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5.15 Mineral Resource Impacts

Since the publication of the Draft Environmental Impact Statement (DEIS), impact calculations have been updated to include the Refined Preferred Alternatives (RPA). This information is presented in **Table 5.15-1**. Adjustments have been made in the discussion of impacts based on comments received from Hanson Aggregates Midwest LLC. Impacts to Hanson Aggregates property have been substantially reduced in the RPA. Impacts to other properties differ in the RPA due to design refinements to Alternative C4, described in **Chapter 3, Alternatives**.

5.15.1 Introduction

Mineral resources in southern Indiana include limestone, oil, gas, coal, shale, sand, gravel, and gypsum. These minerals have many uses, such as providing electricity for homes and offices, energy for transportation, heating/cooling for residents and businesses, and building products. Building products include cement products from shale, asphalt paving bitumen from crude oil, and limestone premium aggregate products.

I-69 Section 6 entails upgrading an existing multi-lane, divided transportation facility to a full freeway design. Most of the right of way necessary for the I-69 Section 6 project is already devoted to transportation use for State Road (SR) 37, which minimizes the area of potential impact on mineral resources in constructing I-69.

5.15.2 Methodology

Mineral resources in the I-69 Section 6 corridor were identified using the project's geographic information system (GIS). Each alternative was analyzed using GIS layers for mineral resources. The existence and extent of the mineral resources crossed by the proposed right of way of the alternatives were calculated and summarized. Mineral resources investigated include coal, shale and gypsum, limestone, oil, natural gas, and sand and gravel.

A field review of the I-69 Section 6 alternatives was completed June 20 and June 21, 2016, by an Indiana Registered Professional Geologist. The review included active and inactive mine sites where mineral resources have been extracted. This analysis also considers information from meetings held February 2, 2016, and August 16, 2016, between Hanson Aggregates and the I-69 project team, and information provided by Hanson Aggregates in emails and written comments, as discussed in **Section 5.15.3**.

Impacts to marketable mineral resources include the right of way acquisitions from developed mineral extraction operations which would make these mineral resources no longer available for extraction and sale. These commercially owned resources which have been developed for extraction are considered to be potentially marketable in this evaluation.



The potential impacts to mineral resources within the I-69 Section 6 alternatives were calculated from GIS layers developed based on parcel ownership and field verification of mineral extraction activities. These impact calculations are conservative and include areas where minerals have been previously extracted and pits became inactive, abandoned, or reclaimed. Some of the mineral resources areas border roadways such as I-465 and SR 37. In these locations, mineral reserves cannot be feasibly extracted due to proximity to the existing roadways or adjacent land use and development restrictions (i.e., setbacks).

5.15.3 Analysis

Impact areas within the I-69 Section 6 alternatives are identified in **Table 5.15-1** at the end of this section. The locations of these impact areas are in two inactive sand and gravel pits on the 156-acre property and the property is crossed by I-69 Section 6 alternatives. There is equipment on the property related to prior sand and gravel operations and currently there is stockpiled material on the site. The eastern portion of the property is an agricultural field and has a residential structure.

While additional sand and gravel resources may exist on the Riverdale Farms property, mineral extraction has not occurred since 2010. A field review on June 20, 2016, observed a paved road entering the property from Smith Valley Road. Potential impact calculations for this property are: 8 acres for Alternative C1, 12 acres for Alternative C2 and the RPA, 8 acres for Alternative C3, and 13 acres for Alternative C4, as shown in **Table 5.15-1** at the end of this section. These estimates are conservative relative to the mineral resources impacts due to the inactive status of sand and gravel extraction on this property.

Irving Materials, Inc., operates an active sand and gravel pit on a 583-acre site adjacent to and west of SR 37 in Johnson County. The location is shown in **Figure 5.15-1** and **Figure 5.15-5**. Impacts on potential sand and gravel resources from right of way acquisition would be 13 acres for Alternative C1, 28 acres for Alternative C2, 11 acres for Alternative C3, 31 acres for Alternative C4, and 34 acres for the RPA. The field survey on June 21, 2016, noted office buildings and processing operations east of the mineral extraction pits. The active mining is located to the west of the office buildings, progressing westward toward the White River.

