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**Chapter 6**

**Comparison of Alternatives**

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## **6 Comparison of Alternatives**

### **6.1 Comparison of Alternatives**

NEPA (40 CFR 1501) and USFWS guidelines (550 FW 2.6) require that an EIS include a discussion and comparison of the effects of the Proposed Action and alternatives, including reasonable mitigation measures identified during the DEIS development. Section 3 of this DEIS describes the alternatives, and the resource-specific sections of Chapter 5 describe the effects and reasonable minimization, avoidance, and mitigation measures. This chapter compares the impacts of the Proposed Action and alternatives and their potential mitigation measures.

#### **6.1.1 Effects Summary**

Four alternatives were carried forward for analysis in the EIS: the Proposed Action, Alternative A – Maximally Restricted Operations Alternative, Alternative B – Minimally Restricted Operations Alternative, and Alternative C – No Action Alternative. The three action alternatives would all include the full build-out of the Project, with the same number of turbines within the same land area developed. The Alternatives are differentiated from one another by varying levels of operational adjustment that would result in different levels of incidental take of Indiana bats. In addition, the Applicant has identified a possible re-design of the Proposed Action's collection system (Redesign Option) that would allow a more efficient infrastructure resulting in greater ease of construction, but would not result in a higher level of take or significantly change the net effect on the Indiana bat. It is anticipated that the Redesign Option would however result in reduced impacts to migratory birds. The No Action Alternative would result in no effects to the identified resources because the Project would not be built. Table 6.1-1 compares the anticipated impacts of the Proposed Action with Alternatives A-C as defined above and in Chapter 3. Mitigation measures that address some or all of the anticipated impacts are described in Chapter 5 and summarized in Table 6.1-2.

**Table 6.1-1 Comparison of Anticipated Impacts for Each Alternative**

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
<b>5.1 - Geology and Soils</b>	<p>Temporary soil disturbance. Construction activities would be largely limited to surface soil disturbance. Bedrock blasting is not expected to occur. The Project would not impact karst formations or caves.</p> <p>Approximately 220.9 ha (545.8 ac), or 219.9 ha (543.6 ac) for the Redesign Option, of soil would be disturbed during construction.</p> <p>Following restoration, the permanent operating footprint of the Project would be approximately 52.2 ha (128.9 ac), or 52.5 ha (129.8 ac) for the Redesign Option, of built facilities.</p> <p>No impacts to geology and soils will result during operation. Where facilities would be removed, the impacts of decommissioning would be generally equivalent to construction-related impacts.</p>	Same as Proposed Action	Same as Proposed Action	No effect
<b>5.2 - Water Resources</b>	<p>Construction activities could result in localized insignificant impacts to groundwater and minor, temporary impacts on surface water at 32 jurisdictional streams, or 49 streams for the Redesign Option. No direct impacts to wetlands would occur, no turbines would be sited within 15 m (50 ft) of a federal or state jurisdictional wetland, and access roads and buried electrical interconnections would be designed and sited to avoid wetlands.</p> <p>The Applicant intends to apply for approval from the USACE for Nationwide Permits for up to 32 stream crossings for a total of not more than 380.3 linear m (1,248 linear ft) of impact, or 49 crossings for a total of not more than 487 m (1,598 ft) of impact for the Redesign Option. Nationwide Permits are a type of general permit applicable to activities</p>	Same as Proposed Action	Same as Proposed Action	No effect

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
	<p>determined to have minimal impact on surface waters. The Applicant would implement compensatory mitigation for stream impacts if required through the USACE Nationwide Permit process for specific crossings.</p> <p>The 100 turbine array and associated access roads and buried interconnections would require no more than 2.4 ha (5.9 ac) of permanent impact and 9.4 ha (23.3 ac) of temporary impact to the 100-year floodplain.</p> <p>Operational activities would have only minor effects on groundwater and surface water. Decommissioning activities may have localized, temporary impacts on water quality.</p>			
5.3 - Vegetation	<p>The proposed Project would have minor, localized effects on vegetation (primarily active crop fields). Approximately 6.5 ha (16.1 ac) of forest and 11.3 ha (27.9 ac) of CRP land would experience temporary or permanent impacts. For the Redesign Option, 6.8 ha (16.8 ac) of forest and 12.4 ha (30.7 ac) of CRP land would be impacted. Temporary impacts to vegetation would occur within the staging areas, gravel access, and maintenance areas surrounding the turbine towers; the temporarily widened portions of the roads; and areas disturbed to install buried electrical interconnects. There is potential to spread existing invasive species within the Project area and for invasive species to be transported to the Project area via maintenance vehicles or repair materials. Operation of the Project would have minor effects on vegetation. Where facilities would be removed, the impacts of decommissioning would be generally equivalent to construction-related impacts.</p>	Same as Proposed Action	Same as Proposed Action	No effect

