

3 ALTERNATIVES ANALYSIS

This chapter addresses the alternatives developed in response to the Applicant's request for an ITP for its proposed Project. The Applicant's proposed Project is a 100-turbine wind energy facility that has the potential to harm or kill Indiana bats and Virginia big-eared bats, thus the necessity for an ITP. Alternatives were analyzed for their capacity to address the Service's purpose and need for the federal action of issuing an ITP and implementing an HCP for Indiana bats and Virginia big-eared bats. This chapter summarizes the decision process that resulted in the elements of the Proposed Action and the development of the alternatives. Alternatives include modification to the proposed Project's footprint and energy capacity, and the number of species to be included in the ITP and HCP (covered species). Additionally, this chapter describes alternatives that were considered but eliminated from detailed analysis in the DEIS.

3.1 Development of Alternatives

NEPA requires that a "range of alternatives" be discussed in the environmental documents prepared for a proposed action (40 CFR 1505.1(e)). This includes a discussion of all reasonable alternatives, which must be thoroughly explored and objectively evaluated. This also includes a brief discussion of alternatives that were considered but eliminated from further analysis (40 CFR 1502.14(a)).

The scope of reasonable alternatives is defined by the purpose and need for the action and guided by the goals and objectives of the acting agency. Reasonable alternatives include those that are practical or feasible from both a technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. Issues identified and discussed during scoping are integral to considering and developing alternatives retained for analysis.

In conformance with NEPA, this DEIS addresses the potential environmental impacts of the proposed action and alternatives (40 CFR 1508.9). A range of reasonable alternatives that could reduce the impacts on Indiana bats and Virginia big-eared bats were evaluated with respect to feasibility and purpose and need.

The Habitat Conservation Planning Handbook (USFWS and NMFS 1996) states that at least 2 types of alternatives are commonly included:

- Any alternative that will reduce species take below levels anticipated for the Proposed Action; and
- A No-Action alternative, which means that no permit will be issued and take will be avoided, or that the project will not be constructed or implemented.

All identified alternatives are listed in Appendix A, Table A.1 of this DEIS, including those derived from comments received during the NEPA scoping process. In summary, the alternatives analysis took the following approach. Initially, all reasonable alternatives were considered during the development of the DEIS. These original alternatives were compared and contrasted based on screening criteria, which are described below. The scoping process provided additional alternatives that were also screened using the same criteria. Project alternatives included other wind turbine configurations and quantities, other locations in West Virginia, as well as other renewable and traditional electric generation options.

Many alternatives were eliminated from further analysis because they did not meet the stated goals or objectives of the Service. Alternatives were dropped largely due to one or more of the following reasons:

- Did not adequately address the Service's terms for protecting ESA-listed bats;
- Ranked poorly according to the project siting criteria; and/or
- Lacked practicality, feasibility, or common sense.

The Proposed Action and 3 alternatives, including the No-Action Alternative (a total of 4 alternatives), were advanced for detailed analysis in this DEIS. The retained alternatives were further examined to ensure they met stated goals and objectives of the Service action and project intent. Lastly, retained

alternatives were analyzed in detail in Chapter 5 Environmental Consequences; the results of the detailed analysis are compared in Table 3-4.

3.1.1 Evaluation Criteria for Reasonable Alternatives for the HCP/ITP Process

3.1.1.1 Conservation Measures for the Indiana Bat and Virginia Big-Eared Bat

Proposed conservation measures were evaluated with the Service's long-term goal for reducing impacts to the Indiana bat and Virginia big-eared bat (covered species) so that eventually ESA protection is no longer necessary. To address conservation measures, reasonable alternatives are required to meet 1 or more of the following criteria:

- Adequately avoid and minimize take of endangered bats;
- Restore or protect endangered bat habitat; or
- Enhance scientific understanding of wind energy development and bat interactions.

