MID-STATES CORRIDOR

Appendix Q – Direct & Indirect Impacts Analysis

Mid-States Corridor
Tier 1 Environmental Impact Statement

Prepared for

Indiana Department of Transportation
Mid-States Regional Development Authority

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Prepared by

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INDIANA DEPARTMENT OF TRANSPORTATION INDOT

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INTRODUCTION

This document analyzes the potential direct and indirect impacts of Mid-States Corridor alternatives on farmland, forests, wetlands, streams and karst features. These impacts in conjunction with the impacts of other reasonably foreseeable actions represent potential cumulative impacts of the Mid-States Corridor.

Direct impacts are those caused by the action (i.e., construction of the Mid-States Corridor), and which occur at the same time and place. These impacts are calculated by identifying the resources that fall within the proposed alternative alignments. The indirect impacts are those caused by the Mid-States Corridor but occur at a later time and are geographically removed from the project. These impacts are calculated by analyzing potential growth induced by the project that would not have otherwise occurred. Other impacts are due to reasonably foreseeable actions which are not connected to the project. The cumulative effects of the Mid-States Corridor are the total of direct impacts, indirect impacts and other impacts. Cumulative impacts to farmland, forests, wetlands, streams, and karst features are detailed by alternative in **Table 1.** The calculations underlying the impacts in **Table 1** are presented in this Appendix.

Note that due to wetland mitigation, the cumulative impacts analysis shows an ***increase*** in wetland acreage in associated with the direct impacts. **Table 1** shows an acreage impact to farmland corresponding to the amount of wetland mitigation. Land used for wetland mitigation is assumed to be converted from farmland.

TABLE 1: CUMULATIVE IMPACTS BY ALTERNATIVE

Cumulative Impacts*						
Resource Impacts**		B	C	M	O	P
Farmland (Acres)	Direct	1,517-1,764	1,082-1,408	1,465-1,857	1,091-1,381	1,354-1,832
	Indirect	3	5	9	4	14-17
	Mitigation	153 - 171	80 - 105	167 - 200	80 - 102	64 - 107
	Other Projects	1,000	1,000	1,000	1,000	1,000
	Cumulative	**2,673-2,938**	**2,167-2,518**	**2,641-3,066**	**2,175-2,487**	**2,432-2,956**
Forests (Acres)	Direct	306-341	408-536	1,973-2,284	1,572-1,734	613-902
	Indirect	1	1	5	3	8-11
	Mitigation	–	–	–	–	–
	Other Projects	150	150	150	150	150
	Cumulative	**457-492**	**559-687**	**2,128-2,439**	**1,725-1,887**	**771-1,063**
Wetlands	Direct (Acres)	76-84	46-56	98-111	46-55	39-56
	Indirect	0	0	0	0	0
	Mitigation	+186-204	+110-135	+202-235	+113-134	+100-141
	Other Projects	7	7	7	7	7
	Cumulative	**83-91 (impact) +103-113 (offset)**	**53-63 (impact) +57-72 (offset)**	**105-118 (impact) +97-117 (offset)**	**53-52 (impact) +60-72 (offset)**	**46-63 (impact) +54-78 (offset)**
Streams	Direct (Ln Ft)***	145,000-168,900	120,300-152,100	238,300-279,600	182,000-209,700	158,488-207,875
	Indirect	0	0	0	0	0
	Mitigation	BMPs	BMPs	BMPs	BMPs	BMPs
	Other Projects	7,000	7,000	7,000	7,000	7000
	Cumulative	**152,000-175,900**	**127,300-159,100**	**245,300-286,600**	**189,000-216,700**	**165,488-214,875**
Karst	Direct (#)	1	–	92-94	52-70	–
	Direct (Acres)	–	–	474-484	313-465	–
	Indirect (#)	NA	NA	NA	NA	NA
	Indirect (Acres)	NA	NA	NA	NA	NA
	Other Projects (acres)	10	10	10	10	10
	Cumulative (#)	**1**	**–**	**92-94**	**52-70**	**–**
	Cumulative (Acres)	**10**	**10**	**484-494**	**323-475**	**10**

* Tier 1 Alternative impacts are reported in ranges including all the local improvements, facility types, and bypass variations.
** Projected impacts to resources by 2045 for the No-Build alternative derived from Baseline Trend Analysis.
***Denotes estimated linear feet where modification of existing channel would occur but assumes no significant loss of stream length.

TRAFFIC ANALYSIS ZONE CALCULATIONS

The Traffic Analysis Zones (TAZs) for the Mid-States Corridor travel model[1] were used in this analysis. There are 21 TAZs that are anticipated to see induced households and jobs due to the building of Mid-States Corridor alternatives. For each of these TAZ, this induced growth is the year 2045 population and/or employment that exceeds the year 2045 no-build growth. The No-Build growth in each study area TAZ is provided in the travel model. Future year forecasts from the travel model were analyzed by TREDIS (Transportation Economic Development Impact System) to forecast increases in employment, population, household income and economic output, and this induced growth was reviewed by an internal team and reallocated geographically. More information on how the growth of the TAZs was projected and allocated can be found in **Appendix B – Economic Measures**.