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
<b>5.4 - Wildlife and Fisheries</b>	<p>Very minor impacts of incidental injury and mortality and displacement during construction phase. Operational impacts to wildlife are expected to include possible displacement due to the presence of the wind turbines and avian and bat mortality as a result of collisions with the wind turbines. Collision risk would be minimized by implementing the HCP, including use of feathering at various cut-in speeds depending on habitat and season, and ABPP. The impacts of decommissioning would be generally equivalent to construction-related impacts.</p>	<p>Same as Proposed Action; but since turbines would be non-operational from ½ hour before sunset to ½ hour after sunrise, collision risks to bats and night-flying birds would be less than that resulting from the Proposed Action from April 1 through October 31. Collision risk would be minimized by implementing an ABPP.</p>	<p>Same as Proposed Action; but collision risks to bats and night-flying birds would be greater than the Proposed Action because the feathering would only occur from August 1 through October 31 for the first six hours after sunset when wind speeds are 5.0 m/s (11 mph) or less. Collision risk would be minimized by implementing the HCP and ABPP.</p>	<p>No effect</p>
<b>5.5 - Rare, Threatened, and Endangered Species</b>	<p>A minimal amount (6.5 ha [16.0 ac], or 6.8 ha [16.7 ac] for the Redesign Option) of forest habitat loss would occur during construction, but this would occur during the non-roosting season so as to preclude direct effects to Indiana bats.</p> <p>Impact to Indiana bats would occur from collision and/or barotrauma during operation, resulting in the estimated take of 5.2 Indiana bats per year. Potential take would be avoided and minimized to the maximum extent practicable at night when bats are active through the use of feathering at various cut-in speeds depending on habitat and season. Use of adaptive management would result in increased cut-in speeds if there are greater than 5.2 Indiana bat mortalities per year.</p> <p>Other federally or state-listed threatened or endangered species would potentially be affected by the Proposed Action including two aquatic species, one reptile, and six birds.</p> <p>Perennial streams in the Action Area have the potential to support the rayed bean mussel and western tongue-tied minnow. However, no in-</p>	<p>As per the Proposed Action, a minimal amount of habitat loss would occur during construction but this would occur during the non-roosting season so as to preclude direct effects to Indiana bats.</p> <p>Take of Indiana bats would be avoided during operation by restricting operation of all turbines from sunset to sunrise from April 1 through October 31.</p> <p>This alternative would not involve the implementation of the HCP and would thus not result in mitigation or conservation measures provided for in the HCP.</p> <p>Impacts to Rayed bean, western tongue-tied minnow, and eastern massasauga would be the same as the Proposed Action.</p>	<p>As per the Proposed Action and Alternative A, a minimal amount of habitat loss would occur during construction but this would occur during the non-roosting season so as to preclude direct effects to Indiana bats.</p> <p>Impact to Indiana bats would occur from collision and/or barotrauma, resulting in the take of greater than 5.2 Indiana bats per year. Potential take would be minimized by feathering all turbines until a cut-in speed of 5.0 m/s (11 mph) is reached, from August 1 through October 31, for the first six hours after sunset. This corresponds to the times when most turbine-induced bat mortality has been detected at other operational wind facilities.</p> <p>Impacts to Rayed bean, western tongue-tied minnow, and eastern massasauga would be the same as</p>	<p>No effect</p>

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
	<p>water work would occur in Exceptional Warmwater Habitat or Coldwater Habitat streams, crossing locations that are documented or assumed to support rayed bean will avoid in-water work, and the Applicant would adhere to NWP, OEPA WQC, NPDES, and SWPPP conditions (see Section 5.2) for work in streams or adjacent riparian areas. Construction of the 100 turbines would impact approximately 1,248 linear feet of streams (1,598 under the Redesign Option), and could result in increased siltation and sedimentation to aquatic resources down-gradient of the area of disturbance. No impact is expected on rayed bean, and only minor potential impacts are expected to tonguetied minnow.</p> <p>There is only a low potential for the eastern massasauga to occur in the Action Area, and with implementation of minimization and avoidance measures described in Section 5.5.2, the Project is not likely to adversely affect the eastern massasauga.</p> <p>Several state-listed threatened and endangered bird species were observed infrequently within the Action Area – least flycatcher, bald eagle, upland sandpiper, loggerhead shrike, northern harrier, and sandhill crane. Stantec observed the northern harrier and the least flycatcher during their 2008 breeding bird surveys, but did not identify any nests for these species, and the Ohio Breeding Bird Atlas does not have records for any of these species breeding in the proposed Action Area. Only the least flycatcher has a moderate potential to nest in the 6.4 ha (15.8 ac) of deciduous forest that would be removed under the Proposed Action. As tree removal would occur October 1 through April 1, and thus would avoid most of</p>	<p>Impacts to state-listed birds would be similar, though possibly less than the Proposed Action due to the greater operational restrictions under this Alternative.</p>	<p>the Proposed Action. Impacts to state-listed birds would be similar, though possibly greater than the Proposed Action due to the lesser operational restrictions under this Alternative.</p>	

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
	<p>the nesting bird season, Project construction is not expected to have significant impacts on Ohio threatened and endangered bird species. Though State-listed birds were infrequently observed in the Action Area, they could be impacted by operation of the Project. However with implementation of specific avoidance and minimization measures within the ABPP, operation related impacts would be minor.</p> <p>Decommissioning impacts on all Federal and State endangered and threatened species are anticipated to be minor.</p>			
<p><b>5.6 - Cultural and Historic Resources</b></p>	<p>There is one archaeological site in the Project Area that is potentially eligible for NRHP listing that has been identified to date. The Applicant has committed to avoiding this site, and any other potentially eligible NRHP site(s) identified in future field studies during construction or decommissioning.</p> <p>A mound was identified within the Action Area, but it would not be affected by the construction or decommissioning of the Project and the Piqua Shawnee Tribe confirmed that the Tribe supports the Project and has no concerns regarding the sanctity of the mound.</p> <p>The 1,475 historic properties identified within the visual APE would be impacted for the operational life of the Project. Any impacts on historic structures during the construction phase are considered temporary. A mitigation plan and memorandum of agreement are in development with consultation from OHPO to address impacts to historic properties.</p>	<p>Same as Proposed Action</p>	<p>Same as Proposed Action</p>	<p>No effect</p>

