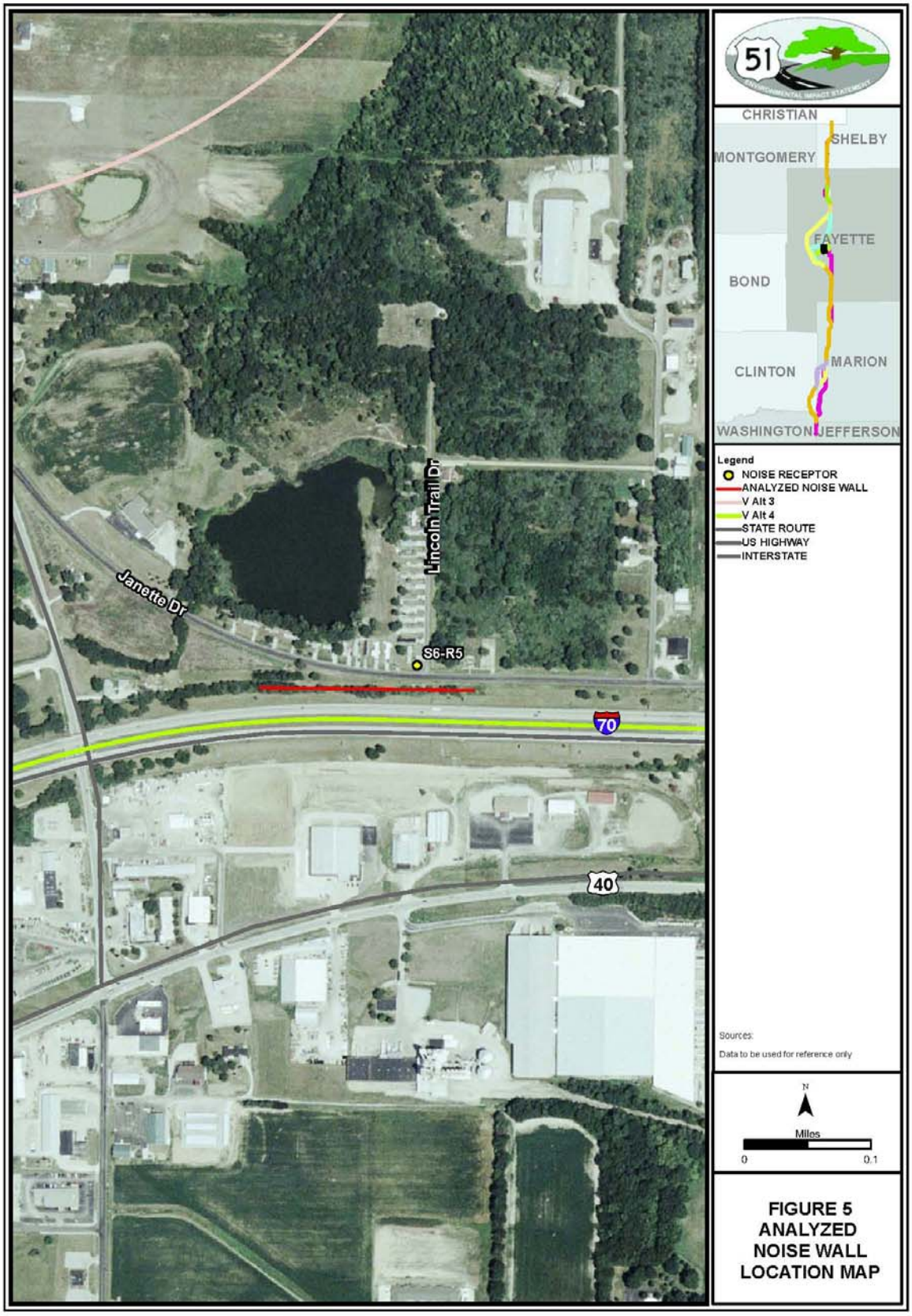

Janette Dr
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FIGURE 5
ANALYZED
NOISE WALL
LOCATION MAP

4.7 Section 7: Vandalia to Ramsey (Rural)

Receptor Selection

The land use within this section is generally forest or agricultural with scattered residences. One receptor has been selected to represent Section 7. The receptor has an associated CNE covering the length of Section 7. The selected receptor represents the worst case traffic noise scenario within the section. The project team is unaware of any recently permitted developments in Section 7. Table 4.7-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors and CNEs depicted. The receptor location is 130 feet from the US Route 51 closest alternative centerline.