Sand and gravel resources may exist within the portion of the property where the potential right of way would be acquired, but it is not expected that mining would occur on the eastern portion of the site near SR 37 due to the current roadway locations and westward orientation of extraction activities. Access to the facility would be perpetuated by all alternatives, including the RPA, via an existing access driveway from Smith Valley Road, which is currently the primary access to the facility.

The JW Jones Gravel Pit is located at 5506 SR 37 (at Perry Road) in Morgan County. The JW Jones Gravel Pit operator sent a letter of intent to commence operations to the Indiana Department of Environmental Management (IDEM) dated March 3, 2016. The property is 289 acres in size. As of July 1, 2016, some ground has been cleared and heavy equipment assembled



on the site. The field review on June 21, 2016, observed it is likely that mining will progress north and west, away from existing SR 37 and I-69 Section 6 alternatives.

The potential impacts from right of way acquisition to the JW Jones Gravel Pit are estimated to be 19 acres for Alternative C1; 18 acres for Alternatives C2, C4, and the RPA; and 13 acres for Alternative C3. Access would be maintained to the property with a local service road that would modify the current direct access from SR 37. The location of the JW Jones Gravel Pit is shown in **Figure 5.15-6**.



Figure 5.15-5: Irving Materials and Riverdale Farms Sand and Gravel Operations





5.15.4 Mitigation

No mitigation would be provided for impacts to sand and gravel or limestone deposits that are not commercially owned and developed for extraction. Sand and gravel material within the right of way may be used by the contractor during construction of I-69. Impacts to commercially owned resources would be compensated as provided by the INDOT Uniform Relocation Assistance program. Existing commercial operations also would be eligible for payment of damages for harm. Impacted areas by type of mineral resource are described in greater detail below.

5.15.4.1 Gas, Oil, and Gas Storage Fields

Much of southwest Indiana contains known petroleum reserves. Oil and gas drilling has occurred in scattered locations in Morgan, Johnson, and Marion counties, including near the project corridor. However, there are no active oil or gas production wells within the proposed right of way of I-69 Section 6 alternatives.

I-69 Section 6 crosses areas that may contain oil or natural gas deposits, but construction of any alternative should not impact the future extraction of these resources under current technology and extraction processes. A GIS review shows no oil or gas production fields located within the I-69 Section 6 alternatives. There are no oil or gas producing wells within the I-69 Section 6 alternatives based on the Indiana Geological Survey Petroleum Database. The database identifies two shallow test wells drilled to the Silurian rocks, one in 1935, and one in 1950. The GIS locations have these borings 0.1 miles and 0.3 miles outside of the I-69 Section 6 alternatives, respectively. These borings were classified as dry and abandoned. No oil or gas was produced.

