



MID-STATES CORRIDOR

APPENDIX JJ – NOISE IMPACTS

Mid-States Corridor Tier 1 Environmental Impact Study

Prepared for
Indiana Department of Transportation
Mid-States Regional Development Authority

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Prepared by
Mid-States Corridor Project Consultant





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NOISE IMPACTS

Introduction

The Mid-States Corridor project will include construction of a combination of new/upgraded multi-county transportation facility from the Ohio River north to I-69. The construction of a new facility, whether on new alignment or utilizing an upgrade of an existing facility will include changes in access and impacts to local communities. A facility of this type will alter the existing travel patterns and increase/decrease travel times.

Transportation related noise impacts are a growing concern. The transportation system within the State of Indiana continues to grow and expand to meet the economic and social needs of the State. As the population grows and economic development continues, the transportation system expands and the traffic volumes increase. The communities adjacent to these facilities will continue to be subjected to higher levels of highway-related noise. The increase in levels of highway-related noise is an environmental concern, especially in high density urban settings and outlying urban/suburban areas where large numbers of residential properties along high volume Interstates and highways are routinely affected.

The Indiana Department of Transportation (INDOT) Traffic Noise Analysis Procedure (July 1, 2017) (“Procedure”) was utilized for the noise analysis. The analysis addresses the intents of this policy, as appropriate for a Tier 1 Environmental Impact Statement (EIS). The Procedure is INDOT’s application of Federal Highway Administration (FHWA) highway traffic and construction noise regulations. The Procedure incorporates application of FHWA standards under 23 CFR Part 772 “Procedures for Abatement of Highway Traffic Noise and Construction Noise.” FHWA recognizes the potential for such adverse off-site effects associated with Type I projects. The Mid-States Corridor qualifies as a Type I project because it: (1) proposes to either construct a highway on a new location or (2) significantly changes the vertical or horizontal alignment and/or number of through-traffic lanes of an existing highway. The INDOT/FHWA policy analyzes noise impacts, as well as reasonable and feasible mitigation, for projects with a defined location and right-of-way. INDOT has not chosen to implement a Type II program to construct noise barriers independently of added-capacity projects.

Methodology

Typically, a highway noise study is designed to quantitatively analyze specific areas for noise impacts along one or more proposed alternatives, each of which possess a clearly defined alignment with known horizontal and vertical geometry and the occupied areas adjacent to the proposed roadway. The goal of the Tier 1 EIS study is to select a corridor to move forward to a Tier 2 EIS study. This noise analyses has been undertaken at a level appropriate to compare working alignments within alternative corridors. The Tier 2 NEPA noise analyses will further evaluate noise impacts by specifically identifying noise receptors of potential noise mitigation.

A Technical Memorandum (Memo), see **Attachment 1**, was provided to INDOT recommending the parameters used for the evaluation of noise impacts and comparison of those impacts by alternative for a Tier I level study for the Mid-States Corridor project. The Memo describes how the intent of the Procedure is addressed without



incorporating all details required in a formal noise analysis. This comparison of alternative noise impacts is appropriate for a Tier I EIS. The goal is to develop noise impact analysis that is consistent with the INDOT Traffic Noise Analysis Procedure (2017) and is both accurate and at the level needed to meet the object of the noise evaluation, without all the significant details typically required in a formal noise analysis.

The purpose of the Tier 1 EIS noise impact analysis is to provide data to inform alternative selection, as such noise analyses have been undertaken at a level appropriate to compare alternatives. The analysis will be accurate and can be used for comparison of noise impacts between alternatives but will not satisfy requirements of typical INDOT noise analysis. The subsequent Tier 2 NEPA study will have an approved alignment and implement INDOT's noise policy with regards to site-specific impacts in more detail.

The Tier 1 Level noise analysis was performed using the FHWA Traffic Noise Model (TNM) Version 2.5 software to predict noise impacts in the vicinity of highways. The noise analysis included a straight line TNM 2.5 model for every alignment disregarding horizontal curvature, the vertical component of the roadway, and terrain and utilize traffic volumes and truck percentages. Available traffic data and ADT truck percentages were used to obtain hourly heavy and medium truck volumes.

The model had no terrain lines, ground zones, tree zones, or building rows. It used simple speed, traffic volume, traffic distance, and GIS points for receptors. Receptor classification was limited to Category B and C NAC sites. Peak hourly volumes and daily traffic volumes from the traffic model was split by cars and trucks. Since a straight-line typical section was used, this type of model ignores terrain lines, tree and ground zones. The receptors were placed at-grade with the road to determine where the 66 dB(A) threshold was. That provides locations that may not be impacted due to cut and fill; but should highlight the worst-case potential for impacts.

The model was constructed to represent the typical section of the proposed roadway and utilized receptors placed at 25-foot intervals perpendicular to the roadway. The results of the model were then used to identify the distance from the edge of pavement where the model predicts future sound levels of 66 dB(A) Leq. Once the distance to the 66 dB(A) level was found for each segment along the working alignment, an ArcGIS shapefile was created demonstrating this buffer around the working alignment. All properties within that limit were then identified as potential impacts for the alternative.

Impacts were evaluated on the number of impacted receptors along each alignment. Focus was placed on the areas with concentrated impacts instead of isolated and small clusters. Noise abatement assessment for a Tier 1 type of analysis evaluated the potential of working alignment alternatives to require potential abatement using professional judgment, topography and aerial photos to identify residential areas where noise abatement might be warranted. Subsequent detailed Tier 2 studies may conclude that some of these areas do not meet the feasible and reasonableness criteria for noise barrier wall abatement and/or may reveal other areas not identified that do meet the requirements.

The noise analysis identifies locations where the proposed roadway is an intrusion adjacent to developed areas. There are five activity categories established to classify land use for the purposes of assessing noise impact and potential noise abatement. **Table 1** describes each of these categories; **Table 2** provides a listing of receptors where highway noise impacts would potentially occur near the alternatives. **Table 3** provides noise impacts by alternative in each county, **Table 4** provides noise impacts by each local improvement, and **Table 5** provides noise impacts by alternative variation and local improvement.



Attachment 1



TECHNICAL MEMO

To: Michael Grovak
From: Brian Shaw – Beam, Longest and Neff, LLC
Cc: Jason DuPont, David Goffinet, Kirsten Lewis
Date: July 1, 2020
Subject: Impact Calculations and DEIS Preparation

This technical memorandum is presented to provide recommended parameters for the evaluation of noise impacts and comparison of those impacts by alternative for a Tier I level study for the Mid-States Corridor project. The goal is to develop noise impact analysis that is consistent with the INDOT Traffic Noise Analysis Procedure (2017) and is both accurate and good enough to meet the object of the noise evaluation, without all the significant details typically required in a formal noise analysis.

Introduction

The Mid-States corridor project will include construction of a combination of new/upgraded multi-county transportation facility from the Ohio River north to I-69. The construction of a new facility, whether on new alignment or utilizing an existing facility will include changes in access and impacts to local communities. A facility of this type will alter the existing travel patterns and increase/decrease travel times.

Transportation related noise impacts have become a growing environmental concern, especially in high density urban settings and outlying urban/suburban areas where large numbers of residential properties along high volume roadways are routinely affected. Transportation related noise related impacts are anticipated along the project corridor. The impacts are expected to be greater in the more urbanized areas within the project footprint including the cities of Bloomington, Bedford, Loogootee, Huntingburg, and Jasper.

Agency Guidance

The Indiana Department of Transportation (INDOT) Traffic Noise Analysis Procedure (July 1, 2017) will be utilized for the noise analysis. The analysis will address the intents of this policy, as appropriate for a Tier 1 level EIS. The INDOT Traffic Noise Analysis Procedure incorporates the application of the Federal Highway Administration (FHWA) standards under 23 Code of Federal Regulations (CFR) Part 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise. The FHWA recognizes the potential for impacts associated with Type I projects. The Mid States corridor qualifies as a Type I project because it: (1) proposes to either construct a highway on a new location or (2) significantly changes the vertical or horizontal alignment and/or number of through-traffic lanes of an existing highway. The INDOT/FHWA policy analyzes noise impacts, as well as reasonable and feasible mitigation, for projects with a defined location and right-of-way. The subsequent Tier 2 NEPA study will implement INDOT's noise policy with site-specific impacts.





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INDOT's 2017 INDOT Traffic Noise Analysis Procedure was developed to implement the requirements of 23 CFR 772 Part 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise and the noise-related requirements of the National Environmental Policy Act of 1969 and focuses on seven principal elements:

- Definition of Impact Criteria and Identification of Noise-Sensitive Land Uses
- Determination of Existing Noise Levels
- Prediction of Future Traffic Noise Levels
- Identification of Traffic Noise Impacts
- Identification and Consideration of Abatement
- Construction Noise Analysis
- Coordination with Local Government Officials

The Tier 1 EIS assessment addresses each of the above elements at a high-level evaluation that is accurate and allows comparison of relative noise impacts of alternatives to the extent appropriate at a Tier 1 EIS level. The subsequent Tier 2 NEPA study will implement INDOT's noise policy with site specific impacts. The intent of the 2017 INDOT Traffic Noise Procedure is addressed without all the significant details typically required in a formal noise analysis.

Methodology

The goal of the Tier 1 EIS noise impact analysis is to provide data to inform alternative selection, as such noise analyses have been undertaken at a level appropriate to compare alternatives. The analysis will be accurate and can be used for comparison of noise impacts between alternatives but will not satisfy requirements of typical INDOT noise analysis. The subsequent Tier 2 NEPA study will have an approved alignment and implement INDOT's noise policy with regards to site-specific impacts in more detail.

The Mid-States Tier 1 Noise Evaluation process will construct a straight line TNM 2.5 model for every alignment disregarding the vertical component of the roadway and terrain and utilize traffic volumes and truck percentages. Available traffic data will be used and anticipate using ADT truck percentages to obtain hourly heavy and medium truck volumes.

- No terrain lines, ground zones, tree zones, or building rows,
- Simple distance speed, traffic volume, traffic distance
- Use GIS points for homes and businesses.
- Limit receptor classification to Category B and C NAC sites.
- Peak hour & daily from traffic model split by cars and truck
- Conduct random sampling of appropriate locations for ambient readings. Determine an average and apply to all rural areas for baseline number. Suburban areas may require a separate ambient background reading.

