3.0 ENVIRONMENTAL EFFECTS

3.1. Socioeconomic Impacts

Socioeconomic impacts include changes in the community, neighborhoods, travel patterns and accessibility, impacts on school districts, impacts on safety, the number of relocated households and/or businesses and economic impacts (employment, inflation, sales and taxes) which can reasonably be expected after completion of the project.

3.1.1. Demographics

Demographic data was collected from the USCB's 1990 Census and 2000 Census (USCB, 2000). Population projected in 2030 was obtained from the BHJ Plan (BHJ, 2008). Because Brilliant is an unincorporated area, the demographic data for the zip code 43913 which includes Brilliant was used. The demographic data for the study area is based on census block groups because these are the smallest geographic area for which income and ethnic information is reported. The study area in West Virginia is represented by Census Tract 317, Block Group 1 and the study area in Ohio is represented by Census Tract 117, Block Group 3.

Population Data

West Virginia

Based on U.S. Census data, the state of West Virginia experienced a slight increase in population (0.8%) between 1990 and 2000. In comparison, the population of Brooke County and the City of Wellsburg experienced a decrease in population between 1990 and 2000 (-5.7% and -14.6%, respectively). According to the BHJ 2030 Plan, by 2030 the population in Brooke County is expected to decrease 5.4% and the population in the City of Wellsburg is expected to decrease 3.5%. The population of the study area on the east side of the Ohio River was 1,253 in 2000 according to U.S. Census data. Table 3-1 summarizes the population data and the population trends for the City of Wellsburg, Brooke County and the state of West Virginia.

Table 3-1: Population Trends, West Virginia

	Population			Percent Change		Study Area Population (2000)
	1990	2000	2030	1990 – 2000	2000 – 2030	
Wellsburg	3,385	2,891	2,789	-14.6%	-3.5%	-
Brooke County	26,992	25,447	24,063	-5.7%	-5.4%	1,253
West Virginia	1,793,477	1,808,344	N/A	0.8%	N/A	-

Ohio

The study area on the west side of the Ohio River experienced a similar decreasing population trend as the east side of the Ohio River. Based on the U.S. Census data, between 1990 and 2000 the population of Jefferson County experienced a decrease (-8.0%) and the population of Brilliant increased slightly (+3.3%), while the state of Ohio underwent an increase in population (+4.7%). The BHJ 2030 Plan projects a decrease in the population of Jefferson County of 24.4% between 2000 and 2030. Refer to Table 3-2 for population data for the study area in Ohio, unincorporated Brilliant, Jefferson County and the state of Ohio. The study area population on both sides of the Ohio River is similar in size; 1,253 residents on the West Virginia side and 1,533 residents on the Ohio side.

Table 3-2: Population Trends, Ohio

	Population			Percent Change		Study Area Population (2000)
	1990	2000	2030	1990 – 2000	2000 – 2030	
Brilliant	1,672	1,728	N/A	3.3%	N/A	-
Jefferson County	80,298	73,894	55,850	-8.0%	-24.4%	1,533
Ohio	10,847,115	11,353,140	N/A	4.7%	N/A	-

Age and Race

West Virginia

In the West Virginia study area, 21.9% of the population is under the age of 18 and 22.3% of the population is 65 years of age or older. The demographics of Brooke County and the state of West Virginia show that 20.4% and 22.3% of the population is less than 18 years old, respectively. 18.3% and 15.3% of the population are 65 years of age or older, respectively.

Minority populations within the West Virginia portion of the study area represent a small portion of the entire study area (1.3%). This is less than the minority population of Brooke County (2.4%) and of West Virginia (5.4%). Table 3-3 summarizes age and racial data for the east side of the Ohio River. The majority of the study area on the east side of the Ohio River is Caucasian and between the ages of 18 and 65.

Table 3-3: Age and Race Trends, West Virginia

	Population	> 18 Years of Age	≥ 65 Years Of Age	Non-minority	Minority
Study Area	1,253	275	280	1,237	16
Wellsburg	2,891	518	693	2,789	102
Brooke County	25,447	5,200	4,662	24,801	606
West Virginia	1,808,344	402,393	276,895	1,714,966	98,378

Ohio

The study area on the west side of the Ohio River and Jefferson County consist of 21.5% and 21.4% of people under 18 years of age, respectively. In the state of Ohio, the percent of the population under the age of 18 is 25.4%. The portion of the population that is 65 years of age or older in the Ohio side of the study area is 15.9%, in Jefferson County it is 18.6% and in the state of Ohio is 13.3%.

Similar to the West Virginia side of the study area, the percentage of minority population within the Ohio portion of the study area is low at 4.6%. In comparison, Jefferson County has a higher percentage of minority population (7.9%) and the state of Ohio has 16.0% minority population. Table 3-4 summarizes age and racial data for the west side of the Ohio River.

Table 3-4: Age and Race Trends, Ohio

	Population	> 18 Years of Age	≥ 65 Years Of Age	Non-minority	Minority
Study Area	1,533	330	244	1,462	71
Brilliant	1,728	392	301	1,710	18
Jefferson County	73,894	15,821	13,752	68,040	5,845
Ohio	11,353,140	2,888,339	1,507,757	9,538,111	1,815,029

Housing and Economic Data

West Virginia

The housing units within the study area on the east side of the Ohio River are mostly single-family residences with over 75% of the available housing units being owner occupied (USCB, 2000).

Within the West Virginia portion of the study area, the median income was $30,987 in 2000. The percentage of low-income population within this portion of the study area (11.7%) is slightly greater than the 11.2% low-income population in Brooke County, but less than the 17.5% low-income population in the state of West Virginia.

The population within the study area is mainly employed in the following industries: educational, health and social services and manufacturing. The West Virginia portion of the study area has an unemployment percentage of 1.5%. Comparatively, Brooke County and the state of West Virginia have unemployment percentages of 2.3% and 3.2%, respectively. Refer to Table 3-5 for housing and economic data for the east side of the Ohio River.

Table 3-5: Housing and Economic Trends, West Virginia

	Housing Units				Persons	
	Total	**Owner Occupied**	**Renter Occupied**	**Vacant**	**Un-Employed**	**Below Poverty Level**
Study Area	498	379	89	30	20	147
Wellsburg	1,493	887	474	132	32	419
Brooke County	11,150	7,971	2,425	754	584	2,862
West Virginia	844,623	553,699	182,782	108,142	58,021	315,794

Ohio

On the west side of the Ohio River, the study area primarily contains single-family residences; there are no multi-unit buildings within the Ohio portion of the study area. Of the 617 housing units within the study area, 90% are owner occupied with the remaining units being renter occupied or vacant.

The median income for the study area on the west side of the Ohio River is $49,444, which is higher than the median income for the study area on the east side of the Ohio River. In the Ohio portion of the study area 4.0% of the population is considered low-income. Jefferson County and the state of Ohio have low-income population percentages of 14.7% and 10.3%, respectively.

On the west side of the Ohio River, the population within the study area is mainly employed by the educational, health and social services, manufacturing and retail trade industries. The unemployment percentage in the Ohio side of the study area is 1.5%. In comparison, the percent of unemployment in Jefferson County and the state of Ohio is 3.3% and 2.5%, respectively. Refer to Table 3-6 for housing and economic data for the west side of the Ohio River.

Table 3-6: Housing and Economic Trends, Ohio

	Housing Units				Persons	
	Total	**Owner Occupied**	**Renter Occupied**	**Vacant**	**Un-Employed**	**Below Poverty Level**
Study Area	617	555	46	16	23	62
Brilliant	829	515	221	93	53	226
Jefferson County	33,291	22,614	7,803	2,874	2,428	10,862
Ohio	4,783,051	3,072,522	1,373,251	337,278	282,615	1,170,698

3.1.2. Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) was signed into law on February 11, 1994. This Executive Order was established to protect minority and low-income populations from experiencing disproportionately high and adverse impacts resulting from federally funded projects. It requires agencies to identify and address high and adverse impacts of projects that would be disproportionately borne by minority or low-income populations. If disproportionately high and adverse impacts are expected, the proposed project cannot be completed unless it can be proven that there is a substantial need for the project, that avoidance and mitigation of the impacts is not practicable, or would have increased high and adverse social, economic, environmental or human health impacts that are more severe, or would have increased costs of extraordinary magnitude.

Environmental Impacts

West Virginia

The study area is predominantly composed of a Caucasian population. The percentage of minority population is 1.2%, 2.4% and 5.4% for the study area, Brooke County and West Virginia, respectively. The percentage of low-income population within the study area is 11.7% while the Brooke County and West Virginia low-income populations are 11.2% and 17.5%, respectively. In addition, the minority and low-income populations within the West Virginia portion of the study area are well dispersed throughout a large study block group area.

The No-Build Alternative will not disproportionately impact minority or low-income populations. Construction of Build Alternatives 2, 2B, 8 or 8B will not result in high and adverse impacts that would be disproportionately borne by minority or low-income populations in West Virginia.

Ohio

Within the Ohio portion of the study area, the percentage of the minority population and the percentage of the low-income population are below the minority and low-income percentages for Jefferson County and Ohio. The percentage of minority population is 4.6%, 7.9% and 16.0% for the study area, Jefferson County and Ohio, respectively. The percentage of low-income population within the study area is 4.0% while the Jefferson County and Ohio low-income populations are 14.7% and 10.3%, respectively.

The No-Build Alternative will not disproportionately impact minority or low-income populations. Within the Ohio portion of the study area, no high and adverse impacts would be disproportionately borne by low-income or minority populations

within the study area as a result of the construction of Build Alternatives 2, 2B, 8 or 8B.

3.1.3. Right-of-Way and Displacements

The eastern terminus of the project is along WV 2 south of the Wellsburg business district. Due to the topography, this section of WV 2 is essentially uninhabitable adjacent to the roadway. To provide flexibility for future widening, WV 2 will be graded to accommodate a future four-lane roadway with auxiliary lanes. This will require a benched cut adjacent to WV 2 up to 500 feet high.

Because the study area in Ohio essentially encompasses the limits of Brilliant, the study area includes both residential and commercial areas. In the immediate vicinity of the Build Alternatives, there are single-family residential homes located along 3rd Street along with businesses such as the Chevron Gas Station and Case Equipment near the existing Riddles Run Interchange. There are also two railroads, Norfolk Southern Railroad and Wheeling & Lake Erie Railway which run parallel to the Ohio River and OH 7 in Ohio.

The right-of-way acquisitions and displacements were developed based on preliminary cut and fill lines. To reduce the impacts, retaining walls were evaluated near critical properties, such as the railroad and existing roadways.

Environmental Impacts

West Virginia

The anticipated right-of-way acquisitions and displacements in West Virginia are summarized in Tables 3-7 and 3-8, respectively. At the top of the hillside adjacent to WV 2, there is an existing microwave tower. All other land within the Build Alternative footprints is forested. No displacements were identified in West Virginia for any of the Build Alternatives.

Table 3-7: Right-of-Way Acquisitions (acres), West Virginia

	Residential	Commercial	Other	Total
No-Build	0.0	0.0	0.0	0.0
Alternative 2	0.0	0.1	43.5	43.6
Alternative 2B	0.0	0.1	43.5	43.6
Alternative 8	0.0	0.1	46.5	46.6
Alternative 8B	0.0	0.1	46.5	46.6

Table 3-8: Displacements, West Virginia

	Residential	Commercial	Other	Total
No-Build	0	0	0	0
Alternative 2	0	0	0	0
Alternative 2B	0	0	0	0
Alternative 8	0	0	0	0
Alternative 8B	0	0	0	0

The No-Build Alternative does not have any direct right-of-way acquisitions or displacement impacts. There will be unavoidable right-of-way acquisitions associated with all Build Alternatives for the benched cut along WV 2. The right-of-way acquisitions for Build Alternatives 2 and 2B are less than Build Alternatives 8 and 8B. All Build Alternatives may impact a microwave tower based on the preliminary cut slopes of 1.5:1 utilized to estimate impacts. The No-Build Alternative and Build Alternatives will not result in any displacements in West Virginia.

Ohio

The anticipated right-of-way acquisitions and displacements in Ohio are summarized in Tables 3-9 and 3-10, respectively. There will be unavoidable aerial easements associated with the proposed bridge over the Norfolk Southern Railroad and Wheeling & Lake Erie Railway.

Table 3-9: Right-of-Way Acquisitions (acres), Ohio

	Residential	Commercial	Other	Total
No-Build	0	0	0	0
Alternative 2	0	4.2	0	4.2
Alternative 2B	0	4.6	0	4.6
Alternative 8	0	2.8	0	2.8
Alternative 8B	0	4.3	0	4.3

Table 3-10: Displacements, Ohio

	Residential	Commercial	Other	Total
No-Build	0	0	0	0
Alternative 2	0	1	0	1
Alternative 2B	0	1	0	1
Alternative 8	0	0	0	0
Alternative 8B	0	0	0	0

The No-Build Alternative does not have any direct right-of-way acquisitions or displacement impacts. There will be unavoidable right-of-way acquisitions associated with all Build Alternatives for minor improvements along 3rd Street.

Build Alternatives 2 and 2B also require the displacement of the Case Equipment business located along 3rd Street.

Mitigation

West Virginia and Ohio

All right-of-way acquisitions and displacements will follow the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, WVDOT and ODOT policies and applicable West Virginia and Ohio laws.

3.1.4. Community Facilities and Services

Community facilities are those that are open to the community for gatherings or public services. To evaluate the potential impacts to Community Facilities, the location of schools, cemeteries, emergency services and health care facilities were identified through windshield surveys and consultation with local officials. The community facilities are shown on Exhibits 3-1, 3-2, 3-3 and 3-4 for Build Alternatives 2, 2B, 8 and 8B, respectively. Other publicly owned facilities, including parks, are described in subsequent section of the EA.

School Facilities

Within the study area, Buckeye North Elementary School (Preschool to Grade 6) is located at 3rd Street and Kennedy Street in Brilliant. In 2011, this school enrolled 286 students. Buckeye North Middle School, which is adjacent to the elementary school, closed as of June 2010. The Buckeye Local School District intends to remodel the closed North Middle School and move the elementary students to this building. The existing North Elementary School would then be closed (Cook, 2011).

Figure 3-1: Buckeye North Elementary School

North of the study area, Wellsburg Middle School (Grades 5 to 8) is located on Main Street in Wellsburg. In 2011, this school enrolled 478 students. Wellsburg Primary School (Kindergarten to Grade 4), also located along Main Street in Wellsburg, has 232 currently enrolled students. St. John Parish School (Pre-Kindergarten to Grade 4) is located in the Wellsburg and currently has 62 enrolled students.

Cemeteries

There are no active cemeteries located within the study area. The Rickey Cemetery, located east of the existing Riddles Run Interchange in Brilliant was moved in 1969 to the New Alexandria Cemetery, located outside of the study area, to accommodate business expansion.

Emergency Services

There is one emergency provider located within the study area. The Wells Township Fire Department is located on the east end of Steuben Street in Brilliant.

There are other emergency providers not located in the study area but do service the area. The Brooke County Ambulance in Wellsburg and the Jefferson County Emergency Management Services in Ohio provide ambulance service to the study area. Fire protection in the study area on the West Virginia side is provided by Wellsburg Volunteer Fire Department in West Virginia. Enforcement services are provided by Wellsburg Police and West Virginia State Police in West Virginia and Brilliant Police Department and Ohio State Police in Ohio.

Health Care Facilities

There are no health care facilities located within the study area. However; regionally, the study area is serviced by three hospitals: Weirton Medical Center in Weirton, WV, Trinity Wheeling Hospital in Wheeling, WV and Trinity Health System in Steubenville, OH.

Worship Facilities

There are four churches located within the study area, all of which are in Brilliant. Methodist First United Church is located along 3rd Street, just south of Hudson Street; First Presbyterian Church is located on Main Street; Steel Valley Baptist and Methodist First United are located on Labelle Street in the northern part of the study area.

Public Transportation

There are no public transportation facilities in the study area. Regionally, Steel Valley Transit Authority operates in Steubenville, OH and Weirton Transit Authority operates in Weirton, WV, both north of the study area. There is no service by these authorities within the study area.

Other Facilities

Within the study area on the Ohio side, there are several other community facilities including a U.S. Post Office on 3rd Street at Ohio Street and the Brilliant Branch Library on Labelle Street. None of these facilities are in the footprints of Build Alternatives 2, 2B, 8, or 8B.

Environmental Impacts

West Virginia and Ohio

The No-Build Alternative could impact the response time of emergency vehicles as traffic delay increases along major routes such as WV 2, OH 7 and the US 22 Veterans Memorial Bridge after the closure of the Market Street Bridge. It also

limits the opportunities for the communities to utilize the community facilities on the opposite side of the river. All Build Alternatives increase the accessibility to community facilities, particularly those on the opposite side of the river. If a significant emergency event occurs which requires more than local emergency providers, all Build Alternatives would significantly reduce response times for ambulance service and fire fighting equipment movements in and around the Wellsburg and Brilliant areas, as well as for the adjacent communities and neighborhoods.

3.1.5. Community Cohesion

Community cohesion results from the interaction of persons and groups within a community. Generally, this interaction is based on physical (e.g. proximity and shared commercial and community facilities) or social (e.g. shared background, values or goals) connections. Community cohesion impacts result when these physical and social connections are altered. To identify potential impacts to community cohesion, windshield and walking surveys were performed within the study area and Wellsburg. Additional information about the interaction between Wellsburg and Brilliant was obtained by talking with residents at the public workshops and Ohio River Bridge Task Force meetings.

Just north of the study area is the City of Wellsburg. Although this town is not in the limits of the study area, its residents likely utilize the facilities within the study area such as the roadway network and Brooke-Pioneer Trail. The Wellsburg community has a well-established business district and residential area. Brilliant is located on the west side of the Ohio River in the study area. Although Brilliant is primarily residential in nature, there are several commercial and industrial properties along the river bank. Brilliant also has a community swimming pool and park facilities. Historically, Wellsburg and Brilliant were connected through a passenger ferry which operated from 1792 to 1940.

Environmental Impacts

West Virginia and Ohio

The No-Build Alternative would not have any impact to community cohesion. The communities of Brilliant and Wellsburg would continue to function independently. The proposed bridge under all Build Alternatives would reconnect Wellsburg and Brilliant and, as a result, promote these towns to share in work, recreational opportunities, the Brooke-Pioneer Trail, religious, or other community activities. The Build Alternatives will not impact or modify the access to the community facilities.

3.1.6. Changes in Travel Patterns

WV 2 and OH 7 are the major arterials running north and south parallel and adjacent to the Ohio River, while US 22 is a six-lane, east-west highway facility that connects

Pennsylvania, West Virginia and Ohio to the north of the study area. I-70 and I-470 are four-lane, east-west highways south of the study area in the Wheeling area. Within this region OH 7 is a four-lane facility and WV 2 has both two-lane and four-lane sections. The proposed bridge is expected to provide residents of Brilliant, Wellsburg and their neighboring communities' access to both WV 2 and OH 7. Since OH 7 is a four-lane arterial, it could provide West Virginia residents faster access to Wheeling, Weirton, Steubenville and other communities north and south of the study area.

The Build Alternatives would provide a direct link between Brilliant and Wellsburg and their neighboring local communities which would modify the existing travel patterns in the study area. With access across the river, neighboring communities to the study area could modify their local travel to access different facilities such as churches, stores, restaurants and work opportunities. It is expected a trip from Wellsburg to Brilliant could be reduced by 25-40 minutes.

Environmental Impacts

West Virginia

The No-Build Alternative does not impact the current travel patterns. All Build Alternatives have similar changes to existing travel patterns. Drivers from the Wellsburg area, who would travel north to utilize the US 22 bridge to access OH 7, would modify their trip to use the proposed bridge. This results in a decrease in northbound traffic along WV 2 between Wellsburg and Weirton and an increase in southbound traffic on WV 2 to the proposed bridge location. Likewise, drivers who currently use the I-70 bridge to access OH 7 would drive north to the new bridge location.

Ohio

The No-Build Alternative does not impact the current travel patterns. An increase in traffic along 3rd Street between the existing Riddles Run Interchange and proposed bridge connection is anticipated for Build Alternatives 2 and 8. Build Alternatives 2B and 8B include a new interchange with OH 7 and connection to 3rd Street, resulting in the existing Riddles Run Interchange being removed from service. As a result, traffic from the east will access the new interchange via 3rd Street, increasing the traffic along 3rd Street from the former Riddles Run interchange to the bridge connection with 3rd Street.

Mitigation

West Virginia and Ohio

Turn lanes and signalization at the proposed intersections are included in the preliminary design to increase capacity and enhance operations at these locations. The proposed intersections will be studied further during final design and designed

according to the ODOT's Location & Design Manual, Volume 1 in Ohio and the appropriate Design Directives in West Virginia. This will include the design of lane configurations, taper rates and storage lengths.

3.1.7. Land Use

Existing land use plans and comprehensive plans were reviewed to identify existing land uses within the project area and planned development and growth. For West Virginia, these included the *Brooke County Land Use Inventory* (E.L. Robinson, 2004) and *Brooke County Comprehensive Plan* (Brooke County, 2008). Currently, there are no comprehensive or land use plans for Wells Township or Jefferson County.

Environmental Impacts

West Virginia

The majority of the study area is located in unincorporated Brooke County. Steep hillsides are the most prominent feature of the landscape, presenting many challenges for land development. Limited agricultural and residential uses are located at the hilltop, while WV 2 lies at the base of the hillside. Limited commercial and residential uses are adjacent to the roadway and a number of sites are vacant. Between WV 2 and the Ohio River, the Brooke-Pioneer Trail runs from Wellsburg to Wheeling. At the Buffalo Creek crossing, the trail connects with the Yankee Trail in Wellsburg.

Within the City of Wellsburg, land use is primarily residential, with industrial and commercial uses centered on WV 2. Institutional and recreational land uses are located along the riverfront. To the south of the study area, Beech Bottom has limited residential and commercial uses, with some industrial uses located along the Ohio River. Much of the land in Beech Bottom is vacant.

Over half of the land within the county in Brooke County is undevelopable due to steep slopes (Brooke County, 2008). However, there are areas with slopes less than 15% that are best suited for industrial and commercial locations. Over 100 acres are located along the Ohio River south of the study area in Beech Bottom, but this location also makes them more prone to flooding.

The No-Build Alternative will not change existing land use. All of the Build Alternatives will directly impact land use in West Virginia due to the need to acquire property to construct a transportation facility. Additionally, all of the Build Alternatives will indirectly impact future land use in West Virginia by providing additional access to previously undeveloped areas. Such changes are consistent with the Brooke County Comprehensive Plan.

Environmental Impacts

Ohio

The majority of the study area is located in unincorporated Jefferson County. The BHJ 2030 Plan was reviewed to determine existing and proposed land uses in the area, supplemented by aerial photography and site visits. BHJ identifies the Brilliant area as "urban-well developed" (BHJ, 2008).

The Ohio landscape consists of a river community with primarily residential land uses and industrial uses, including the Cardinal Power Plant. The Norfolk Southern Railroad and Wheeling & Lake Erie Railway span the entire landscape. OH 7 runs the length of the study area, with interchanges at Brilliant on the north and Riddles Run on the south. Most developed land is located west of the railroads and OH 7, with limited uses adjacent to the Ohio River. Educational and recreational facilities are centrally located near the 3rd Street with Hudson Street intersection. Industrial uses line the Ohio River, including the AEP Service Corporation and Cardinal Power Plant, near the existing Riddles Run interchange, an industrial park near the northern Brilliant interchange and the Wells Township public works facility. The Cardinal Fly Ash Retention Reservoir is located in the hillside to the west. A former gravel pit, now filled with water, is located just south of Hudson Street, west of OH 7.