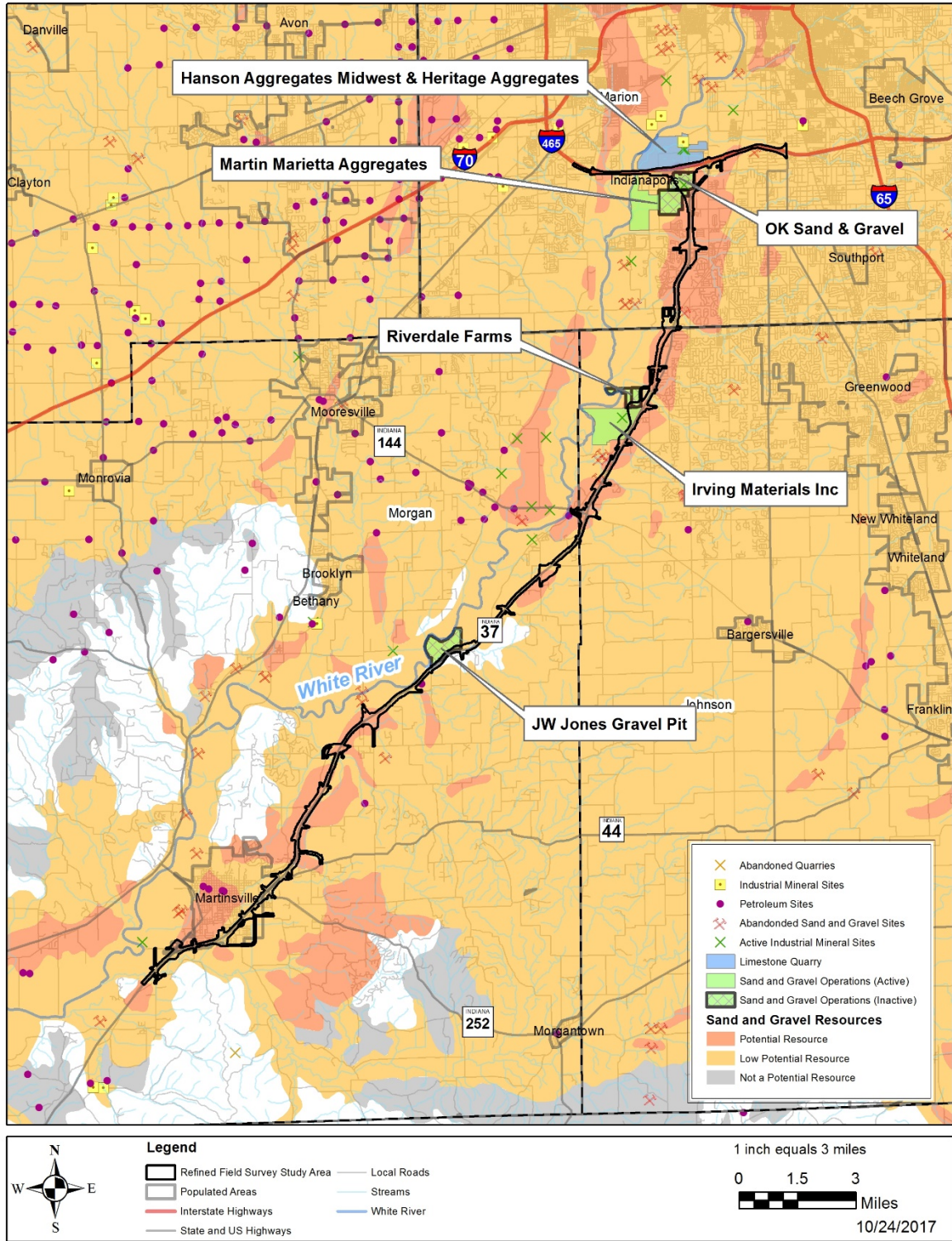
The location information for some wells within the Indiana Geological Survey Petroleum Database is generalized and may vary from mapped locations. Such a variance is more likely for data on older wells. Field verifications of older abandoned wells is not possible without extensive excavation, since these typically were capped below the existing ground level. The standard operating procedure included in *INDOT SOPs – Wells, Asbestos, Snow, and Ice Control* will be applied to any undocumented or abandoned well encountered during construction.

5.15.4.2 Coal

There are no known areas of coal mining or active coal mines within the I-69 Section 6 project area. Coal bearing strata have been removed by geological processes in the I-69 Section 6 area. Future coal mining is not anticipated in the I-69 Section 6 right of way.



Figure 5.15-1: Mineral Resources in the I-69 Section 6 Project Area



5.15.4.3 Shale and Gypsum

There are no known shale or gypsum deposits in any of the I-69 Section 6 rights of way.

5.15.4.4 Limestone

Marketable aggregate limestone resources are known to underlie portions of I-69 Section 6 proposed right of way¹ based on the GIS review. There are no marketable architectural dimension limestone resources known to exist in I-69 Section 6 project area. **Figure 5.15-2** shows an active limestone quarry operation adjacent to the project area. There is one active aggregate limestone producing quarry within the potential right of way of I-69 Section 6 alternatives, which is described below.

Hanson Aggregates Harding Street Quarry (Hanson Aggregates) is adjacent to the Sagamore Ready Mix plant located north of and adjacent to I-465 where the I-69 Section 6 interchange is planned. The location of the facility is shown in **Figure 5.15-1**. Immediately north of the quarry is the Milestone No. 1 Plant, which produces concrete. Several other trucking and related businesses are located in and around the quarry. Meetings were held between Hanson Aggregates and the project team on February 16, 2016, and August 16, 2016. At that time, the operators of Hanson Aggregates stated that they plan to continue pit quarrying aggregate limestone near I-465 through 2024.