TABLE 4.7-1
SECTION 7 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S7-R1	SFR	B / 67	130	4

SFR = Single Family Residence

Noise Monitoring

Table 4.7-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at S7-R1 was 64 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.7-2
SECTION 7 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S7-R1	64	62	-2

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 7 utilizing TNM. Table 4.7-3 presents the existing (2012) and projected (2040) noise levels for the receptor, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 62 dB(A) at receptor S7-R1. The projected No Build 2040 traffic

noise level is 63 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level from is 64 dB(A) at receptor S7-R1. The projected Build 2040 noise level increases two dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes and a shift of US Route 51 closer to S7-R1 due to the addition of two travel lanes.

Under the proposed 2040 Build scenario, receptor S7-R1 does not approach, meet or exceed the FHWA NAC. The receptors is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.7-3
SECTION 7 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build, dB(A)*		Increase from Existing to Build, dB(A)
			Ramsey Creek Option A	Ramsey Creek Option B	
S7-R1	62	63	64	64	2 / 2

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 7 is within unincorporated areas of Fayette County. Section 7 is currently agricultural with scattered residences. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 7 were assessed to determine their potential for future development into uses that have an established NAC. Fayette County does not have a future land use plan; because of this, it was assumed that there are no official plans for new development in agricultural areas of Section 7 prior to the US Route 51 design year of 2040. For this reason, no agricultural land in Section 7 was screened for potential noise sensitive receptor locations due to new planned development.

4.8 Section 8: Ramsey (Urban)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. The densely populated areas of Ramsey are generally avoided by the proposed build alternative. Three receptors have been selected to represent Section 8. Each receptor will have an associated CNE that it represents. The project team is unaware of any recently permitted developments in Section 8. Table 4.8-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors and CNEs depicted. The receptor locations are between 215 feet and 280 feet from the US Route 51 existing centerline.

TABLE 4.8-1
SECTION 8 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft	Represented Receptors
S8-R1	SFR	B / 67	215	2
S8-R2	SFR	B / 67	275	7
S8-R3	SFR	B / 67	280	7

SFR = Single Family Residence

Noise Monitoring

Table 4.8-2 summarizes the noise monitoring result for the receptor locations monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise levels ranged between 48 dB(A) and 55 dB(A). Model validation using monitoring results is not applicable for this section as all receptors are located in areas where traffic noise is not the predominant noise source in the existing condition.

TABLE 4.8-2
SECTION 8 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, L_{eq}
S8-R1	48 / 48
S8-R2	55
S8-R3	51

Traffic Noise Analysis

Data collected during the noise monitoring of existing conditions was used to determine existing noise levels because all three receptors are located away from existing US Route 51, in locations where traffic is not the predominant noise source.

Table 4.8-3 presents the existing (2012) and projected (2040) noise levels for the three receptors, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level ranges from 48 dB(A) at receptor S8-R1 to 55 dB(A) at receptor S8-R2. The projected No Build 2040 noise levels are not expected to change from the existing condition as traffic noise is not the predominant noise source in the area of the receptors.

The projected build 2040 noise levels range from 61 dB(A) at S8-R2 and S8-R3 to 62 dB(A) at S8-R1. Build condition traffic noise levels increase between 6 dB(A) and 14 dB(A) from the existing scenario. None of the receptors approach, meet, or exceed the FHWA NAC, and there is no substantial noise increase over existing conditions (greater than 14 dB(A)). Therefore a noise

abatement analysis is not warranted.

TABLE 4.8-3
SECTION 8 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build, dB(A)**		Increase from Existing to Build, dB(A)
			R Alt 1	R Alt 2	
S8-R1	48	48	62	---	14
S8-R2	55	55	---	61	6
S8-R3	51	51	61	---	10

* Noise monitoring was conducted at S8-R1, S8-R2, and S8-R3. Monitoring is also anticipated to be representative of no build conditions.

** Build noise levels predicted using TNM and are generated by traffic volumes on proposed US Route 51.

--- Build noise level not applicable for this alternative.