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
<b>5.7 - Land Use and Recreation</b>	<p>Temporary risk of soil erosion and loss of soil productivity, as well as some damage to existing crops, fences, gates, and subsurface tile drains may result from construction and decommissioning activities. Landowners may experience a temporary or permanent loss of use in areas during the construction and operation. Approximately 42.0 ha (103.9 ac) of agricultural land would be permanently impacted. Visual impacts and temporary moderate construction noise impacts may occur at recreational areas within 1.6 km (1 mi) of the facility.</p>	Same as Proposed Action	Same as Proposed Action	No effect
<b>5.8 - Visual Resources</b>	<p>Short term visual disturbances associated with construction and decommissioning may occur. A significant direct adverse impact on visual resources may result for some residents within 1.6 km (1 mi) of the nearest turbine, and in sensitive locations such as cemeteries, churches, schools, and sites of historic or cultural significance.</p> <p>As under the Redesign Option more of the 34.5 kV interconnects will be buried underground (86.5 km [53.7 km] with Redesign Option versus 56.7 km [35.2 mi] for the Proposed Action), the adverse impact on visual resources may be slightly higher during construction since the total area of disturbed earth would likely be larger than as for the Proposed Action. However, during operation of the Redesign Option the areas where the underground interconnects were buried would be revegetated, potentially reducing the impact on visual resources for some residents compared to the Proposed Action.</p>	Same as Proposed Action	Same as Proposed Action	No effect

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
<b>5.9 - Socioeconomics and Environmental Justice</b>	No significant impacts on land use categorization or local public services and facilities are expected from construction, operation, or decommissioning. No adverse impacts to minority or low income populations are expected. The construction and operation of the Facility is anticipated to have a moderate positive impact from generation of Alternative Tax revenues to all taxing jurisdictions that host the Facility.	Operations would be restricted from ½ hour before sunset to ½ hour after sunrise between April 1 and October 31, and the Project would therefore produce less energy and generate less revenue than the Proposed Action.	Operation would be restricted less than the proposed action and therefore energy production would be slightly greater than the Proposed Action, increasing the amount of energy generated and therefore the amount of revenue produced.	No effect; no generation of Alternative Tax revenue
<b>5.10 - Noise</b>	Temporary moderate unavoidable impact would result from construction noise at some of the homes in the Project Area. During Project operation the predicted operational Leq sound levels (average case) would not exceed thresholds at any non-participating residence, while the L <sub>90</sub> sound levels (worst case scenario) exceed 34 dBA (the nominal nighttime impact threshold) at numerous residences near the proposed Facility and exceed 40 dBA (the nominal daytime impact threshold) at a few residences.	Same as Proposed Action; but no noise impacts associated with turbine operation from ½ hour before sunset to 1/2 hour after sunrise during the entire period over which Indiana bats are active (April 1 through October 31) as all turbines would be non-operational.	Same as Proposed Action; but no noise impacts from August 1 through October 31 from ½ hour before sunset to ½ hour after sunrise during periods when wind speeds are 5.0 m/s (11 mph) or less as all turbines would be non-operational.	No effect
<b>5.11 - Air Quality</b>	Temporary impacts to air quality from the operation of construction equipment and vehicles; positive moderate impact to the overall air quality in the region due to its potential to offset/displace future emissions from existing power plants	Construction impacts would be the same as the Proposed Action. Alternative A would feather more of the time than the Proposed Action; therefore, less energy would be generated and approximately 23 percent less air emissions would be offset, compared to the Proposed Action.	Construction impacts would be the same as the Proposed Action. Alternative B would feather less of the time than the Proposed Action; therefore, more energy would be generated and approximately 2 percent more air emissions would be offset, compared to the Proposed Action.	No effect; no overall positive impact to air quality due to offsetting of current emissions from existing power plants
<b>5.12 - Transportation</b>	Temporary impacts to roads, traffic operations and safety due to turbine component shipment during construction and decommissioning. No impact during operation.	Same as Proposed Action	Same as Proposed Action	No effect

Resource	Proposed Action – Modified Operations	Alternative A – Maximally Restricted Operations Alternative	Alternative B – Minimally Restricted Operations Alternative	Alternative C – No Action
5.13 - Communications	Minor effects on over-the-air remaining low-power analog stations or very low-power FM radio stations, though impacts are sporadic and localized. No significant negative direct or indirect impacts on radio broadcasts, microwave transmission, and military radar from construction, operation or decommissioning.	Same as Proposed Action, but to the extent that interference is expected, Alternative A would have slightly lower effects on communications than the Proposed Action due to reduced total hours of operation.	Same as Proposed Action, but to the extent that interference is expected, Alternative B would have slightly larger effects on communications than the Proposed Action because Alternative B proposes more operational hours than the Proposed Action.	No effect
5.14 - Health and Safety	No significant adverse impacts on health and safety due to ice shedding, tower collapse and blade shear, stray voltage, fire and fuel, lightning strike, and wind turbine syndrome. Based on the Applicant’s commitment to not exceed 30 hours of shadow flicker per year, the Project’s shadow flicker is not likely to have an adverse impact on permanent non-participating residences.	Same as Proposed Action; a very slightly reduced risk of ice shedding (due to time-of year restrictions and reduced total hours of operation) and slightly reduced risk of blade shear events (due to reduced total hours of operation).	Same as Proposed Action; a very slightly increased risk of ice shedding (due to time-of year restrictions and increased total hours of operation) and slightly increased risk of blade shear events (due to increased total hours of operation),	No effect