The No-Build Alternative will not change existing land use. All of the Build Alternatives will directly impact land use in Brilliant due to the need to acquire property to construct a transportation facility. Additionally, all of the Build Alternatives will indirectly impact future land use by providing additional access to these areas.

3.2. Cultural Resource Impacts

Historic and cultural resources are protected under Federal law through Section 106 of the National Historic Preservation Act of 1996, as amended and implementing regulation 36 CFR 800 (Code of Federal Regulations), as revised on January 11, 2001. In accordance with these regulations, historic and cultural resources were identified and evaluated within the area of potential effect (APE) for this project.

3.2.1. Archaeological Resources

Phase IA Archaeological field surveys were conducted in October 2009 and April 2011 to identify cultural resources, evaluate the potential for archaeological resources, document existing ground conditions and topography and document evidence of prior disturbances to archaeological features. These surveys were undertaken at two separate times during the alternatives development process. The APE for this project is approximately 182 acres.

Phase 1A Archaeological Surveys (Davis and Biondich, 2009) were submitted to the West Virginia Division of Culture and History (WVDCH), ODOT and Ohio State Historic Preservation Office (OSHPO) on March 3, 2010 for Build Alternatives 2, 4A and 7. In a letter dated March 22, 2010, WVDCH concurred with the Phase 1A recommendations to perform Phase 1B studies. ODOT in conjunction with OSHPO concurred with the Phase 1A recommendations for a Phase 1B study for the Preferred Alternative in a letter dated April 12, 2010.

After additional project alternatives were developed, Phase 1A Archaeological Survey Addendums (Curtis and Biondich, 2011) were prepared for Build Alternatives 2B, 8 and 8B and submitted to WVDCH and ODOT (for submission to OSHPO) on May 26, 2011.

Environmental Impacts

West Virginia

The existing topographic setting includes both floodplains and terraced areas adjacent to the Ohio River and Buffalo Creek. East of this area, there is a steeply sloping hillside adjacent to WV 2. The APE has been previously impacted by transportation facilities including WV 2; the former Pittsburgh, Cincinnati and St. Louis Railway which has been converted to the Brooke-Pioneer Trail; the Panhandle Traction Company Trolley line which has been converted to a utility corridor; and commercial/residential developments along WV 2.

As per correspondence from the WVDCH dated April 22, 2009, there are no previously recorded archaeological resources within the study area (refer to Appendix A for correspondence).

The No-Build Alternative will not impact archaeological resources. For the Build Alternatives, the majority of the APE was designated as low to no probability for the discovery of archaeological sites based on the previous disturbances along the terraced area of the Ohio River banks and the steeply sloping topographic setting along the east side of WV 2.

The Phase IA Archaeological Survey Addendum, dated May 2011, recommended Phase 1B testing for the Preferred Alternative. This will include a geomorphological study of the terraced river valley and testing within the limited, undisturbed upland areas on slopes less than 15%. The methodology and findings of this testing will be submitted to WVDCH for review and comment. The results of Phase IB testing will determine if archaeological consultation is complete or additional survey is required.

Ohio

The existing topographic setting includes floodplains adjacent to the Ohio River which have been developed. The APE has been previously impacted by transportation facilities including OH 7, Norfolk Southern Railroad, Wheeling & Lake Erie Railway and residential, commercial and industrial developments.

A literature review performed for this project indicated that no previously recorded history/architecture resources or previously recorded archaeological sites would be affected by the proposed bridge construction project on the Ohio side of the river. Cultural resource field investigations performed on the Ohio side of the river also determined that no cultural resources eligible for inclusion in the National Register of Historic Places would be affected by the proposed project.

The No-Build Alternative will not impact any archaeological resources. For the Build Alternatives, the majority of the APE was designated as low to no probability for the discovery of archaeological sites based on the previous disturbances along the terraced area of the Ohio River banks and development along 3rd Street; therefore, no additional work is recommended.

Mitigation

West Virginia

In a letter dated June 24, 2011, WVDCH reviewed the findings of the Phase 1A Archaeological Survey Addendum and concurred with recommendations for Phase IB testing (see Appendix A). A Programmatic Agreement between FHWA and WVDCH has been prepared to defer Phase 1B testing until the design stage. The Programmatic Agreement, included in Appendix D, is pending concurrence from FHWA and WVDCH.

Ohio

On August 1, 2011, the Ohio State Historic Preservation Office concurred with ODOT that a "no historic properties affected" was the appropriate Section 106 determination. Therefore, no further cultural resource investigations are required in Ohio for this project.

3.2.2. Historic Resources

A Historic Structure Survey was conducted within the APE in October 2009, August 2010 and April 2011. The survey included both research and a field investigation. The research included an examination of the National Register of Historic Places (NRHP), Historic Property Inventory (HPI) forms, and Ohio Historic Inventory (OHI) forms. A field survey was conducted in order to identify, document and determine the current condition of any structures over 50 years of age or older within the APE. The APE for this project is approximately 182 acres.

A Phase IA Cultural Resource Survey was submitted to the WVDCH on May 26, 2011 (Davis and LaBelle, 2011). A Phase I Literature Review-History/Architecture (Davis, Kurtik and LaBelle, 2011) was submitted to ODOT (for submission to OSHPO) on July 14, 2011.

Environmental Impacts

West Virginia

As per correspondence from the WVDCH dated April 22, 2009, there are four documented resources in the study area. One resource, the Wellsburg Historic District, is listed on the NRHP. Three individual resources, BR-0017 the Alexander Wells Cabin, BR-0045 the Ohio River Navigation Lights (Wellsburg) and BR-0051 the Brooke County Poor Farm, have been determined eligible for the NRHP. Other resources within the study area were documented through previous cultural resource studies for other projects. The Wellsburg, Bethany and Washington Railway, which runs parallel to the Ohio River and WV 2, was determined to be not eligible for the NRHP as per a letter dated January 12, 1999. Since the time that WVDCH identified these resources, Build Alternatives 4A and 7 have been eliminated from further consideration and these four historic resources are no longer within the APE.

A Phase IA Cultural Resource Survey was conducted in May 2011. The survey concluded that none of the four previously recorded historic resources are located directly within the footprints of the Build Alternatives, and no other previously documented historic resources are located within the footprints of the Build Alternatives. No structures 50 years of age or older that may be eligible for the NRHP were identified within the study area. No additional study for historic resources in West Virginia was recommended.

The No-Build Alternative will not impact historical resources. For the Build Alternatives, none of the previously documented resources are within the footprints of the Build Alternatives. No structures 50 years of age or older and eligible for the NRHP were identified within the study area. No structures 50 years of age or older that may be eligible for the NRHP were identified within Build Alternative 2, 2B, 8, or 8B.

Ohio

As per correspondence from the OHS dated June 17, 2009, there are nine properties in the Ohio Historic Inventory in the study area and one NRHP eligible property, the JEF-562-14/J.T. Bracken House. Since the time of the initial consultation with OHS, Build Alternatives 4A and 7 have been eliminated from further consideration and these properties are no longer within the APE.

A Phase I Literature Review-History/Architecture was conducted in July 2011, in accordance with the Guidelines for Historic Resource Surveys prepared by the Ohio Historical Society (OHS). The survey determined that there are no resources previously determined eligible for or listed on the NRHP within the APE for Build Alternatives 2, 2B, 8, and 8B. As part of the survey, eight properties 50 years of age or older were identified within the APE and OHI forms were completed for each resource. None of these properties are being recommended as eligible for the NRHP; however. Table 3-11 summarizes the properties identified within the APE in Ohio which are 50 years of age or older.

Table 3-11: Properties over 50 Years of Age or Older Identified within the APE, Ohio

OHIO Structure Number/ Property Name	UTM Coordinates	Date(s) of Construction/ Occupation	Style and Type of Building/Structure	National Register Eligibility Status
JEF-926-14/ Westfall Property	Z17 E530965 N4456649	ca. 1945	No Academic Style House	Recommended Not Eligible
JEF-927-14/ Owens Property	Z17 E5530706 N4456658	ca. 1945	Bungalow Elements	Recommended Not Eligible
JEF-928-14/ Walker Property	Z17 E531719 N4456668	ca. 1945	No Academic Style House	Recommended Not Eligible
JEF-929-14/ Zimnox Coal Company Warehouse	Z17 E5530782 N4456711	ca. 1945	No Academic Style House	Recommended Not Eligible
JEF-930-14/Sox Property	Z17 E530810 N4456725	ca. 1945	No Academic Style House	Recommended Not Eligible
JEF-931-14/Wilt Property	Z17 E530834 N4456744	ca. 1945	No Academic Style House	Recommended Not Eligible
JEF-932-14/ Cleveland & Pittsburgh (C&P) Railroad	Z17 E530834 N4456389	1857	Railroad	Recommended Not Eligible
JEF-933-14/ Wheeling & Lake Erie (W&LE) Railroad	Z17 E530854 N4456351	1891	Railroad	Recommended Not Eligible

A literature review performed for this project indicated that no previously recorded history/architecture resources or previously recorded archaeological sites would be

affected by the proposed bridge construction project on the Ohio side of the river. Cultural resource field investigations performed on the Ohio side of the river also determined that no cultural resources eligible for inclusion in the National Register of Historic Places would be affected by the proposed project.

The No-Build Alternative will not impact historical resources. None of the Build Alternatives will directly impact any NRHP eligible or listed historic resources; therefore, no additional work is recommended.

Mitigation

West Virginia

The Phase IA Cultural Resource Survey, dated May 2011, concluded no additional work is recommended. On February 10, 2012, WVDCH concurred with this recommendation.

Ohio

On August 1, 2011, the Ohio State Historic Preservation Office concurred with ODOT that a "no historic properties affected" was the appropriate Section 106 determination. Therefore, no further cultural resource investigations are required in Ohio for this project.

3.2.3. Publicly Owned Land/ Section 4(f) Properties

All federally funded projects are subject to Section 4(f) of the Department of Transportation Act of 1966, which affords protection to publicly-owned properties that are considered significant for recreation. Parks and other recreation areas were identified through a windshield survey. The publically owned land is shown in Exhibits 1-2, 3-1, 3-2, 3-3 and 3-4.

Environmental Impacts

West Virginia

There is one recreation facility located in the study area. The Brooke-Pioneer Trail runs parallel to WV 2 and the Ohio River on the former Pittsburgh, Cincinnati and St. Louis Railway and extends from Wellsburg to Wheeling. The trail is currently owned by WVDOT; however, the Brooke County Commissioners have a permit for trail use. In 1997, the Brooke-Pioneer Trail Association was formed to promote the use of the trail and has jurisdiction over the trail. Within the study area, the trail is paved and various interpretive plaques identify unique features of the trail. There is an unpaved parking area located on WV 2 at Buffalo Creek. The

Figure 3-2: Brooke-Pioneer Trail

trail is open for non-motorized usage from dawn until dusk. The trail has also been used for emergency vehicles at times when WV 2 was closed due to rock slides in the area.

The Brooke-Pioneer Trail was identified as a Section 4(f) resource since it is considered a publicly owned park/recreation area. A Section 4(f) property is assessed for impacts under the provisions of the USDOT Act of 1966 and related regulations. The Brooke-Pioneer Rail Trail is the only Section 4(f) property that would be impacted by the proposed project and is impacted under all Build Alternatives. The Section 4(f) de minimis Impact Analysis is provided in Appendix C.

FHWA has made the preliminary determination that the proposed project would have a de minimis effect on the Brooke-Pioneer Trail. The project will cross over the Brooke-Pioneer trail aerially and will require the trail be closed temporarily during construction. The crossing of the trail is not a "use" as that term is used in the regulations, but the temporary closure would be considered a "use." As stipulated in Federal regulations (23 CFR Part 774), an impact to a publicly owned park may be determined to be de minimis if:

(i) The transportation use of the Section 4(f) resource, together with any impact avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f);

(ii) The official(s) with jurisdiction over the property are informed of FHWA's intent to make the de minimis impact finding based on their written concurrence that the project will not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f); and

(iii) The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, and attributes of the Section 4(f) resource.

West Virginia Summary

The No-Build Alternative will not impact the Brooke-Pioneer Trail. Each Build Alternative will span the Brooke-Pioneer Trail aerially and as a result have a temporary use impact. During construction of any Build Alternative, temporary closures will be required to maintain the safety for trail users and the contractor.

Ohio

There are six parks and recreation facilities located in the study area in Ohio. Each park is described in more detail as follows.

Wells Township Community Park

The Wells Township Community Park includes both a park/picnic area and a public pool. The park/picnic area is located along Hudson Street. The park consists of a parking lot, pavilion, horseshoe pits and a concrete block structure for bathroom facilities as well as benches, swing sets and a wooden climbing set. The park is open to the public on Wednesdays 10 am to 2 pm and Saturdays 12 pm to 4 pm. The access is gated and locked when applicable.

Figure 3-3: Wells Township Community Park Pavilion

The pool is open during the summer season only and has set hours of operation. Access to this pool is from Labelle Street. The pool property is owned by Wells Township. Wells Township took control of this parcel through deed dated July 13, 1995, agreeing specifically that should the property cease to be occupied or used for local government purposes by Wells Township, the property will revert back to the Board of Education of the Buckeye Local School District. Along with the community pool, this parcel has a one-story structure, used as a changing room and for concessions.

Figure 3-4: Wells Township Community Park Pool

Although the park sits on the Board of Education's property, both the park and pool are maintained and operated by the Wells Township.

The noise analysis indicates existing noise levels at the Wells Township Community Park exceed the FHWA Noise Abatement Criteria (NAC). The No-Build Alternative and all of the Build Alternatives increase noise at the park by less than 0.5 dBA (see Section 3.3.15). However, according to 23 CFR 774.15(f), FHWA has indicated this is not considered a constructive use under Section 4(f) since the existing noise level is already higher than the NAC and the change is barely perceptible (3 dBA or less).

Buckeye Local Middle/Elementary School Fields

The football field is located between the Buckeye North Middle School and the Wells Township Community Park and is owned by the Board of Education. This property is used by the school, but the walking track around the football field is open to the public.

Figure 3-6: Buckeye Local School Track

Allen Hawkey Courts

The Allen Hawkey Courts were established in 1999 by the Wells Township Trustees. The property was given to the Trustees by the Board of Education of Buckeye Local School District by Quit Claim deed. The deed explains that while in session, the School District shall be afforded the first priority for use of the described property. Also, if Wells Township ceases to use the property for recreational purposes, the Board of Education retains rights to repurchase the property. The Board of Trustees of Wells Township is responsible for maintaining the property.

Figure 3-5: Allen Hawkey Courts

This property consists of a swing set and gazebo, sand volleyball court, basketball court, tennis court and skateboard park. This property is located along 3rd Street, adjacent to the Buckeye Local Middle School parking lot and football field. Access to these courts is open to the public and can be accessed through the Buckeye Local Middle School parking lot. There are no restricted hours of operation posted on site.

Rich Lewis Memorial Park & Danny Duda Field

This baseball field was built in 2007 by the Wells Township Trustees. It is located over several parcels owned by the county or township. Several parcels were transferred to Wells Township in Spring 2006. Others were given to Jefferson County in Fall 2000 and are leased to Wells Township Board of Trustees in renewable 5-year leases. Deeds to these parcels are specific to describe the land use as recreational and public. If the land use on these parcels should change, the property reverts back to the original owners.

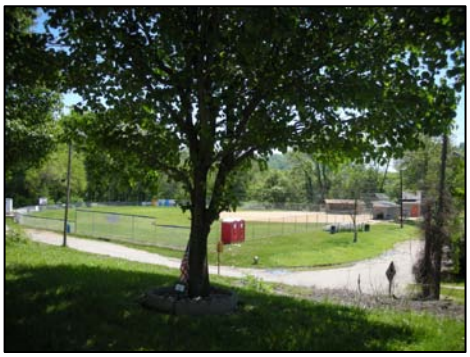


Figure 3-7: Rich Lewis Memorial Park & Danny Duda Field

The property consists of one baseball/softball field with two concrete block dugouts. The field is surrounded by fence. Access to this field is from LaGrange Street. The property has no posted hours of operation and is open to the public.

Unnamed Ballfield

The ballfield is located off of 3rd Street near Gilchrist Street and Everson Way. The field has concrete block dugouts. There are gravel parking lots on the west side of the field and also to the south, across the street. There are no signs restricting the public from using this ballfield or any signs announcing the hours of operation. It is actively used for ball games. This property is owned by the Wells Township Board of Trustees, but is leased to the fire department. The fire department plans on building a new station, pending funding.

Figure 3-8: Unnamed Ballfield

Unnamed Park

The park sits on the northwest corner of the intersection of Ross and Market Street in Brilliant. The park consists of a 2 swing sets, a basketball court and a parking lot placed on approximately 2 acres. Although the property is owned by Norfolk Southern, it is leased to Wells Township for $1 per year. The park is open to the public and closes at dusk.

Figure 3-9: Unnamed Park

Village Community Park

The Village Community Park is located on the east side of the Wells Township Trustee Building at 409 Prospect Avenue (Goosman, 2009). The park lies adjacent to the parking lot and consists of an area of grass with no structures. This park was funded by a grant from the National Park Service, Land and Water Conservation Fund.

Figure 3-10: Village Community Park

Ohio Summary

The No-Build Alternative will not take any land from any of the park or recreation facilities in Ohio, will not affect access to any of the park or recreation facilities, and will not diminish the features, attributes and overall function of these properties. None of the Build Alternatives takes any land from any of the parks and recreation areas in the study area in Ohio and will not diminish the features, attributes and overall function of these properties.

Mitigation

West Virginia

Concurrence that the project would not adversely affect the activities, features and attributes that qualify the resource for protection under Section 4(f) from the Brooke-Pioneer Trail Association, as the official with jurisdiction over the trail, is pending. Comments, dated August 25, 2011, were received from the Brooke-Pioneer Trail Association and coordination is continuing. A detailed Section 4(f) *de minimis* analysis, including a review of applicable regulations is provided in Appendix C. This publication, along with this entire EA and a public meeting, will afford the public an opportunity for review and comment on the proposed project's effects on Section 4(f) property.

As identified in the Section 4(f) de minimis Impact Analysis, proposed mitigation measures include providing 14-day advanced notification of trail closure; a 25-foot buffer around the American Elm tree canopy during construction; and repairs to return the trail to original condition after construction.

Ohio

As identified in Section 2.0, Build Alternative 7, which has been eliminated from further consideration, impacted two parks in Ohio. Additional Build Alternatives were developed to avoid impacting the parks. As a result, Build Alternatives 2, 2B, 8 and 8B do not take any land from any parks in Ohio, do not affect access to these properties, and do not diminish the features, attributes and overall function of these properties; therefore, no mitigation in Ohio is required.

3.3. Natural Environmental Impacts

The natural environment includes the forest, wetlands, animals and other natural resources within which man lives. The balances between the benefit to man and the cost to the natural environment are evaluated in the following sections.

3.3.1. Floodplain Encroachment

The protection of floodplains and floodways is required by Executive Order 11988; USDOT Order 5640.2, Floodplain Management and Protection; FHPM (Federal-Aid Highway Program Manual) 6-7-3-2, Location and Hydraulic Design of Encroachments on Floodplains; and 23 CFR 650. The intent of these regulations is

to avoid or minimize highway encroachments within the 100-year (base) floodplains, where practicable and to avoid land use development that is incompatible with floodplain values. Where encroachments are unavoidable, the regulations require taking appropriate measures to minimize impacts. The 100-year floodplains are shown in Exhibits 3-1 through Exhibits 3-4 for the Build Alternatives.

Actual Ohio River impacts are likely to be associated with the bridge piers located within the river. At the conceptual design level, exact bridge pier locations are subject to change and thus are not known; however, the number of proposed bridge piers is expected to be four piers with footprint dimensions of 15 feet by 70 feet each.

Environmental Impacts

West Virginia

The Federal Emergency Management Agency (FEMA) Q3 Flood Data designates floodplains (100-year and 500-year) associated with the Ohio River and Buffalo Creek within the West Virginia portion of the study area. A summary of the impacted floodplain areas for each alternative is shown in Table 3-12. As shown, the Build Alternatives have similar impacts to the 100-year floodplain. Build Alternative 2B has the greatest impact to the floodplains with approximately 3.89 acres of impact to 100-year floodplain. These impacts are a conservative assessment as the entire span of the Ohio River was considered in the analysis. Estimated actual impacts based on conceptual design of the bridge piers are also included in Table 3-12. This analysis is similar to the conservative assessment; however, the analysis does not consider the entire span of the Ohio River.

Table 3-12: Floodplain Impacts (acres), West Virginia

	Conservative 100-Year Floodplain	Estimated 100-Year Floodplain[1]	Conservative 500-Year Floodplain[2]	Estimated 500-Year Floodplain[1]
No-Build	0.00	0.00	0.00	0.00
Alternative 2	3.73	0.54	1.21	1.21
Alternative 2B	3.89	0.54	1.21	1.21
Alternative 8	3.15	0.21	0.06	0.06
Alternative 8B	3.15	0.21	0.06	0.06

Note 1: Based on conceptual design of bridge piers.
Note 2: Based on incremental amounts outside of the 100-year floodplain

Ohio

The FEMA Flood Insurance Rate Maps (FIRM) designates floodplains (100-year and 500-year) associated with the Ohio River within the Ohio portion of the study area. A summary of the impacted floodplain areas for each alternative is shown in

Table 3-13. As shown, Build Alternative 8B has the greatest impact to the floodplains with approximately 17.75 acres of impact to 100-year floodplains. These impacts are a conservative assessment, as the entire span of the Ohio River and the entire area of the large pond were included in the analysis (see Exhibits 3-2 and 3-4). Table 3-13 also shows the estimated actual impacts to floodplains that are based on the preliminary conceptual design of the bridge piers and the anticipated fill in the pond. This analysis is similar to the conservative assessment however; the analysis does not consider the entire span of the Ohio River, nor the filling of the entire pond. During design of the Preferred Alternative, the span lengths, pier location and size, and required fill in the pond will be determined and detailed hydraulic analyses will be conducted.

Table 3-13: Floodplain Impacts (acres), Ohio

	Conservative 100-Year Floodplain[1]	Estimated 100-Year Floodplain[2]	Conservative 500-Year Floodplain[1,3]	Estimated 500-Year Floodplain[2]
No-Build	0.00	0.00	0.00	0.00
Alternative 2	8.22	6.04	4.07	4.07
Alternative 2B	15.34	10.34	11.91	11.91
Alternative 8	8.62	4.48	5.92	5.92
Alternative 8B	17.75	10.97	12.05	12.05

Note 1: Estimate includes entire span of Ohio River and complete filling of pond.
Note 2: Based on preliminary conceptual design of bridge piers, and filling only a portion of pond.
Note 3: Based on incremental amounts outside of the 100-year floodplain

Mitigation

West Virginia and Ohio

During design of the Preferred Alternative, encroachments on the 100-year floodplains will be minimized to the extent possible. For any encroachment that must occur, all efforts will be taken to reduce the risk of flooding and the effects on human health, safety and welfare.