The model will be constructed to represent the typical section of the proposed roadway and will utilize receptors placed perpendicular to the roadway and then refined to identify the distance from the edge of



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pavement where the model predicts future sound levels of 66 dB(A) Leq. Once the distance to 66 dB(A), is found for each segment along the corridor, an ArcGIS shapefile will be created demonstrating this buffer around the corridor. All properties within that limit will then be identified and reported as potential impacts for the corridor.

Impacts will be evaluated on how many receptors are impacted per alignment and the number of anticipated impacted receptors along each alignment. Focus will be on the areas with concentrated impacts instead of isolated and small clusters. Potential mitigation for a Tier 1 type of analysis will compare relative potential of alternatives to require potential abatement. These locations are confined to residential areas and a table will be included that summarizes a review using professional judgment, area contours and aerial photos to identify residential areas where noise abatement potentially would be needed. Subsequent detailed Tier 2 studies may conclude that some of these areas do not meet the feasible and reasonableness criteria for noise barrier wall abatement and/or may reveal other areas not identified that do meet the requirements.

The analysis will also include a general statement on potential noise impacts to wildlife regarding foraging and mating for an alternative that passes through a natural area has higher potential for impacts.

Limitations

The proposed Tier 1 noise analysis procedures will be sufficient for alternative comparison but not be conducted at a level of detail typically required of INDOT noise analyses. Subsequent detailed Tier 2 studies may result in conclusions dissimilar to the findings of this Tier 1 assessment. Variability in the Tier 2 analysis is possible if the alignments change to avoid significant resources such as Section 106 resources and wildlife.



TABLE 1: FHWA NOISE ABATEMENT CRITERIA

Activity Category	NAC Leq(h)	Activity Description
A	57 dBA (exterior)	Land 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 dBA (exterior)	Residential including single and multi-family residences (duplexes, apartments, condominiums), mobile home communities and facilities that provide long-term residential stays.
C	67 dBA (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 dBA (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 dBA (exterior)	Hotels, motels, offices, restaurants/bars and other developed lands, properties or activities not included in Category A-D.

TABLE 2: POTENTIALLY IMPACTED RECEPTORS BY ALTERNATIVE

Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
1	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
2	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
3	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
4	Residential	Dubois	X	X										
5	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
6	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
7	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
8	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
9	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
10	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
11	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
12	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
13	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
14	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
15	Residential	Dubois			X	X	X	X	X	X	X	X	X	X



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
16	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
17	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
18	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
19	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
20	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
21	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
22	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
23	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
24	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
25	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
26	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
27	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
28	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
29	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
30	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
31	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
32	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
33	Residential	Dubois			X	X	X	X	X	X	X	X	X	X
34	Residential	Dubois			X	X	X	X			X	X	X	X
35	Residential	Dubois			X	X	X	X			X	X	X	X
36	Residential	Dubois			X	X	X	X			X	X	X	X
37	Residential	Dubois			X	X	X	X			X	X	X	X
38	Residential	Dubois			X	X	X	X			X	X	X	X
58	Residential	Dubois	X	X										
59	Residential	Dubois	X	X										
60	Residential	Dubois	X	X										
61	Residential	Dubois	X	X										
62	Residential	Dubois	X	X										
63	Residential	Dubois	X	X										
64	Residential)	Dubois	X	X										
65	Residential	Dubois	X	X										
66	Residential	Dubois	X	X										
67	Residential	Dubois	X	X										
68	Residential	Dubois	X	X										
69	Residential	Dubois	X	X										
70	Residential	Dubois	X	X										
71	Residential	Dubois	X	X										



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
72	Residential	Dubois	X	X										
73	Residential	Dubois	X	X										
74	Residential	Dubois	X	X										
75	Residential	Dubois	X	X										
76	Residential)	Dubois	X	X										
81	Residential	Dubois	X	X										
82	Residential	Dubois	X	X										
83	Residential	Dubois	X	X										
84	Residential	Dubois	X	X										
92	Residential	Dubois							X	X				
93	Residential	Dubois							X	X				
94	Residential	Dubois							X	X				
95	Residential	Dubois							X	X				
96	Residential	Dubois							X	X				
97	Residential	Dubois							X	X				
98	Residential	Dubois							X	X				
99	Residential	Dubois							X	X				
100	Residential	Dubois							X	X				
49	Residential	Daviess									X	X		
50	Residential	Daviess									X	X		
56	Residential	Daviess									X		X	
57	Residential	Daviess									X	X	X	X
77	Residential	Daviess	X	X										
78	Residential	Daviess	X											
79	Residential	Daviess	X	X										
80	Residential	Daviess	X											
85	Residential	Daviess			X									
86	Residential	Daviess			X	X								
87	Residential	Daviess			X	X								
88	Residential	Daviess			X									
89	Residential	Daviess			X	X								
90	Residential	Daviess			X	X								
91	Residential	Daviess			X	X								
125	Residential	Daviess												
201	Residential	Daviess												
202	Residential	Daviess												
203	Residential	Daviess												



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
204	Residential	Daviess												
205	Residential	Daviess												
206	Residential	Daviess												
207	Residential	Daviess												
208	Residential	Daviess												
209	Residential	Daviess												
210	Residential	Daviess												
211	Residential	Daviess												
212	Residential	Daviess												
213	Residential	Daviess												
214	Residential	Daviess												
215	Residential	Daviess												
216	Residential	Daviess												
217	Residential	Daviess												
218	Residential	Daviess												
219	Residential	Daviess												
220	Residential	Daviess												
257	Residential	Daviess												
258	Residential	Daviess												
259	Residential	Daviess												
260	Residential	Daviess												
261	Residential	Daviess												
262	Residential	Daviess												
263	Residential	Daviess												
264	Residential	Daviess												
265	Residential	Daviess												
266	Residential	Daviess												
267	Residential	Daviess												
39	Residential	Martin					X	X			X	X	X	X
40	Residential	Martin					X	X			X	X	X	X
41	Residential	Martin									X	X		
42	Residential	Martin									X	X		
43	Residential	Martin									X	X		
44	Residential	Martin									X	X		
45	Residential	Martin					X						X	X
46	Residential	Martin					X						X	X
47	Residential	Martin									X	X		



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
48	Residential	Martin											X	X
51	Residential	Martin											X	X
52	Residential	Martin									X	X		
53	Residential	Martin									X			
54	Residential	Martin									X	X		
55	Residential	Martin									X		X	
114	Residential	Martin					X							
121	Residential	Martin					X	X						
122	Residential	Martin					X	X						
123	Residential	Martin					X	X						
124	Residential	Martin					X	X						
126	Residential	Martin												
127	Residential	Martin												
128	Residential	Martin												
129	Residential	Martin												
130	Residential	Martin												
131	Residential	Martin												
132	Residential	Martin												
133	Residential	Martin												
134	Residential	Martin												
135	Residential	Martin												
136	Residential	Martin												
137	Residential	Martin												
138	Residential	Martin												
139	Residential	Martin												
140	Residential	Martin												
141	Residential	Martin												
142	Residential	Martin												
143	Residential	Martin												
144	Residential	Martin												
145	Residential	Martin												
146	Residential	Martin												
147	Residential	Martin												
148	Residential	Martin												
149	Residential	Martin												
150	Residential	Martin												
151	Residential	Martin												



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
152	Residential	Martin												
153	Residential	Martin												
154	Residential	Martin												
155	Residential	Martin												
156	Residential	Martin												
157	Residential	Martin												
158	Residential	Martin												
159	Residential	Martin												
160	Residential	Martin												
161	Residential	Martin												
162	Residential	Martin												
163	Residential	Martin												
164	Residential	Martin												
165	Residential	Martin												
166	Residential	Martin												
167	Residential	Martin												
168	Residential	Martin												
169	Residential	Martin												
170	Residential	Martin												
171	Residential	Martin												
172	Residential	Martin												
173	Residential	Martin												
174	Residential	Martin												
175	Residential	Martin												
176	Residential	Martin												
177	Residential	Martin												
178	Residential	Martin												
179	Residential	Martin												
180	Residential	Martin												
181	Residential	Martin												
182	Residential	Martin												
183	Residential	Martin												
184	Residential	Martin												
185	Residential	Martin												
186	Residential	Martin												
187	Residential	Martin												
188	Residential	Martin												



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
189	Residential	Martin												
190	Residential	Martin												
191	Residential	Martin												
192	Residential	Martin												
193	Residential	Martin												
194	Residential	Martin												
195	Residential	Martin												
196	Residential	Martin												
197	Residential	Martin												
198	Residential	Martin												
199	Residential	Martin												
200	Residential	Martin												
221	Residential	Martin												
222	Residential	Martin												
223	Residential	Martin												
224	Residential	Martin												
225	Residential	Martin												
226	Residential	Martin												
227	Residential	Martin												
228	Residential	Martin												
229	Residential	Martin												
230	Residential	Martin												
231	Residential	Martin												
232	Residential	Martin												
233	Residential	Martin												
234	Residential	Martin												
235	Residential	Martin												
236	Residential	Martin												
237	Residential	Martin												
238	Residential	Martin												
239	Residential	Martin												
240	Residential	Martin												
241	Residential	Martin												
242	Residential	Martin												
243	Residential	Martin												
244	Residential	Martin												
245	Residential	Martin												



Potentially Impacted Receptors by Alternative														
ID	USE	COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
246	Residential	Martin												
247	Residential	Martin												
248	Residential	Martin												
249	Residential	Martin												
250	Residential	Martin												
251	Residential	Martin												
252	Residential	Martin												
253	Residential	Martin												
254	Residential	Martin												
255	Residential	Martin												
256	Residential	Martin												
113	Residential	Lawrence							X	X				
115	Residential	Lawrence					X	X						
116	Residential	Lawrence					X	X						
117	Residential	Lawrence					X	X						
118	Residential	Lawrence					X	X						
119	Residential	Lawrence					X							
120	Residential	Lawrence					X							
101	Residential	Orange							X					
102	Residential	Orange							X	X				
103	Residential	Orange							X	X				
104	Residential	Orange							X	X				
105	Residential	Orange							X	X				
106	Residential	Orange							X	X				
107	Residential	Orange							X	X				
108	Residential	Orange							X	X				
109	Residential	Orange							X	X				
110	Residential	Orange							X	X				
111	Residential	Orange							X	X				
112	Residential	Orange							X	X				

NOTE: All residential sites are single family/dwelling.