Undeveloped Lands Evaluation

Section 8 is within unincorporated areas of Fayette County and includes the area east of Ramsey. Section 8 is currently agricultural with scattered residences, with residential uses in the alignment areas in Ramsey. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 8 were assessed to determine their potential for future development into uses that have an established NAC. Neither Fayette County nor Ramsey has planned future land uses for Section 8 for new development prior to the US Route 51 design year of 2040 (Fayette County has no future land use plan). For this reason, no agricultural land in Section 8 was screened for potential noise sensitive receptor locations due to new planned development.

4.9 Section 9: Ramsey to Oconee (Rural)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. One receptor has been selected to represent Section 9. The receptor has an associated CNE covering the length of Section 9. The selected receptor represents the worst case traffic noise scenario within the section. The project team is unaware of any recently permitted developments in Section 9. Table 4.9-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest proposed centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors and CNEs depicted. The receptor location is 140 feet from the US Route 51 closest proposed centerline.

TABLE 4.9-1
SECTION 9 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft	Represented Receptors
S9-R1	SFR	B / 67	140	13

SFR = Single Family Residence

Noise Monitoring

Table 4.9-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at receptor S9-R1 was 63 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.9-2
SECTION 9 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S9-R1	63	60	-3

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 9 utilizing TNM. Table 4.9-3 presents the existing (2012) and projected (2040) noise levels for the receptor, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 60 dB(A) at receptor S9-R1. The projected No-Build 2040 traffic noise level is 61 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level from is 62 dB(A) at receptor S9-R1. The projected Build 2040 noise level increases two dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes and a shift of US Route 51 closer to S9-R1 due to the addition of two travel lanes.

Under the proposed 2040 Build scenario, receptor S9-R1 does not approach, meet or exceed the FHWA NAC. The receptors is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.9-3
SECTION 9 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S9-R1	60	61	62	2

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 9 is within unincorporated areas of Shelby County and Fayette County. Section 9 is currently agricultural with scattered residences. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 9 were assessed to determine their potential for future development into uses that have an established NAC. Neither Shelby County nor Fayette County has planned future land uses for Section 9 for new development in agricultural areas prior to the US Route 51 design year of 2040 (Fayette County has no future land use plan). For this reason, no agricultural land in Section 9 was screened for potential noise sensitive receptor locations due to new planned development.

4.10 Section 10: Oconee (Urban)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. Four receptors have been selected to represent Section 10. Each receptor will have an associated CNE that it represents. The project team is unaware of any recently permitted developments in Section 10. Table 4.10-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors and CNEs depicted. The receptor locations are between 100 feet and 400 feet from the US Route 51 closest alternative centerline.

TABLE 4.10-1
SECTION 10 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft	Represented Receptors
S10-R1	SFR	B / 67	400	4
S10-R2	SFR	B / 67	200	5
S10-R3	SFR	B / 67	100	3
S10-R4	Church	C / 67	115	1

SFR = Single Family Residence

Noise Monitoring

Table 4.10-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at receptor S10-R3 was 63 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.10-2
SECTION 10 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)	Modeled Existing Noise Level, dB(A)*	Difference Between Modeled and Monitored, dB(A)
S10-R3	63	64	1

*Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the four receptor locations in Section 10 utilizing TNM. Table 4.10-3 presents the existing (2012) and projected (2040) noise levels for the receptors, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level ranges from 59 dB(A) at receptor S10-R2 to 64 dB(A) at receptor S10-R3. The projected No Build 2040 noise levels are not expected increase one decibel due to an increase in traffic volumes.

The projected build 2040 noise levels range from 55 dB(A) at S10-R1 to 65 dB(A) at S10-R3. For receptors S10-R2 and S10-R4, build condition traffic noise levels increase between 1 dB(A) and 3 dB(A) from the existing scenario. For receptor S10-R1, the predicted traffic noise levels in the build condition is less than the existing noise levels due to a shift of US Route 51 away from the receptor. None of the receptors approach, meet, or exceed the FHWA NAC, and there is no substantial noise increase (greater than 14 dB(A)) over existing conditions. Therefore a noise abatement analysis is not warranted.