**Table 6.1-2 Mitigation Measures**

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.1 - Geology and Soils</b>	<p>A SWPPP including an Erosion and Sedimentation Control Plan would be implemented, consisting of stabilization of steep slopes with geotextiles or other similar devices (particularly during rain events), silt fences, hay bale dikes or other suitable methods of slowing sheetflow and retaining sediment onsite, as well as identifying designated crossings over streams to minimize erosion and sedimentation in riparian areas, wetlands, and streams.</p>
	<p>Removal of topsoil from disturbed areas would be stockpiled and retained for re-application once site disturbance is complete.</p>
	<p>The construction footprint would be minimized by delineating and avoiding sensitive resources such as streams, wetlands, cultural resources, etc. in the field prior to construction and adhering to work area limits during construction.</p>
	<p>Compacted soils would be restored through manual or mechanical cultivation to re-aerate the soil and promote seed germination.</p>
<b>5.2 - Water Resources</b>	<p>Areas subject to temporary disturbance (not within the permanent Project footprint but disturbed during construction) would be revegetated with native seed in accordance with the NPDES permit and erosion and sedimentation plan.</p>
	<p>No discharges of contaminated effluent or hazardous materials would occur directly to a receiving water body. SPCC procedures would be implemented to prevent the release of hazardous substances into the environment.</p>
	<p>Should blasting be required, the exact location of private water supply wells within the Project Area would be determined and clearly marked to avoid potential damage and no blasting would occur within a 30.5 m (100 ft) buffer around private wells.</p>
	<p>Large built components of the Project, including wind turbines, staging areas, the operations and maintenance building, and the substation, would be sited to avoid wetlands, and minimize necessary in-stream work.</p>
	<p>The applicant would comply with all manufacturer’s recommendations and applicable permit conditions regarding application of herbicides.</p>
<p>The construction footprint would be minimized by delineating and avoiding sensitive areas in the field prior to construction and adhering to work area limits during construction. These measures would limit potential impacts of soil compression on normal infiltration rates.</p>	
<p>Buckeye Wind and its contractors would follow strict guidelines dictating the use and handling of hazardous materials and other contaminants, which would minimize the potential for impacts to water quality and/or aquatic life.</p>	
<p>Contractors would develop and implement a comprehensive sediment and erosion control plan to minimize impacts to waterways.</p>	

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.2 - Water Resources (continued)</b>	<p>In those cases when only buried electrical interconnects cross a perennial stream, the Applicant would horizontally directionally drill underneath the stream regardless of its beneficial use classification. In cases where only buried electrical interconnects cross an intermittent or ephemeral stream, the Applicant would open trench through the stream and conduct the trenching during periods of no water flow.</p>
	<p>Existing or narrow crossing locations over surface waters would be used whenever practicable. Low-impact crossing techniques, equipment restrictions, herbicide use restrictions, and erosion and sedimentation control measures would be implemented.</p>
	<p>Clearing of vegetation along stream banks would be minimized, and areas cleared during construction would be stabilized following construction.</p>
	<p>Should groundwater be encountered during excavation, water removal would be conducted as follows: a sump pit would be used to trap and filter water for pumping to a suitable discharge point, areas of cleared vegetation along streams would be stabilized, and clean pumped water would be discharged to a vegetated and stabilized area (or to an appropriately sized level spreader or riprap energy dissipater) to minimize scouring of the receiving area. Sediment-laden water would be pumped through a filter bag or into a sediment trapping device prior to discharge.</p>
	<p>Unavoidable impacts to streams would be mitigated in accordance with any required permits issued by the USACE or Ohio EPA under the CWA, Section 401 or 404 or the Ohio Isolated Wetlands Program.</p>
<b>5.3 - Vegetation</b>	<p>Topsoil removal and decompaction would be conducted in agricultural areas where soil restoration is necessary to accommodate future agricultural uses. These practices would also mitigate any potential impacts that soil compaction could have on infiltration of rain and snowmelt, thereby further reducing any potential impact to groundwater recharge.</p>
	<p>No Project components would be sited within any groundwater SWPA.</p>
	<p>Project components would be sited in previously disturbed areas (e.g., existing farm lanes) to the maximum extent possible and areas of vegetation and soil disturbance would be limited to the smallest size practicable.</p>
	<p>Disturbed areas outside of active agricultural fields would be re-seeded with vegetation native to the Project area.</p>
	<p>Conduct regularly scheduled invasive species monitoring to identify any occurrences of invasive species, and develop an eradication plan as needed.</p>
<p>Targeting a minimum of six different tree species from the list found in Appendix L of the Rangewide Indiana Bat Protection and Enhancement Plan Guidelines (PEP Guidelines) (USFWS et al. 2009) for planting in riparian and wooded corridor restoration areas.</p>	
<p>Pre-construction contours/soil/substrate conditions to be established in disturbed areas to the extent practicable.</p>	
<p>Disturbed stream banks would be stabilized per the conditions of any formal state/Federal-issued permit.</p>	
<p>Disturbed agricultural fields would be restored by decompacting soil, re-spreading stockpiled topsoil, and removing any large rocks or debris that would impact future cultivation.</p>	

**Resource**

**Avoidance, Minimization, and Mitigation Measures**

**5.4 - Wildlife and Fisheries**

Tree removal during construction would occur between 1 November and 31 March, to reduce the potential for impacts on roosting bats, and nesting/breeding birds. CRP land would be cleared only during the non-breeding season for grassland birds (before March 1 and after July 15).