Analysis

The analysis identified the number of potential receptor sites within the Category B NAC zone predicted. The Category B NAC was selected because it is routinely used to assess exterior impacts at residential properties, the



most common activity category encountered. Impacts are stated as the number of potentially impacted receptors in each corridor.

To assess the relative impact of each alternative, the number of potential residential receptors within the 66 dBA zone was determined. For each alternative, the number of relocations identified by category is discussed. In general, the risk of noise impacts from any of the alternatives naturally increases in situations where the facility encroaches upon land in which higher densities of human occupation occur. As with most highway projects of this size and nature, single family residences will be the primary receptor class of concern with regards to NAC impact and the potential for abatement.

Because many of the alternatives involve new alignment, the location of the alignment within the corridor will be critical in determining which receptors are adversely impacted by highway noise. A simple shift in alignment of a few hundred feet or so away from a densely populated neighborhood may be all that is required to abate a potential noise impact. In other cases, it will become necessary to evaluate the cost effectiveness of noise barrier walls to attenuate noise levels at a cluster of sensitive receptors

The 12-county study area is located in a primarily rural area of southwestern Indiana. Due to the rural setting potential receptors locations were spread out with sparse density of houses. **Table 3** summarizes the number of impacted receptors by alternative and county and **Table 4** summarizes the number if impacted receptors by local improvement.

TABLE 3: NOISE IMPACTS BY ALTERNATIVE AND COUNTY

Impacted Receptors by Alternative												
COUNTY	B2	B3	C2	C3	M2	M3	O2	O3	P2Ew	P3Ew	P2Ee	P3Ee
Daviess	4	2	7	5	0	0	0	0	4	3	2	1
Dubois	24	24	37	37	37	37	41	41	37	37	37	37
Lawrence	0	0	0	0	6	4	1	1	0	0	0	0
Martin	0	0	0	0	9	6	0	0	11	9	7	6
Orange	0	0	0	0	0	0	12	11	0	0	0	0
Total	28	26	44	42	52	47	54	53	52	49	46	44

**TABLE 4: NOISE IMPACTS BY LOCAL IMPROVEMENT**

Local Improvements				Potential Impact Locations
LI-#	Existing Road	Alternatives	Section	
LI-1	US 231	B, C, M, O, P	2	4
LI-2	US 231	B, C, M, O, P	2	7
LI-3	US 231	B, C, M, O, P	2	0
LI-4	US 231	C, M, O, P	2	0
LI-5	US 231	C, M, O, P	2	15
LI-6	US 231	M, P	3	0
LI-7	US 231	M, P	3	4
LI-8	US 231	P	3	0
LI-9	US 231	P	3	5
LI-10	SR 56	B	2	9
LI-11	SR 257	B	2	5
LI-12	SR 257	B	3	8
LI-13	SR 450	M	3	2
LI-14	SR 450	M	3	2
LI-15	SR 56	O	3	2
LI-16	SR 56	O	3	1
LI-17	SR 145	O	3	1
LI-18	US 150	O	3	1



TABLE 5: NOISE IMPACTS BY ALTERNATIVE VARIATION AND LOCAL IMPROVEMENT

Local Improvements				Receptor Information			66 dB(A) Threshold from Centerline									
LI-#*	Existing Road	Alts	Section	ID	Use	County	B		C		M		O		P	
							B2	B3	C2	C3	M2	M3	O2	O3	P2	P3
LI-1	US 231	B, C, M, O, P	2	01-01	Residential	Dubois					X					
				01-02	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				01-03	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				01-04	Residential	Dubois	X	X	X	X	X	X	X			
LI-2	US 231	B, C, M, O, P	2	02-01	Residential	Dubois	X	X								
				02-02	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				02-03	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				02-04	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				02-05	Residential	Dubois	X	X	X		X	X	X	X	X	X
				02-06	Residential	Dubois	X	X	X	X	X	X	X	X	X	X
				02-07	Residential	Dubois	X	X								
LI-5	US 231	C, M, O, P	2	05-01	Residential	Dubois							X	X		
				05-02	Residential	Dubois			X	X	X	X	X	X	X	X
				05-03	Residential	Dubois			X	X	X	X	X	X	X	X
				05-04	Residential	Dubois			X	X	X	X	X	X	X	X
				05-05	Church	Dubois							X	X		
				05-06	Residential	Dubois			X	X	X	X	X	X	X	X
				05-07	Residential	Dubois			X	X	X	X	X	X	X	X
				05-08	Residential	Dubois							X	X		
				05-09	Residential	Dubois			X	X	X	X	X	X	X	X
				05-10	Residential	Dubois							X	X		
				05-11	Residential	Dubois			X	X	X	X	X	X	X	X
				05-12	Residential	Dubois			X	X	X	X	X	X	X	X
				05-13	Residential	Dubois			X	X	X	X	X	X	X	X
				05-14	Residential	Dubois							X	X		



Local Improvements				Receptor Information			66 dB(A) Threshold from Centerline									
LI-#*	Existing Road	Alts	Section	ID	Use	County	B		C		M		O		P	
							B2	B3	C2	C3	M2	M3	O2	O3	P2	P3
				05-15	Residential	Dubois							X	X		
LI-7	US 231	M, P	3	07-01	Residential	Martin						X				
				07-02	Residential	Martin						X				
				07-03	Residential	Martin						X				
				07-04	Residential	Martin						X				
LI-9	US 231	P	3	09-01	Residential	Daviess									X	X
				09-02	Residential	Daviess									X	X
				09-03	Residential	Daviess									X	X
				09-05	Residential	Greene									X	X
				09-06	Hotel	Greene									X	X
LI-10	SR 56	B	2	10-01	Residential	Dubois	X	X								
				10-02	Residential	Dubois	X	X								
				10-03	Residential	Dubois	X	X								
				10-04	Residential	Dubois	X	X								
				10-05	Residential	Dubois	X	X								
				10-06	Residential	Dubois	X	X								
				10-07	Residential	Dubois	X	X								
				10-08	Residential	Dubois	X	X								
				10-09	Residential	Dubois	X	X								
LI-11	SR 56	B	2	11-01	Residential	Pike	X	X								
				11-02	Residential	Pike	X	X								
				11-03	Residential	Pike	X	X								
				11-04	Residential	Pike	X	X								
				11-05	Residential	Pike	X	X								
LI-12	SR 257	B	3	12-01	Residential	Daviess	X	X								
				12-02	Residential	Daviess	X	X								
				12-03	Residential	Daviess	X	X								
				12-04	Residential	Daviess	X	X								



Local Improvements				Receptor Information			66 dB(A) Threshold from Centerline									
LI-#*	Existing Road	Alts	Section	ID	Use	County	B		C		M		O		P	
							B2	B3	C2	C3	M2	M3	O2	O3	P2	P3
				12-05	Residential	Daviess	X	X								
				12-06	Residential	Daviess	X	X								
				12-07	Residential	Daviess	X	X								
				12-08	Residential	Daviess	X	X								
LI-13	SR 450	M	3	13-01	Residential	Martin					X	X				
				13-02	Residential	Martin					X	X				
LI-14	SR 450	M	3	14-01	Residential	Lawrence					X	X				
				14-02	Residential	Lawrence					X	X				
LI-15	SR 56	O	3	15-01	Residential	Dubois							X	X		
				15-02	Residential	Dubois							X	X		
LI-16	SR 56	O	3	16-01	Residential	Dubois							X	X		
LI-17	SR 145	O	3	17-01	Residential	Orange							X	X		
LI-18	US 150	O	3	18-01	Residential	Orange							X	X		

* Local Improvements 3, 4, 6 and 8 did not have any impacted receptors.

Alternative B

The Alternative B expressway variation, Alternative B2, splits from US 231 north of I-64 and heads northwest. Alternative B2 follows the western edge of Huntingburg and Jasper before continuing to the northwest to meet I-69 south of Washington, IN. The Super-2 variation, Alternative B3, follows the same route as Alternative B2, but it is narrower than the expressway variation. These alternatives are primarily through agricultural lands and avoid cutting through the larger communities of Jasper and Huntingburg.

Alternative B2 has a total of 28 impacted receptor locations in Dubois and Daviess Counties (**Figure 1**). Alternative B3 has a total of 26 impacted receptor locations within Dubois and Daviess Counties (**Figure 2**). There were not any significant residential high-density clusters where impacts are anticipated.

There are six different local improvements associated with the Alternative B variations. Local improvements one, two, and ten have a total of 19 impacted receptor locations within DuBois County, local improvement 11 has a total of five impacted receptor locations within Pike County, and local improvement 12 has a total of eight impacted receptor locations within Daviess County. Local improvements three and four are associated with the Alternative B variations but local improvement three does not have any impacted receptors and currently local improvement four is an access management evaluation and will not impact any receptors at this time.