TABLE 4.10-3
SECTION 10 NOISE MODELING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S10-R1	60	61	55	-5
S10-R2	59	60	62	3
S10-R3	64	65	65	1
S10-R4	62	63	63	1

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 10 is within unincorporated areas of Shelby County and includes the area east of the city of Oconee. Section 10 is currently agricultural with scattered residences and a church, with residential uses along US Route 51 at Oconee. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 10 were assessed to determine their potential for future development into uses that have an established NAC. Shelby County has no planned future land uses for Section 10 for new development prior to the US Route 51 design year of 2040. The City of Oconee is currently zoned as residential use from the city's existing edge of development east to US Route 51; Shelby County's future zoning map shows these zoning boundaries are not expected to change in future. For this reason, no agricultural land in Section 10 was screened for potential noise sensitive receptor locations due to new planned development.

4.11 Section 11: Oconee to North Limit (Rural)

Receptor Selection

The land use within this section is generally agricultural with scattered residences. The project team is unaware of any recently permitted developments in Section 11. One receptor has been selected to represent Section 11. The receptor has an associated CNE covering the length of Section 11. The selected receptor represents the worst case traffic noise scenario within the section. Table 4.11-1 lists the receptor number, the associated CNE, the receptor type, the activity category and associated NAC, the approximate distance to the US Route 51 closest alternative centerline, and the number of receptors represented. Figure 4 depicts the aerial photograph of the study area with the receptors and CNEs depicted. The receptor location is 160 feet from the US Route 51 closest alternative centerline.

TABLE 4.11-1
SECTION 11 NOISE RECEPTOR LOCATIONS

Receptor/ CNE Number	Receptor Type	Activity Category/ NAC (dB(A))	Distance to Closest Alternative Centerline, ft.	Represented Receptors
S11-R1	SFR	B / 67	160	2

SFR = Single Family Residence

Noise Monitoring

Table 4.11-2 summarizes the noise monitoring result for the receptor location monitored in the field. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results. The monitored noise level at S11-R1was 58 dB(A). Monitored noise levels are within 3 dB(A) of the modeled noise levels, which validates the TNM model. The impact analysis and abatement evaluation will be conducted using the build traffic noise model results.

TABLE 4.11-2
SECTION 11 NOISE MONITORING RESULTS

Receptor/ CNE Number	Noise Level Monitored, dB(A)*	Modeled Existing Noise Level, dB(A)**	Difference Between Modeled and Monitored, dB(A)
S11-R1	58 / 58	56	-2

* Noise monitoring was conducted twice in this location

**Modeling methodology is presented in Section 3. Noise modeling results are presented below.

Traffic Noise Analysis

Existing (2012), No Build (2040), and Build (2040) traffic noise levels were predicted for the single receptor location in Section 11 utilizing TNM. Table 4.11-3 presents the existing (2012) and projected (2040) noise levels for the receptor, as well as the anticipated difference in noise levels for these two time periods.

The existing 2012 noise level is 56 dB(A) at receptor S11-R1. The projected No Build 2040 traffic noise level is 57 dB(A). The increase of one decibel in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise level from is 59 dB(A) at receptor S11-R1. The projected Build 2040 noise level increases three dB(A) from the existing condition. Increases in noise levels are due to an increase in traffic volumes and a shift of US Route 51 due to the addition of two travel lanes.

Under the proposed 2040 Build scenario, receptor S11-R1 does not approach, meet or exceed the FHWA NAC. The receptors is also not considered impacted due to a substantial increase (greater than 14 dB(A) increase) in traffic noise levels, and therefore a noise abatement analysis is not warranted.

TABLE 4.11-3
SECTION 11 NOISE MONITORING RESULTS

Receptor	Existing, dB(A)*	No Build, dB(A)*	Build Alternative, dB(A)*	Increase from Existing to Build, dB(A)
S11-R1	56	57	59	3

* Noise levels predicted using TNM and are generated by traffic volumes on US Route 51.

Undeveloped Lands Evaluation

Section 11 is the north end of the US Route 51 project area and is within unincorporated areas of Christian County and Shelby County. Section 11 is currently agricultural with scattered residences. Agricultural land is in Activity Category F, and there are no NAC applicable to this activity category. The agricultural sections of Section 11 were assessed to determine their potential for future development into uses that have an established NAC. Neither Christian County nor Shelby County has planned future land uses for Section 11 for new development in agricultural areas prior to the US Route 51 design year of 2040. For this reason, no agricultural land in Section 11 was screened for potential noise sensitive receptor locations due to new planned development.