To minimize the impacts to floodplains, an Erosion and Sedimentation Control Plan will be prepared and implemented during construction. Roadway embankments and any disturbed areas within the floodplains will be seeded with native seed mixtures to protect the floodplains from erosion and to enhance the natural and beneficial floodplain values.

During design of the Preferred Alternative, a detailed hydraulic analysis will be performed to ensure that the floodplain crossing will accommodate the 100-year flood and that any increase in backwater is minimized. The hydraulic analysis will include a risk analysis to determine the risk associated with any additional flooding.

Any construction within floodplains will be in compliance with Executive Order 11988, Floodplain Management, FEMA regulations, and all Federal, state and local regulations. Coordination with and approval by the U.S. Army Corps of Engineers (USACE), the Brooke County Floodplain Manager, the Wellsburg Floodplain Manager and the Ohio Department of Natural Resources will also be required.

3.3.2. Wetlands and Stream Impacts

Wetlands

Wetland delineations were conducted in October 2009 to identify wetlands and Waters of the US within the project alternatives in accordance with the *Wetlands Delineation Manual* (USACE, 1987) and subsequent guidance. These investigations were used to aid in additional off-site wetland determinations conducted in April and May 2011. A compilation and review of background data sources was conducted, including USGS topographic mapping, 2010 aerial photography, USF&WS National Wetlands Inventory (NWI) information, United States Department of Agriculture – National Resources Conservation Services (USDA-NRCS) county soil survey information for Brooke and Jefferson Counties and NLCD land use information.

A wetland is defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Part III of the *Wetlands Delineation Manual* outlines three primary criteria for determination of jurisdictional wetlands. The methodology requires that wetlands exhibit positive indicators for three parameters: hydrophytic plants, hydric soils and wetland hydrology. The wetlands are shown in Exhibits 3-1 to 3-4 for the Build Alternatives.

Environmental Impacts

West Virginia

The West Virginia portion of the study area consists of primarily steeply sloping forested bluffs and pockets of open and low-intensity developed spaces. The forest species composition includes mixed hardwoods and is indicative of a mesophytic to river floodplain forest community.

Numerous roadside ditches and small seeps containing diffuse, ephemeral to intermittent flows were noted on the West Virginia hillside. These flows consisted of a mixture of groundwater and road and hillside runoff that passed into various drop inlet structures along the hillside and roadway. These structures were connected to culverts, which passed under WV 2 and the Brooke-Pioneer Trail as they proceeded down the hillside, before discharging into the Ohio River. These areas did not exhibit wetland criteria (i.e., hydrology, vegetation and soils).

The NWI mapping did not identify any wetlands other than the Ohio River within the footprints of the Build Alternatives in West Virginia. The NWI mapping identified the Ohio River as R2UBH (Riverine, (2) Lower Perennial, Unconsolidated Bottom, Permanently Flooded). The project will impact the Ohio River, as discussed later in this section.

Ohio

The Ohio portion of the study area is more developed than the West Virginia side of the study area. Land uses on this side consist of developed open and low to medium intensity developed areas.

An unmapped system of roadside ditches containing ephemeral to intermittent flows of runoff from and around OH 7 was noted on the Ohio side. These flows consisted of narrow conveyances that contained wetland hydrology; however, in most cases, did not meet the wetland vegetation (hydrophytes) and hydric soils wetland criteria.

One feature on the Ohio side is the former sand and gravel pit located just north of the existing Riddles Run interchange. From the NWI mapping, this pond was classified as a PUBHx (Palustrine, Unconsolidated Bottom, Permanently Flooded, excavated) wetland. Four PEM (Palustrine Emergent) wetlands were identified within the footprints of the Build Alternatives as discussed below:

- Area 12 is a narrow PEM wetland located at the bottom of a narrow drainage feature which is contained within a strongly sloping ravine.
- Area 20 is a linear PEM wetland which drains into the southeast side of the pond.
- Area 20A is a PEM wetland located near Area 20.
- Area 22 is a PEM wetland located near Area 12.

Table 3-14 summarizes the wetland inventory in Ohio and Table 3-15 summarizes the Wetland Impacts.

Table 3-14: Wetland Inventory in Build Alternatives, Ohio

Wetland	Classification	Acres
Area 12	PEM	0.04
Area 20	PEM	0.03
Area 20A	PEM	0.10
Area 22	PEM	0.02
	PEM Total	**0.19**
Pond	PUB	9.54
	PUB Total	**9.54**
	Inventory Total	**9.73**

Table 3-15: Wetland Impact Summary (acres), Ohio

	No-Build	Build Alternative			
		2	2B	8	8B
Area 12	0.00	0.00	0.00	0.00	0.00
Area 20	0.00	0.00	0.03	0.00	0.03
Area 20A	0.00	0.00	0.10	0.07	0.10
Area 22	0.00	0.00	0.01	0.00	0.00
Pond	0.00	0.00	1.63	0.75	2.82
Total	**0.00**	**0.00**	**1.77**	**0.82**	**2.95**

The No-Build Alternative will not impact wetlands. All Build Alternatives will impact the Ohio River, as described later in this section. Build Alternative 8B impacts 2.95 acres of wetlands which is more than any other alternative. Build Alternative 2B impacts 1.77 acres of wetlands and Build Alternative 8 impacts 0.82 acres of wetlands.

Mitigation

West Virginia and Ohio

The Build Alternatives of this project will unavoidably impact Waters of the United States after consideration has been made to avoid and minimize impacts. During design of the Preferred Alternative, a subsequent wetland delineation following the 1987 Corps of Engineers *Wetland Delineation Manual*, subsequent related guidance memoranda, including the *Interim* (USACE, 2010) and "to be published" *Final Eastern Mountains and Piedmont Regional Supplements* is recommended to delineate specific impacts associated with the proposed project.

During design of the Preferred Alternative, efforts will be made to avoid and minimize impacts. Permanent and temporary wetland impacts will be mitigated prior to completion of the bridge. Impacted sites will be returned to their original grade and seeded or planted with native wetland species to replicate or enhance the original vegetated community. Selection and design of the mitigation site(s) will be closely coordinated with the USACE Huntington District as the lead agency and the following cooperating agencies WVDOT and ODOT, the West Virginia Department of Natural Resources (WVDNR) and Ohio Department of Natural Resources (ODNR), West Virginia Department of Environmental Protection (WVDEP) and Ohio Environmental Protection Agency (OEPA), as part of the Section 404 permitting process.

Stream Impacts

USGS Steubenville West Quadrangle 7.5-minute topographic map and field investigations conducted in October 2009 were used to identify and characterize rivers and streams within the study area. The Ohio River was identified in both Ohio

and West Virginia within Build Alternatives 2, 2B, 8 and 8B and impacts were quantified by state.

For the Ohio River, the impact analysis was calculated in two ways: 1) Impact area includes the entire bridge deck and 2) Impact area only includes the piers. Actual Ohio River impacts are likely to be associated with the bridge piers located within the river. At the conceptual design level, exact bridge pier locations are subject to change and thus are not known; however, it is expected that there will be four proposed bridge piers with footprint dimensions of 15 feet by 70 feet each. The estimated river impacts associated with all the bridge piers is a total of 4,200 square feet or approximately 0.10 acres. These impacts are divided, as it is assumed that 2 piers will be located within the West Virginia and Ohio side of the proposed project (i.e., 2,100 square feet or approximately 0.05 acres each).

Environmental Impacts

West Virginia

In addition to the Ohio River, Buffalo Creek was present within the study area. The NWI mapping identified the Ohio River as R2UBH (Riverine, (2) Lower Perennial, Unconsolidated Bottom, Permanently Flooded) and Buffalo Creek was identified as R3UBH (Riverine, (3) Lower Perennial, Unconsolidated Bottom, Permanently Flooded). The Ohio River and Buffalo Creek are both considered Waters of United States. As shown in Table 3-16, Buffalo Creek is not located within the environmental footprint for any Build Alternative. No additional streams were identified within the Build Alternative footprints.

Table 3-16: Waters of the United States (acres), West Virginia

	No-Build	Build Alternative			
		2	2B	8	8B
Ohio River	0.00	0.00	0.00	0.00	0.00
Entire Bridge Deck	0.00	3.34	3.34	3.61	3.61
Assumed Piers Only	0.00	0.05	0.05	0.05	0.05
Buffalo Creek	0.00	0.00	0.00	0.00	0.00
Total[1]	0.00	0.05	0.05	0.05	0.05

Note 1: Total is based on the assumed pier area only

The No-Build Alternative will not impact any Waters of the United States. Each of the Build Alternatives will impact 0.05 acres of Waters of the United States, based on an assumed pier design.

Ohio

As indicated previously, impacts to the Ohio River were calculated in two ways as shown in Table 3-17. The NWI mapping identified the Ohio River as R2UBH (Riverine, (2) Lower Perennial, Unconsolidated Bottom, Permanently Flooded).

Table 3-17: Waters of the United States Impacts (acres), Ohio

	No-Build	Build Alternative			
		2	2B	8	8B
Ohio River	0.00	0.00	0.00	0.00	0.00
Entire Bridge Deck	0.00	2.14	2.14	1.78	1.78
Assumed Piers Only	0.00	0.05	0.05	0.05	0.05
Total[1]	0.00	0.05	0.05	0.05	0.05

Note 1: Total is based on the assumed pier area only

Approximately 0.5 miles west of the Cardinal power plant is the Cardinal fly ash retention reservoir. The tail waters of this reservoir appear to feed a small stream, Blockhouse Hollow, which passes down the Ohio hillside before flowing under OH 7. The USGS map shows this drainage terminating before reaching the Cardinal plant at the Riddles Run interchange. This intermittent to perennial stream appears to be diverted underground at Brilliant Salt Run Road, where it appears to flow to the east through a large culvert. At this point, the culverted stream enters into the southern portion of the study area through a 72 inch diameter corrugated metal pipe. The culvert emerges and discharges into a forested, sapling-shrub ditch before being diverted again to the east through a similar culvert to the Ohio River. The unnamed portion of this stream is a perennial stream that varies in width from 6 to 8 feet. It has a defined bed and bank and some portions of the stream have a narrow riparian bench. Depth of flow within the stream was generally one foot or less. The stream contained a riffle and pool structure with a substrate dominated by gravel and cobble with minimal fines. The side slopes of the ditch are steep, suggesting that the ditch was likely created. Evidence of wetland hydrology and hydric soils (lowchroma and gleyed soils) were only encountered within the stream and along the narrow banks.

The impacted length identified in Table 3-18 represents the actual impacts based on the cut/fill limits for each alternative. The No-Build Alternative and Build Alternatives 2 and 8 do not impact any streams. Build Alternatives 2B and 8B impact 13 feet of an unnamed tributary to the Ohio River.

Table 3-18: **Stream Impacts (feet), Ohio**

	Unnamed Tributary	
	Length in Footprint	**Length Impacted**
No-Build	0	0
Alternative 2	550	0
Alternative 2B	675	13
Alternative 8	380	0
Alternative 8B	675	13

Mitigation

West Virginia and Ohio

The Build Alternatives of this project will unavoidably impact Waters of the United States after consideration has been made to avoid and minimize impacts. Exact impacts cannot be determined until the design of the Preferred Alternative has been finalized.

During design of the Preferred Alternative, a subsequent wetland delineation following the *Wetlands Delineation Manual* (USACE, 1987), subsequent related guidance memoranda, including the *Interim* (USACE, 2010) and "to be published" *Final Eastern Mountains and Piedmont Regional Supplements* is recommended to delineate specific impacts associated with the proposed project.

During design of the Preferred Alternative, efforts will be made to avoid and minimize impacts. Permanent and temporary wetland impacts from the Preferred Alternative will be mitigated prior to completion of the project. Impacted sites will be returned to their original grade and seeded or planted with native wetland species to replicate or enhance the original vegetated community. Selection and design of the mitigation will be closely coordinated with the USACE Huntington District as the lead agency and the following cooperating agencies WVDOT and ODOT, the WVDNR and ODNR and WVDEP and OEPA, as part of the Section 404 permitting process. Within Ohio, OEPA will regulate any jurisdictional streams and ditches. In addition, OEPA will require mitigation for both permanent and temporary impacts and jurisdicational ditch impacts.

Finding

According to Executive Order 11990, the following finding is made: the proposed project will unavoidably impact wetlands and Waters of the United States, as all alternatives cross the Ohio River. Therefore, there is no practical alternative to avoiding wetlands. Compensatory mitigation will be provided to offset the loss of wetlands. Thus, the proposed project will have no net loss of wetlands.

3.3.3. Water Quality

The study area is located within the Upper South Ohio River Watershed (HUC 8 #05030106) and is assessed according to the Ohio River Valley Water Sanitation Commission (ORSANCO) and West Virginia water quality criteria. ORSANCO and its member states, including West Virginia and Ohio, cooperate to improve water quality in the Ohio River Basin allowing the river and its tributaries to be used for drinking water, industrial supplies and recreational purposes; and to support a healthy and diverse aquatic community. The West Virginia Integrated Water Quality Monitoring and Assessment Report (WVDEP, 2008) was reviewed to determine the quality of the named streams identified based on ORSANCO and WVDEP standards. The report indicated the Ohio River within the study area was impaired. Although Buffalo Creek was listed as impaired in upstream reaches, the reach within the study area (Hydrological Unit Classification (HUC) 8 #05030106) did not appear to be impaired.

The Ohio River from MP 84.9 to MP 71.4, which includes the study area, is designated as not supporting the following uses: aquatic life, public water supply, water contact recreation, agriculture and wildlife, water supply industrial, water transport, cooling and power. This area is characterized as a Category 5 Stream and has been placed on the West Virginia 303(d) list of waters that are not meeting their water quality standards (WVDEP, 2008). Category 5 includes waters that have been assessed as impaired and are expected to require a Total Maximum Daily Loads (TMDL). Section 303(d) of the Clean Water Act requires states to develop TMDLs for waters not meeting designated uses after technology-based controls have been implemented. A TMDL establishes the allowable loadings of pollutants for a water body, quantifies the reductions necessary to meet all designated uses and assigns load allocations.

The Ohio River was listed as impaired in 1996 and 1998 due to a fish consumption advisory resulting from elevated Polychlorinated Biphenyls (PCB) levels in fish. Also, total PCB data for the Ohio River sediment collected indicated widespread, low-level PCB contamination in the environment, as well as several areas of higher concentration zones of PCB contamination. In 2002, a TMDL established the allowable loadings of PCBs for the Ohio River and quantified the reductions necessary to meet the applicable water quality standards (ORSANCO, 2002). In addition to PCB contamination, the Ohio River was listed as impaired in 2006 and 2008 for dioxin, iron and bacteria. A bacteria TMDL is currently being developed. Other parameters that have been previously listed as impairments include chlordane, lead, aluminum and copper.

The 303(d) List states that the pollutant source for the impairments in the Upper South Ohio River Watershed is unknown (WVDEP, 2008). In general, ORSANCO states that non-point source pollution from urban runoff, agricultural activities and

abandoned mines is a major cause of water pollution in the Ohio River. There are also two permitted wastewater discharges in the vicinity of the study area. ORSANCO sets Pollution Control Standards for industrial and municipal waste water discharges to the Ohio River and tracks certain dischargers whose effluent can seriously impact water quality. The standards designate specific uses for the Ohio River and establish guidelines to ensure the river is capable of supporting these uses.

Environmental Impacts

West Virginia and Ohio

The No-Build Alternative would not cause water quality impacts. Temporary and permanent impacts to the Ohio River are expected due to construction and operation activities. Impacts to other streams identified within the study area are anticipated as well.

The Build Alternatives will disturb existing land in West Virginia and Ohio and possibly surface water in Ohio. Based on preliminary design, the land disturbance should not have major impacts to the Ohio River, Blockhouse Hollow, unnamed tributaries, or adjacent waterways. Riverbed disturbance within the Ohio River may cause increased turbidity during construction with the potential for release of pollutants from re-suspended sediment. Impacts are anticipated to be minimal and relatively short term. Exact impacts cannot be quantified because the quantity of accumulated sediment and the area of riverbed that will be disturbed during construction are unknown. The cross-sectional area of riverbed within the study area is approximately 150 feet parallel to the river and ranges from approximately 1,200 to 1,500 feet wide perpendicular to the river shoreline. Construction activities within and adjacent to the Ohio River and other identified streams presents the possibility of a hazardous material spill. Secondary impacts from re-suspended riverbed sediment may include sediment deposition on fish spawning areas, floodplains and wetlands. The permanent placement of the bridge will contribute to increased run-off from the bridge deck and associated causeways and the potential for spills of hazardous materials during transportation. Long-term water quality impacts associated with run-off are anticipated to be minimal, especially since the river is no longer receiving run-off from the Fort Steuben Bridge that was recently closed.

Mitigation

West Virginia and Ohio

A USACE Section 404 permit and Section 401 Water Quality Certification will be required for construction of any Build Alternative. The Water Quality Certification will incorporate Best Management Practices (BMPs) to reduce the potential for surface water impacts during construction. These BMPs may include erosion control and temporary seeding of all exposed soils, segregation and protection of fuel supplies and other hazardous materials, containment of re-suspended sediment via

silt curtains and other applicable measures for the protection of surface waters. These requirements will be incorporated into the project construction specifications and will be coordinated with the Federal and state agencies.

3.3.4. Wild and Scenic Rivers

No Wild and Scenic Rivers are located within the study area.

3.3.5. Natural and Wild Areas

No Natural and Wild Areas are located within the study area.

3.3.6. Vegetation and Wildlife

Land Cover Types and Vegetation

Field observations for vegetation and wildlife within the study area were made on October 5-6, 2009. The study area includes outcroppings of Pennsylvanian sandstone and shale with a mesophytic forest in the uplands to floodplain forest communities in the lowlands along the Ohio River (USDA-NRCS, 1995 and 1974). While the West Virginia portion of the study area remains heavily forested, the Ohio portion of the study area is primarily developed.

Vegetation observed within the study area during the site visit included silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), sycamore (*Platanus occidentalis*), box-elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), American elm (*Ulmus americana*), black locust (*Robinia pseudoacacia*), hackberry (*Celtis canadensis*), eastern red cedar (*Juniperus virginiana*), various species of pine (*Pinus spp*), eastern hemlock (*Tsuga canadensis*), jewelweed (*Impatiens capensis*), pokeweed (*Phytolacca americana*), broad-leaf cattail (*Typha latifolia*), river grape (*Vitis riparia*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), golden rod (*Solidago canadensis*), smartweed (*Polygonum spp*), brome (*Bromus spp*), fescue (*Festuca spp*), orchard grass (*Dactylis spp*) and Kentucky bluegrass (*Poa spp*).

Numerous invasive and non-native plant species were also observed within the study area. Noted species were tree-of-heaven (*Ailanthus altissima*), Japanese honeysuckle (*Lonicera japonica*), Japanese knotweed (*Polygonum cuspidatum*), garlic mustard (*Alliaria petiolata*), autumn-olive and Russian-olive (*Elaeagnus umbellate* and *E. angustfolia*) and multiflora rose (*Rosa multiflora*). Other potential invasive and non-native species known to occur near the study area but not observed include amur, morrow and tatarian honeysuckle (*Lonicera maackii*, *L. morrowii* and *L. tatarica*), glossy buckthorn and common buckthorn (*Rhamnus frangula* and *R. cathartica*), purple loosestrife (*Lythrum salicaria*) and common reed grass (*Phragmites australis*) (OIPC, 2006).

Environmental Impacts

West Virginia and Ohio

Prior to assessing the vegetation and wildlife within the Ohio River Bridge Crossing study area, the NLCD (2001) was obtained from the USDA Geospatial Data Gateway. A review of the NLCD data suggests that the study area consists of open water; developed, open space; developed, low intensity; developed, medium intensity; developed, high intensity; deciduous forest; evergreen forest; and grassland/herbaceous (see detailed descriptions below). Tables 3-19 and 3-20 include the approximate land cover types for West Virginia and Ohio, respectively.

Table 3-19: Land Cover Types (acres), West Virginia

	Build Alternative			
	2	**2B**	**8**	**8B**
Open Water	6.27	6.27	6.04	6.04
Developed, Open Space	12.45	12.45	9.24	9.24
Developed, Low Intensity	7.05	7.05	6.28	6.28
Developed, Medium Intensity	0.00	0.00	0.00	0.00
Developed, High Intensity	0.00	0.00	0.00	0.00
Deciduous Forest	55.04	55.04	32.45	32.45
Evergreen Forest	11.27	11.27	9.13	9.13
Grassland, Herbaceous	0.60	0.60	0.25	0.25
Total Acres	**92.68**	**92.68**	**63.39**	**63.39**

Table 3-20: Land Cover Types (acres), Ohio

	Build Alternative			
	2	**2B**	**8**	**8B**
Open Water	6.27	10.92	10.78	11.20
Developed, Open Space	6.81	22.01	8.27	22.00
Developed, Low Intensity	6.91	19.83	13.05	20.03
Developed, Medium Intensity	8.19	12.71	8.53	13.24
Developed, High Intensity	0.00	0.00	0.00	0.00
Deciduous Forest	0.22	3.32	1.11	3.16
Evergreen Forest	0.00	0.00	0.00	0.00
Grassland, Herbaceous	0.00	0.00	0.00	0.00
Total Acres	**28.40**	**68.79**	**41.74**	**69.63**

Under the No-Build Alternative, the proposed project would not be built and there would be no construction, operational or maintenance related impacts to land cover or vegetation. Construction of the proposed project would likely require clearing most, if not all, of the existing vegetation. The extent of these impacts would vary depending on specific design parameters. Some of the existing land cover types and natural vegetation would be permanently lost due to the project construction.

Operational impacts of the proposed project may include accidents or equipment failure that could release petroleum products into adjacent plant communities. In the unlikely event of a spill or a release, the area would be cleaned up to prevent irreparable harm to the environment. Maintenance related impacts include the periodic application of herbicides and mowing to control unwanted vegetation. Control of excess vegetation within the right-of-way also reduces the potential for fires.

Maintenance procedures would also include occasional mowing, if vegetation becomes a problem within the right-of-way. Operation and maintenance activities would have minor impacts on the surrounding plant communities.

Mitigation

West Virginia and Ohio

Whenever existing plant communities are disturbed, the aforementioned invasive and non-native plant species could be introduced and become established. However, following BMPs such as mowing and herbicide application would help prevent the introduction of these species. In addition, all disturbed areas will be re-vegetated (utilizing a native seed mixture) upon completion of construction.

Wildlife

Various terrestrial and aquatic wildlife resources can be found within the project study area. These wildlife species lists were developed through observations made during the October 2009 site visit and from various WVDNR and ODNR publications. Impacts to wildlife from construction, operation and maintenance of the proposed project include wildlife fragmentation, mortality and habitat disturbance.

Wildlife observed within the study area during the October 2009 site visit included both mammals and birds. Mammals observed (i.e., actual presence or tracks) included eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridana*), white-tailed deer (*Odocoileus virginianus*) and raccoon (*Procyon lotor*). Other mammals known to occur near the study area, but not observed, include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), wild boar (*Sus scrofa*) and black bear (*Ursus americanus*).