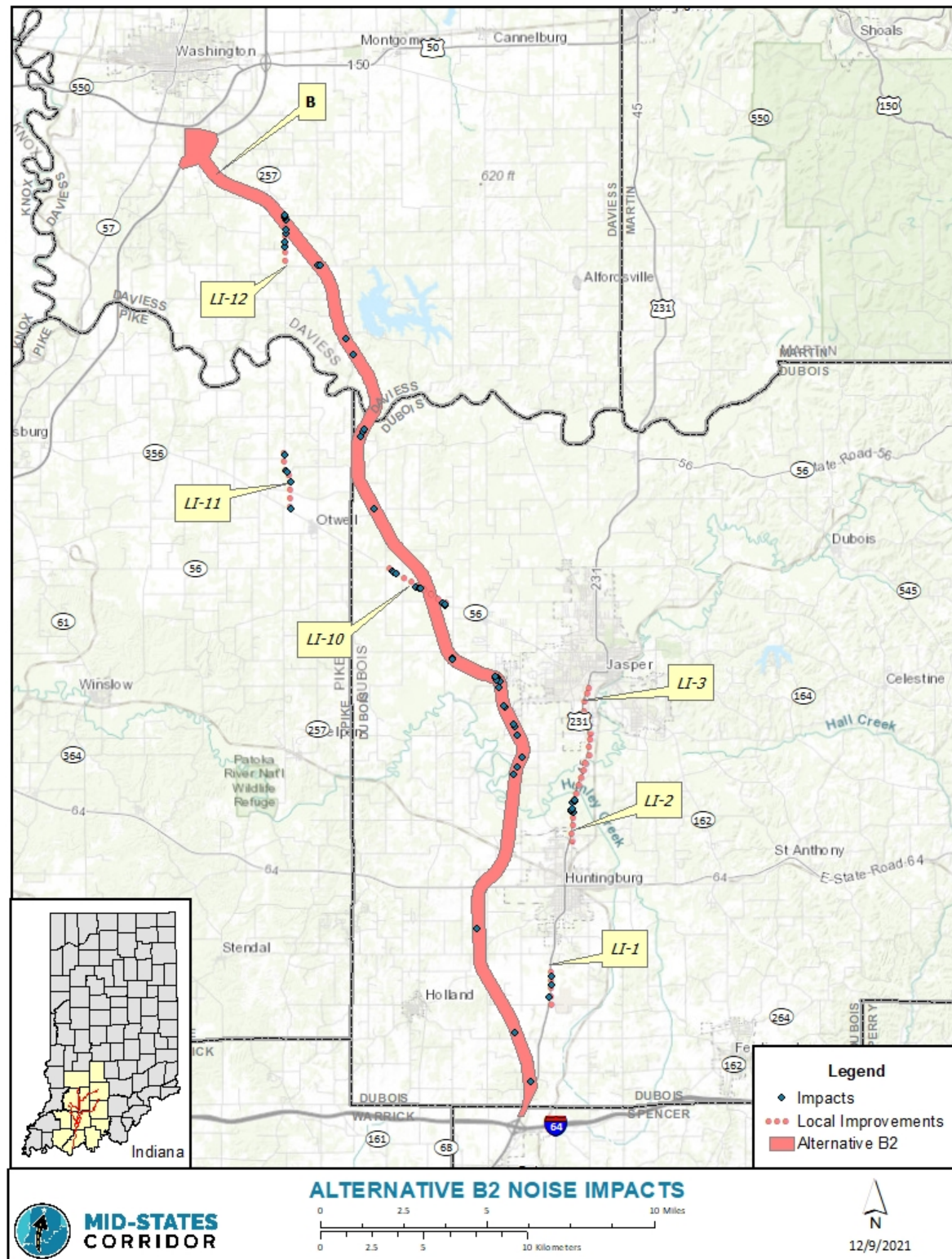


FIGURE 1: ALTERNATIVE B2 NOISE IMPACTS (EXPRESSWAY)

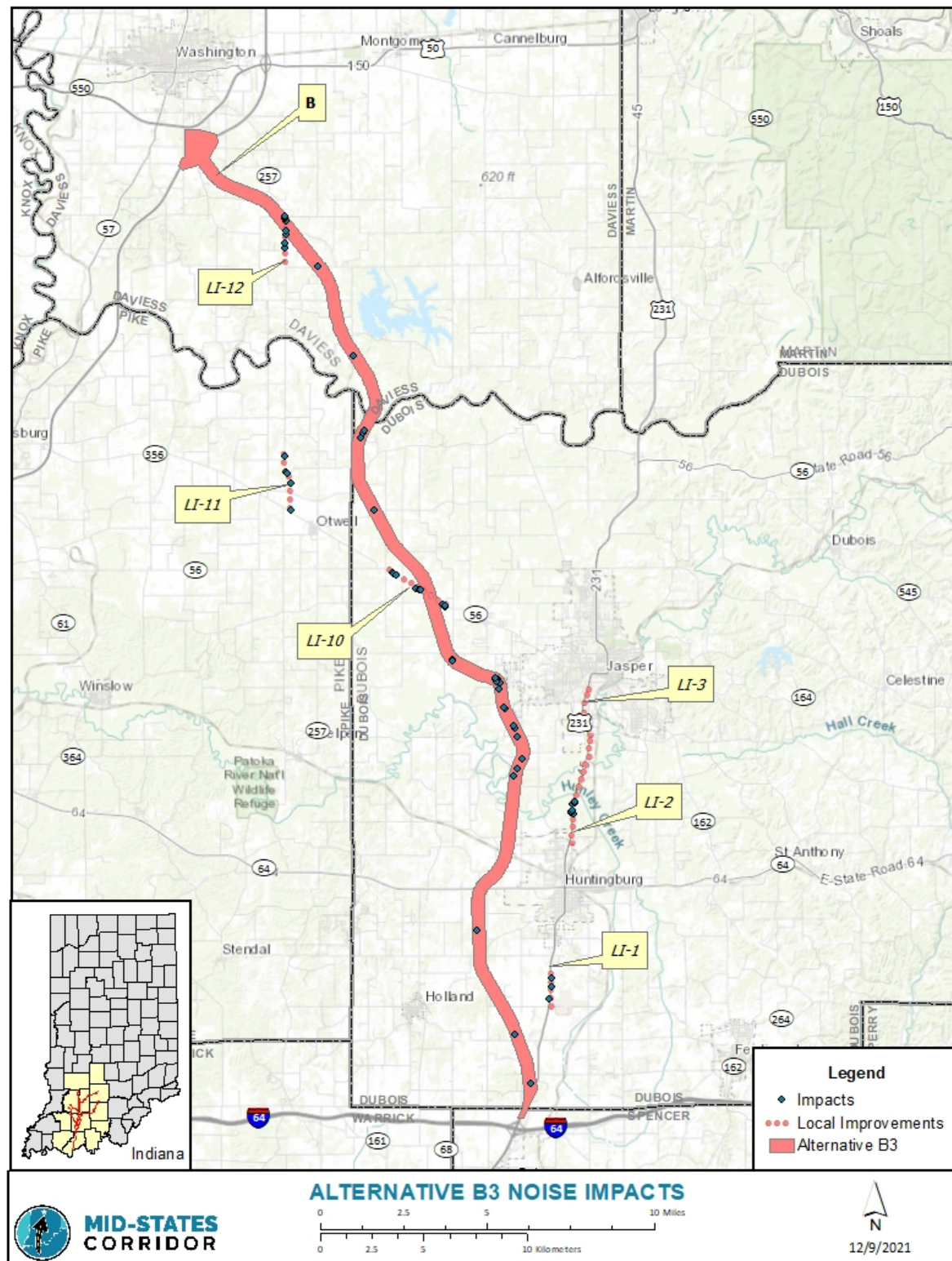


FIGURE 2: ALTERNATIVE B3 NOISE IMPACTS (SUPER-2)



Alternative C

The Alternative C expressway variation, Alternative C2, begins north of I-64 along US 231 and goes east around both Huntingburg and Jasper before crossing west over US 231. After crossing US 231 and going around the western side of Haysville, Alternative C2 continues northwest, going around the southeast corner of Alfordsville and north around Corning, before ending at I-69 east of Washington, where US 150 meets I-69. The Super-2 variation, Alternative C3, follows the same route as Alternative C2, except it is narrower than the expressway variation and results in fewer possible relocations. These alternatives are primarily through agricultural and forested lands, and do not cut through larger communities in the area.

Alternative C2 has a total of 44 impacted receptor locations within Dubois and Daviess Counties (**Figure 3**). Alternative C3 has a total of 42 impacted receptor locations within Dubois and Daviess Counties (**Figure 4**). There were not any significant high density residential clusters where impacts are anticipated.

There are five different local improvements associated with the Alternative C variations. Local improvements one, two, and five have a total of 10 impacted receptor locations within DuBois County. Local improvements three and four are associated with the Alternative C variations but local improvement three does not have any impacted receptors and currently local improvement four is an access management evaluation and will not impact any receptors at this time.

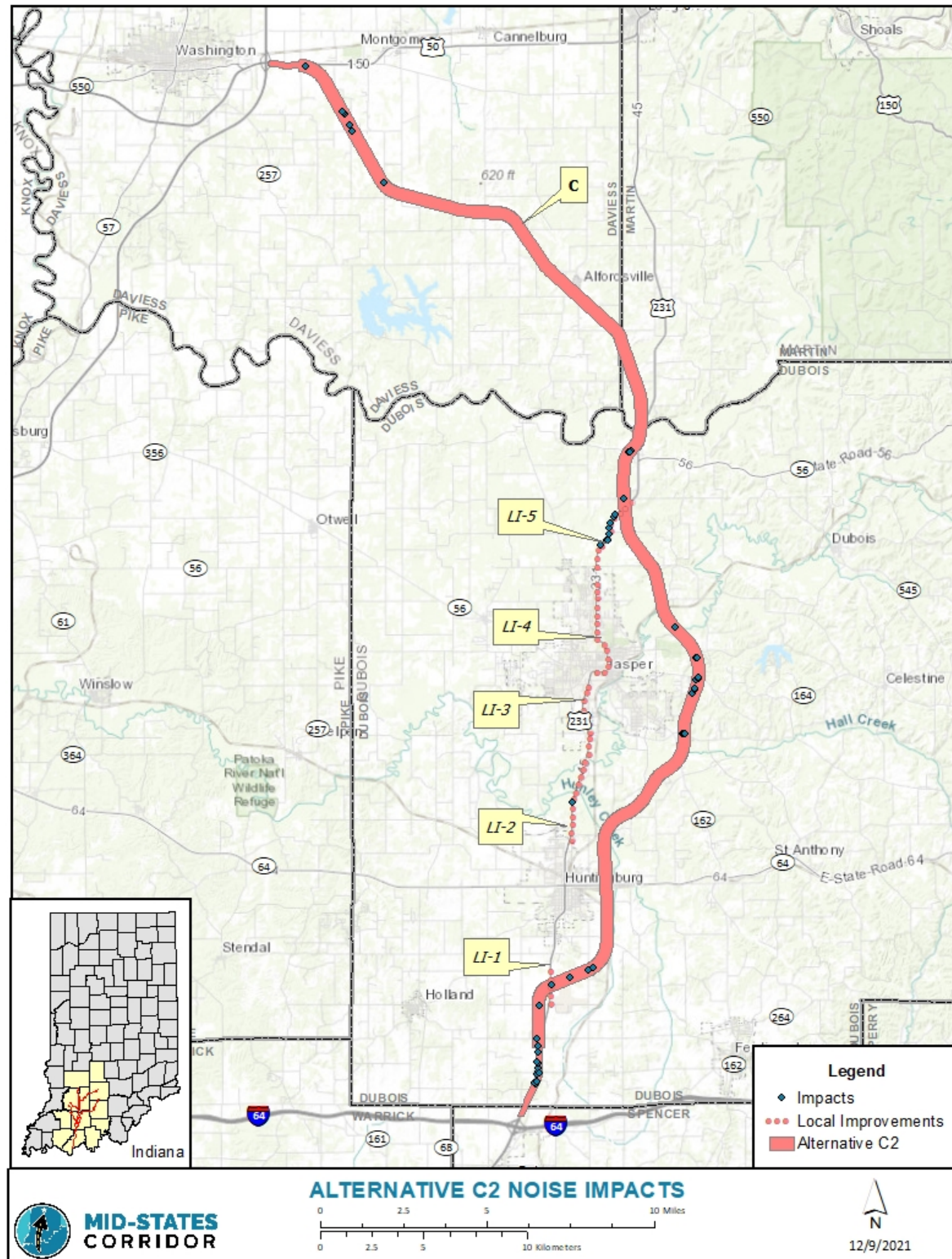


FIGURE 3: ALTERNATIVE C2 NOISE IMPACTS (EXPRESSWAY)