Figure 5.15-2: Entrance to Hanson Aggregates Harding Street Quarry

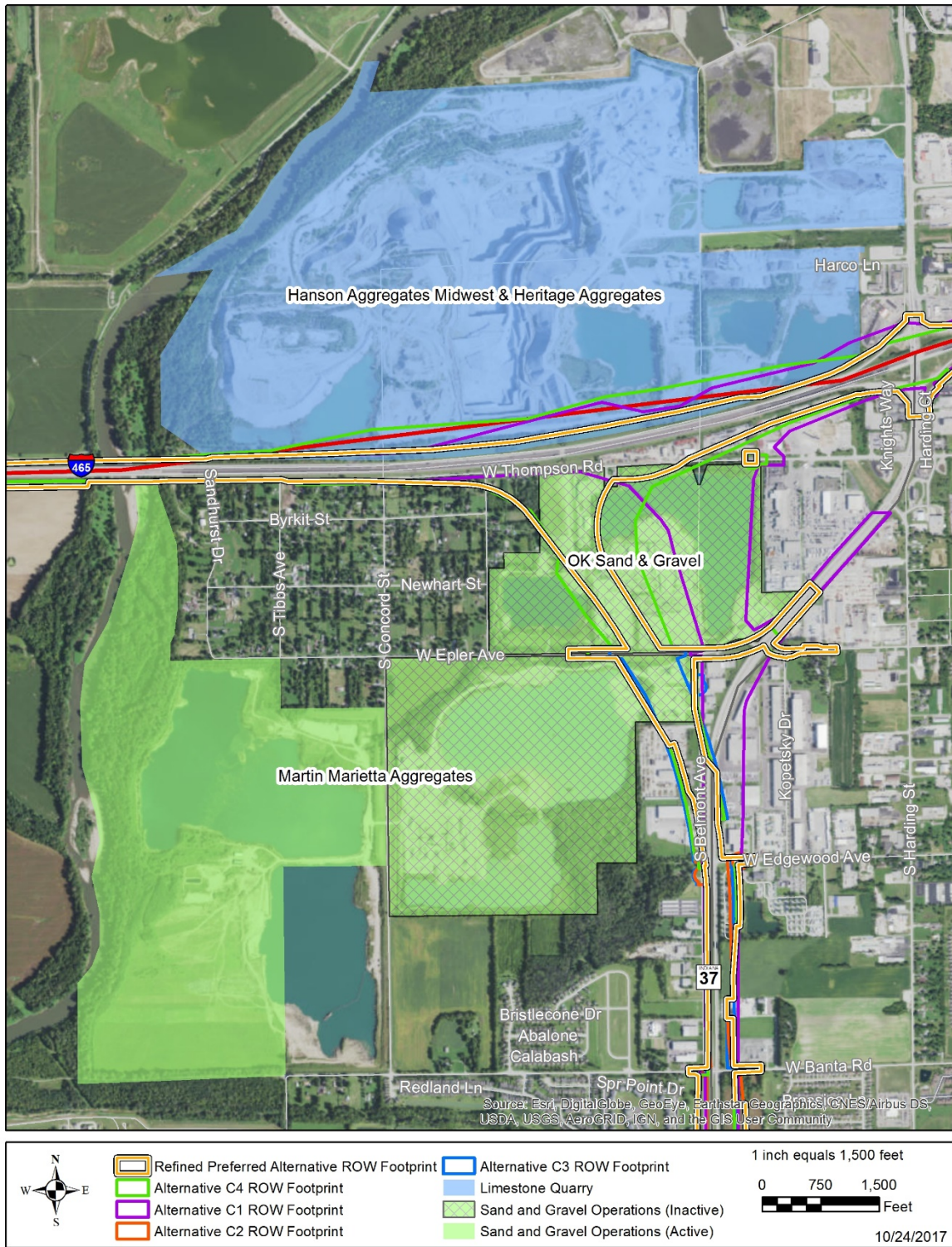


The impacts to potentially marketable limestone mineral resources in the I-69 Section 6 right of way are estimated to be 41 acres with Alternative C1; 66 acres with Alternatives C2, C3, and C4; and 17 acres with the RPA. These impacts are confined to the Hanson Aggregates property, shown in **Figure 5.15-3**. No other limestone quarries exist within the I-69 Section 6 project area.