Birds observed included mallard duck (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), American crow (*Corvus brachyrhynchos*), mourning dove (*Zenaida macroura*), bluejay (*Cyanocitta cristata*), American robin (*Turdus migratorius*) and European starling (*Sturnus vulgaris*). Other birds known to occur near the study area but not observed include

northern cardinal (*Cardinalis cardinalis*), wild turkey (*Meleagris gallopavo*) and red-winged black bird (*Agelaius phoeniceus*) (WVDNR, date unknown).

Fish species known to occur within the Ohio River near the project study area (OEPA, 2009) include gizzard shad (*Dorosoma cepedianum*), smallmouth buffalo (*Ictiobus bubalus*), black buffalo (*Ictiobus niger*), shorthead redhorse (*Moxostoma macrolepidotum*), spotted sucker (*Minytrema melanops*), common carp (*Cyprinus carpio*), silver chub (*Hybopsis storeriana*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), channel shiner (*Notropis wickliffi*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), black crappie (*Pomoxis nigromaculatus*), rock bass (*Ambloplites rupestris*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), spotted bass (*Micropterus punctulatus*), bluegill sunfish (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), sauger (*Stizostedion canadensis*), walleye (*Stizostedion vitreum*), hybrid striped bass (*Morone saxatilis x Morone chrysops*), white bass (*Morone chrysops*) and freshwater drum (*Aplodinotus grunniens*).

Environmental Impacts

West Virginia and Ohio

The existing terrestrial habitat in the project study area has been fragmented due to various anthropogenic actions such as previous construction of highway corridors and smaller roads, along with the conversion of land for residential, commercial and industrial uses. The Ohio portion of the study area includes residences and businesses within the unincorporated town of Brilliant and numerous developed streets and roadways. The West Virginia side is less developed and consists mainly of deciduous and evergreen forest.

These historic land use changes have disrupted the continuity and function of the historic terrestrial wildlife habitat by affecting foraging habits, reproductive habits and migratory movement of many species. For some species, these changes have created barriers to movement between the mountains and valleys in the region.

Under the No-Build Alternative, the proposed project would not be built and there would be no construction, operational, or maintenance related impacts to terrestrial or aquatic wildlife.

Terrestrial Wildlife

As mentioned, terrestrial wildlife habitat in the study area has already been fragmented due to the previous construction of highways and smaller roads; and the conversion of land for residential, commercial and industrial uses. The construction of the proposed project could result in increased habitat fragmentation and wildlife

mortality. The extent of these impacts would vary depending on specific design parameters.

Some additional impacts, such as wildlife mortality, are expected from the construction, anticipated increases in traffic and the subsequent operation and maintenance of the proposed project. These impacts are not anticipated to significantly contribute to further habitat fragmentation or the alteration of wildlife behavior in the study area. Construction impacts to terrestrial wildlife species in the study area are expected to be minor and short-term. Construction activities would temporarily displace several species of wildlife, but they would likely return after construction or find alternate habitat in the surrounding undeveloped areas. Maintenance activities such as herbicide application in the study area are not expected to significantly impact wildlife.

The construction, operation and maintenance of the proposed project could include accidents or equipment failure that could release petroleum products into adjacent wildlife communities. These unforeseen and unfortunate events would likely cause temporary habitat fragmentation and perhaps even some wildlife mortality. In the unlikely event of a spill or a release, the area would be cleaned up to prevent irreparable harm to the environment, and thus wildlife could return to the area after the spill or release had been remediated or mitigated. The construction and the subsequent operation and maintenance of the proposed project may affect wildlife communities, but those actions are not likely to cause significant impacts.

Aquatic Wildlife

Construction, operation and maintenance of the proposed project will likely result in both short-term and long-term impacts to aquatic resources. All impacts are anticipated to be minor. Similar to impacts discussed above, construction impacts to aquatic resources may include mortality due to equipment operation and minor habitat fragmentation due to limited access within the construction area. In addition, habitat may be disturbed due to turbid water if accumulated riverbed sediment is re-suspended or by noise associated with equipment operation. Operation and maintenance impacts would be minimal but could include loss of habitat from the constructed structure, alteration of habitat due to shading in areas that were not previously shaded and potential water quality degradation due to runoff from the bridge deck and causeways. These impacts may result in permanent habitat alteration but overall impacts are not likely to be significant.

Mitigation

West Virginia and Ohio

Proposed mitigation techniques include preparing an Erosion and Sediment Control Plan to minimize the impacts to wildlife habitat and study area streams. The disturbed areas would be re-vegetated to reintroduce habitat for native species.

3.3.7. Rare, Threatened and Endangered Species

Federal Species

In compliance with the Endangered Species Act of 1973 (16 U.S.C. 1536) and the Migratory Bird Treaty Act (16 U.S.C. 703–712), the USF&WS determines whether a Federal action would be likely to adversely affect, harm, or jeopardize the continued existence of any federal threatened, endangered, or candidate (T&E) species or its habitat. The USF&WS also designates federally protected, threatened, endangered and candidate species. Table 3-21 lists the Federal species status that have the potential to occur in the study area according to coordination letters from these agencies and additional literature searches. See Appendix A for agency correspondence.

Table 3-21: Federally Threatened and Endangered Species Potentially Occurring in Study Area

Common Name (Scientific Name)	Classification	Habitat
Indiana Bat (*Myotis sodalis)*	Endangered	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Bald Eagle (*Haliaeetus leucocephalus*)	No longer listed but covered under other Federal laws	Breeds and winters along major rivers and large lakes
Pink Mucket Pearly Mussel (*Lampsilis abrupta*)	Endangered	Medium to large rivers with sand and gravel substrates
Fanshell Mussel (*Cyprogenia stegaria*)	Endangered	Medium to large rivers with sand and gravel substrates
Sheepnose Mussel (*Plethobasus cyphyus*)	Endangered	Shallow areas in larger rivers and streams
Snuffbox Mussel (*Epioblasma triquetra*)	Endangered	Small to medium-sized creeks and some larger rivers, in areas with a swift current
Eastern Hellbender Salamander (*Cryptobranchus a. alleganiensis*)	Federal Species of Concern; Ohio endangered species	Clear, fast-flowing, well-oxygenated, unpolluted streams and rivers with riffle areas and abundant large flat rocks

West Virginia

USF&WS-West Virginia correspondence dated August 17, 2009 stated the proposed project crosses the Ohio River, which is known to contain Federally-endangered pink mucket pearly mussel (*Lampsilis abrupta*) and fanshell mussel (*Cyprogenia stegaria*), and a candidate species, the sheepnose mussel (*Plethobasus cyphyus*). On March 12, 2012, the sheepnose mussel was listed as endangered by the USF&WS.

Ohio

USF&WS-Ohio correspondence dated April 27, 2012 stated there are no Federal wilderness areas, or designated Critical Habitiat within the vicinity of the proposed site. The project site is within one mile of the Ohio River Islands National Wildlife Refuge.

USF&WS-Ohio further stated the proposed project lies within the range of the Federally-endangered sheepnose mussel (*Plethobasus cyphyus*), snuffbox mussel (*Epioblasma triquetra*) and a species of concern, the eastern hellbender salamander (*Cryptobranchus a. alleganiensis*). USF&WS-Ohio recommended that a survey be conducted if the project were to directly or indirectly impact any of the species' habitat.

West Vriginia and Ohio

In follow-up documentation, both the West Virginia and Ohio USF&WS stated there are no records of mussel populations within the study area and that the project is not likely to affect endangered mussel species.

Both the West Virginia and Ohio USF&WS also noted the Federally-endangered Indiana bat (*Myotis sodalis)* could be potentially affected by the proposed project. Indiana bat summer foraging habitats are generally defined as riparian, bottomland and upland forest and old fields or pastures with scattered trees.

State Species

West Virginia

Correspondence from the WVDNR dated April 16, 2009 indicated that there are no records of known occurrences of rare, threatened, or endangered species, wetlands, or natural trout streams within the study area and that surveys for freshwater mussels will be required.

Ohio

A correspondence letter issued on April 15, 2009 from the ODNR indicated there are no state records of rare or endangered species within a one-mile radius of the study area. In addition, there are no state nature preserves, scenic rivers, ecological

sites, geologic features, animal assemblages, state parks, state forests or state wildlife areas within a one-mile radius of the study area.

Environmental Impacts

Indiana Bat (Myotis sodalist)

West Virginia

Under the No-Build Alternative, the proposed project would not be built and there would be no construction or operational and maintenance related impacts. Each of the Alternatives (Build Alternative 2, 2B, 8 and 8B) would have similar impacts and will be discussed collectively.

The USF&WS-West Virginia noted that the Indiana bat may use the project area for foraging and roosting between April 1 and November 15. Indiana bat summer foraging habitats are generally defined as riparian, bottomland and upland forest and old fields or pastures with scattered trees. Roosting/maternity habitat consists primarily of live or dead hardwood tree species which have exfoliating bark that provide space for bats to roost between the bark and the bole of the tree. Tree cavities, crevices, splits, or hollow portions of tree boles and limb also provide roost sites (Beverly and Gumbert 2004).

The USF&WS-West Virginia has determined the number of acres of suitable foraging and roosting habitat on the West Virginia landscape available to each Indiana bat, versus the total acreage of forest. The USF&WS has determined that small projects greater than a five-mile radius from a hibernaculum or known capture site, affecting 17 acres or less of suitable forested habitat will have a very small chance of resulting in direct or indirect take of the species; and therefore, these effects are considered discountable.

If less than 17 acres of Indiana bat maternity habitat will be impacted by this project, then no further consultation under the Endangered Species Act is required for this species. If more than 17 acres will be disturbed, then further consultation with the Service will be required.

The land use cover summary, provided in Table 3-19, indicates that more than 17 acres of deciduous forest exists within Build Alternative 2, 2B, 8 and 8B for the West Virginia portion of the study area. Therefore, additional Indiana bat consultation with the USF&WS-West Virginia and WVDNR was conducted.

A mist net survey for Indiana bats was performed June 27 and 28, 2011 within the study area in West Virginia. Data were collected at two net sites for a total of eight net nights. A total of 42 bats were collected, none of which were the Indiana bat. The species collected included the northern long-eared bat (72.41%), big brown bat

(14.28%), little brown bat (11.90%), and eastern red bat (2.38%). The Mist Net Survey Report (Johnson, 2011) concluded that the Indiana bat is either absent from the project area or may be present in very low numbers and that the proposed project is not likely to adversely affect the Indiana bat. This finding is pending concurrence from USF&WS.

Ohio

Based on email correspondence from USF&WS-Ohio dated June 13, 2011 and April 27,2012, there is no habitat for the Indiana bat within the Ohio study limits and therefore, no mist net surveys are required.

Bald Eagle (Haliaeetus leucocephalus)

West Virginia

On August 9, 2007, the bald eagle was removed from the Federal list of threatened and endangered species. It remains protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act of 1918. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles. The USF&WS recently finalized a rule defining "take" that includes "disturb." "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USF&WS, 2007). No occurrences of eagles or eagle nests were noted during field surveys in the study area.

Ohio

The USFWS-Ohio stated in their April 27, 2012 letter that due to the project type, location, and onsite habitat, the Bald Eagle would not be expected within the project area, and no impact to this species is expected in Ohio. Relative to this species, this precludes the need for further action on this project in Ohio.

Summary

The No-Build Alternative will not cause impacts to the species. The Build Alternatives are not known to occur within a distance of 660 feet of any known bald eagle occurrences. Therefore, the Build Alternatives are not anticipated to impact the species.

Pink Mucket Pearly Mussel, Fanshell Mussel, Sheepnose Mussel, and Snuffbox Mussel

West Virginia and Ohio

The No-Build Alternative will not cause impacts to the species. Each of the Alternative (Build Alternatives 2, 2B, 8 and 8B) would have similar impacts. Given the species habitat requirements, it is unlikely that the species occurs within the study area. As noted previously, both West Virginia and Ohio USF&WS have indicated there are no known populations of mussels in the study area.

Mitigation

Indiana Bat

West Virginia

A Mist Net Survey Report, dated July 2011, concluded this project is not likely to adversely affect the Indiana bat. This finding is pending concurrence from USF&WS-West Virginia.

Ohio

No habitat is present in Ohio; therefore, mitigation is not required.

Bald Eagle

West Virginia and Ohio

If during construction a habitat for Bald Eagle is identified, the USF&WS will be notified and applicable mitigation measures at the time of construction will be established.

Mussels

West Virginia and Ohio

Pollution prevention and stormwater best management practices (BMPs) will be implemented around the proposed construction areas to limit impacts to water quality and potential mussel habitat in the Ohio River. Additional mussel consultation with both the West Virginia and Ohio USF&WS, WVDNR and ODNR will be conducted prior to construction.

Salamanders

West Virginia and Ohio

Pollution prevention and stormwater best management practices (BMPs) will be implemented around the proposed construction areas to limit impacts to water quality and potential salamander habitat in the project area. Additional salamander consultation with the USF&WS-Ohio, and ODNR will be conducted prior to construction.

3.3.8. Prime and Unique Farmland

Regulations adopted pursuant to Federal Law (43 Federal Register 4031, January 31, 1978, amended at 65 Federal Register 57538, September 25, 2000:7 CFR Part 657) require the USDA-NRCS to identify and locate prime farmland soils, since these soil types are protected in accordance with the Farmland Protection Policy Act of 1981 (FPPA) (7 United States Code (USC) 4202). Prime farmland soils are defined as land with the best combination of physical and chemical characteristics for producing feed, forage, fiber and oilseed crops, and are available for these uses. In addition to the prime farmland soils, the farmland program encourages the soil identification of farmland of statewide and local importance. Farmland of statewide and local importance soils are defined as land other than prime farmland which has a good combination of physical and chemical characteristics for the production of crops.

A farmland assessment was conducted in accordance with the FPPA for the No-Build and Build Alternatives. Soil surveys were reviewed to determine if any soils within the study area limits meet the characteristic criteria for determining prime farmland or farmland of statewide or local importance. The criteria include soil type, slope, texture, quality, location and moisture availability. The study area limits for each alternative were overlaid on soil survey maps in order to determine how many acres of each category of protected farmland would potentially be impacted. The impacted acres were then recorded on the required Farmland Conversion Impact Rating Form (AD 1006).

Environmental Impacts

West Virginia

The land use in Brooke County within the study area is primarily residential with commercial, industrial and manufacturing, although county classified soils as prime farmland and farmland of statewide importance exist in Brooke County, West Virginia. The total acreage of soils in Brooke County reaches just over 56,960 acres. Of this total, 55% is classified as soils of prime farmland and farmland of statewide importance. Although 55% of the soils have the prime farmland or farmland of statewide importance designation, the Soil Survey (USDA–NRCS, 1974) indicates a decline in farmland to approximately 30% of the land in the county actually being used for cropland or pasture in 1969. According to the *Brooke County Comprehensive Plan* (Brooke County, 2008), less than half of the land suitable for growing crops and raising cattle is used for either purpose primarily because of the economics of farming.

Comparing the study area limits for each of the Build Alternatives with the County Soil Survey, Build Alternative 2 and 2B contain soils that are classified as prime farmland and farmland of statewide importance. Build Alternatives 2 and 2B only

impact soils classified as farmland of statewide importance (0.37 acres each) and do not impact soils with prime farmland classification. The No-Build and Build Alternatives 8 and 8B do not impact any soils of prime farmland or farmland of statewide importance; these alternatives contain soil types including Westmoreland silt loams. Table 3-22 summarizes the impacts for each Alternative.

Table 3-22: Impacted Soil Summary (acres), West Virginia

	Prime Farmland	Farmland of Statewide Importance
No-Build	0.00	0.00
Alternative 2	0.00	0.37
Alternative 2B	0.00	0.37
Alternative 8	0.00	0.00
Alternative 8B	0.00	0.00

The Farmland Conversion Impact Rating Form (AD 1006) was submitted to the NRCS on August 24, 2011. On October 12, 2011, NRCS provided Land Evaluation Criterion Relative Value of Farmland to be Converted. NRCS reported an estimated 2.0 and 1.5 acre impacts to Farmland of Statewide Importance for Build Alternatives 2/2B and 8/8B, respectively. As per discussions with NRCS on March 16, 2012 (see Appendix A) the difference between values reported in Table 3-22 and NRCS' calculations is based on the level of accuracy in determining impacts. NRCS calculated impacts based on paper maps provided with the Farmland Conversion Impact Rating Form submittal, while impacts shown in Table 3-22 were calculated using Geographic Information Systems (GIS), which is more precise. NRCS concurred that it is acceptable to report the findings as shown in Table 3-22. Build Alternatives 2 and 2B received scores of 1.2 while Builds Alternatives 8 and 8B received scores of 1.3.

Ohio

The land use in Jefferson County within the study area is primarily manufacturing and industrial, although county classified soils as prime farmland and farmland of local importance exist in Jefferson County, Ohio. The total acreage of soils in Jefferson County reaches just over 262,300 acres. Of this total, 45% is classified as soils of prime farmland and farmland of local importance. Although 45% of the soils have the prime farmland or farmland of local importance designation, the Soil Survey (USDA–NRCS, 1995) indicates that approximately 16% of the land in the county is actually used for cropland or pasture. Comparing the study area limits for each of the alternatives with the county soil survey, none of the Build Alternatives impacts county classified prime farmland or farmland of local importance soils. Within the study areas for the alternatives, the soil types include Urban Land Complexes, Clarksburg Silt Loam and Westmoreland Lowell Complex. Table 3-23 summarizes the impacts in Jefferson County, Ohio for each Alternative.

Table 3-23: Impacted Soil Summary (acres), Ohio

	Prime Farmland	Farmland of Statewide Importance
No-Build	0.00	0.00
Alternative 2	0.00	0.00
Alternative 2B	0.00	0.00
Alternative 8	0.00	0.00
Alternative 8B	0.00	0.00

As per the Farmland Screening Sheet, prepared by ODOT on September 7, 2011, the Farmland Conversion Impact Rating Form (AD 1006) is not required.

Mitigation

West Virginia
No mitigation is required.

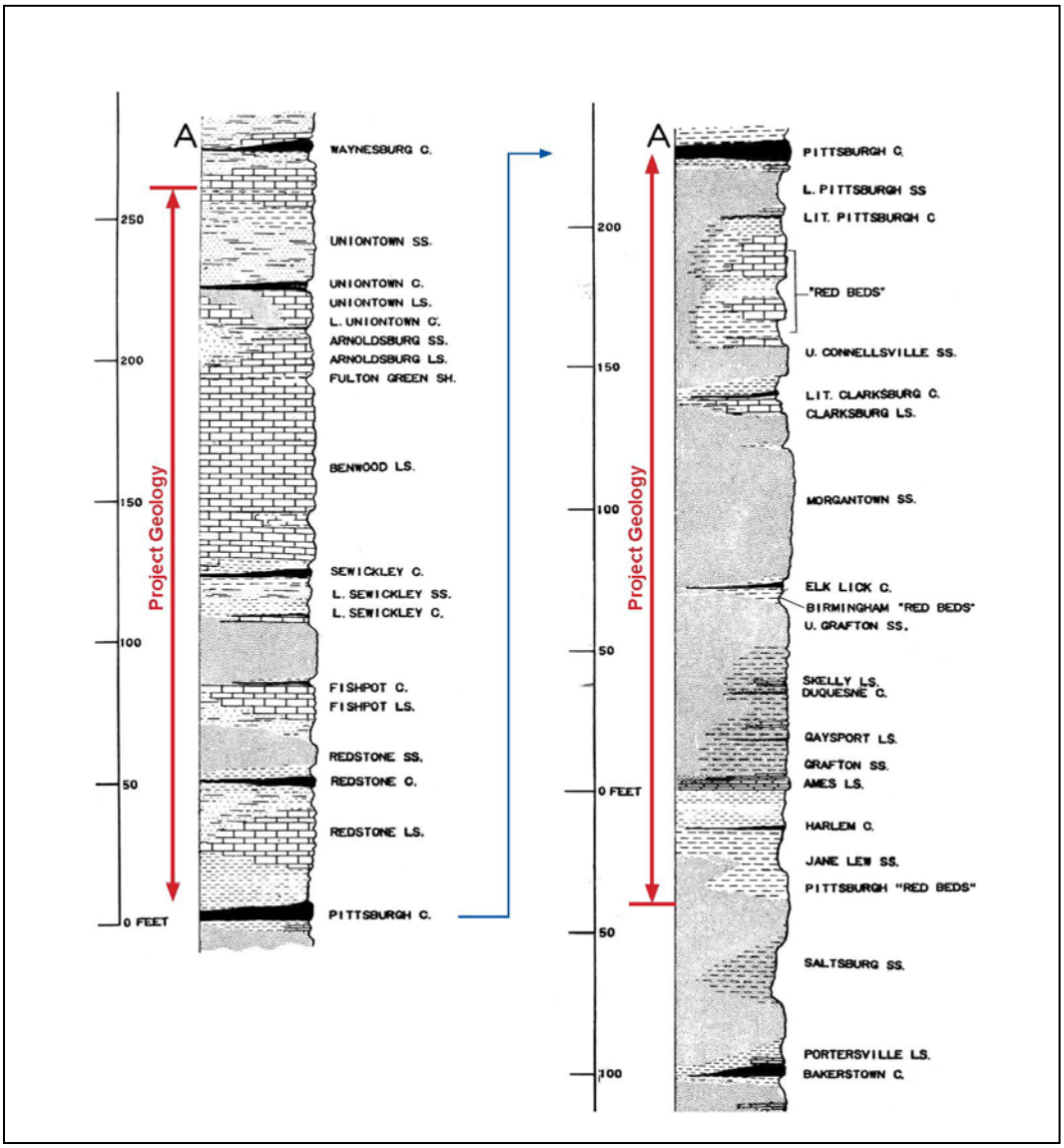
Ohio
No mitigation is required.

3.3.9. Geologic Resources and Mining

Geologic Resources
The evaluation of geologic conditions was based upon research of published literature on geology of the area, a review of available subsurface information and coordination with appropriate state and local agencies. Also, a field reconnaissance was conducted to review the Build Alternatives and to identify and confirm obvious factors which may influence alternative selection. No considerable differences regarding geologic conditions were found to exist between the Build Alternatives. Therefore, discussion in this section is organized by state with no discernment made between individual alternatives.

This project is located in the Appalachian Plateaus Physiographic Province of the Central Appalachian Mountains. This region is characterized by deeply-dissected, moderate to high-relief topography formed by downcutting and rejuvenation of local rivers and streams. Surficial rock strata are typically relatively flat lying (10° or less) and consist of cyclic sandstones, shales, limestones, claystones, siltstones and coals of Pennsylvanian Age. In the study area, rock is believed to be comprised of the Monongahela and Conemaugh Series. Available geologic information indicates that rock beds dip in the study area which appears to be limited to about 10 to 25 feet per mile. Localized variations in the rock dip could be present. A Project Geologic Column is included as Figure 3-11.

Figure 3-11: Project Geologic Column



West Virginia

The study area on the West Virginia side of the river is located on the cut bank side of the river. This area is characterized by relatively steep hillside above the river with intermittent benches containing the Brooke-Pioneer Trail and WV 2. Soil deposits near the base of the slope are typically interlaced deposits of colluviums and alluvium. These materials are typically of fairly low strength and existing soil slopes have existing factors of safety around 1.0. This is supported by seasonal landslides that occur along WV 2 during periods of heavy precipitation and/or spring thaw. The placement of embankment on these slopes should be avoided if at all possible since it will likely require deep benching or support by walls on deep foundations to provide an acceptable factor of safety.