The 21 TAZs with induced growth are located within Daviess, Dubois, Greene, Lawrence, Martin and Spencer counties. **Figure 1** shows the location of the 21 TAZs forecasted to receive induced growth. **Figure 2** and **Figure 3** show the land cover for these TAZs. Ratios of available farm and forest land within these TAZs with induced growth were used to estimate the acreage of induced growth impacts to farmland and forested land. **Table 2** shows the acreage of projected induced growth forecasted to occur on the farm and forest land in each county. For each county, the anticipated percentages of impacts on farmland and forests were used to determine indirect impacts to that county using the induced acreage impacts for induced households and jobs in each TAZ, as shown in **Tables 3 to 7**. For example, the acres of agricultural land potentially converted with Alternative B of the Mid-States Corridor in Daviess County was calculated by multiplying the total number of induced acres by 94% to get 0.61 acres of potential converted agricultural land.

[1] See **Appendix T – Travel Forecasting Model Documentation** for a detailed explanation of the Mid-States Corridor travel model and its TAZs

TABLE 2: ACRES OF LAND USE TYPE POTENTIALLY CONVERTED WITH INDUCED GROWTH, BY ALTERNATIVE

Alternative	County	Daviess	Dubois	Greene	Lawrence	Martin	Spencer	Total
B	Agricultural	0.61	2.48	–	–	–	–	3.09
	Forested	0.04	0.69	–	–	–	–	0.73
C	Agricultural	2.99	2.48	–	–	–	–	5.47
	Forested	0.19	0.69	–	–	–	–	0.88
M	Agricultural	–	4.00	–	2.93	–	2.51	9.44
	Forested	–	1.13	–	3.43	–	0.67	5.23
O	Agricultural	–	2.98	–	1.46	–	–	4.44
	Forested	–	0.84	–	1.72	–	–	2.56
P	Agricultural	–	7.49-9.94	2.97-3.31	–	0.57-1.03	2.51-3.03	13.54-17.31
	Forested	–	2.11-2.80	2.74-3.05	–	2.61-4.68	0.67-0.8	8.13-11.33