5. CONSTRUCTION NOISE

Trucks and machinery used for construction produce noise which may affect some land uses and activities during the construction period. Residents along the alignment will at some time experience perceptible construction noise from implementation of the project. To minimize or eliminate the effect of construction noise on these receptors, mitigation measures have been incorporated into the Illinois Department of Transportation's Standard Specifications for Road and Bridge Construction as Article 107.35.

6. SUMMARY

This traffic noise study has been coordinated to evaluate traffic noise for the proposed improvements. Traffic noise was evaluated at forty-six receptor locations. The Existing 2012 noise levels range from 44 dB(A) to 69 dB(A). The projected No Build 2040 traffic noise levels range from 44 dB(A) to 70 dB(A). Generally, receptor noise levels either remain the same or increase between 1 dB(A) and 2 dB(A) from the existing scenario to the No Build scenario. Any increase in traffic noise levels is due to an increase in traffic volumes.

The projected Build 2040 traffic noise levels range from 45 dB(A) to 70 dB(A). The projected Build 2040 noise levels increase between one dB(A) and fourteen dB(A) from the existing condition. In several locations, the build scenario traffic noise levels are less than the existing ambient noise levels. Increases in noise levels are due to an increase in traffic volumes and the realignment of US Route 51 closer to receptors. Under the proposed 2040 build scenario, one receptor location meets the FHWA NAC, and therefore warranted a noise abatement analysis. None of the receptors are considered impacted due to a substantial increase in traffic noise levels greater than 14 dB(A) from existing conditions.

A noise wall was evaluated for the impacted receptor. This noise wall, located along the right of way of I-70, could feasibly be built. The feasible noise barrier also achieved IDOT's noise reduction design goal. This noise wall, however, is not considered economically reasonable, as the actual costs per benefited receptor exceeds the adjusted allowable cost per benefited receptor. Therefore, noise abatement is not likely to be implemented as part of this project.

APPENDIX A

[DATE]

Allison Austin
Director of Community
Development & Planning
222 S. Poplar
Centralia, Illinois 62801

Re: Traffic Noise Information for Undeveloped Lands
US Route 51 Improvements
South of the City of Centralia to south of the City of Pana

Ms. Austin:

The Illinois Department of Transportation is currently conducting environmental (Phase I) preliminary engineering studies for the proposed improvement of US Route 51 from south of the City of Centralia in Jefferson County, Illinois to south of the City of Pana in Christian County, Illinois. The proposed project includes realignment and additional lanes for US Route 51. The existing and planned land use adjacent to the road is a mixture of agricultural and residential, with some areas of commercial, industrial and institutional.

As part of the Phase I Environmental Study for this proposed project, projected future traffic noise levels were evaluated for lands (either currently under your jurisdiction or land that may come under your jurisdiction) near the proposed roadway improvement. For your information, this study area includes land that is planned for future development in a comprehensive land use plan.

Attached for your information is an exhibit showing the predicted design year (2040) build traffic noise levels for the undeveloped land identified along the project corridor within your jurisdiction. For each highlighted future development area the distance from the edge of the nearest proposed travel lane (based on the realignment and four-lane proposed improvement) to the 66-dB(A) (for residential areas; highlighted in solid white, and 60 feet from EOP) and 71-dB(A) (for commercial areas, highlighted in a dashed white line, and 20 feet from EOP) noise level contours is listed.