¹ Potentially marketable limestone is from the Muscatatuck Group (particularly the North Vernon Limestone). It is in and near the I-69 Section 6 alternatives from the Johnson and Marion county boundary, extending to the northern terminus of I-69 Section 6. This limestone is considered potentially marketable due to its quality and shallow depth. For this analysis, “potential marketability” does not take into consideration current market conditions or the current status of the proven marketable reserves.



Figure 5.15-3: I-69 Section 6 Mineral Resources near I-465





Hanson Aggregates is actively mining at present (2017). It has mined in an 800-acre area since 1960. One of the areas of active mining within the complex is advancing to the south toward the existing I-465 right of way. Hanson Aggregates expects to reach the south limit of the quarry with full-depth excavation in about two years. This south limit is where their drive is located immediately adjacent to I-465. They will then turn east or west (to be determined) and will continue operations. Hanson Aggregates plans to have active mining to supply limestone products for the next 40 years. Much of the limestone product is expected to serve the transportation industry. Stripping of overburden in one of these directions in 2017 will be followed by active mining and limestone extraction.

Hanson Aggregates provided comments on the DEIS. See **Volume III, Comments and Responses**, Part A, Public Comments - Individuals (PI) Section of this FEIS for a full listing of Hanson Aggregates comments and INDOT responses. Hanson Aggregates comments focused on the size of the land acquisition and the loss of limestone reserves.

Hanson Aggregates equated reserve losses in acreage to a percent of recoverable reserves: 57 percent of its recoverable reserves for Alternative C1, and 77 percent for Alternatives C2, C3, or C4. The RPA had not been defined when Hanson Aggregates calculated percentage of recoverable limestone reserves. Hanson Aggregates did not describe the details of how these calculations were made, but clearly, the results would be different for the RPA. Impacts to Hanson Aggregates with the RPA are estimated to be approximately 50 acres less than the 66 acres estimated for Alternative C4 in the DEIS. The reduction in impacts will allow Hanson Aggregates to mine more of its limestone reserves in the future.

All I-69 Section 6 alternatives include right of way from Hanson Aggregates property. Acreages in **Table 5.15-1** at the end of this section represent the relative impact of each alternative to future extraction from the property. Total acreages of the quarry property to be acquired for right of way are presented in the table as potential impacts. These are conservative estimates, since some of the mineral reserves within this area may be extracted prior to right of way acquisition for I-69 Section 6.

5.15.4.5 Sand and Gravel

Active sand and gravel extracting operations are located along the west side of SR 37 at several locations. As shown in the four-county mineral resource inventory map in **Figure 5.15-1**, there are additional potentially marketable sand and gravel resources on both sides of SR 37 between Martinsville and I-465. Potential impacts to sand and gravel resources resulting from the I-69 Section 6 alternatives include five pit operations, as described below.

The OK Sand and Gravel Pit is located south of I-465 and Thompson Road, west of SR 37, and north of Epler Avenue. Its 174-acre location is shown in **Figure 5.15-1**. Sand and gravel was mined from several flooded pits on this site which is now inactive and abandoned. A field review on June 21, 2016, observed parcels related to this site reclaimed as lakes and dry level areas developed for industrial activity. No active mining was observed.

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The right of way impacts to the OK Sand and Gravel Pit site are 57 acres for Alternative C1, 62 acres for Alternative C2 and C4, 61 acres for Alternative C3, and 47 acres for the RPA. The potential impact acreages presented in the **Table 5.15-1** at the end of this section are conservative due to the status of mineral extraction at this site. Observations during field review on June 21, 2016, indicate that previous sand and gravel extraction operations on this site have removed the economically marketable resources, and current land use has been converted. Based on the inactive status of the mineral extraction on this property, it is expected that the I-69 Section 6 alternatives will have no impact to potentially marketable mineral reserves on this site.