Geologic mapping indicates the Pittsburgh Coal is present at approximately elevation 1,000 feet in the area and has been extensively strip and deep mined. Refer to the Project Geologic Column for the following discussion. Using the Pittsburgh Coal as a marker bed, the Pittsburgh "Red Beds" are likely present around the existing grade of WV 2. Above the Pittsburgh "Red Beds" are relatively soft interbedded shales and siltstones. This whole unit is typical limited to about 60 to 80 feet. Above the "Red Beds" is the Morgantown and Grafton Sandstones which are generally coalesced into one massive sandstone. This unit is typically 80 to 100 feet in the area. Above the Morgantown-Grafton Sandstone and below the Pittsburgh Coal are two less massive sandstones (Upper Connellsville and Little Pittsburgh) separated by about 40 feet of "red bed" material. Above the Pittsburgh Coal are typically alternating layers of sandstone limestone and coal. The coals include the Redstone (typically 1 to 2 feet), Sewickley (typically 1 to 2 feet) and Uniontown (typically 1 to 2 feet). No mining is documented in these three seams. The limestone units include the Redstone, Fishpot and Benwood. The quality of these materials varies widely in the region.

Based on a review of the project geology, a slope of 1.5:1 was used for conceptual and preliminary studies prior to obtaining borings. This slope ratio should sufficiently account for alternating layers of soft and relatively hard bedrock.

Ohio

The study area on the Ohio side of the river is typically located on the depositional side of the river on an alluvial plain. These materials typically consist of sands and gravels of varying density but layers of fine grained materials may also be present with varying shear strengths. Bedrock is anticipated to be relatively deep on the alluvial plain. Depths of 60 to 80 feet to bedrock are anticipated with the potential for variation.

Bridge substructure will likely require deep foundations in this area. It should be noted that the existing river banks typically have a factor of safety of around 1.0. Therefore, the placement of embankment would likely require support by walls on deep foundations or the embankments would need to be moved back away from the river bank to provide an adequate factor of safety on global stability.

Mining

A review of the mining activity databases maintained by the West Virginia Geological and Economic Survey and the Ohio Geologic Survey indicate the presence of current, former and potential mining areas within the study area (Price, 1956).

Environmental Impacts

West Virginia

According to the West Virginia Geological and Economic Survey, the Dunkard and Monongahela coal groups are present in the vicinity of the study area. From these groups, portions of the Pittsburgh, Redstone and Sewickley Coal Seams (Monongahela Group) extend into the study area. The potential impacts to surface and underground mining areas (existing or abandoned) as well as, economically viable deposits that have yet to be mined for each of the alternatives according to the available data are provided in Table 3-24.

Table 3-24: Impacted Mining Summary (acres), West Virginia

	Surface Mining	Existing Underground Mining[1]	Identified Abandoned Mines	Economically Viable Coal Deposits Yet to be Mined		
				Restone	Sewickley	Total
No-Build	0.00	0.00	0.00	0.00	0.00	0.00
Alternative 2	0.00	20.74	0.00	15.20	8.12	22.32
Alternative 2B	0.00	20.74	0.00	15.20	8.12	22.32
Alternative 8	0.00	11.69	0.00	8.44	5.15	13.59
Alternative 8B	0.00	11.69	0.00	8.44	5.15	13.59

Note 1: Pittsburgh Coal Seam

The No-Build Alternative will not impact existing mines or the potential for future mining activities. Build Alternatives 2 and 2B have more potential impacts to existing underground mines and areas not yet mined.

Ohio

According to the Ohio Geologic Survey, A-Law (issued 1966-1973), B-Law (issued 1973-1976), C-Law (issued (1976-1981) and D-Law (issued 1981-current) permitted coal mining areas are present in the vicinity of the study area. Data indicating the location and extent of coal mining activities occurring under licensing regulation (1947-1966) and prior to regulation (1947) are largely unavailable at this time. The impacts to underground mining areas (active or abandoned) as well as, economically viable deposits that have yet to be mined for each of the alternatives according to the available data are provided in Table 3-25.

Table 3-25: Impacted Mining Summary (acres), Ohio

	A, B, C, or D Law Permitted Mining	Identified Abandoned Mines	Economically Viable Coal Deposits Yet to be Mined
No-Build	0.00	0.00	0.00
Alternative 2	0.00	0.00	0.00
Alternative 2B	0.00	0.00	0.00
Alternative 8	0.00	0.00	0.00
Alternative 8B	0.00	0.00	0.00

The No-Build Alternative and Build Alternatives will not impact existing mines or the potential for future mining activities.

Mitigation

West Virginia

A coal valuation will be performed during the right-of-way acquisition phase to determine the aerial extent and seam thickness. All right-of-way acquisitions and displacements will follow the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, WVDOT policies and applicable West Virginia laws.

3.3.10. Aesthetics

The *Visual Impact Assessment for Highway Projects* (USDOT, 1981) was consulted for the evaluation of visual and aesthetic impacts.

Project Setting & Regional Landscape

The regional landscape establishes the general visual environment of the project, which is determined by defining landscape units. Units that make up an entire landscape are often a place or district that is commonly known among local viewers.

West Virginia

In the study area, Brooke County is characterized by steep bluffs along the Ohio River Valley. Most existing urban population and industrial development is settled within low-level valley areas while the natural features of the interior create a primarily wooded and rugged terrain. Topographically, nearly 60% of the area has a slope range greater than 16%. The study areas for all Build Alternatives have a landscape that includes the Ohio River and the hillside beyond WV 2. The West Virginia landscape is primarily industrial land, made up of mined areas with oil and gas wells with sections of its original agricultural, woodland, recreational and open space lands. Throughout the West Virginia landscape are utilities, including several transmission lines. Patches of residential areas exist within the hillside beyond

WV 2. The abandoned rail line currently known as the Brooke-Pioneer Trail makes up one of the landscape units within the study area of all Build Alternatives in West Virginia.

North of the study area, but relating to all Build Alternatives is the Wellsburg Historic District containing historic Wellsburg Wharf, located on the Ohio River at the intersection of 6th Street and Main Street. Views of the Ohio River and Ohio's landscape can be seen from the Historic District and the Wharf. Several landscape units contribute to the historic nature of the Wellsburg Historic District.

Ohio

The Ohio River divides Ohio from West Virginia, along with dividing two different landscapes and land uses. The Ohio landscape consists of a river community with primarily residential land uses and the nearby Cardinal Power Plant. The Norfolk Southern Railroad and Wheeling & Lake Erie Railway span the entire landscape.

All Build Alternatives span over OH 7, which was designated as a Scenic Byway in 1988. The purpose of the Scenic Byways Program is to preserve, protect, interpret and promote essential qualities of designated byways. The main reason for the byway is its once historic nature serving as an extension of the industrial economy in Cincinnati. ODOT considers OH 7 to be an Ohio Scenic Byway; therefore, many landscape units can be seen from the highway driving northbound or southbound. The view of West Virginia beyond the Ohio River from the Scenic Byway portrays natural and man-made landscape units. Coordination with the ODOT Scenic Byways Program Coordinator has been initiated (see Appendix A).

Identified Viewsheds

After review of existing landscape and the units that make up those landscapes, public comments and the historic lands evaluation, it is determined that multiple viewsheds are located in both Ohio and West Virginia. Viewsheds are considered to be land areas from within the West Virginia and Ohio landscapes in which a proposed bridge could be seen. Tables 3-26 and 3-27 list the viewsheds for West Virginia and Ohio, respectively and how they apply to each of the Build Alternatives.

Table 3-26: Viewsheds, West Virginia

Landscape Unit	Build Alternative Applicability
Recreational Areas (Wellsburg Wharf, Brooke Pioneer Trail)	All Alternatives
Residential Areas (Wellsburg Residences)	All Alternatives

Table 3-27: Viewsheds, Ohio

Landscape Unit	Build Alternative Applicability
Ohio River Scenic Byway, OH 7	All Alternatives
Residential Areas (Brilliant Residences)	All Alternatives
Recreational Areas (Richard Lewis Memorial Park & Danny Duda Fields, Unnamed Community Park, Allan Hawkey Courts and Wells Township Park/Pool)	Alternatives 2B and 8B
Institutional Areas (Buckeye Local North Elementary School)	Alternatives 2B and 8B

Identified Viewers & Viewing Duration

Duration of a view refers to the length of time the view is observed by a particular viewing user group. The view duration may be either short-term or long-term. Short-term views include momentary or intermittent views, such as those visible from a moving source over a short distance (for example: motorists' views from a moving vehicle). Long-term views are composed chiefly of constant views as experienced over an extended period of time (for example: view from a residential property, recreation land, or office building). Tables 3-28 and 3-29 identify the user's viewing duration for each viewshed for West Virginia and Ohio, respectively.

Table 3-28: Viewshed Users and Duration, West Virginia

Viewshed	User Type	Viewer Duration
Recreational Areas (Wellsburg Wharf)	Users	Long-Term
Recreational Areas (Brooke Pioneer Trail)	Users	Short-Term
Residential Areas	Residents	Long-Term
Historic Areas	Visitors/Residents	Long-Term
Natural Areas	Users	Short-Term

Table 3-29: Viewshed Users and Duration, Ohio

Viewshed	User Type	Viewer Duration
Ohio River Scenic Byway, OH 7	Motorists	Short-Term
Residential Areas	Residents	Long-Term
Recreational Areas	Users	Long-Term
Institutional Areas	Users	Long-Term

Environmental Impacts

West Virginia and Ohio

The visual impacts of the No-Build and Build Alternatives are determined by assessing the visual quality change and predicting viewer response to that change. The level of visual impact is determined by combining the compatibility and the

viewer response. As defined by FHWA, a high level of visual impact would result if the proposed bridge would introduce new visual elements that would strongly contrast or that would be incompatible with the character of the existing landscape. A low level of visual impact is a minor adverse change to the existing visual resource.

Visual Impact Analysis

The viewsheds that could potentially be impacted due to a proposed bridge were evaluated for visual impacts. A new bridge could be considered positive and negative. Understanding that the purpose of a new river crossing is to provide alternative transportation routes and alleviate congestion at the existing Ohio River crossings between Ohio and West Virginia, it must be noted that the viewsheds in both states would be noticeably altered by a new river crossing.

Viewer Perception

Some viewers would consider a new bridge an obstruction of a clear view of the Ohio River, while other viewers may consider the bridge to be an interesting added feature for the area. According to September 2009 public workshop comments, the overall reaction to a proposed new bridge crossing is positive. The only concern identified was that the bridge should not be constructed in the middle of Brilliant's largest residential area that includes some of the newer homes. Residents are considered to be sensitive viewers, due to the daily long-term viewing duration. The residential views vary greatly depending on the distance from each of the Build Alternative crossing locations. The majority of the homes in West Virginia are located at an equal or a higher level than a proposed bridge. The residential, recreational, natural and institutional lands below a proposed bridge would consider the bridge to have high visual impact if viewing duration for that viewshed is long-term.

For any of the Build Alternatives, a new bridge would be considered an additional viewshed for users of the Wellsburg Historic District and Wharf. This is considered to be an enhancement to the existing viewshed.

Views from along the Ohio River Scenic Byway, OH 7, would exhibit a high visual impact since a new bridge would provide an additional viewshed for scenic byway users. A new bridge is considered to be an enhancement to the views from the Ohio River Scenic Byway; however, a new bridge would inhibit the existing views of the West Virginia hillside and Ohio River. The viewing duration along the scenic byway is considered to be short-term since it would be a continuous view while traveling along the byway itself.

Although the viewing duration for users of the Brooke Pioneer Trail is short-term, all Build Alternatives would span over the trail. This creates a permanent change to the existing views while on the trail, therefore, creating a high visual impact.

In summary, Build Alternative 2, 2B, 8, or 8B would not adversely impact the views from any of the viewsheds within the West Virginia or Ohio landscapes. The construction of a new bridge crossing would alter the physical appearance of the community; however, it is viewed by the public as a needed transportation mobility option between Ohio and West Virginia.

Mitigation

West Virginia and Ohio

Mitigation measures will be implemented during design of the Preferred Alternative according to WVDOT and ODOT polices and procedures. When determining mitigation measures, the BHJ 2030 Plan's Environmental Factors & Mitigation and the Brooke County Long Range Plan's Land Use Plan measures, objectives and goals should be considered. BHJ's Environmental Factors & Mitigation suggests:

- Considering landscaping.
- Installing beautification elements.
- Limiting construction to specific times.
- Implementing design refinements.

The Brooke County Long Range Plan's Land Use Plan includes objectives and goals including:

- Identifying historical, scenic, archaeological, architectural or similar significant lands or buildings and specify preservation plans and programs so as not to unnecessarily destroy the past development which may make a viable and affordable contribution in the future.
- Requiring that the design is consistent with the land use component, set goals, plans and programs to promote a sense of community, character and identity.
- Promoting cost-effective development of community facilities and services.
- Reducing the destruction or demolition of historic sites and other resources by reusing land and buildings and revitalizing areas.
- Creating conditions favorable to health, safety, economic development, mobility and transportation.

It should be noted the design and aesthetic characteristics of a new bridge has not been determined at this phase, although the bridge would be designed with

sensitivity to the community context. In terms of its scale and design, the bridge is anticipated to be designed as a new viewshed to act more as an enhancement to the existing views.

3.3.11. Energy Impacts

The two operational existing bridges in the Steubenville/Weirton vicinity, the US 22 Veterans Memorial Bridge and Market Street Bridge, act as the only transportation connections between West Virginia and Ohio in the region. The Market Street Bridge is weight restricted and thus only passenger vehicles can use the span. The US 22 Veterans Memorial Bridge is the only bridge in the region which allows heavy industrial, commercial and emergency highway vehicles to cross the river, therefore, a significant amount of energy is currently expended to cross the Ohio River.

This analysis evaluated two types of energy: 1) construction energy and 2) operational energy. Construction energy is the energy required building a new bridge and energy expended by vehicles delayed by construction activities. Initial energy expenditure is required to construct the new bridge. Operational energy is related to the VMT and energy expended to operate the vehicles utilizing the roadway network.

Environmental Impacts

West Virginia and Ohio

Construction Energy

The amount of energy required for each of the Build Alternatives is directly related to the surface area of construction. It is assumed that vehicle delay due to construction is proportional to the surface area for each Build Alternative. The No-Build Alternative does not require initial construction energy expenditure. Build Alternatives 2B and 8B require the most surface area for improvement of the Build Alternatives. The surface area in square yards of pavement for each of the Build Alternatives is listed below in Table 3-30 by state.

Table 3-30: **Surface Area (SY) of Improvement**

	Surface Area (SY of Pavement)			
	West Virginia	**Ohio**	**Bridge Structure**	**Total**
No-Build	0	0	0	0
Alternative 2	20,500	2,000	126,000	148,500
Alternative 2B	20,500	22,400	127,800	170,700
Alternative 8	20,600	4,200	127,200	152,000
Alternative 8B	20,600	26,800	130,200	177,600

Note: Surface Area of Improvement accounts for structure, approach slabs and tying the structure into the existing local roadway based on preliminary engineering estimates.

Operational Energy

The No-Build Alternative results in higher energy consumption per vehicle due to additional miles traveled leading to increased travel times and decreased efficiency.

Regardless of the location of the Build Alternative, a new bridge would create a shift in existing routes. Since the existing Ohio River crossings are located at Market Street and US 22, approximately six miles to the north of the study area, new routes would be considered to create less miles traveled, decrease travel times, avoid delay and increase overall efficiency. A savings in operational energy consumption results from implementation of a new bridge.

Emissions are correlated to energy use and are impacted by vehicle miles traveled (VMT) and operational efficiency. VMT is the total number of miles of travel by all vehicles within the BHJ Metropolitan Planning Area in an average day. In order to demonstrate energy savings, the future traffic model generated by BHJ was utilized for Alternative comparison purposes. The future traffic model for the year 2030 indicates that a new bridge crossing would allow for less vehicle miles traveled resulting in energy conservation (Snelting, 2010). Reductions in VMT are due to the less circuitous routes between the two states, but more specifically, between the origins and destinations of Brilliant and Wellsburg. Table 3-31 summarizes the forecasted 2030 miles less traveled for each of the alternatives.

Table 3-31: Vehicle Miles Traveled

	Vehicle Miles Traveled (2030)	**Miles Less Traveled**
No-Build	2,388,790	-
Alternative 2	2,366,660	-22,130
Alternative 2B	2,366,660	-22,130
Alternative 8	2,366,660	-22,130
Alternative 8B	2,366,660	-22,130

For each of the Build Alternatives, vehicle operating speeds will potentially decrease during construction. The adjacent roadways that form a connection with the bridge can expect additional traffic volumes. Table 3-32 lists the roadways that could potentially experience vehicular increases and operating speed decreases during construction of a Build Alternative and after the bridge is operational.

Table 3-32: Energy Changes Along Adjacent Roadways

	Adjacent Roadways	
	Ohio	**West Virginia**
Alternative 2	3rd Street, Clark Way, Kelley Way, Cleaver Street	WV 2, CR 27
Alternative 2B	3rd Street, Clark Way, Kelley Way, Cleaver Street, OH 7	WV 2, CR 27
Alternative 8	3rd Street, Clark Way, Cleaver Street, Morris Street	WV 2, CR 27
Alternative 8B	3rd Street, Clark Way, Clever Street, OH 7	WV 2, CR 27

Mitigation

West Virginia and Ohio

Energy impacts cannot be directly mitigated; however, the following measures should be considered for all the Build Alternatives:

- Delays along adjacent roadways due to construction would be minimized by construction phasing.
- Efforts will be made to utilize efficient construction methods and equipment to minimize construction energy consumption.
- Energy expenditure for construction will be recovered as the new improvements result in overall energy reduction.

3.3.12. Groundwater

Groundwater resources of the study area were assessed through the use of existing data gathered from the U.S. Environmental Protection Agency (USEPA)/Office of Drinking Water, the Ohio Environmental Protection Agency (OEPA)/Division of Drinking and Ground Waters (DDAGW), and the *EDR DataMap Well Search Report* prepared by Environmental Data Resources, Inc. (EDR, 2009). The location and existence of specific wells will be determined during design of the Preferred Alternative. It is assumed from the topography of the region and the location of the Ohio River that the surficial groundwater flows toward the Ohio River.

Environmental Impacts

West Virginia

Review of previously mentioned sources indicated that groundwater distributed by City of Wellsburg and water wells is the primary source of potable water in the study area. This includes all private property owners in Wellsburg and Beech Bottom, WV. No wellhead protection areas are known to be located in the study area. Additionally, the study area private property owners have public sewer service. City of Wellsburg also operates a wastewater treatment plant to the north of the study area that treats local wastewater. Impacts to the water supply and treatment system for each of the alternatives according to the available data are shown in Table 3-33.

Table 3-33: Groundwater Impacts, West Virginia

	Public Water Supply	Groundwater Wells	Wellhead Protection Areas	Treatment Facility
No-Build	N/A	N/A	N/A	N/A
Alternative 2	No Impacts	No Impacts	No Impacts	No Impacts
Alternative 2B	No Impacts	No Impacts	No Impacts	No Impacts
Alternative 8	No Impacts	No Impacts	No Impacts	No Impacts
Alternative 8B	No Impacts	No Impacts	No Impacts	No Impacts

Ohio

As previously mentioned, mapping was obtained from OEPA's Division of Drinking and Ground Waters to determine if there any potential drinking water resources in or near the project area. This mapping shows that there is one wellhead protection area to the west of the project area; however, there are no drinking water resources within any of the build alternatives. The drinking water resources' location is shown in relation to each Build Alternative in Exhibits 3-1 through Exhibit 3-4.

Mitigation

West Virginia

During final design every effort will be made to minimize the impacts to groundwater in the study area. In order to minimize potential impacts to groundwater resources, the following BMPs and recommendations will be considered and undertaken, where appropriate, during final design and construction:

- Prepare and implement an approved Erosion and Sedimentation Control Plan.
- Promptly revegetate all disturbed areas to prevent accelerated runoff to surface waters.
- Designate and construct all stormwater management facilities to prevent or minimize runoff.

- Minimize the amount of vegetative clearing and impervious surface within the right-of-way to reduce runoff.
- Consider the use of vegetated stormwater management basins to assist in the infiltration by soils of highway runoff.
- Coordinate mitigation activities with the natural resource agencies.

Ohio

As there are no drinking water resources within the Preferred Alternative, no mitigation is required.

3.3.13. Waste Areas

An Environmental Site Assessment (ESA) Screening and its addendum was conducted in December 2011 and January 2012 as per ODOT's Environmental Site Assessment Guidelines, dated April 2009, for Build Alternatives 2, 2B, 8 and 8B. A total of twenty-three properties were identified and investigated in the Build Alternatives. Based on the ESA Screening, one site in West Virginia and four sites in Ohio warranted a Phase I ESA.

The Phase I ESA for one site in West Virginia was conducted in accordance with the American Society for Testing and Materials (ASTM) 1527-05. The four Phase I ESA sites located in Ohio were conducted under ODOT's Environmental Site Assessment Guidelines, dated April 2009.

Environmental Impacts

West Virginia

The historical research found that the project area has been developed since at least the early 1900s. This development includes railroad tracks and residential properties and is consistent with current land uses. An environmental database search was conducted by Environmental Data Resources (EDR) for the project area on Septmber 14, 2011. Although the EDR database did not identify any environmental records for sites in West Virginia, one site of concern was identified during the historical research. As shown in Exhibit 3-5, Site R, known as the Zatta property, is located on the slope above the Ohio River on the West Virginia side. This property is an active farm that is also being used as a salvage yard and is located outside of the project boundaries.

The No-Build and Build Alternatives 2, 2B, 8 and 8B do not impact any identified waste areas in West Virginia.

Ohio

The ESA Screening consisted of identification of all properties within the Build Alternatives, a regulatory database search, a cursory review of historical aerial

photographs, and a site inspection. Based on the information collected during the ESA Screening, four sites were investigated in the Phase I ESA.

The Phase I ESA investigation consisted of a detailed review of historical review for each site noted below through historical aerial photographs, city directories and other historical information, a regulatory file review, a site reconnaissance, and interviews. Based on this information, a Phase II ESA is warranted for all four sites for the reasons stated below.

- Zimnox Coal Company, 1210 3rd Street (Site K) – The Bureau of Underground Storage Tanks Regulations (BUSTR) file for this site indicates that the underground storage tanks (USTs) were removed in 1992; however, the owner has yet not submitted a Closure Report as required. In addition, the BUSTR file indicated that the soils removed from the tank cavity was placed in a Zimnox owned coal mine. Because of the open BUSTR case and the lack of a closure report to determine if the site has been impacted from its USTs, a Phase II ESA is warranted.
- Steel Valley Tank and Welding Inc., 24 County Road 7E (Site 26) – This site has potentially been used as a construction demolition and debris (CD&D) landfill which also accepted slag. In addition, sand blasting to remove paint from equipment has occurred outside. Therefore, a Phase II ESA is warranted to determine the potential waste materials that may be encountered during the project's construction.
- Marathon Gas Station (Midei Service Center), 1004 3rd Street (Site H) – This site currently has an active release and warrants a Phase II ESA to determine if the release has impacted the project area.
- Southeastern Equipment Company, 1356 3rd Street (Sites I and J) – The tenant currently conducted maintenance activities on this site and stores waste materials from this activity outside. A Phase II ESA is warranted to determine if the site has been contaminated from these practices.