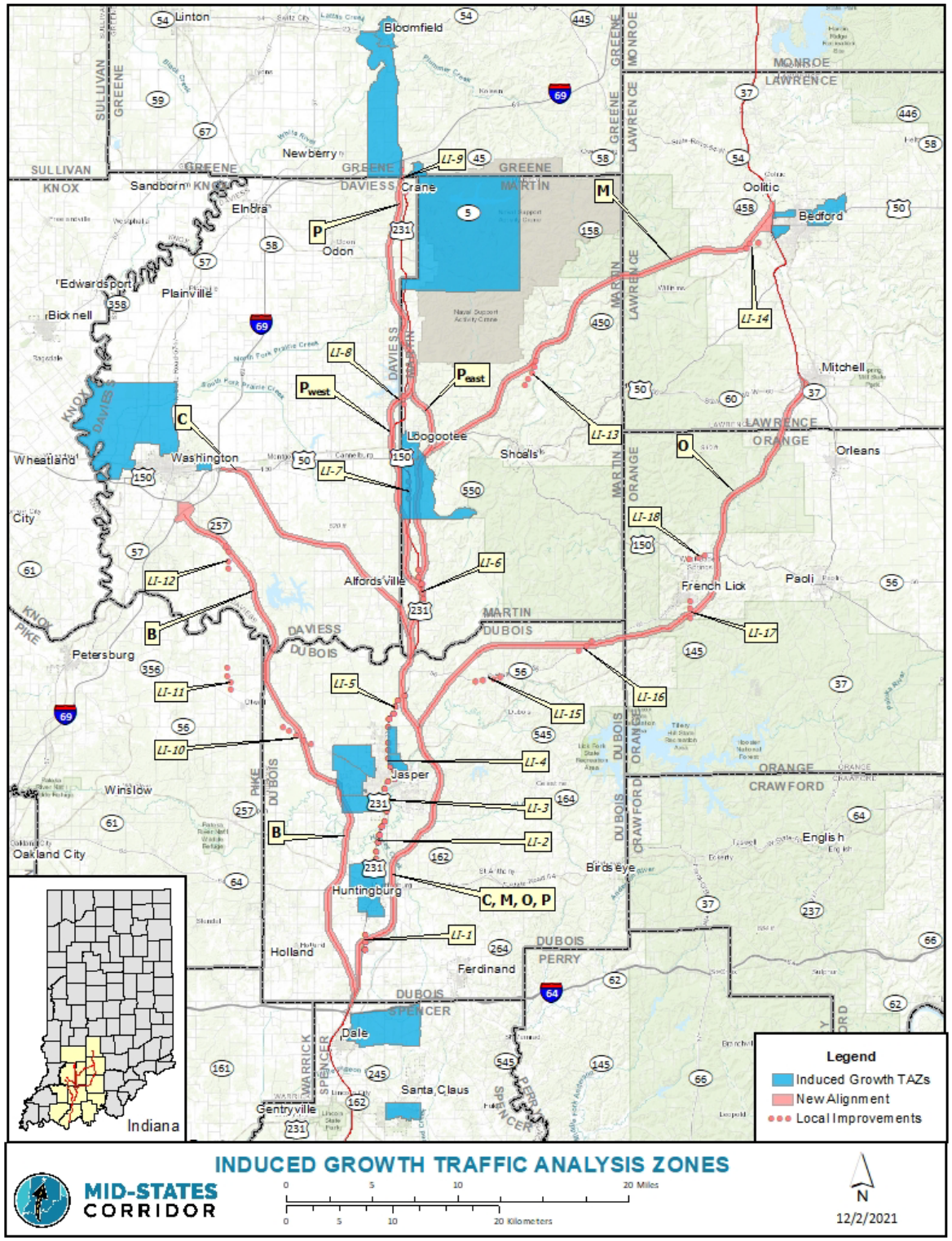

FIGURE 1: INDUCED GROWTH TAZS

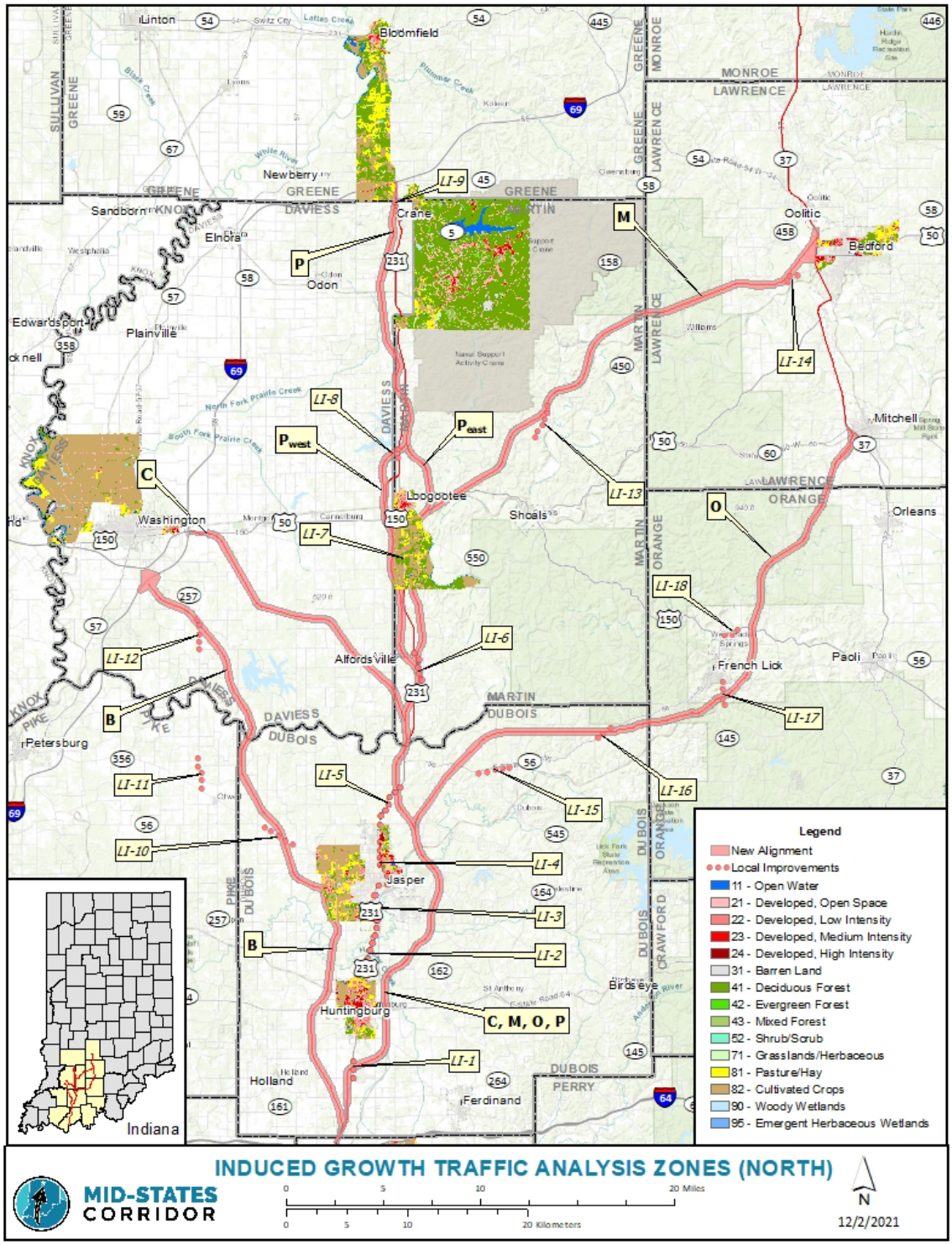

FIGURE 2: LAND COVER FOR THE INDUCED GROWTH TAZS (NORTH)