The Applicant would implement various cut-in speeds at different times of the day and year as part of the minimization measures incorporated in the HCP for Indiana bat impact. This approach would also reduce mortality of other bat species and birds during low wind-speed nights.

The Project’s design incorporates aspects of the Service Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines (details presented in Section 5.4.2).

For any protected species of raptor nest identified within the Action Area, impact minimization measures would be established in cooperation with the ODNR.

Meteorological (MET) towers would be free standing without guy wires.

The minimum amount of pilot warning and obstruction avoidance lighting specified by the Federal Aviation Administration (FAA) would be used. The lights used on turbines or MET towers would be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA.

Where feasible, electric power lines would be placed underground or on the surface as insulated, shielded wire to avoid electrocution of birds. Above-ground lines would be marked in accordance with the Avian Power Line Interaction Committee (APLIC), “Suggested Practices for Avian Protection on Power Lines,” to the extent practicable.

Access roads built for the Project would be posted with a 25 mile per hour speed limit to minimize risk of collision with Indiana bats and other wildlife.

Implementation of a post-construction monitoring plan based on the ODNR recommendations and coordination with the USFWS, to determine the rates and species-specific patterns of avian and/or bat collision fatalities at turbines.

Implementation of an Avian and Bat Protection Plan for the life of the Project that includes avoidance and minimization measures, post-construction monitoring, and adaptive management and mitigation to reduce impacts to migratory birds and bats that are not federally-listed.

**Resource**

**Avoidance, Minimization, and Mitigation Measures**

**5.5 - Rare, Threatened, and Endangered Species**

Turbine curtailment would be implemented during spring, summer, and fall, to reduce Indiana bat mortality during low wind-speed nights (6 m/s [13 mph] or less). The cut-in speeds would be highest for turbines in habitat most suitable for Indiana bats, and during the fall season when Indiana bats in general are most at risk of collision/barotrauma.

Tree clearing would be minimized to the maximum extent practicable — the 100 turbine layout would require 6.5 ha (16.01 ac) of tree clearing. The Applicant proposes to add an additional 6.58.9 ha (16.122 ac), of proposed mitigation land to compensate for habitat lost during construction land to the 74.883.4 ha (200.96 ac) of mitigation land needed to compensate for take of individual bats to compensate for habitat lost during construction.

The Applicant will not remove trees that are known to have been used as a roost site for Indiana bats.

The Applicant will avoid removal of potential roost trees identified during the November 2010 habitat assessment to the maximum extent practicable.

Prior to finalizing the detailed design of Project components, the Applicant will make all reasonable attempts to offset the clearing radii around turbines or adjust roads/interconnects to preserve flagged potential roosts to avoid and minimize impacts of potential roost removal to the maximum extent practicable.

At the time of tree clearing, a natural resource specialist who is familiar with Indiana bat habitat requirements will be present and any potential roost trees not identified previously (including maternity roosts) within the clearing zone will be flagged.

Tree clearing would be conducted during the period between 1 November and 31 March, when Indiana bats would not be using the area, to avoid potential mortality of Indiana bats that could result from removal of previously unidentified maternity roost trees. Prior to tree removal, the 6.5 ha (16.1 ac) acres of forest proposed for removal would be assessed for maternity roost trees and the limits of clearing would be clearly demarcated on the site with orange construction fencing (or similar), to prevent inadvertent over-clearing of the site.

Streams, wetlands, and associated riparian areas would be avoided or impacts minimized to the maximum extent practical, in order to minimize impacts to aquatic and riparian habitat, forest connectivity, and wildlife movement corridors. Construction contractors would be required to adhere to all conditions of the NWP, Ohio EPA WQC, NPDES permit, SWPPP, and any additional State or OPSB requirements. Required stream crossings would be horizontally directional drilled to avoid unnecessary clearing of forested riparian areas. Wetlands and streams near proposed Project-related facilities would be flagged for avoidance prior to construction.

A monitoring and adaptive management program would be implemented to keep Indiana bat mortality at or below permitted levels.

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.5 - Rare, Threatened, and Endangered Species (continued)</b>	<p>The Applicant would minimize the potential for construction and decommissioning-related impact to rayed bean mussels by avoiding in-water work in perennial streams where the species is known or assumed to be present.</p>
	<p>The Applicant would minimize the potential for construction, operation, and decommissioning-related impacts to the eastern massasauga by restricting construction activities to the extent practicable between 15 November and 1 March, conducting temporary ground disturbance at least 15 m (50 ft) from the wetland containing potential massasauga habitat, use buried silt fences during construction and decommissioning, post 10 mph speed limits within one half-mile around the wetland, installing gates at access points along the road, and training O&amp;M personnel on the appearance, protected status, and proper avoidance of the massasauga.</p>
	<p>The Applicant would minimize potential impacts on tonguetied minnow by avoiding direct impacts to designated Exceptional Warmwater Habitat and Coldwater Habitat streams, and implementing best management practices associated with NPDES permits and Nationwide Permits to minimize impacts from sedimentation and runoff in perennial streams.</p>
	<p>The Applicant will minimize potential impacts on bald eagles by implementing a series of measures including: monitoring for and reporting eagle mortality for the life of the Project; minimize, the likelihood that eagles will use the Project site by carcass management and maintenance of vegetation heights around turbines to reduce prey availability and raptor foraging; developing a plan to periodically update the predicted risk of the Project to eagles; developing an adaptive management plans that initiate action if risk to eagles is found to increase to moderate or high levels in the future; committing to consider and incorporate, where appropriate, the latest research findings and minimization measures concerning eagle mortality at wind power projects; ground wires would be marked with deflectors; and following APLIC guidelines for overhead utilities, to the extent possible.</p>
	<p>Tree removal would occur November 1 through March 31, and thus would avoid most of the forest nesting bird season (nesting season is generally considered to be February 1 through August 31). Further, CRP land will be cleared only during the non-breeding season for grassland birds (before 1 March and after 15 July). Thus direct impacts to state-listed birds that may nest in the Project area would be avoided.</p>
	<p>The Applicant would avoid and minimize the potential of operation-related impacts to state-listed birds with the following measures: using a turbine design that doesn't support roosting or perching; burying collector lines wherever feasible to minimize the potential risk of electrocution to bald eagles and other birds; equipping above-ground collector lines and distribution poles with insulated and shielded wire to avoid electrocution of eagles and other birds; designing and maintaining new distribution poles, where possible and as dictated by DPL construction guidelines, so that they are insulated in order to protect raptors from electrocution; ensuring permanent MET towers would be non-guyed, free-standing structures; installing perch deterrents to prevent raptor perching activity should insulating of lines associated with new poles not be possible; removing carcasses from access roads and turbine pads to prevent raptor scavenging; minimizing operational and FAA lighting to the maximum extent practicable to reduce attraction of birds; and, controlling any ground-based lighting necessary for safety or security at the turbines or substation by use of motion detectors or infrared sensors.</p>