The No-Build Alternative will not impact any of these sites in Ohio.

Mitigation

West Virginia

No sites were identified through the database search, review of historical data, and field reconnaissance. No mitigation is required.

As per ASTM standard (E 1527-05), it is recommended the findings be reevaluated if the Phase I ESA is more than 6 months old when property acquisition or construction begins.

Additionally, the construction documents will include notes that instruct contractors to immediately stop all subsurface activities in the event that potentially hazardous materials are encountered, an odor is identified, or significantly stained soil is visible. Contractors should be instructed to follow all applicable regulations regarding discovery and response for hazardous materials encountered during the construction process. Special care should be taken in the event of ground disturbance near the following site.

- Zatta Property (Site R), existing farm and salvage yard, Wellsburg, WV.

Ohio

A Phase II ESA Work Plan and Phase II ESA will be completed for the following sites if they are determined to be within the limits of the Preferred Alternative. Based on the results of the Phase II ESA, the appropriate remedial measures will be incorporated into the project plans as necessary.

- Zimnox Coal Company, 1210 3rd Street;
- Steel Valley Tank and Welding, Inc., 24 County Road 7E;
- Marathon Gas Station (Midei Service Center), 1004 3rd Street; and
- Southeastern Equipment Company, 1356 3rd Street.

3.3.14. Air Quality

The Federal Clean Air Act of 1970 (42 USC 7401 et seq.) required the USEPA to adopt ambient air quality standards. The USEPA has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public from the adverse health effects associated with air pollution. A complete listing of the NAAQS is shown in Table 3-34. The primary standards are established at levels that are intended to protect the public health. Secondary standards are required to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Table 3-34: National Ambient Air Quality Standards

Pollutant	Average Time	Primary	Secondary
Particulate Material (PM_{10} = 10 microns or smaller)	24-hour	150 ug/m^3	Same as Primary
Particulate Material ($PM_{2.5}$ = 2.5 microns or smaller)	24-hour Annual Mean	35 ug/m^3 15 ug/m^3	Same as Primary
Sulfur Dioxide (SO_2)	24-hour Annual Mean 3-hour	0.14 ppm 0.03 ppm None	None None 0.5 ppm
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm 35 ppm	Same as Primary Same as Primary
Ozone (O_3)	8-hour/day	0.075 ppm	Same as Primary
Nitrogen Dioxide (NO_2)	Annual Mean	0.053 ppm	Same as Primary
Lead (Pb)	Quarterly Mean	1.5 ug/m^3	Same as Primary

Pursuant to the Clean Air Act, USEPA has developed regional or local classifications for each Federal criteria pollutant. Areas where pollutant concentrations meet the NAAQS are classified as attainment and areas where concentrations of a pollutant exceed the NAAQS are designated as non-attainment.

This project is located within an area that is a maintenance area for the pollutants ozone and PM_{10}. For $PM_{2.5,}$ the area is currently designated as nonattainment; however, on October 4, 2011 the USEPA proposed to determine the Steubenville-Weirton $PM_{2.5}$ nonattainment area has clean data for the 2006 24-hour $PM_{2.5}$ NAAQS. If this proposal is finalized, USEPA will acknowledge that monitors in the Steubenville-Weirton nonattainment area currently read as attainment relative to the 2006 $PM_{2.5}$ standard. Ohio and West Virginia have also prepared draft requests for redesignation of their respective portions of the nonattainment area relative to the 1997 annual $PM_{2.5}$ standard, and the comment period for each ended on April 3, 2012. The states will finalize these requests and submit to USEPA; after submittal, USEPA has up to eighteen (18) months to act on their requests. Should USEPA approve these requests, the area will ultimately be designated as attainment and will, for a period of 20 years, become a maintenance area for $PM_{2.5}$. When this designation is made, the states of Ohio and West Virginia will no longer be required to develop State Implementation Plans (SIP) identifying programs intended to achieve attainment of the NAAQS for the area. Instead, they will be required to submit maintenance plans to sustain attainment with the NAAQS.

There is a stay of the Cross-State Air Pollution Rule (CSAPR) which has delayed any redesignations by USEPA for $PM_{2.5}$ until that matter is settled through the courts. Therefore, no determinations have been made to date on the clean data

proposal, and no estimate can be made for when a determination will be made for the yet to be submitted redesignation requests.

MPOs are also required to undertake conformity determinations on metropolitan transportation plans and improvement programs before they are adopted.

Environmental Impacts

West Virginia and Ohio

BHJ performed an air quality conformity analysis as part of the preparation of the *2030 Plan* and the *BHJ MPO TIP for Federal-Aid Projects 2012 through 2015 Four-Year Short Range Program*, adopted May 25, 2011 (most recent update is Revision 4 dated March 28, 2012). The proposed Ohio River Bridge Crossing is included among the projects that were evaluated in the air quality conformity analysis (BHJ, 2008 and 2010).

The air quality conformity analysis found the projects included in the 2030 LRTP will not cause or contribute to any new localized $PM_{2.5}$ or 8- hour ozone violations or increase the frequency or severity of any $PM_{2.5}$ or 8-hour ozone violations. The analysis determined the LRTP met the applicable criteria of 40 Code of Federal Regulations (CFR) 51 and 40 CFR 93 and conformed with the SIP for air quality. Because the project was included in the conformity analysis in the 2030 LRTP, it has been determined that the project has been accounted for in the motor vehicles emissions budget.

While the study area is considered maintenance for PM_{10}, the USEPA and the OEPA have determined this is the result of industrial point sources in Weirton and Follansbee in West Virginia and Steubenville and Mingo Junction in Ohio, and motor vehicle emissions have little to no impact on the area's maintenance status for $PM_{10.}$ Since the overall contribution of motor vehicle emissions in these areas is small and thus any significant change in such emissions over time would be unlikely, no additional quantitative analysis is necessary for any transportation-related PM_{10} impacts for the study area.

Due to the relatively minimal amount of ADT (10,000 vpd) and percentage of heavy vehicle traffic (2%) in 2030 for the project, it is not expected that the project will cause or contribute to any new localized PM_{10} or $PM_{2.5}$ violations or increase the frequency or severity of any $PM_{2.5}$ violations. On October 31, 2011, USEPA Region 3 concurred via email that this project is not a project of air quality concern. Additionally, on November 1, 2011, OEPA concurred with USEPA's finding (see Appendix A for agency correspondence).

The constructed project will not result in an increase in the ADT of more than 10,000 vehicles within 10 years of project completion date. Also, the project does not involve a new project right-of-way that will have an ADT increase of more than 20,000 vehicles within 10 years of construction. Hence, no Carbon Monoxide studies are required.

Mobile Source Air Toxics (MSATs)

On September 30, 2009, the FHWA released an update to its interim guidance on when and how to analyze MSATs during the NEPA process for highways. In the context of a transportation facility, MSATs are compounds emitted from highway vehicles and non-road equipment. The FHWA guidance on the analysis of MSAT recommends:

- No analysis: For projects which qualify as categorical exclusion status (under 23 CFR 771.117(c), exempt under 40 CFR 93.126, or which have no meaningful potential MSAT effects because of no meaningful impacts on traffic volumes or vehicle mix.
- Qualitative analysis: For projects that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions.
- Quantitative analysis: For projects which alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location or those which create new or add significant capacity to urban highways where traffic volume is projected to be in the range of 140,000 to 150,000 annual average daily traffic (AADT) or greater by the design year.

The following qualitative analysis is consistent with ODOT's *Technical Guidance for Analysis of Mobile Source Air Toxics*, dated August 1, 2006 and ODOT's MSAT Analysis Flowchart, dated December 15, 2010, and in accordance with the FHWA interim guidance.

For any of the Build Alternatives, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each Build Alternative. Because the VMT estimated for the No-Build Alternative is higher than for any of the Build Alternatives, higher levels of MSAT are not expected from any of the Build Alternatives compared to the No-Build. Currently, vehicles traveling between Brilliant and Wellsburg are required to complete an indirect, one-way 20-mile route. The Build Alternatives between Brilliant and Wellsburg provide a direct connection between the two communities and eliminates the out-of-direction travel required under existing conditions, thereby reducing the VMT as compared to the No-Build Alternative. In addition, because the estimated VMT under each of the Build Alternatives is the same, it is expected there

would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72% from 1999 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Under each alternative there may be localized areas where VMT would increase and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely be most pronounced in the areas where the Build Alternative connects to WV 2 and OH 7 and along WV 2 and OH 7. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

On October 31, 2011, ODOT initiated coordination with OEPA for MSATs. The coorresondence requested review and comment on the qualitative anlaysis and indicates this project meets the criteria for “Low Potential MSAT Effects”. On December 2, 2011, OEPA responded with no comments and concurred this is a project with low potential MSAT effects.

Construction-Related Particulate Matter

Demolition and construction activities can result in short-term increases in fugitive dust and equipment-related particulate emissions in and around the study area. (Equipment-related particulate emissions can be minimized if the equipment is well maintained). The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, on-site movement of equipment and transportation of materials. The potential is greatest during dry periods, periods of intense construction activity and during high wind conditions. The potential air quality impacts will be short-term, occurring only while demolition and construction work is in progress and local conditions are appropriate.

Mitigation

West Virginia and Ohio

With the application of appropriate measures to limit dust emissions during construction, none of the Build Alternatives will cause any significant, short-term particulate matter air quality impacts. Adherence to dust control measures in the

WVDOH Standard Specifications Roads and Bridges and the Ohio Construction and Material Specifications will help minimize the effects of construction on air quality.

3.3.15. Noise Impacts

A detailed traffic noise analysis was conducted in accordance with 23 CFR 772, *FHWA Highway Traffic Noise: Analysis and Abatement Guidance* (2010). This analysis also used the *ODOT Standard Noise Procedure for Analysis of Highway Traffic Noise,* dated April 26, 2011 as a general guidance. The study specifically used the ODOT criteria for establishing noise impacts to the project.

The FHWA established guidelines defining noise abatement criteria (NAC) as shown in Table 3-35. These criteria are set forth in 23 CFR 772. According to this regulation, noise abatement measures are considered if one of the following criteria are met:

- The design year predicted noise levels approach or exceed the noise abatement criteria.
- The design year predicted noise levels substantially exceed the existing noise levels.

FHWA allows the State Highway Authority (SHA) to establish the definition of "approach" and "substantially exceed". Both WVDOH and ODOT Noise Analysis and Abatement Guidelines were used in the traffic noise analysis for this project. Noise levels of 1 dBA below FHWA's NAC are considered as approaching noise impacts (66 dBA for residential use and 71 dBA for commercial use) and greater than 10 dBA as a substantial increase where mitigation measures must be considered.

Table 3-35: FHWA Noise Abatement Criteria (NAC)

Land Use Category	Leq(h)[1] (dBA)	Description of Land Use Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Residential
C	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D[2]	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars and other developed lands, properties or activities not included in A-D or F.
F	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical) and warehousing.
G	---	Undeveloped lands that are not permitted.

Note 1: Leq(h) – The hourly value of Leq. Leq is the equivalent steady-state sound level, which in a stated period of time contains the same acoustical energy as the time-varying sound level during the same period. For purposes of measuring or predicting noise levels, a receptor is assumed to be at ear height, located five feet above ground surface. (FHWA, 2010)
Note 2: Use of interior noise levels shall be limited to situations where exterior noise levels are not applicable, i.e., where there are no exterior activities to be affected by traffic noise, or where exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities.

Traffic noise abatement measures must be considered when the FHWA NAC are approached, met, or exceeded. Noise abatement measures must be designed to be reasonable and feasible. Some of the mitigation measures to be considered are:

- Traffic management measures.
- Alteration of horizontal and vertical alignments.
- Acquisition of property rights for construction of noise barriers.
- Construction of noise barriers.
- Acquisition of undeveloped land for buffer zones.
- Noise insulation of Activity Category D land use facilities.

These measures were evaluated and it was determined noise barriers are the most practical noise abatement option as they are cost-effective and generally they could be built along the roadway within the existing right-of-way. Noise barriers are constructed only if they are effective in reducing traffic noise, feasible and reasonable. Some of the criteria used include:

- Feasibility – This generally deals with considering whether it is possible to build an abatement measure given site constraints and whether the abatement measure provides a minimum reduction in noise level.
  - An acoustically feasible barrier must reduce the traffic noise level by at least 7dBA at one location.
  - The barrier must meet the requirements of safety in accordance with state policies and procedures.
  - Feasibility factors should be considered like barrier height, topography, drainage, utilities, maintenance of abatement measures, maintenance of adjacent properties and access to adjacent properties.
  - Every possible attempt should be made to substantially reduce the traffic noise at all impacted receptors. Generally, these are the first row impacted receptors.
- Reasonableness – This is a more subjective criterion than feasibility. This implies that a good judgment is applied in arriving at a decision.
  - Total cost of the noise barrier should not exceed $35,000 per benefited residence. The estimated cost of the noise barrier is based on the $25 per square foot, the standard cost for the construction of noise barriers used in Ohio and West Virginia. A residence is considered benefited if traffic noise levels are reduced by 5 dBA or more as a result of a noise barrier (this may include second row receptors).
  - Adverse Impacts: noise barriers should not have significantly adverse environmental and social-economic impact.
  - Public Support: noise barriers are wanted by most impacted residents.

Data Collection

Existing traffic noise levels were measured at eleven representative locations within the study area in 2009. Four of these locations (O-05, O-06, O-16 and O-20) are within the footprints for Build Alternatives 2, 2B, 8 and 8B as shown in Exhibit 3-6. The levels were measured during the afternoon peak hour periods (4:00 p.m. to 6:00 p.m.) to represent the highest traffic noise levels. These periods provide the best opportunity to identify the highest existing traffic noise level, since they have the highest volume of traffic traveling at free flow speeds. Tuesday through Thursday were selected to perform the noise measurements because peak hour traffic volumes on these days represent the typical weekday traffic conditions. Air humidity, surface

characteristics and wind speeds have an effect on noise levels. Measurements were not taken during certain weather conditions, such as windy and rainy days to avoid inaccurate measurements of traffic noise. Monitored existing noise levels range from 56.5 dBA to 69.0 dBA, A-weighted (dBA).

Existing Noise Model and Calibration

A Traffic Noise Model (TNM) model was developed for the existing conditions using the existing roadway geometry, existing ground topography, traffic speeds, observed traffic volumes and observed vehicle mix. The existing measured noise levels were used to calibrate the traffic noise model. The majority of differences between the measured and modeled existing noise levels were within 3 dBA, which is the smallest change in sound level perceptible to human ears. The locations having more than 3dBA difference were calibrated by inputting terrain lines, ground zones, etc. in order to reduce the difference to 3dBA. Based on the results of the calibration process, the traffic noise model is accurate in predicting the existing traffic noise levels. The existing model was used as a basis for the future models and was updated according to the future 2030 conditions.

Environmental Impacts

West Virginia

Noise sensitive sites were identified within 500 feet from the proposed roadway, as shown in Exhibit 3-6. A total of eight traffic noise receptor locations, all representing the Brooke-Pioneer Trail, were evaluated for this study.

Traffic noise for future conditions was predicted using the calibrated TNM 2.5 model. Table 3-36 summarizes the existing and future traffic noise levels by alternative. As indicated, no sensitive receptors have levels above the NAC for the Existing, No-Build and all Build Alternatives. Since there are no impacts for any of the Build Alternatives, a determination of noise abatement effectiveness and cost analysis is not required.

Table 3-36: Summary of Traffic Noise Levels (dBA), West Virginia

Sensitive Receptor	Type	Noise Abatement Criteria	Existing	No-Build	Build Alternative			
					2	2B	8	8B
WV-1	Section 4(f)	66.0	55.0	55.0	56.0	56.0	56.5	56.0
WV-2	Section 4(f)	66.0	56.5	56.5	58.0	58.0	58.0	57.5
WV-3	Section 4(f)	66.0	57.5	58.0	60.5	60.0	60.0	59.5
WV-4	Section 4(f)	66.0	59.0	59.0	61.0	61.0	60.5	60.0
WV-5	Section 4(f)	66.0	60.0	60.0	61.0	61.0	61.0	61.0
WV-6	Section 4(f)	66.0	60.0	60.0	61.5	61.5	61.5	61.5
WV-7	Section 4(f)	66.0	59.5	59.5	61.0	61.0	61.5	61.0
WV-8	Section 4(f)	66.0	55.0	55.0	60.5	60.0	60.5	60.5

Ohio

Noise sensitive sites were identified within 500 feet from the proposed roadway, as shown in Exhibit 3-6. A total of sixteen traffic noise receptor locations (representing 120 residences, the Wells Township Community Park, Wells Township Pool, Allen Hawkey Courts and a school (track, football, baseball field) were evaluated for this study. Commercial properties were not analyzed because no outdoor areas of frequent human activity could be determined that would benefit from lower noise levels and generally the commercial properties would not desire any noise mitigation as they like to maintain their visibility.

Traffic noise for future conditions was predicted using the calibrated TNM 2.5 model. Table 3-37 summarizes the existing and future traffic noise levels by alternative. As indicated, seven sensitive receptors have levels above the NAC for existing, No-Build and all Build Alternatives.

Table 3-37: Summary of Traffic Noise Levels (dBA), Ohio

Sensitive Receptor	Type	Noise Abatement Criteria	Existing	No-Build	Build Alternative			
					2	2B	8	8B
O-01	Residential	66.0	68.0	68.5	69.0	68.5	69.0	69.0
O-02	Residential	66.0	64.0	64.0	65.5	64.5	65.0	64.0
O-03	Residential	66.0	61.5	62.0	63.5	62.5	64.0	63.0
O-04	Residential	66.0	69.0	70.0	71.5	73.5	75.5	71.0
O-05	Residential	66.0	60.5	61.0	64.5	64.5	65.5	64.5
O-06	Residential	66.0	66.0	67.0	67.0	68.5	71.0	72.5
O-07	Residential	66.0	59.0	60.0	62.0	63.5	64.5	64.5
O-08	Residential	66.0	58.5	59.0	61.0	61.5	62.0	62.0
O-09	Residential	66.0	56.5	58.0	59.0	60.5	61.5	63.0
O-10	Residential	66.0	59.5	61.5	59.0	61.5	59.5	62.5
O-11	Allen Hawkey Courts	66.0	63.0	63.5	63.5	63.5	64.0	64.0
O-12	School Playground	66.0	68.5	68.5	69.0	69.0	69.0	68.5
O-13	Wells Township Community Park	66.0	69.0	69.0	69.5	69.5	69.5	69.0
O-14	Wells Township Community Park	66.0	68.0	68.0	68.5	68.0	68.5	68.0
O-15	Swimming Pool	66.0	67.5	68.0	68.5	68.0	68.5	68.0
O-16	Elementary School	66.0	64.5	65.0	65.5	65.0	65.5	65.0

Note: Highlighted cells indicate that traffic noise impacts are predicted to occur

Noise Abatement Measures and Effectiveness

Traffic noise levels were calculated for each alternative, impacts were evaluated and potential noise barrier locations were determined. Receptors O-04 and O-06 were not analyzed for noise barriers because a continuous effective noise barrier could not be provided due to presence of access roads and driveways.

A total of two noise barriers for each alternative were considered for mitigating predicted traffic noise impacts. For all alternatives both barriers extend along OH 7. Barrier 1 is along the OH 7 SB entrance ramp and Barrier 2 is along OH 7 SB north of the Riddle Run interchange. The noise models were updated with potential noise barriers and traffic noise levels were predicted and analyzed. The noise barriers were evaluated to shield Receptors O-01, O-12, O-13, O-14 and O-15. Tables 3-38 and 3-39 summarize the dimensions and locations of the potential noise barriers for Barrier 1 and Barrier 2, respectively. Exhibit 3-6 illustrates the locations of these noise barriers.

Table 3-38: Potential Noise Barrier 1 Dimensions and Effectiveness

Alternative	Height (feet)	Length (feet)	Maximum Noise Level Reduction	Barrier Effective?
Alternative 2	25	1,000	3.5 dBA	No
Alternative 2B	25	850	5.0 dBA	No
Alternative 8	25	1,000	3.5 dBA	No
Alternative 8B	25	1,100	7.0 dBA	Yes

Table 3-39: Potential Noise Barrier 2 Dimensions and Effectiveness

Alternative	Height (feet)	Length (feet)	Maximum Noise Level Reduction	Barrier Effective?
Alternative 2	12	1,700	9.0 dBA	Yes
Alternative 2B	12	1,700	10.0 dBA	Yes
Alternative 8	12	1,700	9.0 dBA	Yes
Alternative 8B	12	1,700	9.0 dBA	Yes

A noise barrier is considered acoustically feasible if it reduces noise level by at least 7dBA or more at least at one location and at least 5dBA noise reduction for majority of receptors. As shown in Table 3-38, Barrier 1 was unable to provide the minimum noise reduction of 7dBA as required for Build Alternatives 2, 2B and 8; therefore, it is not considered to be feasible for those alternatives. Whereas, Barrier 1 for Build Alternative 8B and Barrier 2 for all Build Alternatives are feasible and effective in traffic noise reduction. Hence, Barrier 1 (Alternative 8B) and Barrier 2 (all alternatives) were considered for reasonableness and a barrier cost analysis was conducted.

Barrier Cost Analysis

In addition to being effective in traffic noise level reduction, barriers must be cost-effective. In accordance with ODOT policy, it was determined that a cost-effective barrier should cost $35,000 or less per benefitted residence. A residence is considered benefitted, if traffic noise levels are reduced by at least 5dBA as a result of a noise barrier. When calculating the cost of potential noise barrier, a unit cost of $25 per square-foot was used, and assumed typical conditions for both the barrier and foundation. As the potential Barrier 2 is proposed over the existing OH 7 structure, additional bridge retrofits may be necessary for the barrier construction. Therefore, an additional $400 per linear foot is assumed for upgrading the existing structure to accommodate the barrier wall. Also, a portion of Barrier 2 is located on a 2:1 slope which will require additional embedment depth for the drilled shaft foundation. Therefore, an additional $350 per linear foot is assumed for the 600-foot portion of the barrier which is on a 2:1 slope.

For calculating benefited receptors, equivalent residential receptors at a school (O-12, O-16) and Wells Township Community park (O-13, O-14 and O-15) were calculated in accordance with ODOT policy. Tables 3-40 and 3-41 present the Barrier Cost Analysis summary for Barriers 1 and 2, respectively.

The cost per benefited receptor for both Barriers is greater than the minimum limit of $35,000 per benefited receptor. Therefore, Noise Barrier 1 for Build Alternative 8B and Noise Barrier 2 for all Build Alternatives along OH 7 are not reasonable based on the cost per benefitted receptor.