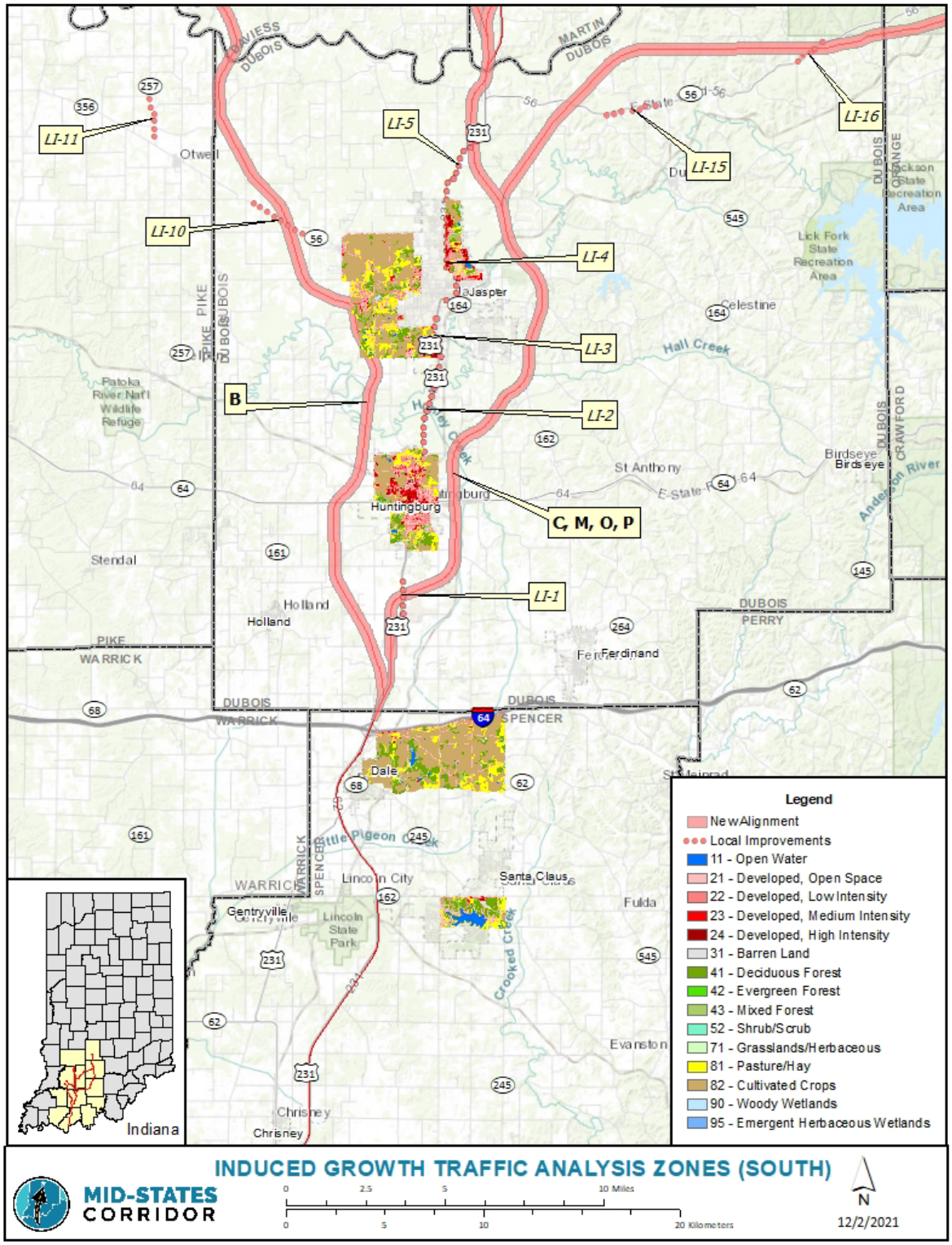

FIGURE 3: LAND COVER FOR THE INDUCED GROWTH TAZS (SOUTH)

Tables 3 to 7 forecast induced land use impacts by alternative for the six counties forecasted to receive induced growth. These tables calculate the acreage impacts of induced housing units and induced jobs. Induced acres for housing were found by dividing the induced number of housing units by 3.96 and induced acres for jobs were found by dividing the induced number of jobs by 15.4. These conversion factors were developed for Rural Southwest Indiana as part of the I-69 Section 4 Tier 2 EIS. For example, in Daviess County for Alternative B there is one induced growth TAZ with a potential for 10 induced jobs; to find the acres of development induced by the job growth, the 10 induced jobs are divided by 15.4 jobs/acre to get 0.65 acres.

Table 3: Induced Land Use Changes for Alternative B

Traffic Analysis Zone	TAZ Size (acres)	Induced No. Housing Units	Induced No. Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres (% Total TAZ Acres)
Daviess County	525	–	10	–	0.65	0.65 (0.12%)
180408	525	–	10	–	0.65	0.65 (0.12%)
Dubois County	5,414	10	10	2.53	0.65	3.18 (0.06%)
181026	2,042	10	–	2.53	–	2.53 (0.12%)
181038	3,373	–	10	–	0.65	0.65 (0.02%)