Resource	Avoidance, Minimization, and Mitigation Measures
<p><b>5.5 - Rare, Threatened, and Endangered Species (continued)</b></p>	<p>Two mitigation options for Indiana bats are proposed: 1) Acquire or otherwise provide protection to 87.8 ha (217.0 ac) of suitable Indiana bat swarming habitat within 11.2 km (7 mi) of a P2 Indiana bat hibernaculum in Ohio, either through acquisition of conservation easements into perpetuity or purchase of the property and then assigning conservation easements in perpetuity. Within the easement areas, restore travel corridors, ensure an adequate number of suitable roost trees and manage woody invasive species. OR, 2) Buy credits from an USFWS-approved Indiana bat mitigation bank whose geographical range service area includes the Project.</p> <p>Implementation of an Avian and Bat Protection Plan for the life of the Project that includes avoidance and minimization measures, post-construction monitoring, and adaptive management and mitigation to reduce impacts to State-listed birds.</p> <p>Applicant would implement one or a combination of the following conservation measures to advance the knowledge base of the Indiana bat and wind energy interactions: 1) Providing funding to a qualified research program to conduct research on Indiana bat behavior relative to operating wind turbines; and 2) Providing funding to a qualified research program to conduct fall migration telemetry studies at Indiana bat hibernacula in Ohio, where landowner permission allows. Results of the research would be incorporated into the adaptive management of the Project, where appropriate.</p>
<p><b>5.6 - Cultural and Historic Resources</b></p>	<p>Avoid site 33CH045 during construction and decommissioning, as well as any other NRHP sites identified by future field studies.</p> <p>A Multiple Property Listing (MPL) to the NRHP for historic one-room schoolhouses throughout the Action Area to promote awareness and preservation of these structures.</p> <p>Documentation and interpretation of the A.P. Howard house and the Obed Horr house, and development of a Teaching with Historic Places lesson plan presenting Champaign County’s role in the Underground Railroad.</p>
<p><b>5.7 - Land Use and Recreation</b></p>	<p>Permanent road widths would be limited to a maximum of 6 m (20 ft) or less, and where possible, following existing farm lanes, hedgerows and field edges to minimize loss and fragmentation of agricultural land.</p> <p>Disturbance of surface and subsurface drainage features would be avoided.</p> <p>All inadvertently damaged tile lines would be repaired.</p> <p>Vehicular access to turbine sites would be minimized until topsoil has been stripped and permanent access roads have been constructed.</p> <p>Vehicular access would be limited to construction roads only.</p> <p>Stripping of topsoil or passage of cranes across agricultural fields would be prohibited during saturated conditions (when soils capacity to assimilate water is exceeded, and standing water forms on the soils surface) when such actions would damage agricultural soils.</p> <p>Blocking of surface water drainage due to road installation or stockpiled topsoil would be avoided.</p>

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.7 - Land Use and Recreation (continued)</b>	<p>Access roads throughout construction would be maintained so as to allow continued use/crossing by farmers and farm machinery to the extent practicable.</p>
	<p>Open excavation areas in active pastureland would be temporarily fenced/secured to protect livestock.</p>
	<p>Excess concrete would be disposed in appropriate locations where additional impacts to natural resources would not occur.</p>
	<p>Concrete trucks would be washed into foundation holes, or outside of active agricultural areas in locations approved by the landowner and in appropriate locations where additional impacts to natural resources would not occur.</p>
	<p>Crane set-up, erection, and breakdown activities would be restricted to designated access roads and immediately adjacent areas and work pads at the turbine sites.</p>
	<p>Subsoil decompaction and rock picking would occur prior to re-spreading of topsoil in temporarily disturbed areas.</p>
	<p>Restored agricultural areas would be stabilized with seed and/or mulch.</p>
	<p>All construction debris would be removed and disposed offsite at the completion of restoration.</p>
	<p>Compensation would be provided for damaged/lost crops.</p>
	<p>Coordination with landowner would occur to assure that interference with irrigation and subsurface drainage is appropriately minimized during construction and avoided during operation and maintenance.</p>
<b>5.8 - Visual Resources</b>	<p>Turbines would be painted white or off-white using non-reflective paints.</p>
	<p>The electrical collection system would be installed below ground wherever feasible. For above-ground segments of the collection system, existing utility rights-of-way and existing utility poles would be used to the maximum extent possible.</p>
	<p>Restore site per NPDES which would make permanent land use impacts minimal.</p>
	<p>Turbine lighting would be kept to the minimum allowable by the FAA.</p>
	<p>Turbines and turbine sites would be maintained to ensure that they are clean and attractive. In particular, rust spots or other flaws in exterior finishes should be corrected as quickly as possible.</p>
	<p>All turbines would have uniform design, speed, color, height, and rotor diameter.</p>
	<p>Towers would include no exterior ladders or cat walks.</p>
<p>Non-specular (i.e., non-reflective) conductor would be used on all overhead electrical lines.</p>	
<p>Lighting at the proposed substation would be turned on only as needed by switch or motion detector.</p>	