Table 3-40: Barrier Cost Analysis for Barrier 1

	Barrier Area (ft^2)	Structure Retrofit Cost	Foundation Cost	Total Cost	Benefitted Receptor	Cost per Benefited Receptor	Barrier Cost-Effectiveness
Alt 8B	27,500	N/A	N/A	$687,500	9	$76,400	No

Table 3-41: Barrier Cost Analysis for Barrier 2

	Barrier Area (ft^2)	Structure Retrofit Cost	Foundation Cost	Total Cost	Benefitted Receptor	Cost per Benefited Receptor	Barrier Cost-Effectiveness
Alt 2	20,400	$240,000	$210,000	$960,000	27	$35,600	No
Alt 2B	20,400	$240,000	$210,000	$960,000	27	$35,600	No
Alt 8	20,400	$240,000	$210,000	$960,000	27	$35,600	No
Alt 8B	20,400	$240,000	$210,000	$960,000	27	$35,600	No

Seven noise receptors (O-1, O-4, O-6, O-12, O-13, O-14 and O-15) for all Alternatives were found to approach or exceed the FHWA NAC. Two barriers were evaluated as noise mitigation options. Barrier 1 was along SB OH 7 Entrance Ramp

and Barrier 2 was along SB OH 7 before the Riddles Run interchange. Barrier 1 (for Build Alternatives 2, 8 and 8B) was neither feasible nor reasonable. Whereas, Barrier 1 for Build Alternative 8B) and Barrier 2 for all Build Alternatives were feasible but not reasonable based on the cost-analysis.

On December 27, 2011, ODOT concured that noise barriers were not found to be feasible and reasonable, and no further action was required. See correspondence in Appendix A.

Mitigation

West Virginia
No mitigation is required.

Ohio
Since noise barriers are not considered reasonable or feasible, no further mitigation requirements are recommended.

3.3.16. Cumulative and Secondary Impacts

Cumulative Impacts
The Council of Environmental Quality (CEQ) defines cumulative impacts as those "impacts on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions" (40 CFR 1508.7). These impacts are ones, when considered in conjunction with other foreseeable projects, which result in a combined effect greater than individual impacts.

There have been some preliminary studies conducted for potential port locations along the Ohio River from Chester to New Martinsville in West Virginia. The new proposed bridge may have a role in site location for the ports. Also, the WV 2/I-68 Authority is advocating to extend I-68 to WV 2 and to widen WV 2 to a four-lane facility along the Ohio River.

As referenced in the Purpose and Need, the three bridges in the Steubenville/Weirton area are either scheduled for closure or improvement. The Fort Steuben Bridge was recently demolished in February 2012. The Market Street is beyond its design life, has weight restrictions and future maintenance is limited. A new bridge connecting Steubenville to West Virginia near Washington Street is under consideration, but is listed as a lower priority than this project. ODOT is also considering access improvements for the Veterans Memorial Bridge, including a possible realignment of OH 7 and its intersection with University Avenue and the bridge ramps. WVDOH has recently made access improvements for this bridge.

The cumulative impacts of these projects along with the proposed bridge will provide greater benefits than any project individually. In combination, these projects will improve the regional connectivity and will reduce travel times considerably. These improvements will attract more businesses to the area and will help improve the economic growth of the region.

No substantial cumulative impacts have been identified. Therefore, no mitigation is required.

Secondary Impacts

According to the Council of Environmental Quality (CEQ), the guidelines for implementing the National Environmental Protection Act (NEPA) defines secondary impacts as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8). These project induced impacts include various impacts, such as alteration in land use, changes in population growth pattern, economic development, water quality and changes in other natural resources.

The new Ohio River Bridge would be key in solving the regional transportation issues by providing better access and reducing travel time throughout the region. Generally, improved access compliments the existing developments and assists in additional growth. There has been an overall population decline in and around the study area. The population of Brooke County and Jefferson County has been declining over the past 20 years and is expected to continue declining into 2030. It is projected that the population in the BHJ region may decline by 18% by 2030. Considering the Market Street Bridge and the Fort Steuben Bridge would both be out of service by the year 2030, the new Ohio River Bridge has the potential to slow or reverse the declining population trend in both Brooke and Jefferson Counties.

In the past years, the industrial developments along the river have provided employment opportunities for both states. Currently there are very limited opportunities to travel between the two states, with the majority of travel being north south movements along the river.

It is estimated that there will be a 12.8% decline in employment from 2000 to 2030. With the construction of this new bridge the inter-state travel would become more efficient and economical and may help in the expansion and diversification of business along the river. Additionally, the new bridge may facilitate new development in Wellsburg and Brilliant, in turn creating more jobs and enhancing regional economic growth.

With the improved access between WV 2 and OH 7, the area will be more attractive to businesses. There are various underutilized regional development sites to the

north and south of study area. Although there is ample opportunity for land development at these sites, over the past few decades, there has been very little development. This new bridge will connect these small communities and may help restore stability in the region and encourage economic and population growth in the area. The Build Alternatives may facilitate a faster build-out of Wellsburg and Brilliant areas than the No-Build Alternative. It is anticipated that the economic benefits related to employment and tax revenues will also occur faster in the Build Alternatives than the No-Build Alternative. The rate at which these areas develop for commercial use may stimulate and sustain economic development.

Secondary impacts from re-suspended riverbed sediment may include sediment deposition on fish spawning areas, floodplains and wetlands. The permanent placement of the bridge will contribute to increased run-off from the bridge deck and associated causeways and the potential for spills of hazardous materials during transportation. Long-term water quality impacts associated with run-off are anticipated to be minimal, especially since the river is no longer receiving run-off from the Fort Steuben Bridge that was recently closed.

No significant secondary impacts are anticipated; therefore, no mitigation is required.

3.4. Temporary Construction Impacts

Environmental Impacts

Ohio River

Phase 1 will include the construction of the river piers and structure. Because the majority of the work in this phase will be performed in the river or along the river, little to no disruption to WV 2 or OH 7 is anticipated. There may be some minor disruptions as materials, such as concrete or beams, are delivered to the project site and staging areas. In this event, the use of flaggers will control traffic through the project. Construction of piers, cofferdams or any other structures in the river will be done in accordance with direction provided by the USCG.

West Virginia

Construction of the proposed WV 2 with the proposed intersection will include a significant amount of earthwork to widen the roadway to a four-lane with auxiliary lanes typical section and bench the hillside. Temporary closures are anticipated while the contractor performs earthwork operations. No detours are expected.

To maintain the safety for users of the Brooke-Pioneer Trail, temporary closures of the trail will be required during earthwork and overhead beam construction. As determined in the Section 4(f) de minimis Impact Analysis, the trail will be closed during construction.

Ohio

Construction of the 3rd Street with proposed intersection will require shoulder and/or lane closures as the intersections and proposed turn lanes are constructed. All Build Alternatives will have similar impacts for the structures to be placed over OH 7 and the railroads. Build Alternatives 2B and 8B will have the most impacts to OH 7 due to the proposed interchange construction and will likely require closure of the outside lane for an extended period of time while the interchange ramps and constructed and the existing Riddle Run interchange ramps are removed. Crossovers on OH 7 would also be necessary during OH 7 bridge reconstruction.

The No-Build Alternative will not have temporary construction impacts. All Build Alternatives will have similar construction impacts for work performed in the Ohio River, along WV 2, over the Brooke-Pioneer Trail, over OH 7 and over the Norfolk Southern Railroad and Wheeling & Lake Erie Railway. The construction impacts for OH 7 will vary by alternative. Build Alternatives 2 and 8 will have the least amount of impacts to OH 7 since there will be no work directly on OH 7.

Mitigation

West Virginia and Ohio

During construction, traffic control will be maintained according to the Manual on Uniform Traffic Control Devices (MUTCD), the WVDOT Manual on Temporary Traffic Control for Streets and Highways and the Ohio Manual of Uniform Traffic Control Devices (OMUTCD), along with all restrictions and requirements described in permits obtained from regulatory agencies. As per the General Bridge Act of 1946 (33 U.S.C. 525-533), as amended, a USCG Bridge Permit will be required for all construction, maintenance and operations of bridges over the navigable waters of the United States.

Pedestrian traffic control along the Brooke-Pioneer Trail will be in accordance with all Section 4(f) provisions.

3.5. Capacity Analyses

In June 2009, the Traffic Study for the Proposed Ohio River Bridge crossing was completed. In April 2011, Addendum #1 to that Traffic Study was submitted. In those documents, capacity analyses were performed for the ramp merge/diverge areas, ramp termini intersections and other proposed intersections for 2012 and 2030 No-Build and Build scenarios to evaluate the existing and future operations of the study area. Highway Capacity Software (HCS+T7F), Version 5.4, was used to determine the level of service (LOS) for the design hour volumes (DHVs).

Environmental Impacts

West Virginia

No-Build

As shown in Table 3-42, the No-Build Alternative will not impact the operations of WV 2 in the study area.

Build Alternatives 2, 2B, 8 and 8B

Due to the similarities of their design and layout, all Build Alternatives have the same projected operations as shown in Table 3-42.

Table 3-42: Intersection Levels of Service, West Virginia

Intersection	No-Build		Build Alternatives 2, 2B, 8 and 8B	
	2012	2030	2012	2030
WV 2 with CR 67	A	A	A	A
WV 2 with Proposed Bridge	-	-	B	B

Ohio

No-Build

As shown in Table 3-43, all existing intersections in the study area are expected to operate at LOS C or better for the 2012 and 2030 No-Build scenarios. The ramp merge and diverge areas for the existing interchanges in Brilliant are expected to operate at LOS A for the 2012 and 2030 No-Build scenarios as shown in Table 3-44.

Build Alternatives

Due to the similarities of their design and layout, Build Alternatives 2 and 8 were analyzed together, as were Build Alternatives 2B and 8B. Tables 3-43 and 3-44 provide the intersection and merge/diverge area operations for each alternative, respectively.

Alternatives 2 and 8

In Build Alternatives 2 and 8, the proposed bridge connects to 3rd Street at a proposed intersection with Clark Way and Cleaver Street, respectively. These intersections, along with all other existing intersections are expected to operate at a LOS C or better in the 2012 and 2030 Build scenarios. As shown in Table 3-44, all merge/diverge areas at the existing interchanges are projected to operate at LOS A for the 2012 and 2030 Build Alternatives 2 and 8 scenarios.

Alternatives 2B and 8B

The 3rd Street with proposed bridge intersection differs between Build Alternatives 2B and 8B. The new intersection on 3rd Street is at Clark Way for Build Alternative 2B and one block north at Cleaver Street for Build Alternative 8B. As shown in Table 3-43 the

proposed bridge with 3rd Street and Clark Way intersection is anticipated to operate at LOS B in 2012 and 2030 for Build Alternatives 2B. The proposed bridge with 3rd Street and Cleaver Street intersection is anticipated to operate at LOS B in 2012 and LOS C in 2030 for Build Alternative 8B.

Build Alternatives 2B and 8B are very similar in design and therefore, the analyses for these Build Alternatives have been combined for the proposed ramp merge/diverge areas and ramp termini intersections. The proposed bridge with the OH 7 NB Ramp termini and OH 7 SB Ramp termini are expected to operate at LOS B for 2012 and 2030. The operations at these intersections were analyzed for three options. In each option, the lane configurations were varied to allow for exclusive turn lanes or shared left-thru lanes while maintaining the 60 foot typical section. Based on the analysis, the intersections operated at LOS B regardless of lane configuration. The options tested are summarized below:

- Option One provides two thru lanes in each direction at the interchange with left-turn lanes for the EB and WB movements. This option provides a protected left-turn phase but as a result of the added turn lanes, it also decreases the width of the lanes to 11 feet between the ramp termini intersections.
- Option Two provides two lanes in each direction across the bridge as well; however the left-turn movement is shared with the thru.
- Option Three reduces the typical section to three lanes with wide shoulders between the two ramp termini intersections. This eliminates the shared lane, but also reduces the thru lanes on the bridge to one. In addition, the thru movement across the bridge will have an offset of up to 6 feet.

As shown in Table 3-44, all evaluated merge/diverge areas for the proposed interchange for Build Alternatives 2B and 8B are projected to operate at LOS A.

Table 3-43: Intersection Levels of Service, Ohio

Intersection	No-Build		Build Alternatives			
			2 and 8		2B and 8B	
	2012	2030	2012	2012	2012	2030
Riddles Run Interchange						
3rd Street with OH 7 SB Ramps	B[1]	B[1]	B	B	-	-
3rd Street with OH 7 NB Entrance Ramp[1]	-	-	A	A	-	-
3rd Street with OH 7 NB Exit Ramp[1]	C	C	B	C	-	-
3rd Street with Proposed Bridge (2B/8B)	-	-	B	C	B/B	B/C
Proposed Interchange						
SR 7 NB Ramps with Proposed Bridge	-	-	-	-	B	B
SR 7 SB Ramps with Proposed Bridge	-	-	-	-	B	B

Note 1: Intersection is unsignalized; LOS is for stop-controlled approach

Table 3-44: Ramp Merge/Diverge Levels of Service, Ohio

Merge/Diverge Area	No-Build		Build Alternatives			
			2B and 8B		2 and 8	
	2012	2030	2012	2030	2012	2030
OH 7 and Brilliant SB Ramps Interchange (Northern Interchange)						
SR 7 SB Exit Ramp	A	A	A	A	A	A
SR 7 SB Entrance Ramp	A	A	A	A	A	A
OH 7 and Riddles Run Interchange (Southern Interchange)						
SR 7 SB Exit Ramp	A	A	-	-	A	A
SR 7 SB Entrance Ramp	A	A	-	-	A	A
SR 7 NB Exit Ramp	A	A	-	-	A	A
SR 7 NB Entrance Ramp	A	A	-	-	A	A
Proposed OH 7 Interchange (Alts 2B and 8B Only)						
SR 7 SB Exit Ramp	-	-	A	A	-	-
SR 7 SB Entrance Ramp	-	-	A	A	-	-
SR 7 NB Exit Ramp	-	-	A	A	-	-
SR 7 NB Entrance Ramp	-	-	A	A	-	-

The No-Build Alternative will have no immediate impacts to the existing roadway system capacity. However, the deterioration and eventual closing of the Market Street Bridge, along with the demolition of the Fort Steuben Bridge could cause increased traffic to the US 22 Veterans Memorial Bridge and the associated US 22/OH 7/University Boulevard intersections. Currently, BHJ is anticipating renovations be done to these intersections to help future capacity. If the proposed modifications to these intersections are not completed, the additional traffic could cause negative impacts to the system in that area.

Mitigation

West Virginia and Ohio

The proposed intersections will be studied further during final design and designed according to the ODOT's Location & Design Manual, Volume 1 in Ohio and the appropriate Design Directives in West Virginia. This will include the design of lane configurations, taper rates and storage lengths.

3.6. Environmental Commitments

A summary of the environmental commitments for the Proposed Ohio River Bridge project are listed in Table 3-45.

Table 3-45: Summary of Environmental Commitments

Environmental Resource		Environmental Mitigation and Commitment
Socioeconomic	**Demographics**	No mitigation required.
	Environmental Justice	No mitigation required.
	Right-of-Way and Displacements	West Virginia and Ohio: All acquisitions and displacements will follow the Uniform Relocation Assistance and Real Property Acquision Policies Act of 1970, WVDOT, and ODOT policies, and applicable West Virginia and Ohio laws.
	Community Facilities and Services	No mitigation required.
	Community Cohesion	No mitigation required.
	Changes in Travel Patterns	West Virginia and Ohio: Need for turn lanes, signalization, and other improvements to enhance operations will be evaluated during design phase.
	Land Use	No mitigation required.
Cultural Resource	**Archaeological Resources**	West Virginia: Preparation of a Phase 1B report and additional surveys and reports, if required. Ohio: No mitigation required.
	Historic Resources	No mitigation required.
	Publicly Owned Land/Section 4(f) Properties	West Virginia: Commitments as agreed to within the approved Section 4(f) de minimis finding. Ohio: No mitigation required.
Natural Environment	**Floodplain Encroachment**	West Virginia and Ohio: An Erosion and Sedimatation Control Plan and detailed hydraulic analysis will be prepared during the design phase. Construction within the floodplains will be coordinated with and permits submitted to the USACE, local Floodplain Managers, and state resource agencies, as required.

Environmental Resource		Environmental Mitigation and Commitment
	Wetlands and Stream Impacts	West Virginia and Ohio: A Wetland Delineation Report will be prepared during the design phase to determine specific impacts associated with the proposed project. Wetland impacts will be mitigated prior to completion of the project. Selection and design of the mitigation will be coordinated with the USACE Huntington District as the lead agency and the following cooperating agencies: WVDOT and ODOT, the WVDNR and ODNR and WVDEP and OEPA, as part of the Section 404 permitting process.
	Water Quality	West Virginia and Ohio: A USACE Section 404 permit and Section 401 Water Quality Certification will be prepared. Best management practices (BMPs) will be incorporated into the design to reduce the potential to surface water impacts.
	Wild and Scenic Rivers	No mitigation required.
	Natural and Wild Areas	No mitigation required.
	Vegetation and Wildlife	*Landcover Types and Vegetation* West Virginia and Ohio: Distrubed areas will be re-vegetated after construction. *Wildlife* West Virginia and Ohio: An Erosion and Sedimatation Control Plan will be prepared during the design phase to minimize species impacts. Distrubed areas will be re-vegetated after construction to reintroduce habitat.
	Rare, Threatened and Endangered Species	*Bald Eagle* West Virginia and Ohio: If Bald Eagle habitat is identified during construction, the USF&WS will be notified and applicable mitigation measures established. *Mussels* West Virginia and Ohio: Pollution prevention and stormwater BMPs will

Environmental Resource		Environmental Mitigation and Commitment
		be implemented around the proposed construction areas to limit impacts to water quality and potential mussel habitat in the Ohio River. Additional mussel consultation with both the West Virginia and Ohio USF&WS, WVDNR and ODNR will be conducted prior to construction. *Salamanders* <u>West Virginia:</u> No mitigation required. <u>Ohio:</u> Pollution prevention and stormwater BMPs will be implemented around the proposed construction areas to limit impacts to water quality and potential salamander habitat in the project area. Additional salamander consultation with the USF&WS-Ohio, and ODNR will be conducted prior to construction.
	Prime and Unique Farmland	No mitigtion required.
	Geologic Resources and Mining	<u>West Virginia:</u> A coal valuation will be preformed during right-of-way acquisition. <u>Ohio:</u> No mitigation required.
	Aesthetics	<u>West Virginia and Ohio:</u> Consideration for aesthetic features according to WVDOT and ODOT polices and procedures will be included during the design phase.
	Energy Impacts	No commitments
	Groundwater	<u>West Virginia:</u> An Erosion and Sedimatation Control Plan will be prepared during the design phase to minimize groundwater impacts. BMPs will be incorporated into the design to reduce the potential to groundwater impacts. <u>Ohio:</u> No mitigation required.

Environmental Resource		Environmental Mitigation and Commitment
	Waste Areas	West Virginia: Findings will be reevaluated if the Phase I ESA is more than six months old when property acquisition or construction begins. Contract documents will note that special care should be taken in the event of ground disturbance near the Zatta Property, an existing farm and salvage yard in Wellsburg, West Virginia. Ohio: A Phase II ESA Work Plan and Phase II ESA will be completed for the Zimnox Coal, Steel Valley Tank and Welding, Marathon Gas Station and Southeast Equipment Company if they are within the Preferred Alternative. Based on the results of the Phase II ESA, the appropriate remedial measures will be incorporated into the project plans as necessary.
	Air Quality	No mitigation required.
	Noise Impacts	No mitigation required.
	Cumulative and Secondary Impacts	No mitigation required.
	Temporary Construction Impacts	West Virginia Commitments as agreed to within the approved Section 4(f) de minimis finding. A USCG Bridge Permit will be prepared. Ohio No mitigation required.
	Capacity Analyses	West Virginia and Ohio: Need for turn lanes, signalization, and other improvements to enhance operations will be evaluated during design phase.

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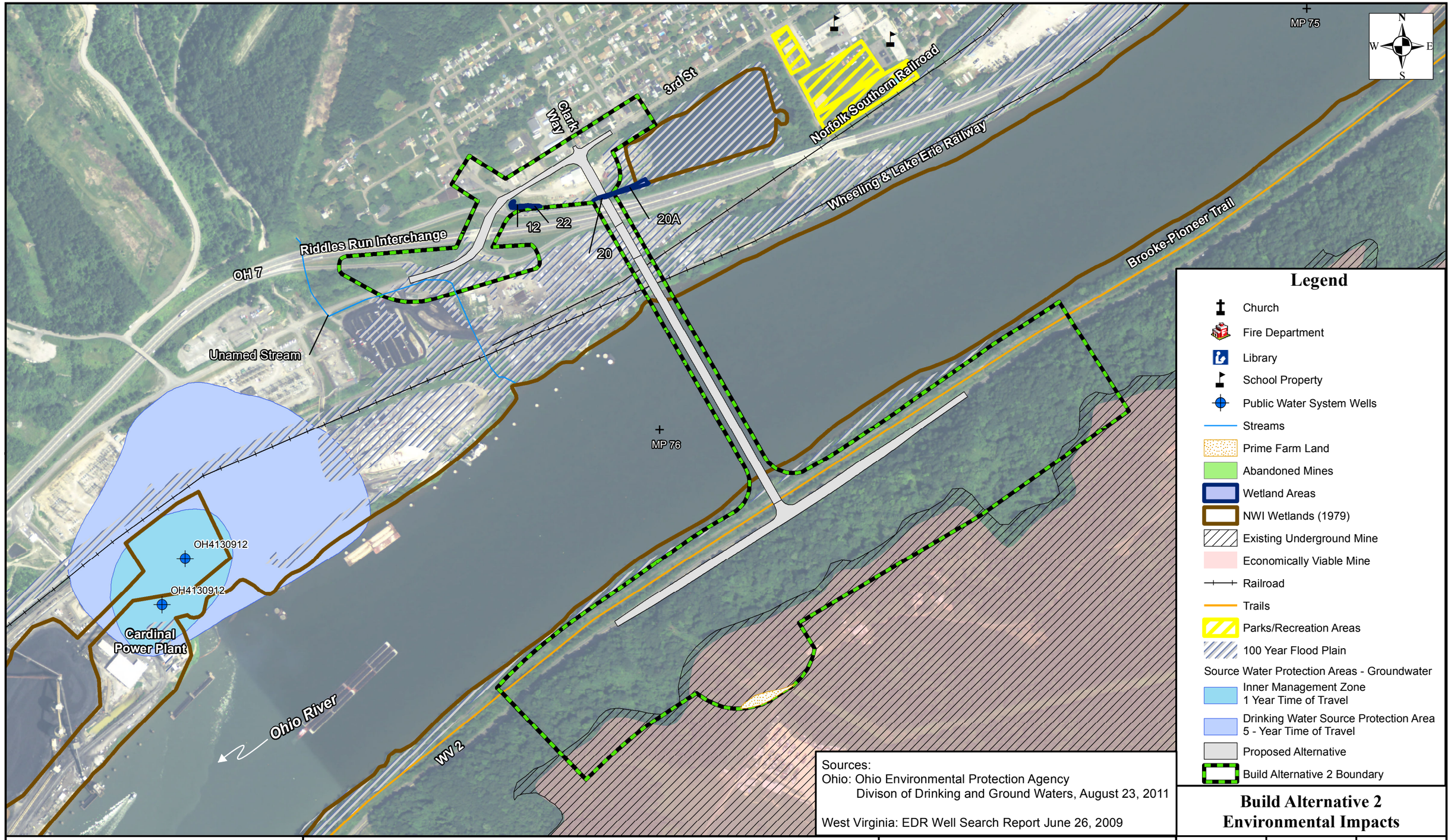