**Used 3.96 units/acre **Used 15.4 jobs/acre*

Table 4: Induced Land Use Changes for Alternative C

Traffic Analysis Zone	TAZ Size (acres)	Induced No. Housing Units	Induced No. Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres (% Total TAZ Acres)
Daviess County	15,725	10	10	2.53	0.65	3.18 (0.02%)
180399	15,200	10	–	2.53	–	2.53 (0.02%)
180408	525	–	10	–	0.65	0.65 (0.12%)
Dubois County	2,522	10	10	2.53	0.65	3.18 (0.13%)
181026	2,042	10	–	2.53	–	2.53 (0.12%)
181054	480	–	10	–	0.65	0.65 (0.14%)

**Used 3.96 units/acre **Used 15.4 jobs/acre*

Table 5: Induced Land Use Changes for Alternative M

Traffic Analysis Zone	TAZ Size (acres)	Induced No. Housing Units	Induced No. Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres (% Total TAZ Acres)
Dubois County	3,034	10	40	2.53	2.53	5.13 (0.17%)
181026	2,042	10	10	2.53	0.65	3.18 (0.16%)
181027	512	–	20	–	1.30	1.30 (0.25%)
181054	480	–	10	–	0.65	0.65 (0.14%)
Lawrence County	2,234	20	20	5.06	1.30	6.36 (0.28%)
180501	346	–	10	–	0.65	0.65 (0.19%)
180505	301	–	10	–	0.65	0.65 (0.22%)
180594	1,453	10	–	2.53	–	2.53 (0.17%)
180613	134	10	–	2.53	–	2.53 (1.9%)
Spencer County	6,778	10	10	2.53	0.65	3.18 (0.05%)
181387	1,222	10	–	2.53	–	2.53 (0.21%)
181398	5,555	–	10	–	0.65	0.65 (0.01%)

**Used 3.96 units/acre*

***Used 15.4 jobs/acre*

Table 6: Induced Land Use Changes for Alternative O

Traffic Analysis Zone	TAZ Size (acres)	Induced No. Housing Units	Induced No. Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres (% Total TAZ Acres)
Dubois County	3,034	10	20	2.53	1.30	3.83 (0.13%)
181026	2,042	10	–	2.53	–	2.53 (0.12%)
181027	512	–	10	–	0.65	0.65 (0.13%)
181054	480	–	10	–	0.65	0.65 (0.14%)
Lawrence County	531	10	10	2.53	0.65	3.18 (0.6%)
180501	346	–	10	–	0.65	0.65 (0.19%)
180603	186	10	–	2.53	–	2.53 (1.36%)

**Used 3.96 units/acre*

***Used 15.4 jobs/acre*

TABLE 7: INDUCED LAND USE CHANGES FOR ALTERNATIVE P

Traffic Analysis Zone	TAZ Size (acres)	Induced No. Housing Units	Induced No. Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres (% Total TAZ Acres)
Dubois County	9,734	20-30	70-80	5.06-7.59	4.55-5.15	9.61-12.74 (0.1-0.13%)
181025	1,843	10	–	2.53	–	2.53 (0.14%)
181026	2,042	10	–	2.53	–	2.53 (0.12%)
181027	512	–	20-30	–	1.30-1.90	1.30-1.90 (0.25-0.37%)
181038	3,373	0-10	20	0-2.53	1.30	1.30-3.83 (0.04-0.11%)
181041	1,485	–	10	–	0.65	0.65 (0.04%)
181054	480	–	20	–	1.30	1.30 (0.27%)
Greene County	10,099	20	10-20	5.06	0.68-1.37	5.71-6.36 (0.06-0.06%)
180531	8,704	10	–	2.53	–	2.53 (0.03%)
180537	371	–	10-20	–	0.65-1.30	0.65-1.30 (0.2-0.4%)
180543	1,024	10	–	2.53	–	2.53 (0.25%)
Martin County	31,661	0-20	10	2.53-5.06	0.65	3.18-5.71 (0.01-0.02%)
180468	4,928	0-10	–	0-2.53	–	0-2.53 (0-0.05%)
180469	1,005	10	–	2.53	–	2.53 (0.25%)
180534	25,728	–	10	–	0.65	0.65 (0.003%)
Spencer County	6,778	10	10-20	2.53	0.65-1.30	3.18-3.83 (0.05-0.06%)
181387	1,222	10	–	2.53	–	2.53 (0.21%)
181398	5,555	–	10-20	–	0.65-1.30	0.65-1.30 (0.01-0.02%)

*Used 3.96 units/acre

**Used 15.4 jobs/acre

OTHER PROJECTS

When identifying cumulative impacts of the Mid-States Corridor, other actions occurring in the study area are analyzed. These "other projects" may be actions by government, private organizations, or individuals. Refer to **Appendix G – Cumulative Impacts Analysis Technical Report** for more information. Five trail projects, two added travel lane projects, a coal to diesel plant, convention center, solar field and cement plant expansion have been identified as "other projects" in the study area. The potential impacts from these projects were calculated using the anticipated alignments and locations of the future projects and analyzing the land uses within those locations. The National Land Cover Database was used to identify the land use types. The potential impact of these "other projects" on farmland, forests, wetlands, streams and karst features is presented in **Table 8.**