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.8 - Visual Resources (continued)</b>	<p>No advertising devices would be allowed on the turbines.</p> <p>If the Project goes out of service, and is not repowered/redeveloped, all visible above-ground turbine components would be removed.</p>
<b>5.9 - Socioeconomics and Environmental Justice</b>	<p>Make land lease payments to participating landowners to offset any possible downward pressure on property values.</p> <p>Health and Safety concerns that may indirectly impact socioeconomic resources also would be addressed through design techniques and compliance with health and safety standards. Implement construction and operation best management practices to minimize health or safety risks.</p> <p>The Applicant would commit to use local/regional labor, goods, and services when practicable. The Project would comply with SB 232.</p>
<b>5.10 - Noise</b>	<p>Best management practices would be implemented for sound abatement during construction, including use of appropriate mufflers, proper vehicle maintenance, and limiting hours of construction to normal daytime working hours, unless there is a compelling reason to work beyond those hours.</p> <p>Landowners would be notified of certain construction sound impacts in advance such as if blasting becomes necessary (however, blasting is unlikely to occur).</p> <p>Siting turbines such that an operational noise impact threshold of 5 dBA above the prevailing day and night background levels (<math>L_{eq}</math>) for non-participating residences is not exceeded.</p> <p>A reasonable complaint resolution procedure would be implemented.</p>
<b>5.11 - Air Quality</b>	<p>Best management practices would be implemented to minimize the amount of dust generated during construction and decommissioning activities.</p> <p>All construction vehicles would be maintained in good working condition to minimize emissions from construction and decommissioning-related activities.</p> <p>Idle times would be limited and shutdowns of construction and decommissioning equipment would occur when not in use.</p> <p>The extent of exposed/disturbed areas would be minimized on the site at any one time and restoring/stabilizing the affected area as stipulated in the NPDES permits.</p> <p>Water or calcium carbonate would be applied to suppress dust on unpaved roads (for both public roads and Project access roads), as needed throughout the duration of construction and decommissioning activities.</p> <p>Any unanticipated construction and decommissioning-related dust problems would be identified and immediate reporting to the construction manager and contractor would be ensured.</p>

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.12 - Transportation</b>	<p>Special hauling permits will be obtained when necessary to transport Project components to and from Project site.</p> <p>The township and county roads to be used for delivering Project equipment and materials would be video-documented prior to the commencement of construction to establish existing conditions. Upon completion of the Project, the Applicant would return all roadways to their pre-construction conditions.</p> <p>Ensure that roads and bridges are adequate to support the construction of the Project. Any road, bridge or culvert that the Champaign County Engineer determined to be inadequate would be rebuilt or reinforced to the specifications established by the Champaign County Engineer.</p> <p>A road bond, or other similar surety, would be established through the Engineer’s Office or the Champaign County Board of Commissioners to provide adequate funds to repair any damage to public roads.</p> <p>Where practicable, deliveries of turbine components would be aggregated in truck caravans to reduce frequency and uncertainty in road closures.</p> <p>Buckeye Wind would communicate with county engineers and local police officials as necessary to accommodate the deliveries, and the vast majority of deliveries would not require scheduled road closures. Delivery timing restrictions should be confirmed through route evaluation studies.</p> <p>Deliveries would be coordinated with state and local police, and chase vehicles and/or police vehicles would be used, as necessary, to ensure that non-Project traffic does not mix with oversize/overweight loads.</p>
<b>5.13 - Communication</b>	<p>All 100 turbines would be sited greater than 3 km (2 mi) from AM transmitters, such that degradation of AM broadcast would not occur.</p> <p>If Project operations result in any impacts to existing over-the-air television coverage, the Applicant would address and resolve each individual problem as commercially practicable. Such resolutions could include the provision of stronger digital antennas, or cable or satellite television service in lieu of non-functional over-the-air television.</p> <p>Prior to final Project design updated telecommunication assessments would be performed to ensure that any changes to communication pathways are accounted for in the final 100-turbine array.</p>
<b>5.14 - Health and Safety</b>	<p>Proper grounding techniques incorporated within and around Project components would eliminate the occurrence of stray voltage.</p> <p>The Project would implement minimum setbacks of 279 m (914 ft) between turbines and permanent non-participating residences and 180 m (590 ft) from adjacent property lines.</p>