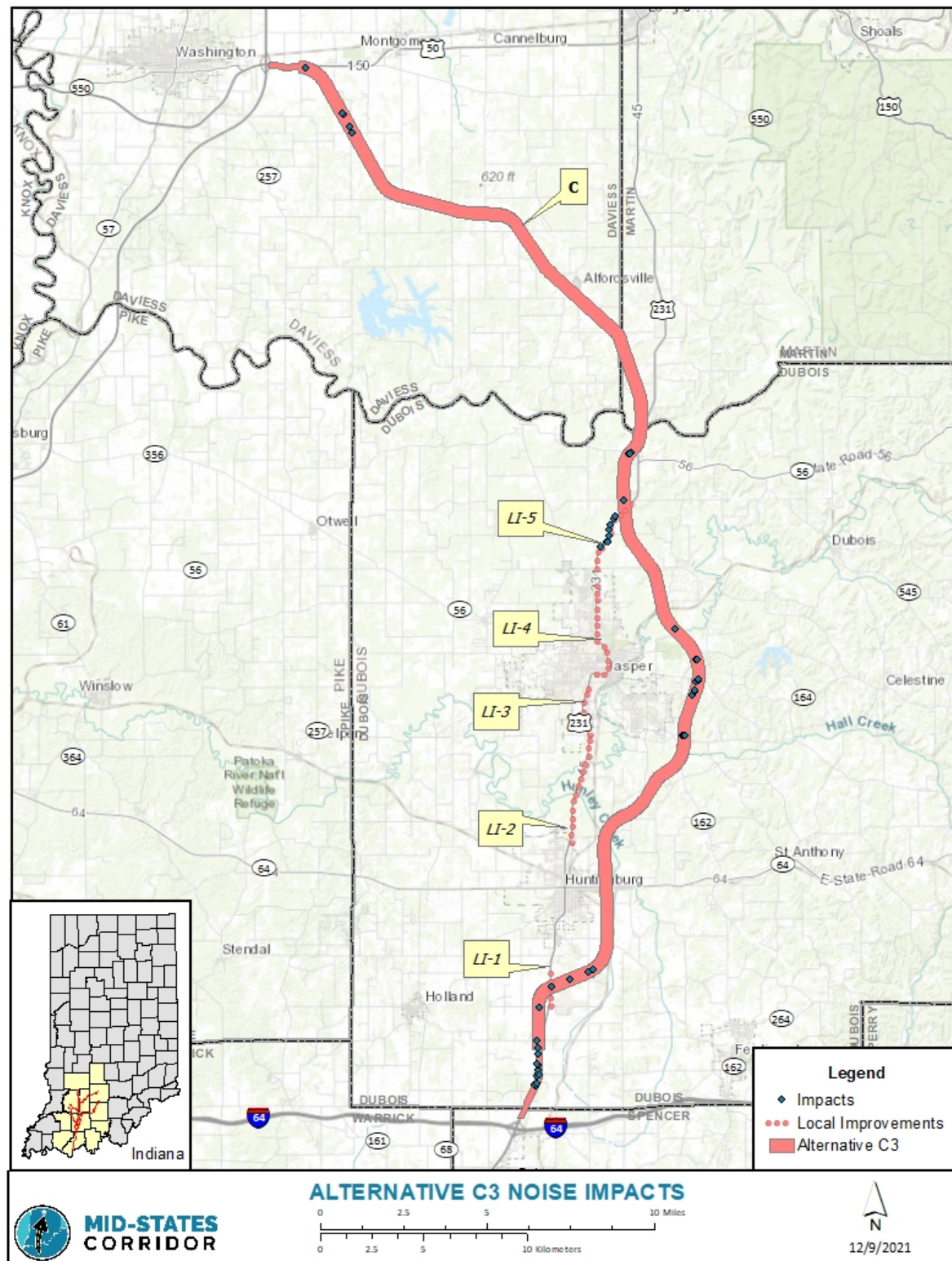


FIGURE 4: ALTERNATIVE C3 NOISE IMPACTS (SUPER-2)



Alternative M

The Alternative M expressway variation, Alternative M2, begins north of I-64 along US 231 and goes east around Huntingburg and Jasper. North of Jasper, Alternative M2 crosses over US 231 and continues north, following US 231 towards Loogootee, and then heads east and parallels CR 450 before ending in Bedford. The Super-2 variation, Alternative M3, follows the same route as Alternative M2, except it is narrower than the expressway alternative and results in fewer possible relocations. Both alternatives are primarily through agricultural and forested lands, and do not cut through larger communities in the area.

Alternative M2 has a total of 52 impacted receptor locations within Dubois, Lawrence, and Martin Counties (**Figure 5**). Alternative M3 has a total of 47 impacted receptor locations within Dubois, Lawrence, and Martin counties (**Figure 6**). There were not any significant high density residential clusters where impacts are anticipated.

There are nine different local improvements associated with the Alternative M variations. Local improvements one, two, five and seven have a total of 18 impacted receptor locations within DuBois County. Local improvements seven and 13 have a total of six impacted receptors within Martin County, and local improvement fourteen has a total of two impacted receptors within Lawrence County. Local improvements three, four and six are associated with the Alternative M variations but local improvements three and six do not have any impacted receptors and currently local improvement four is an access management evaluation and will not impact any receptors at this time.

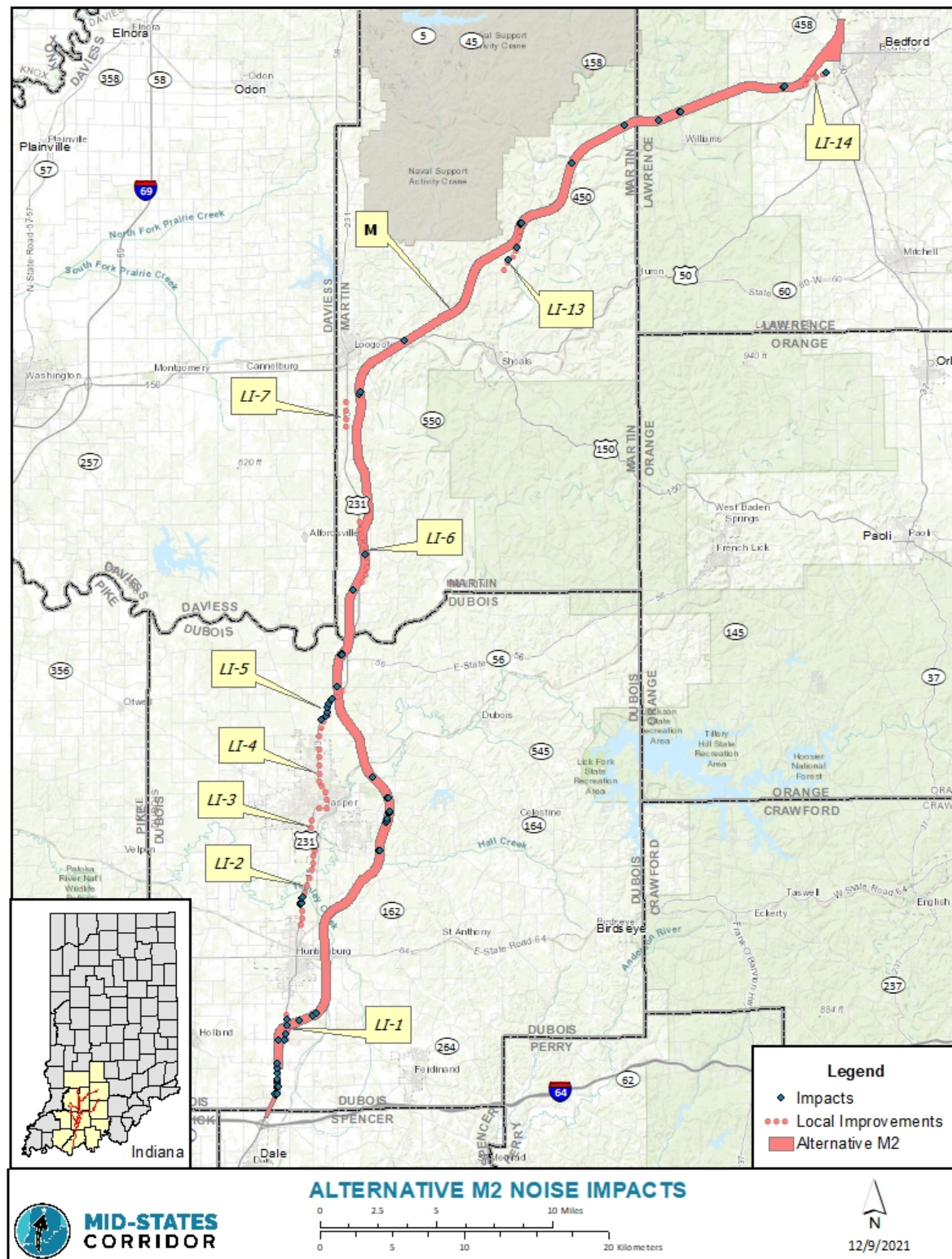


FIGURE 5: ALTERNATIVE M2 NOISE IMPACTS (EXPRESSWAY)