TABLE 8: IMPACTS OF "OTHER PROJECTS" BY RESOURCE TYPE

Resource Impacts ("Other" Project)	Farmland (Acres)	Forest (Acres)	Wetland (Acres)	Stream (Linear Ft)	Karst (Acres)
Loogootee Trail	0.22	1.6	NA	NA	NA
Lincoln Boyhood Trail	NA	6.9	NA	NA	NA
Warrick Trail	1.33	4	NA	NA	NA
Eastside Trail	2.45	NA	NA	NA	NA
Milwaukee Road Trail	16.23	25	4.9	NA	NA
SR 54 - Added Travel Lanes	14.90	6.45	NA	NA	NA
SR 37 Added Travel Lanes	NA	NA	NA	NA	NA
Coal to Diesel Plant	232	66	2	7,000	NA
Convention Center	33	NA	NA	NA	NA
Solar Field	680	NA	NA	NA	NA
Cement Plant	20	40	NA	NA	10
Total*	**1,000.13**	**149.95**	**6.9**	**7,000**	**10**

Rounded totals to nearest whole number when included in **Table 3.6-1*

FARMLAND

The 2017 United States Department of Agriculture (USDA) Census of Agriculture identified 1,417,600 acres of agricultural lands in study area. See **Appendix F**.

Direct Farmland Impacts

The direct conversion of agricultural land to highway right of way is an estimated 1,571 to 1,764 acres for the B Alternatives, 1,082 to 1,408 acres for the C Alternatives, 1,465 to 1,857 acres for the M Alternatives, 1,091 to 1,381 acres for the O Alternatives and 1,354 to 1,832 acres for the P Alternatives. These totals include the direct impacts by the Local Improvements associated with each alternative. See

Table 9: Impacts by Local Improvement for a breakdown of the direct impacts by each of the eighteen Local Improvements.

Potential impacts to agricultural land are summarized in **Chapter 3.24**.

Indirect Farmland Impacts

Within each TAZ, the induced growth converts agricultural land and forest to households and commercial development. A total of 3 acres (Alternative B alternatives), 5 acres (Alternative C alternatives), 9 acres (Alternative M alternatives), 4 acres (Alternative O alternatives) and between 14 to 17 acres (Alternative P alternatives) of agricultural land is forecasted to be converted within the Mid-States Corridor as a result of induced growth from the new corridor. These indirect land use changes vary between the alternatives based on the locations of the alternatives and the amount of available agricultural land within the induced growth TAZ.

Farmland Impacts – Other Projects

Nine out of the eleven identified "other projects" are projected to have an impact on farmland in the study region, for a total of 1,000 acres. The smallest impact is expected from the Loogootee Trail, which is expected to convert approximately one quarter of an acre. The largest impacts are expected from the coal to diesel plant in Dale with 232 acres of impact and a solar field near Huntingburg with 680 acres of impact to farmland.

Based on the evaluation and analysis of this Tier 1 study, the trends and impacts to farmland do not appear to be significant. This will be evaluated further in the Tier 2 study.

FORESTS

Forested lands identified in the 2016 National Land Cover Database (NCLD) totaled 1,510,900 acres. See **Appendix F**.

Direct Forest Impacts

The direct conversion of forest land to highway right-of-way is estimated to be 306 to 341 acres for the B Alternatives, 408 to 536 acres for the C Alternatives, 1,973 to 2,284 acres for the M Alternatives, 1,572 to 1,734 acres for the O Alternatives and 613 to 902 acres for the P Alternatives. These totals include the direct impacts by the Local Improvements associated with each alternative. See **Table 9: Impacts by Local Improvement** for a breakdown of the direct impacts by each of the eighteen Local Improvements.

Indirect Forest Impacts

Indirect impacts to forests would result from land converted to commercial or residential development, as a result of additional access provided by the Mid-States Corridor. There are approximately 519,500 acres of forested land in the six counties where TAZs identified as potential locations for project-induced development are located. Within the 21 TAZs identified as potential locations for project-induced development, there are approximately 30,215 acres of forested land. Development expected to occur as

a result of the Mid-States Corridor is 1 acre (Alternative B alternatives), 1 acre (Alternative C alternatives), 5 acres (Alternative M alternatives), 3 acres (Alternative O alternatives) or between 8 to 11 acres (Alternative P alternatives).

Forest Impacts – Other Projects

Seven out of the eleven identified "other projects" are projected to impact 184 acres of forested land in the study area. The smallest impact is expected from the Loogootee Trail, which is expected to convert approximately 1.6 acres. The three largest impacts to forests are expected from the Milwaukee Road Trail (approximately 25 acres), the coal to diesel plant in Dale (66 acres), and the cement plant in Mitchell (40 acres). There will be some impacts to forested land due to the construction of the Milwaukee Road Trail, but it will be minimal so as to keep the aesthetic of the region and the purpose of the trail.

Based on the evaluation and analysis of this Tier 1 study, the trends and impacts to forest do not appear to be significant. This will be evaluated further in the Tier 2 study.

WETLANDS

An estimated 38,819 acres of wetlands are found in the study area. Within the six counties that the 21 TAZs with the potential for induced growth related to the project were identified, there are an estimated 18,689 acres of wetlands. More detail regarding wetland impacts can be found in **Chapter 3.18**.