The Martin Marietta Aggregates Belmont Plant² produces sand and gravel. This site is located south of Epler Avenue and west of Belmont Avenue, as shown in **Figure 5.15-1**. The entrance to this facility is shown in **Figure 5.15-4**. Previously, sand and gravel was mined on a 250-acre parcel located east of Concord Street and south of Epler Avenue. Sand and gravel is currently processed for market west of Concord Street on a separate parcel that will not be impacted by any I-69 Section 6 alternative.

All alternatives, including the RPA, would have right of way impacts on the inactive parcel east of Concord Street. Approximately 16 acres in the northeastern corner of this parcel may have sand and gravel resources remaining, but this area has structures that support other industrial and commercial land uses. These mineral resources are not economically marketable based on this land use. Field reviews identified IMI and Sagamore concrete mixing operations on the portion of the parcel that includes the potential right of way. These businesses and other structures along Belmont Avenue would not be impacted by Alternative C1, but would be relocated as part of Alternatives C2, C3, C4, and the RPA.

Figure 5.15-4: Entrance to Martin Marietta Aggregates



Potential impacts to the Martin Marietta Aggregates property in this northeastern 16-acre area would be 16 acres with Alternative C2, C4, and the RPA; and 13 acres with Alternative C3. These estimates are conservative, given the current land use which makes mineral extraction uneconomic.

² Martin Marietta Aggregates is also proposing a quarrying operation approximately 1,900 feet west of existing SR 37 just south of Fairview Road. The proposal is subject to review and approval by state and local officials. Available information has been reviewed to evaluate potential impacts of I-69. It was determined this quarry would not be impacted by I-69 Section 6.



Riverdale Farms owned a sand and gravel pit north of Smith Valley Road and west of SR 37 in Johnson County, which was in active operation from 2006 to 2010. See **Figure 5.15-5**. There are two inactive sand and gravel pits on the 156-acre property and the property is crossed by I-69 Section 6 alternatives. There is equipment on the property related to prior sand and gravel operations and currently there is stockpiled material on the site. The eastern portion of the property is an agricultural field and has a residential structure.

While additional sand and gravel resources may exist on the Riverdale Farms property, mineral extraction has not occurred since 2010. A field review on June 20, 2016, observed a paved road entering the property from Smith Valley Road. Potential impact calculations for this property are: 8 acres for Alternative C1, 12 acres for Alternative C2 and the RPA, 8 acres for Alternative C3, and 13 acres for Alternative C4, as shown in **Table 5.15-1** at the end of this section. These estimates are conservative relative to the mineral resources impacts due to the inactive status of sand and gravel extraction on this property.

Irving Materials, Inc., operates an active sand and gravel pit on a 583-acre site adjacent to and west of SR 37 in Johnson County. The location is shown in **Figure 5.15-1** and **Figure 5.15-5**. Impacts on potential sand and gravel resources from right of way acquisition would be 13 acres for Alternative C1, 28 acres for Alternative C2, 11 acres for Alternative C3, 31 acres for Alternative C4, and 34 acres for the RPA. The field survey on June 21, 2016, noted office buildings and processing operations east of the mineral extraction pits. The active mining is located to the west of the office buildings, progressing westward toward the White River.

Sand and gravel resources may exist within the portion of the property where the potential right of way would be acquired, but it is not expected that mining would occur on the eastern portion of the site near SR 37 due to the current roadway locations and westward orientation of extraction activities. Access to the facility would be perpetuated by all alternatives, including the RPA, via an existing access driveway from Smith Valley Road, which is currently the primary access to the facility.

The JW Jones Gravel Pit is located at 5506 SR 37 (at Perry Road) in Morgan County. The JW Jones Gravel Pit operator sent a letter of intent to commence operations to the Indiana Department of Environmental Management (IDEM) dated March 3, 2016. The property is 289 acres in size. As of July 1, 2016, some ground has been cleared and heavy equipment assembled on the site. The field review on June 21, 2016, observed it is likely that mining will progress north and west, away from existing SR 37 and I-69 Section 6 alternatives.