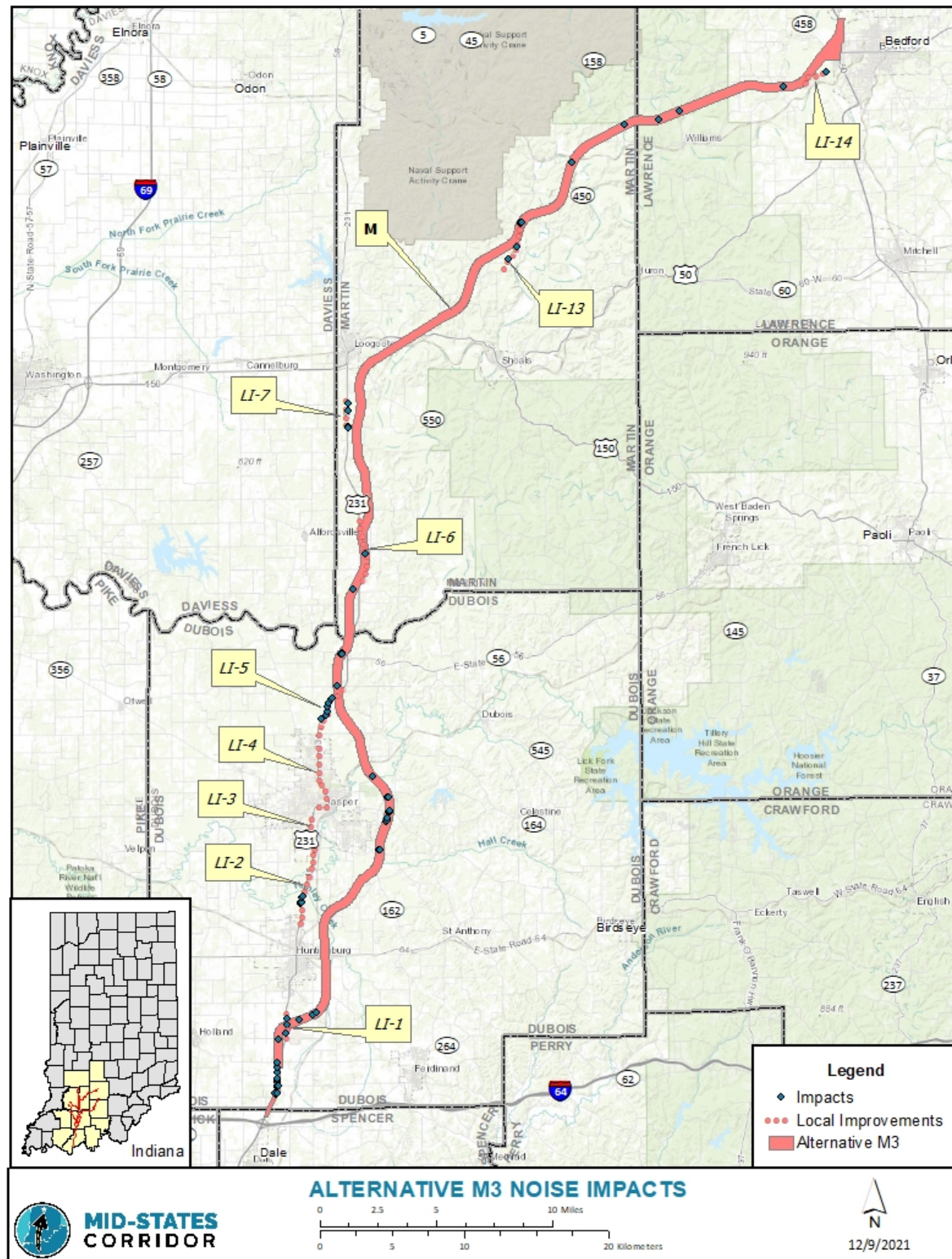


FIGURE 6: ALTERNATIVE M3 NOISE IMPACTS (SUPER-2)



Alternative O

The Alternative O expressway variation, Alternative O2, begins north of I-64 along US 231 and goes east around Huntingburg and Jasper. Alternative O2 continues north and crosses SR 56 and heads east before going around the eastern edge of French Lick. After passing French Lick, this alternative heads north and ends in Mitchell. The Super-2 variation, Alternative O3, follows the same route as Alternative O2, except it is narrower than the expressway variation and results in fewer possible relocations. These alternatives are primarily through agricultural and forested lands, and do not cut through larger communities in the area.

Alternative O2 has a total of 54 impacted receptor locations within Dubois, Lawrence, and Orange Counties (**Figure 7**). Alternative O3 has a total of 53 impacted receptor locations within Dubois, Lawrence, and Orange Counties (**Figure 8**). There were not any significant high density residential clusters where impacts area anticipated.

There are nine different local improvements associated with the Alternative O variations. Local improvements one, two, five, fifteen and sixteen have a total of 26 impacted receptor locations within DuBois County. Local improvements 17 and 18 have a total of two impacted receptors within Orange County. Local improvements three and four are associated with the Alternative M variations but local improvement three does not have any impacted receptors and currently local improvement four is an access management evaluation and will not impact any receptors at this time.

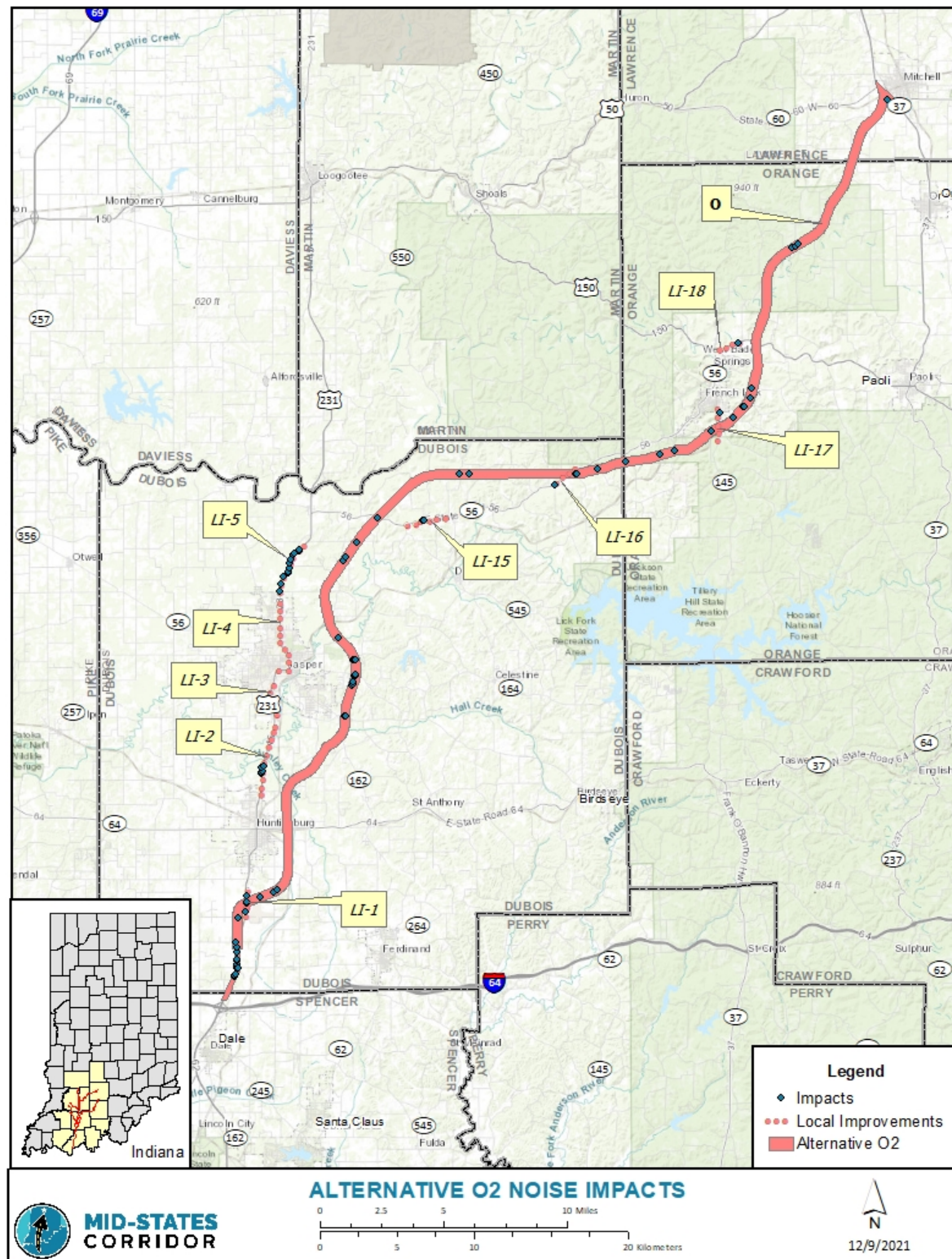


FIGURE 7: ALTERNATIVE O2 NOISE IMPACTS (EXPRESSWAY)