Direct Wetland Impacts

The direct impacts to wetlands were calculated using the following classes: forested wetland, shrub/scrub wetland, emergent wetland, unconsolidated shore, ponds and lakes. Direct impacts to wetlands are 76 to 74 acres for the B Alternatives, 46 to 56 acres for the C Alternatives, 98 to 111 acres for the M Alternatives, 46 to 55 acres for the O Alternatives and 39 to 56 acres for the P Alternatives. See **Table 3.18.1** in **Chapter 3.18.** Wetland mitigation requirements will offset some of these losses, and this wetland mitigation may not in all cases, be provided in the same county as the impacts occur. These totals include the direct impacts by the Local Improvements associated with each alternative. See **Table 9: Impacts by Local Improvement** for a breakdown of the direct impacts by each of the eighteen Local Improvements.

There may be impacts to adjacent wetlands due to surface water runoff of pollutants, erosion and siltation from the roadway construction. Permits required for the construction of the Mid-States Corridor would include a detailed mitigation and monitoring plan for wetland and stream impacts.

Chapter 3.26 describes required permits and associated mitigation practices. Best Management Practices (BMPs) would be used to prevent non-point source pollution, to control surface water runoff and to minimize sediment damage to water quality and aquatic habitats. INDOT Standard Specifications and Special Provisions govern construction activities to control erosion and subsequent water pollution.

Indirect Wetland Impacts

Indirect impacts to wetlands as a result of the construction of the Mid-States Corridor are possible. An example of such indirect impacts is a developer purchasing wetlands to build a service facility near an interchange. Given permitting requirements, such indirect wetland impacts are expected to be minimal. They also would be subject to permitting requirements which would result in creation of additional wetlands.

Pollutants and runoffs from impervious surfaces of the development near the wetland could result in impacts to wetlands. There are approximately 415 acres of wetlands within the 21 TAZs that have been identified to have potential for induced growth due to the project. Aside from the wetlands that are directly impacted by the Mid-States Corridor, these wetlands are not in the immediate vicinity of the proposed alignments. Minimal indirect impacts to wetlands are anticipated due to the construction of the Mid-States Corridor.

Wetland Impacts – Other Projects

Two out of the eleven identified "other projects" are projected to have an impact on wetlands in the study region, for a total of approximately 7 acres. The coal to diesel plant in Dale will impact approximately 2 acres and the Milwaukee Road Trail will impact approximately 4.9 acres of wetlands.

Based on the evaluation and analysis of this Tier 1 study, the trends and impacts to wetlands do not appear to be significant. This will be evaluated further in the Tier 2 study.

STREAMS

An estimated total of 41,342 miles (approximately 218,300,000 linear feet) of streams are found in the study area.

Direct Stream Impacts

The linear feet of streams within the Mid-States Corridor right-of-way have been identified by four different types of water bodies: canals/ditches, intermittent, perennial, and unclassified. These totals include the direct impacts by the Local Improvements associated with each alternative. See **Table 9: Impacts by Local Improvement** for a breakdown of the direct impacts by each of the eighteen Local Improvements.

The linear feet of stream impacts for the different alternatives are as follows:

- B Alternatives
  - Canals/Ditches: 28,300 to 33,000 linear feet
  - Intermittent: 26,200 to 30,700 linear feet
  - Perennial: 11,600 to 13,200 linear feet
  - Unclassified: 78,900 to 92,000 linear feet
- C Alternatives
  - Canals/Ditches: 22,700 to 27,400 linear feet

  - Intermittent: 20,800 to 26,900 linear feet
  - Perennial: 8,600 to 10,500 linear feet
  - Unclassified: 68,200 to 87,300 linear feet

- M Alternatives
  - Canals/Ditches: 34,200 to 37,600 linear feet
  - Intermittent: 33,800 to 41,900 linear feet
  - Perennial: 29,400 to 32,600 linear feet
  - Unclassified: 140,900 to 167,400 linear feet

- O Alternatives
  - Canals/Ditches: 26,900 to 31,300 linear feet
  - Intermittent: 45,700 to 52,100 linear feet
  - Perennial: 13,500 to 14,800 linear feet
  - Unclassified: 95,900 to 111,500 linear feet

- P Alternatives
  - Canals/Ditches: 22,900 to 27,300 linear feet
  - Intermittent: 27,600 to 36,600 linear feet
  - Perennial: 16,500 to 24,000 linear feet
  - Unclassified: 91,600 to 120,000 linear feet

Streams in the project area are not anticipated to experience loss of length, as those that are crossed by the project could have a structure put in place, be realigned or channelized. More information about the stream impacts of the Mid-States Corridor can be found in **Section 3.19**. A total of 43 unique stream segments of impaired streams were crossed by the alternatives; none of the impairments for these were associated with highway transportation sources. Agricultural non-point sources were observed as the dominant source of impairments in the Study Area. The Mid-States Corridor would not further impair the water quality of 303(d) listed waterbodies in the Study Area.