Legend

- Church
- Fire Department
- Library
- School Property
- Public Water System Wells
- Streams
- Prime Farm Land
- Abandoned Mines
- Wetland Areas
- NWI Wetlands (1979)
- Existing Underground Mine
- Economically Viable Mine
- Railroad
- Trails
- Parks/Recreation Areas
- 100 Year Flood Plain

Source Water Protection Areas - Groundwater

- Inner Management Zone 1 Year Time of Travel
- Drinking Water Source Protection Area 5 - Year Time of Travel
- Proposed Alternative
- Build Alternative 2 Boundary

Sources:
Ohio: Ohio Environmental Protection Agency
Divison of Drinking and Ground Waters, August 23, 2011

West Virginia: EDR Well Search Report June 26, 2009

Build Alternative 2 Environmental Impacts

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

Feet
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Job No.	Date	Exhibit
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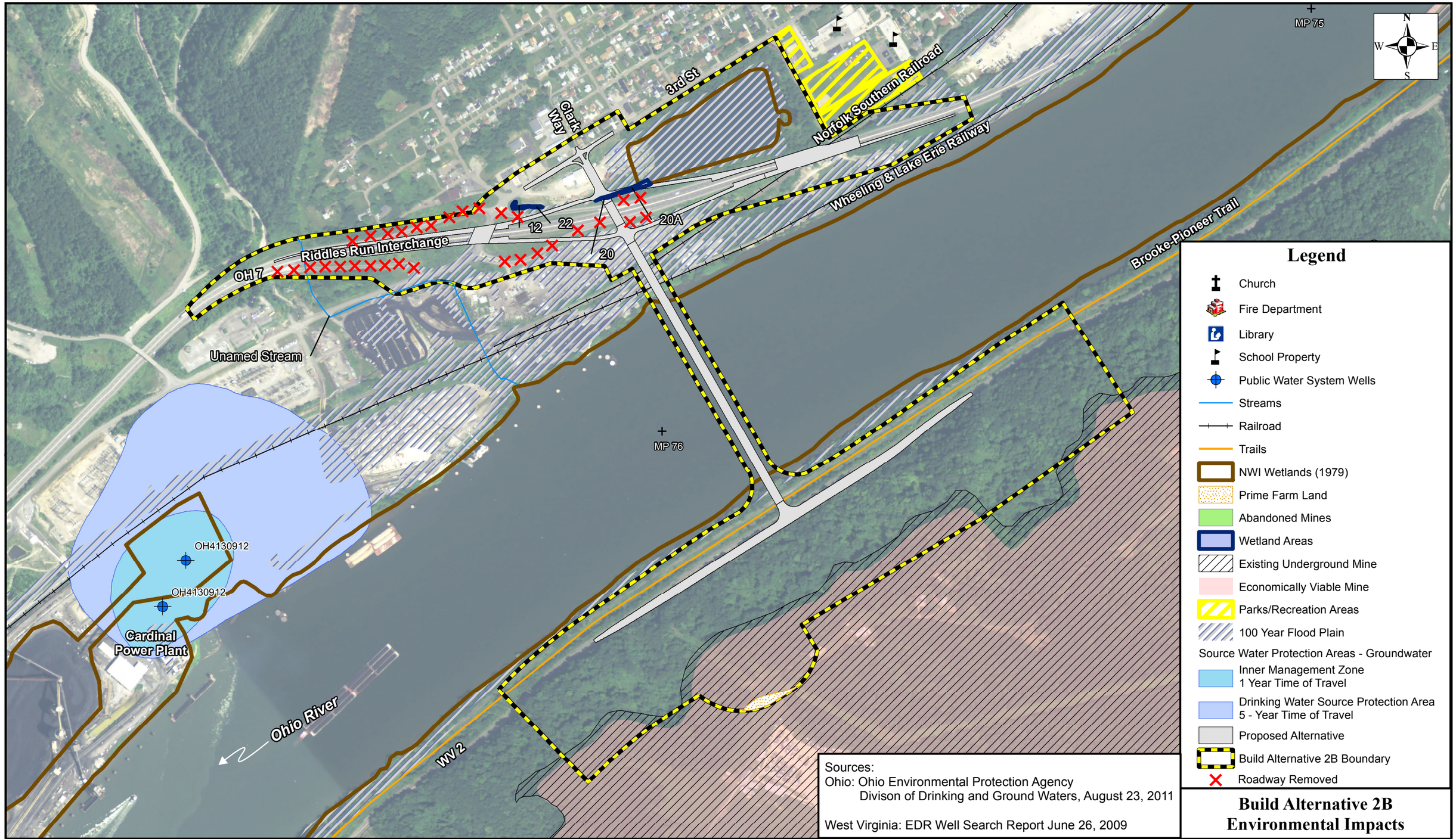

Legend

- Church
- Fire Department
- Library
- School Property
- Public Water System Wells
- Streams
- Railroad
- Trails
- NWI Wetlands (1979)
- Prime Farm Land
- Abandoned Mines
- Wetland Areas
- Existing Underground Mine
- Economically Viable Mine
- Parks/Recreation Areas
- 100 Year Flood Plain

Source Water Protection Areas - Groundwater

- Inner Management Zone 1 Year Time of Travel
- Drinking Water Source Protection Area 5 - Year Time of Travel
- Proposed Alternative
- Build Alternative 2B Boundary
- Roadway Removed

Sources:
Ohio: Ohio Environmental Protection Agency
Divison of Drinking and Ground Waters, August 23, 2011

West Virginia: EDR Well Search Report June 26, 2009

Build Alternative 2B Environmental Impacts

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

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Job No.	Date	Exhibit
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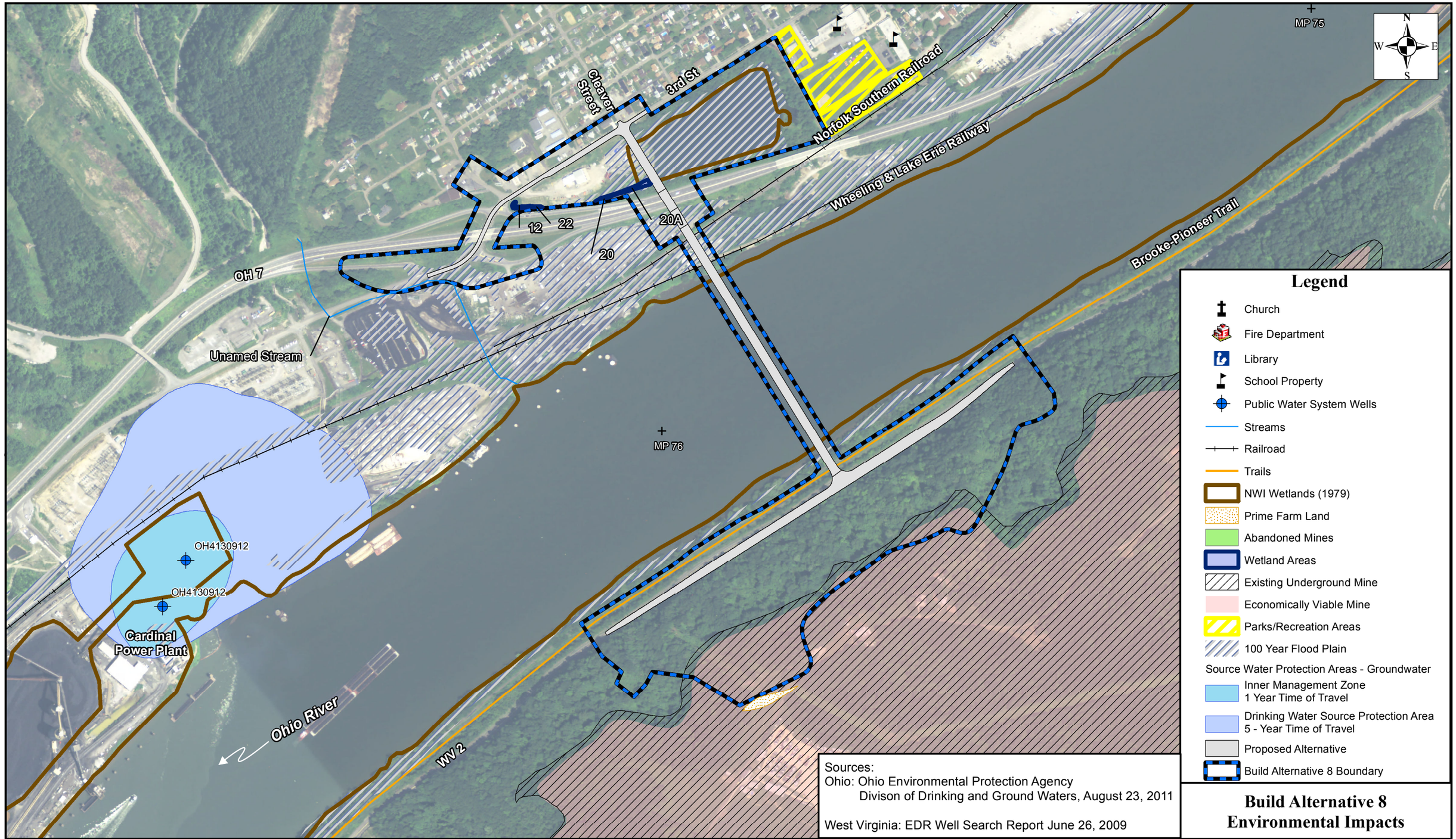

Legend

- Church
- Fire Department
- Library
- School Property
- Public Water System Wells
- Streams
- Railroad
- Trails
- NWI Wetlands (1979)
- Prime Farm Land
- Abandoned Mines
- Wetland Areas
- Existing Underground Mine
- Economically Viable Mine
- Parks/Recreation Areas
- 100 Year Flood Plain

Source Water Protection Areas - Groundwater

- Inner Management Zone 1 Year Time of Travel
- Drinking Water Source Protection Area 5 - Year Time of Travel
- Proposed Alternative
- Build Alternative 8 Boundary

Sources:
Ohio: Ohio Environmental Protection Agency
Divison of Drinking and Ground Waters, August 23, 2011

West Virginia: EDR Well Search Report June 26, 2009

Build Alternative 8 Environmental Impacts

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

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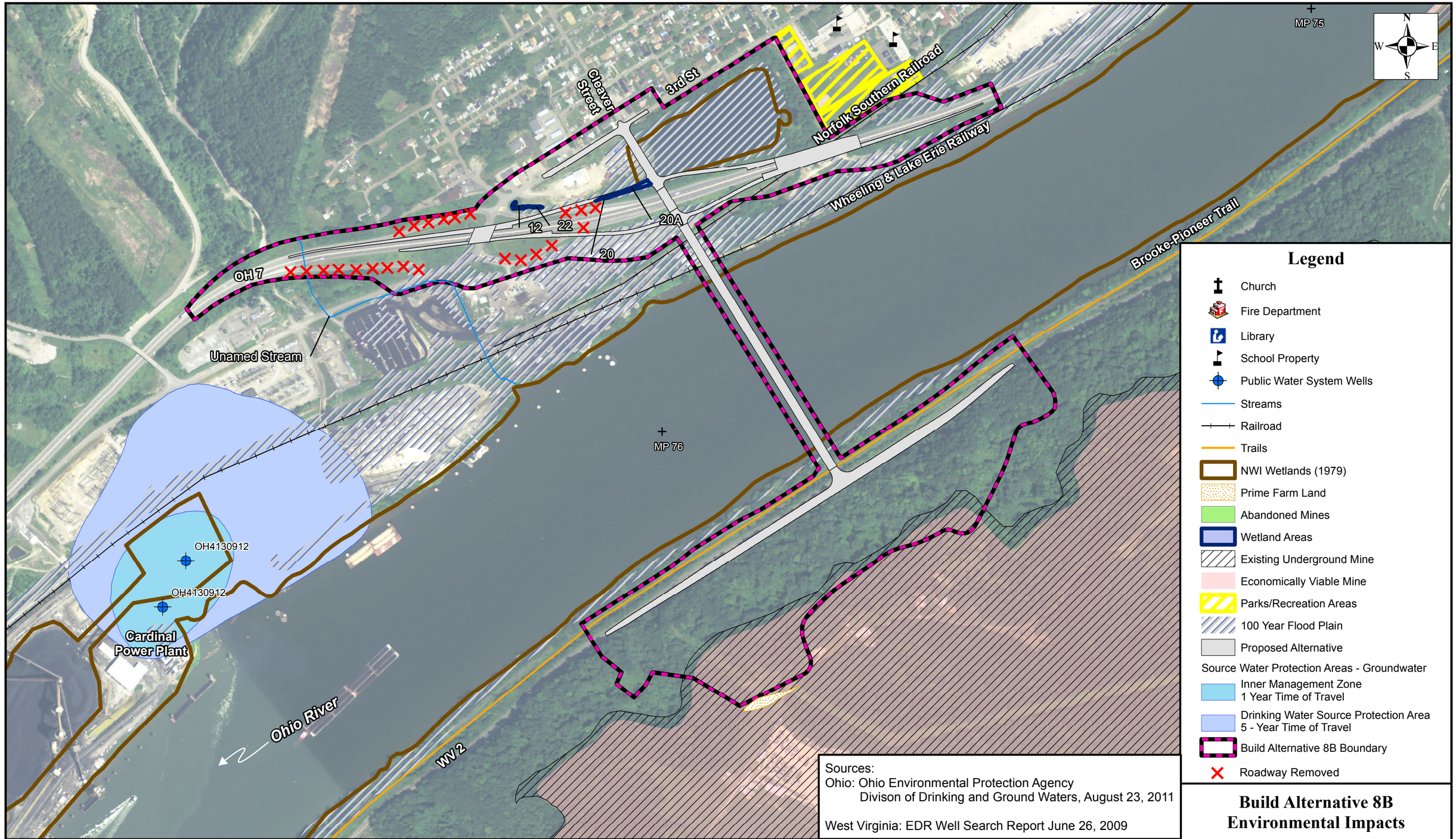

Legend

- Church
- Fire Department
- Library
- School Property
- Public Water System Wells
- Streams
- Railroad
- Trails
- NWI Wetlands (1979)
- Prime Farm Land
- Abandoned Mines
- Wetland Areas
- Existing Underground Mine
- Economically Viable Mine
- Parks/Recreation Areas
- 100 Year Flood Plain
- Proposed Alternative

Source Water Protection Areas - Groundwater

- Inner Management Zone 1 Year Time of Travel
- Drinking Water Source Protection Area 5 - Year Time of Travel
- Build Alternative 8B Boundary
- Roadway Removed

Sources:
Ohio: Ohio Environmental Protection Agency
Divison of Drinking and Ground Waters, August 23, 2011

West Virginia: EDR Well Search Report June 26, 2009

Build Alternative 8B Environmental Impacts

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

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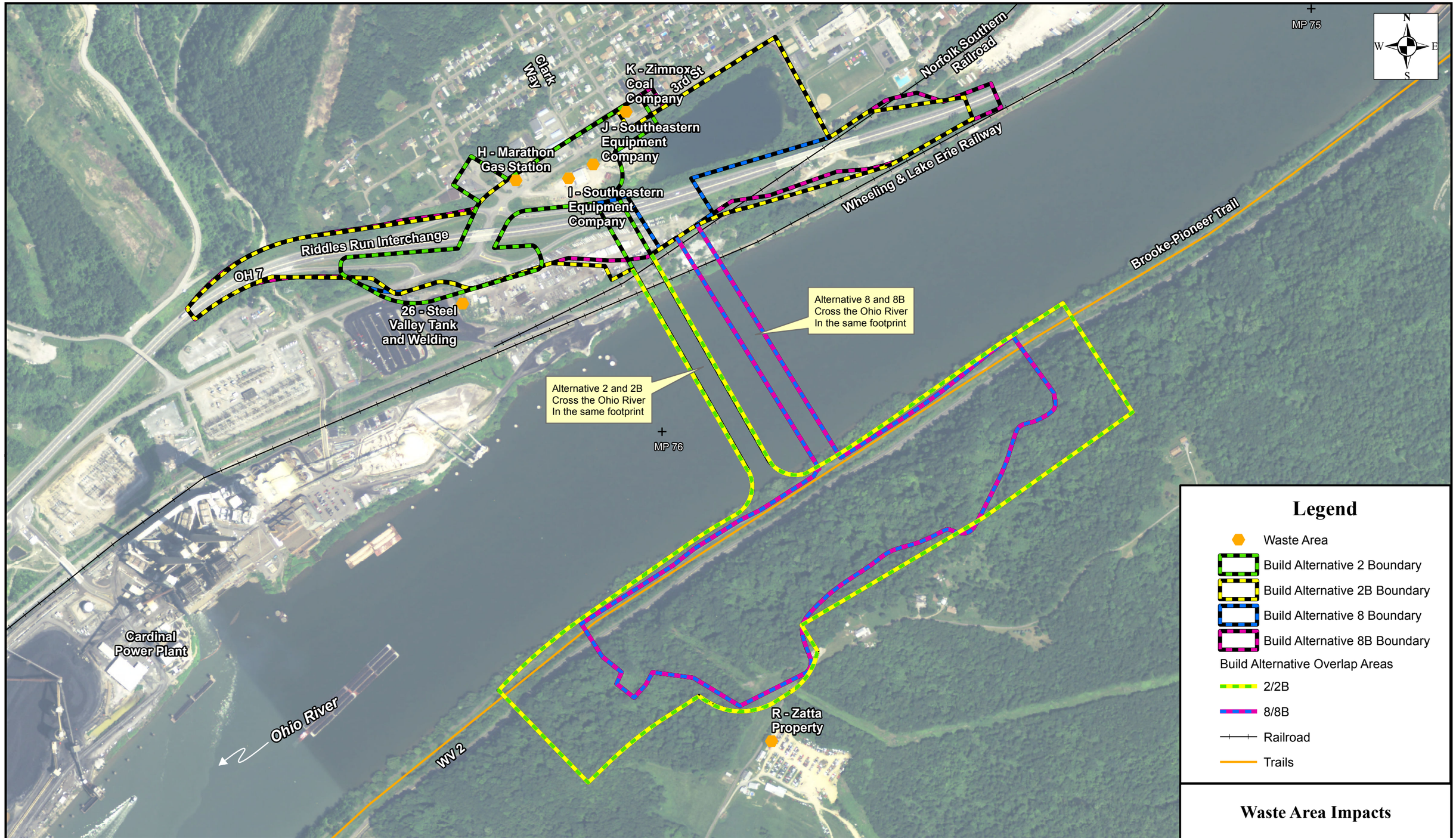

Legend

- Waste Area
- Build Alternative 2 Boundary
- Build Alternative 2B Boundary
- Build Alternative 8 Boundary
- Build Alternative 8B Boundary

Build Alternative Overlap Areas

- 2/2B
- 8/8B
- Railroad
- Trails

Waste Area Impacts

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

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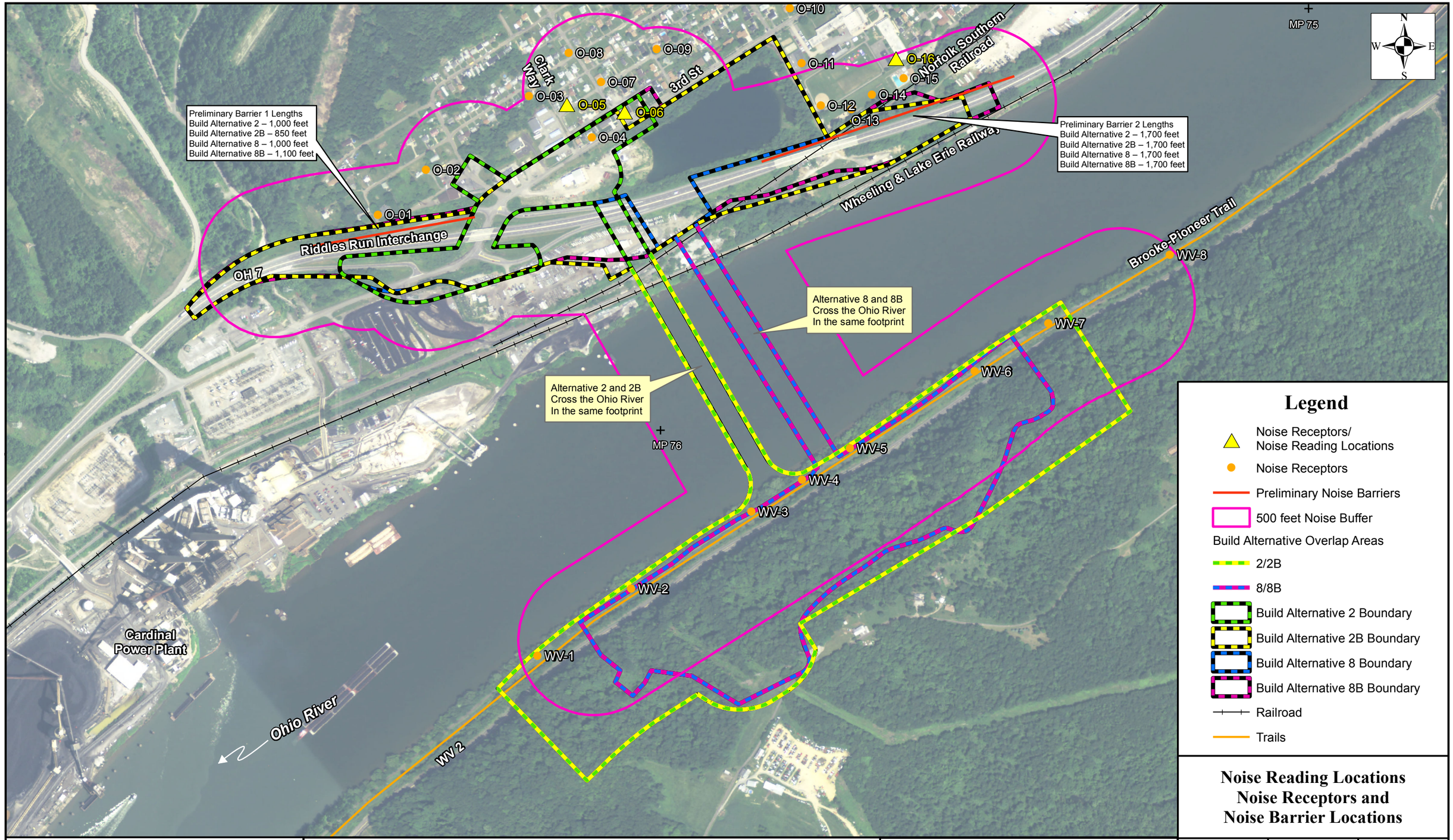

Legend

- Noise Receptors/ Noise Reading Locations
- Noise Receptors
- Preliminary Noise Barriers
- 500 feet Noise Buffer

Build Alternative Overlap Areas

- 2/2B
- 8/8B
- Build Alternative 2 Boundary
- Build Alternative 2B Boundary
- Build Alternative 8 Boundary
- Build Alternative 8B Boundary
- Railroad
- Trails

Noise Reading Locations Noise Receptors and Noise Barrier Locations

PROPOSED OHIO RIVER BRIDGE
BROOKE COUNTY, WV AND JEFFERSON COUNTY, OH

STATE PROJECT: S205-2/23-0.00 00; FEDERAL PROJECT: HPP-0223(003)D; PID:79353

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Job No.	Date	Exhibit
83938	12/20/11	3-6

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