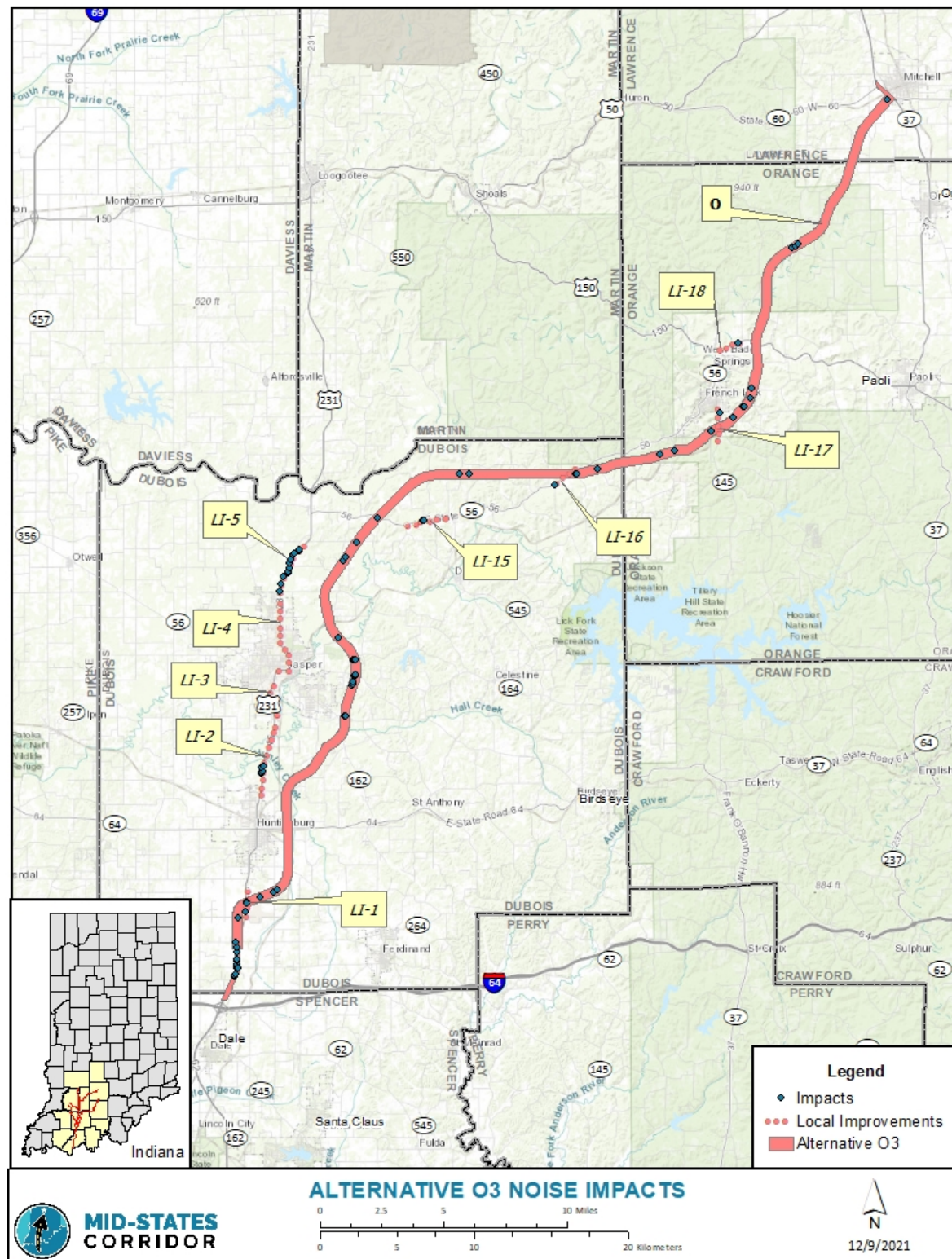


FIGURE 8: ALTERNATIVE O3 NOISE IMPACTS (SUPER-2)



Alternative P

Alternative P has four different alternative options: two expressway and two Super-2. The eastern expressway and Super-2 variations, P2Ee and P3Ee respectively, begin north of I-64 along US 231, and go east around Huntingburg, Jasper, and east around Loogootee. These variations continue north, parallel to US 231, before joining with I-69 northeast of Scotland, and south of Bloomfield. The Super-2 variation, Alternative P3Ee, follows the same route as Alternative P2Ee, except it is narrower than the expressway and results in fewer possible relocations. These alternatives are primarily through agricultural and forested lands, and do not cut through larger communities in the area.

The western expressway and Super-2 variations, P2Ew and P3Ew, begin north of I-64 along US 231, and go east around Huntingburg and Jasper, but are located west around Loogootee. These variations continue north, parallel to US 231, before joining with I-69 northeast of Scotland, and south of Bloomfield. The Super-2 variation follows the same route as Alternative P2Ew, except it is narrower than the expressway and results in fewer possible relocations. These alternatives are primarily through agricultural and forested lands, and do not cut through larger communities in the area.

Alternative P2e has a total of 46 impacted receptor locations within Daviess, Dubois, and Martin Counties (**Figure 9**). Alternative P3Ee has a total of 44 impacted receptor locations within Daviess, Dubois, and Martin Counties (**Figure 10**). Alternative P2Ew has a total of 52 impacted receptor locations within Daviess, Dubois, and Martin Counties (**Figure 11**). Alternative P3Ew has a total of 49 impacted receptor locations within Daviess, Dubois, and Martin Counties (**Figure 12**).

There are nine different local improvements associated with the Alternative P variations. Local improvements one, two and five have a total of 16 impacted receptor locations within DuBois County, local improvement seven has a total of four impacted receptors within Marin County. Local improvement nine has a total of 3 impacted receptors in Daviess County and two impacted receptors in Greene County. Local improvements three, four, six and eight are associated with the Alternative P variations but local improvements three, six and eight do not have any impacted receptors and currently local improvement four is an access management evaluation and will not impact any receptors at this time.

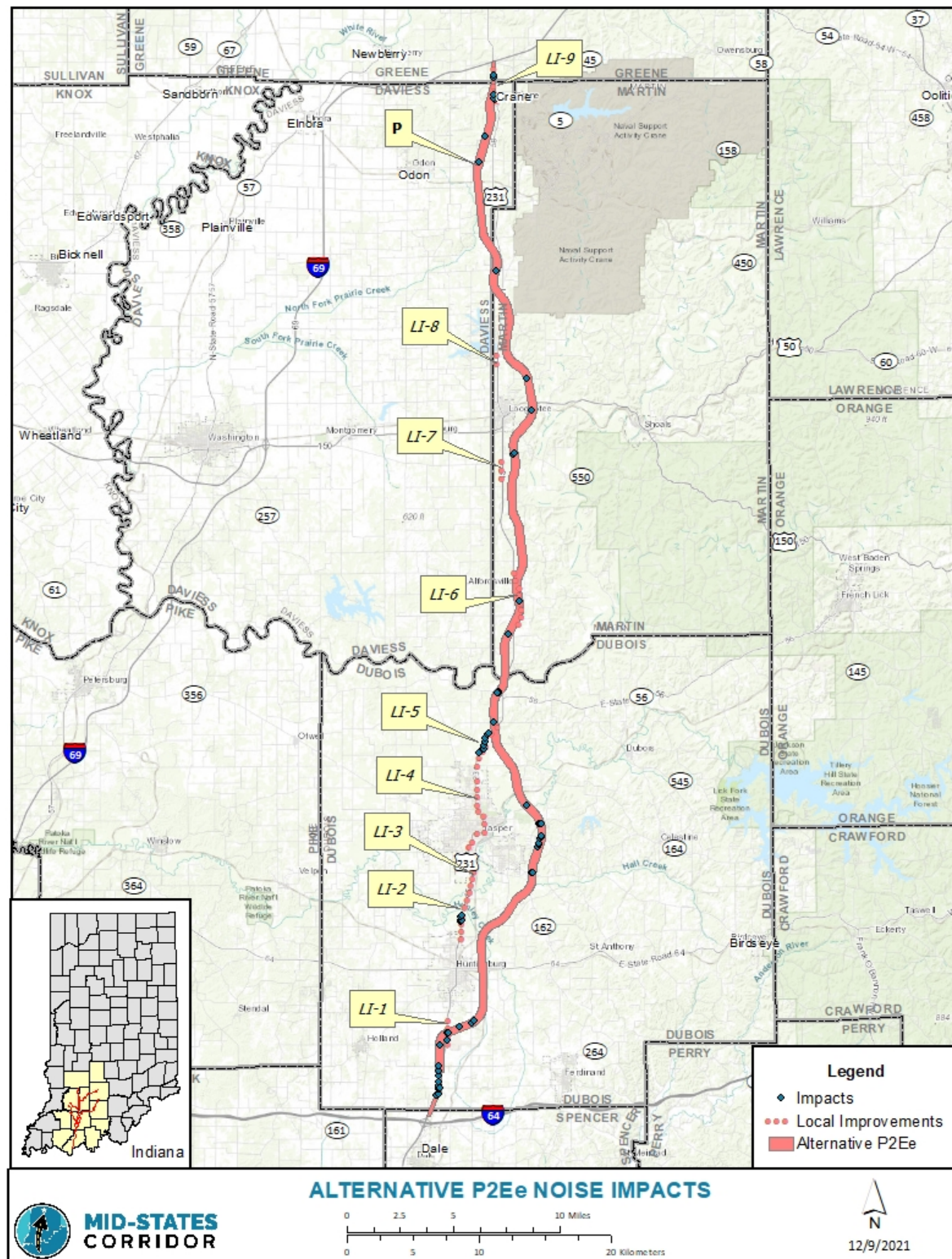


FIGURE 9: ALTERNATIVE P2Ee NOISE IMPACTS (EXPRESSWAY)