Indirect Stream Impacts

A loss of length to streams as an indirect impact are not anticipated, but streams that are impacted by the project or by growth induced by the project may be realigned or channelized. Streams could have similar indirect impacts as wetlands. For example, there could be stream impacts on land purchased by a developer to build a residential or commercial establishment. Impacts could occur from construction activities and surface water runoff. Development that occurs near streams tends to be adjacent the stream rather than directly impacting it. Depending on the location, type of development and potential stream/water quality impact, various permit requirements must be met, such as a Clean Water Act (CWA) Section 404 Permit, CWA Section 401 Water Quality Certification, Indiana Department of Environmental Management (IDEM) Isolated Wetlands Permit, National Pollutant Discharge Elimination System (NPDES) permits authorized under the CWA, IDNR permit approvals for floodway and below the high-water line of lake impacts under the state of Indiana's Flood Control Act IC 14-28-1 and Navigable Waterways Act IC 14-29-1 and construction plan to fulfill Rule 5 requirements (327 IAC 15-5) under NPDES guidelines.

Stream Impacts – Other Projects

One out of the eleven identified "other projects" are projected to have an impact on streams. The coal to diesel plant in Dale is anticipated to impact approximately 7,000 linear feet of streams in the study region, with the potential to affect the level of impairments. The coal to diesel plant is not being induced by the Mid-States Corridor, and therefore is considered a cumulative impact. The Mid-States Corridor project may impact some of the same streams as the plant, but will not increase the level of impairment to those streams.

Based on the evaluation and analysis of this Tier 1 study, the trends and impacts to streams do not appear to be significant. This will be evaluated further in the Tier 2 study.

KARST

The karst landscape in Indiana is primarily concentrated in southern Indiana, and there are several different types of karst features. Impacts were identified for seven karst features/indicators. Including caves (#), dye points (#), dye line crossings (#), springs (#), sinkholes (#), sinkhole areas (acres) and sinking stream basins (acres).

Direct Karst Impacts

The direct impacts were identified for seven karst features/indicators listed above. For the Alternative B alternatives, there is only one karst feature impacted, a sinkhole. There are no karst features impacted for either Alternative C or Alternative P.

Alternative M impacts include 28 cave entrances within a kilometer of the alternative, four dye points, three dye lines, two springs, 55 to 57 sinkholes, 388 to 398 acres of sinkhole areas and 86 acres of sinking stream basins. Alternative O impacts include 21 caves within a kilometer, zero to two dye points, eight to ten dye lines, one spring, 22 to 36 sinkholes, 78 to 158 acres of sinkhole areas and 235 to 307 acres of sinking stream basins. These totals include the direct impacts by the Local Improvements associated with each alternative. See **Table 9: Impacts by Local Improvement** for a breakdown of the direct impacts by each of the eighteen Local Improvements.

Indirect Karst Impacts

There are few karst features within the 21 TAZs identified as potential locations for project-induced development. One cave is located within potential induced growth TAZ, but it is not expected to be impacted. Other karst features present within the six counties with potential project-induced growth TAZs are sinkholes, with seven in Daviess County, nine in Greene County, 36 in Lawrence County, seven in Martin County and two in Spencer County. These are not located in the immediate vicinity of the alternatives and are not likely to be indirectly impacted as a result of the Mid-States Corridor Project.

Karst Impacts – Other Projects

One out of the eleven identified "other projects" are projected to have an impact on karst features. The cement plant in Mitchell is anticipated to impact approximately ten acres of karst features.

Based on the evaluation and analysis of this Tier 1 study, the trends and impacts to karst features do not appear to be significant. This will be evaluated further in the Tier 2 study.

TABLE 9: IMPACTS OF LOCAL IMPROVEMENTS

Local Improvements*				Impact (Units)				
LI-#	Existing Road	Alternatives	Section	Farmland (Acres)	Forest (Acres)	Wetland (Acres)	Stream (Linear Ft)	Karst (Acres)
LI-1	US 231	B, C, M, O, P	2	9	1	0.1	1,157	0
LI-2	US 231	B, C, M, O, P	2	10	19	12	3,471	0
LI-3	US 231	B, C, M, O, P	2	0.01	0.1	0.001	5,938	0
LI-4	US 231	C, M, O, P	2	0	0.02	0	0	0
LI-5	US 231	C, M, O, P	2	9	4	0	3,980	0
LI-6	US 231	M, P	3	17	28	1	5,044	0
LI-7	US 231	M, P	3	11	2	0.003	1,964	0
LI-8	US 231	P	3	7	2	0	1,012	0
LI-9	US 231	P	3	16	3	0	243	0
LI-10	SR 56	B	2	15	2	0	575	0
LI-11	SR 257	B	2	15	4	0.2	1,547	0
LI-12	SR 257	B	3	10	1	0.4	5,755	0
LI-13	SR 450	M	3	15	23	0.2	3,049	0
LI-14	SR 450	M	3	2	18	0	340	12
LI-15	SR 56	O	3	17	9	0.05	984	0
LI-16	SR 56	O	3	7	8	0.01	3,878	0
LI-17	SR 145	O	3	5	5	0.3	3,134	0
LI-18	US 150	O	3	4	2	1	2,583	0.4

* Local Improvements are associated with the alternative and do not change for variations within alternatives.