Resource	Avoidance, Minimization, and Mitigation Measures
<b>5.14 - Health and Safety (continued)</b>	<p>Operations and maintenance staff would be trained and, in virtually all cases, would be the first level of response to in-tower emergencies. Local fire and emergency service personnel would also receive training in providing response services that are appropriate for activities, materials, and risks associated with the Project. This could include, for example, hazardous materials training related to the fuels and other potentially hazardous materials stored at the operations and maintenance facility.</p> <p>Local emergency service personnel would be given material safety data sheets for potentially hazardous construction materials.</p> <p>Construction managers would coordinate with local emergency service personnel to ensure that they are aware of the location and nature of various construction activities.</p> <p>Construction managers would coordinate with police and ODOT to ensure that deliveries of Project materials (specifically overweight and oversize turbine and crane components) are achieved safely.</p> <p>The 100 turbines would be sited such that non-participating residence and other sensitive receptors (including schools, libraries, churches, hospitals and nursing homes) would not be subject to Shadow Flicker exceeding 30 hours per year. For residences (or businesses, if applicable) with the potential to receive more than 30 hours per year of Shadow Flicker, site-specific evaluations would be conducted to determine whether adequate trees or buildings exist to provide screening. If necessary, trees would be planted in appropriate locations on these properties to minimize shadow flicker or other appropriate minimization measures would be employed.</p>

### 6.1.2 Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to the loss, as a result of the Project, of future options for resource development or management, especially of nonrenewable resources such as minerals and cultural resources (40 CFR 1508.1 1). Irretrievable commitment of resources refers to the lost production or use value of renewable natural resources as a result of the Project (40 CFR 1508.1 1). Construction and operation of the Buckeye Wind Project involves the irreversible and irretrievable commitment of material resources, energy, and biological resources.

To date, no irreversible or irretrievable loss of resources associated with the Project has occurred. Further, the USFWS will not approve any proposal that would result in irreversible or irretrievable loss of resources prior to publication of the final EIS and ROD, and issuance of an ITP.

#### 6.1.2.1 Irreversible and Irretrievable Commitment of Material Resources and Energy

Material resources used for the Project for all action alternatives (Proposed Action and Alternatives A and B) include building materials for new turbines, access roads, underground and overhead electricity collection lines, MET towers, and other facilities. Construction of the Project would also require use of fossil fuels, a nonrenewable natural resource; however, operation of the Project would result in lower overall fossil fuel use since power delivered to the grid from this Project would offset the generation of energy at existing conventional power plants that use fossil fuels.

#### *Proposed Action*

Construction of the Proposed Action would result in an irreversible or irretrievable loss of some biological resources over the life of the Project, including the irretrievable loss of approximately 46.9 ha (115.8 ac), or 47.0 ha (116.2 ac) of vegetation for the Redesign Option. The relative amount of wooded habitat within Indiana bat habitat categories 1, 2 or 3 that would be impacted by construction activities is expected to be minor: 6.5 ha (16.1 ac), or 6.8 ha (16.8 ac) for the Redesign Option, of forest habitat loss would occur during construction. This would equate to about 0.1% of the 2,744 ha (6,779 ac) of total wooded areas in the Action Area to be cleared. The 100 turbine array would result in 6.5 ha (16.0 ac) of disturbance to deciduous and evergreen forests, or 6.8 ha (16.7 ac) for the Redesign Option. Grassland and CRP habitat loss totals 2.7 ha (6.7 ac) of impacts for the Proposed Action and Redesign Option. The Proposed Action would have minor impacts on up to 32 streams totaling not more than 380.3 linear m (1,248 linear ft), while the Redesign Option would have minor impacts to 49 streams totaling not more than 487 m (1,598 ft). The Applicant would implement compensatory mitigation for stream impacts if required through the USACE Nationwide Permit process for specific crossings.

Operation of the Proposed Action would result in the incidental take of approximately 130 Indiana bats over the life of the Project. Additionally up to 17,500 migratory birds and 100,625 bats (species other than Indiana bat) may be incidentally taken during the life of the Project. Note that this is a worst case scenario developed using average numbers at other wind facilities (see Section 5.14 of this DEIS). The actual incidental take of migratory birds and bats (other

than Indiana bat) as a result of the Proposed Action should be substantially lower due to implementation of the Project's ABPP and HCP.

### ***Alternatives A and B***

Construction of the Project under Alternatives A or B would result in the same irreversible or irretrievable loss of resources as described for the Proposed Action. Operation of the Project under Alternative A (Maximally Restricted Alternative) would result in no (or very limited) impacts to Indiana bats, other non-listed bat species, and night flying migratory birds since the wind turbines would not operate when bats are active. Impacts of this alternative to diurnal (i.e., active during the day) migratory birds would be the same as the Proposed Action.

Operation of the Project under Alternative B would result in greater impacts to Indiana bat, non-listed bats, and night flying migratory birds due to fewer operational restrictions than the Proposed Action. Impacts of this alternative to diurnal (i.e., active during the day) migratory birds would be the same as the Proposed Action.

### ***No Action Alternative***

The No Action Alternative would result in no irretrievable or irreversible commitment of resources because the Project would not be built.

## **6.2 Identification of Preferred Alternative**

The USFWS has not selected a preferred alternative for the proposed action at this time. The USFWS is seeking public input for the selection of the preferred alternative during the public comment period for the DEIS. Following the public review and consideration of comments received, the preferred alternative will be chosen and announced in the FEIS.

## **6.3 Identification of Environmentally Preferred Alternative**

The environmentally preferred alternative is the alternative that would promote the requirements expressed in section 101(b) of NEPA. It is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (CEQ 1981, Q6a). The environmentally preferred alternative has not been selected at this time. USFWS will consider comments received from the public on this DEIS and select an environmentally preferred alternative in the ROD.