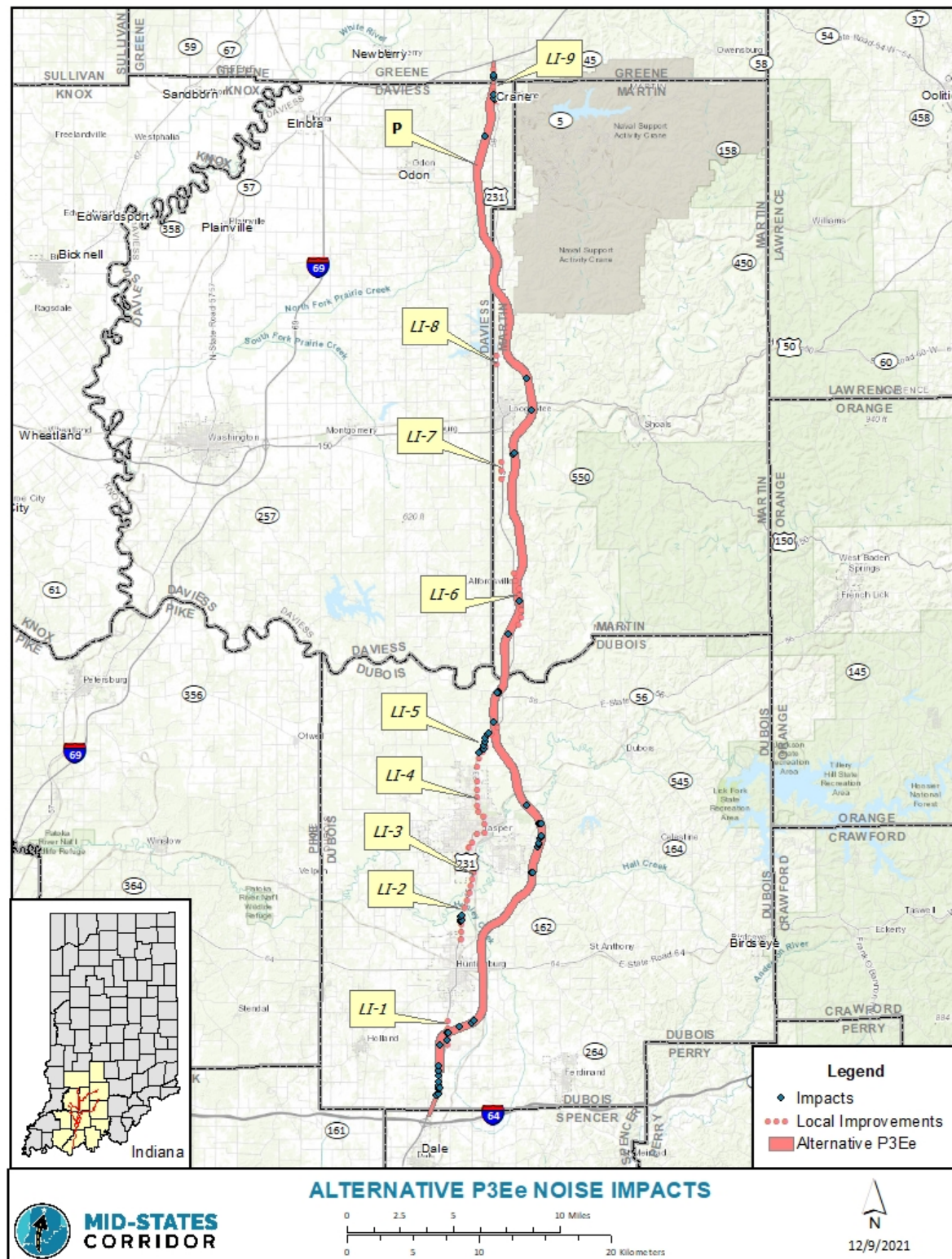


FIGURE 10: ALTERNATIVE P3Ee NOISE IMPACTS (SUPER-2)

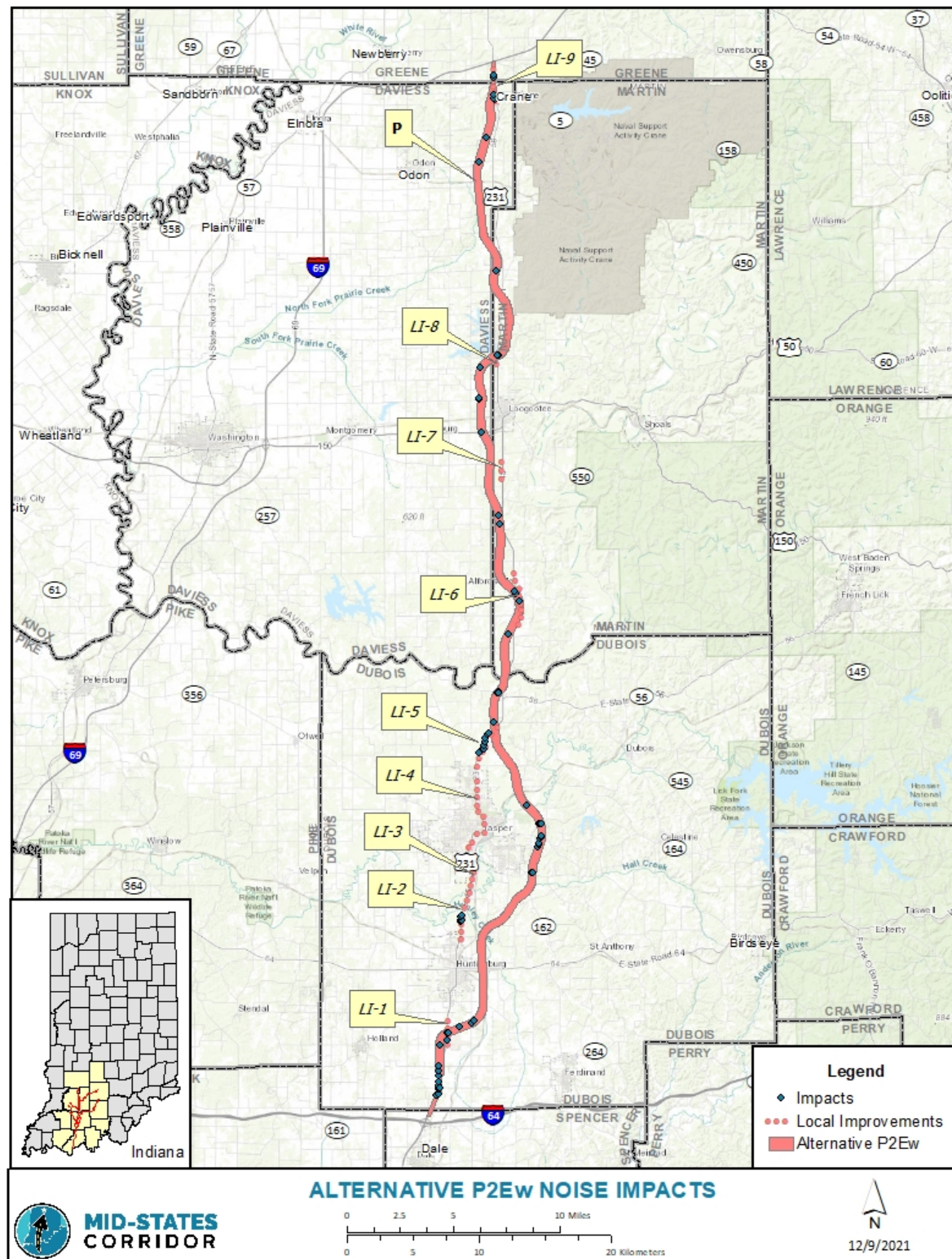


FIGURE 11: ALTERNATIVE P2Ew NOISE IMPACTS (EXPRESSWAY)

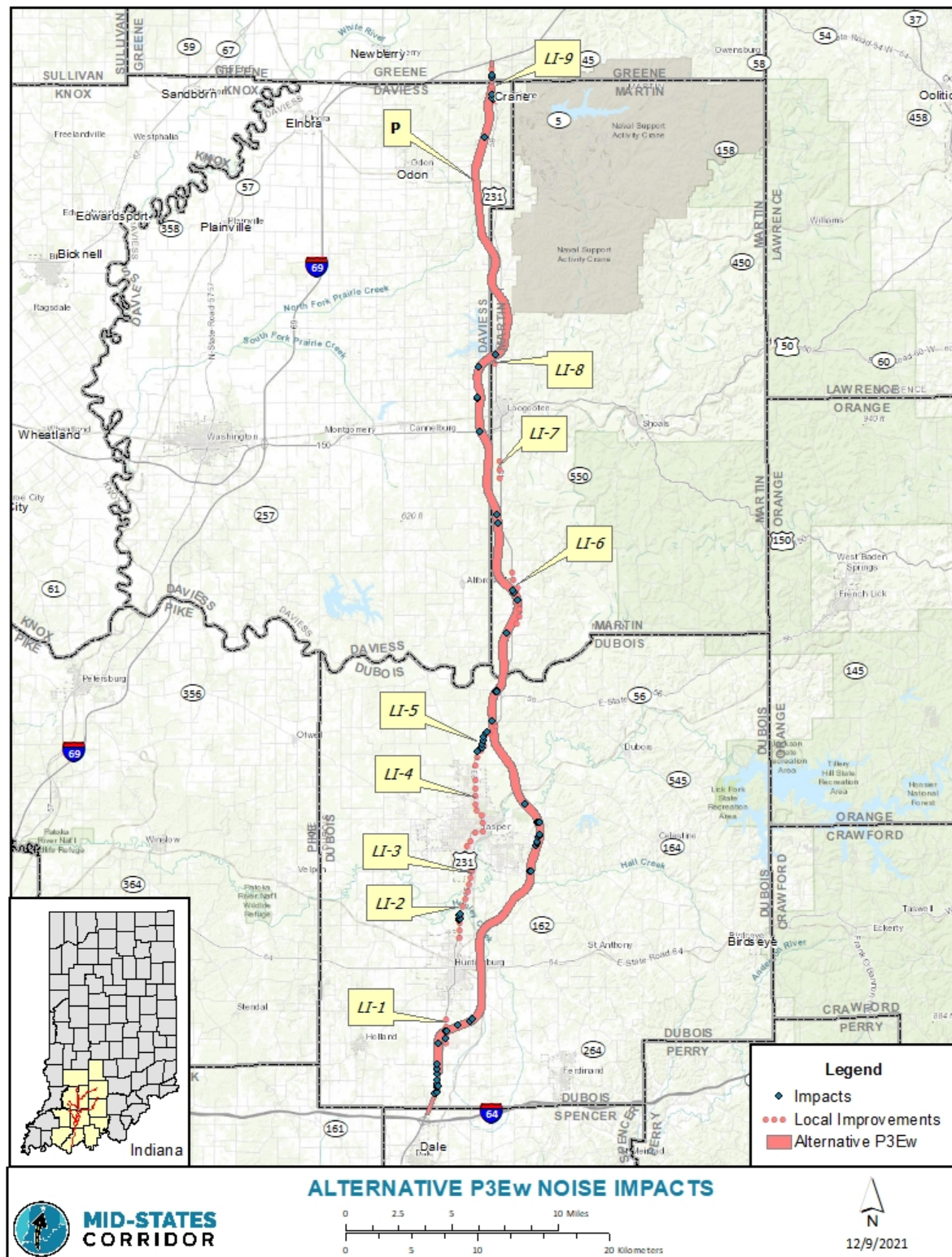


FIGURE 12: ALTERNATIVE P3Ew NOISE IMPACTS (SUPER-2)