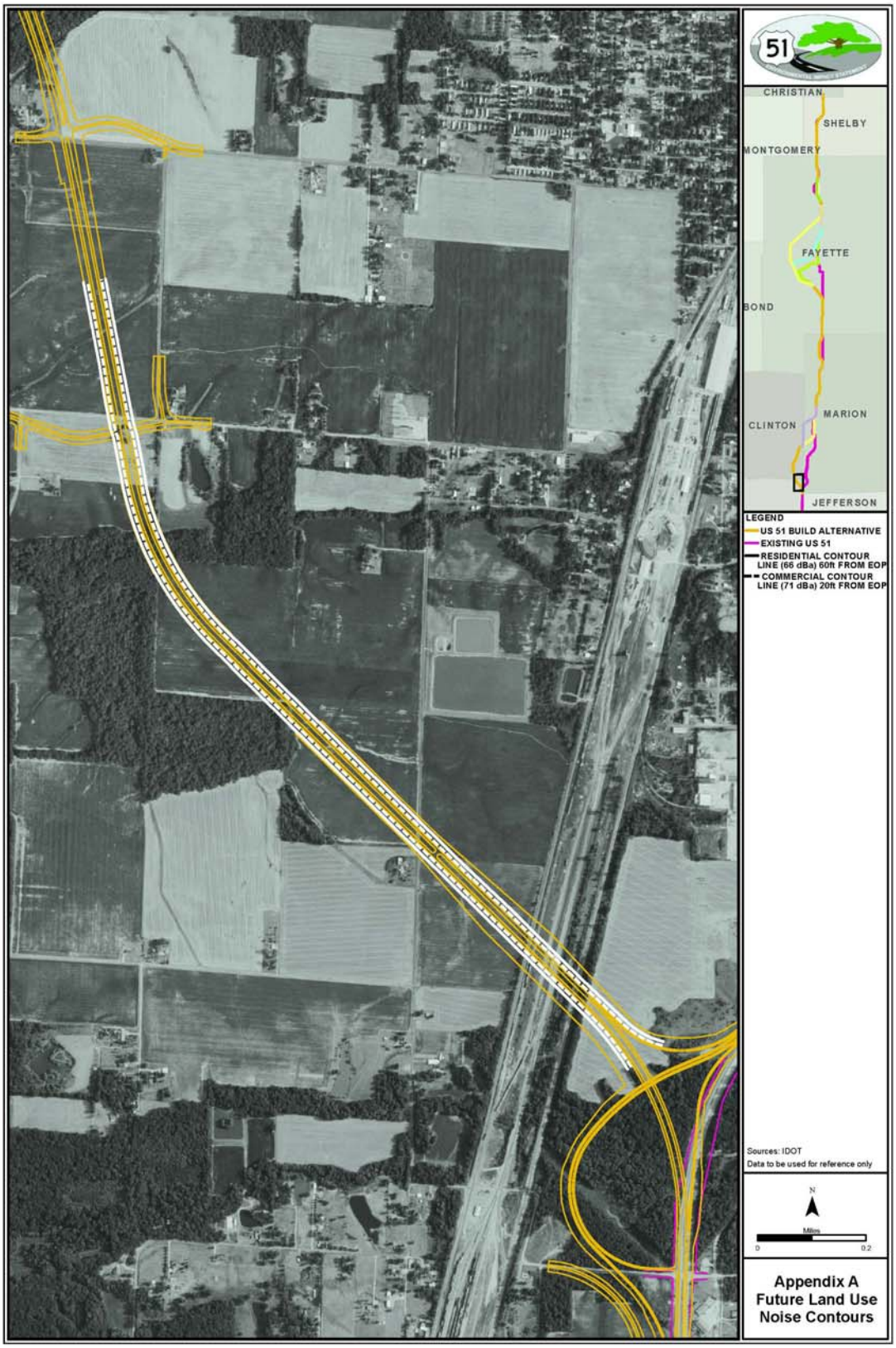
We hope this information will be useful to you in planning and permitting future development in your area. We recommend that you carefully consider the future predicted noise levels to avoid potential issues of public concern over incompatible noise levels.

To help with your future planning and discernment regarding permitting decisions, we encourage you to obtain the Federal Highway Administration (FHWA) publication titled *Entering the Quiet Zone: Noise Compatible Land Use Planning*. This publication can be obtained from the FHWA website:

www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/quitezon.pdf

For additional information regarding traffic noise, regulations and policy, noise analyses or noise abatement, we encourage you to visit the Department's web site at: http://www.dot.il.gov/. Click on the "Environment" link and then the "Traffic Noise" link to access this information.

Sincerely,


CHRISTIAN
SHELBY
MONTGOMERY
FAYETTE
BOND
CLINTON
MARION
JEFFERSON
LEGEND
US 51 BUILD ALTERNATIVE
EXISTING US 51
RESIDENTIAL CONTOUR LINE (66 dBa) 60ft FROM EOP
COMMERCIAL CONTOUR LINE (71 dBa) 20ft FROM EOP
Sources: IDOT
Data to be used for reference only
N
Miles
0
0.2
Appendix A
Future Land Use
Noise Contours