The potential impacts from right of way acquisition to the JW Jones Gravel Pit are estimated to be 19 acres for Alternative C1; 18 acres for Alternatives C2, C4, and the RPA; and 13 acres for Alternative C3. Access would be maintained to the property with a local service road that would modify the current direct access from SR 37. The location of the JW Jones Gravel Pit is shown in **Figure 5.15-6**.



Figure 5.15-5: Irving Materials and Riverdale Farms Sand and Gravel Operations



Figure 5.15-6: JW Jones Gravel Pit





5.15.5 Mitigation

No mitigation would be provided for impacts to sand and gravel or limestone deposits that are not commercially owned and developed for extraction. Sand and gravel material within the right of way may be used by the contractor during construction of I-69. Impacts to commercially owned resources would be compensated as provided by the INDOT Uniform Relocation Assistance program. Existing commercial operations also would be eligible for payment of damages for harm to their existing business operations which are outside of the land taken for right of way. All such compensation is determined during post-NEPA right of way acquisition.

Oil and gas well information in GIS databases is generalized. No wells are anticipated to be encountered. However, there is potential for encountering older wells due to the imprecision of older records. If an undocumented well is encountered in the right of way during construction, the standard operating procedure included in *INDOT SOPs – Wells, Asbestos, Snow, and Ice Control* will be applied.

5.15.6 Summary

The major mineral resources within I-69 Section 6 include limestone bedrock, and sand and gravel deposits. Potentially marketable limestone mineral reserves exist north of the interchange with I-465. At present, there is one active limestone quarry in that area, operated by Hanson Aggregates. Potentially marketable sand and gravel mineral resources exist along the west side of SR 37 south of I-465, operated by five companies. **Table 5.15-1** summarizes the mineral resources included in the potential right of way of I-69 Section 6 alternatives.

Impacts to potentially marketable limestone resources range from 17 acres with the RPA to 66 acres with Alternatives C2, C3, and C4. All these impacts would occur north of I-465. The notable reduction in impacts with the RPA is due to engineering adjustments made as the DEIS preferred alternative (Alternative C4) was refined to define the RPA. These adjustments are described in **Section 3.8**.

Five sand and gravel pits are located in the proposed I-69 Section 6 right of way. At present, two of these are active and three are inactive. Impacts to potentially marketable sand and gravel resources (active and inactive) range from 97 acres with Alternative C1 to 140 acres with Alternative C4. The RPA would impact approximately 127 acres of potentially marketable sand and gravel resources. The lower impact of the RPA compared to Alternative C4 results from engineering refinements made after the DEIS was published, as described in **Section 3.8**.

Total estimated impacts on mineral resources, including active and inactive operations range from 138 acres with Alternative C1 to 206 acres with Alternative C4. The RPA is estimated to impact 144 acres. Total estimated impacts for active operations range from 69 acres for the RPA to 115 acres for Alternative C4.



Table 5.15-1: Mineral Resources Potentially in Right of Way of Alternatives

Mineral Resources	Quantity	Alt C1	Alt C2	Alt C3	Alt C4	RPA
Limestone (active)						
Hanson Aggregates Limestone Quarry (active)	Area (acres)	41	66	66	66	17
Sand and Gravel (active and Inactive)						
Irving Materials, Inc. (active)	Area (acres)	13	28	11	31	34
JW Jones Gravel Pit (active)	Area (acres)	19	18	13	18	18
OK Sand and Gravel Pit (inactive)	Area (acres)	57	62	61	62	47
Martin Marietta Aggregates (inactive)	Area (acres)	0	16	13	16	16
Riverdale Farms Sand and Gravel (inactive)	Area (acres)	8	12	8	13	12
Total Sand and Gravel Impacts	Area (acres)	97	136	106	140	127
All Mineral Resources						
TOTAL IMPACTS- Active and Inactive Operations	Area (acres)	138	202	172	206	144
TOTAL IMPACTS - Active Operations only ⁽¹⁾	Area (acres)	73	112	90	115	69

(1) Inactive sand and gravel areas are excluded based on the consideration that any remaining resources are no longer economical or marketable based on past extraction and/or current land use.

Source: Layers from Indianamap.org. Layers titled Petroleum Fields and Bedrock Geology and Industrial Minerals, active 2016.