Avoidance, minimization, and mitigation measures associated with the Project were based on BRE's consultation with the Service and consistency with specified goals and tasks in 2 bat Recovery Plans (USFWS 1984, 2007). Conservation measures include or address measures to protect and/or enhance existing habitat for covered species. Conservation measures that did not meet Project objectives and the Service's goal for consistency with species recovery plans were not retained for detailed analysis.

3.1.1.2 Effects to Other Potentially Affected Wildlife Resources

Avoidance, minimization, and mitigation measures associated with each alternative were evaluated for their potential to positively affect other wildlife resources, with particular focus on unlisted bat species and avian species most at risk to the effects of wind development. Long-distance tree-roosting migratory bats have been found to be most at risk for collision with wind facilities, particularly during fall migration (Arnett et al. 2008, Horn et al. 2008). Fatalities of many bird species have been documented at wind power facilities (Erickson et al. 2001 and many others). Although raptors have received the most attention (e.g., at Altamont Pass in California), migratory songbirds (passerines) represent by far the highest number of avian fatalities at wind power facilities (Osborn et al. 2000, Johnson et al. 2000a, 2003a, Erickson et al. 2001, Howe 2002, and others). Thus, alternatives were evaluated based on the extent to which they minimized risks to other bat and avian species.

3.1.1.3 Wind Project Site Selection and Project Viability

When considering alternatives to the proposed Project, site selection was an important evaluation criterion. Wind project viability is greatly affected by location. The site selection process used by BRE was based on several constraints, including reducing impacts to sensitive resources, maximizing energy production, and accommodating existing land uses. BRE conducted an environmental screening to identify a location that would meet the siting criteria and comply with specified environmental constraints. Of particular importance in the screening process was the Project's location relative to adequate wind resources; electric transmission lines; land parcels that can accommodate the WVPSC's defined setback distances; land use criteria; and sensitive natural resources. Alternatives were evaluated based on their ability to meet the conditions of this screening process.

The facility's proposed location, based on this site selection process, is highly significant to Project viability. Locations that would result in non-adherence to siting criteria (e.g., proximity to transmission lines, adequate wind resource), and locations hindered by technical constraints were dropped from further consideration.

3.2 Alternatives

Alternatives include the No-Action, Proposed Action, and 2 action alternatives (for a total of 4 alternatives) These 4 alternatives are summarized in Table 3-1. The 3 action alternatives all consist of issuance of an ITP and implementation of measures to avoid and minimize take of covered species and conservation

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measures to benefit covered species. The Proposed Action includes issuance of an ITP and implementation of the HCP for the Indiana bat and Virginia big-eared bat as proposed by the Applicant. One of the action alternatives considers the inclusion of additional covered species that are not currently afforded protection under the ESA but will be exposed to risks associated with the Project and will benefit from conservation measures. The remaining action alternative considers implementation of the HCP as proposed by the Applicant but only for Phase I of the Project (a reduced take alternative).

It is important to note, that the modification of the stipulation (described in Section 1.1.1) does not affect the 4 alternatives retained for detailed analysis. The limited operations will be implemented from April 1, 2012, until November 15, 2012. Should the ITP be issued prior to November 15, 2012, the interim operations specified in the modified stipulation will be superseded by the provisions of the ITP and HCP. Should the ITP not be issued before November 15, 2012, the original no take provisions of the Judge's Order will be reinstated (i.e., the existing 67 turbines would be turned off at night while bats are active, as described in Section 1.1). Project operations would thus be confined to daytime hours during the bat active season in years following 2012 unless and until an ITP is issued or the Judge's Order is amended.

Pursuant to the modification of the stipulation, the limited operations protocol does affect the existing conditions of the Project for 2012. The existing conditions for those resources that may be affected by the modification (noise, bats, and birds) are discussed in those corresponding sections of Chapter 4, Affected Environment. These short-term effects also are analyzed as cumulative effects in Chapter 5.

3.2.1 Alternative 1: No-Action Alternative – No Take/No ITP/No HCP

Alternative 1 is the No-Action alternative. Pursuant to NEPA, the No-Action Alternative requires the acting agency to consider the consequences of not implementing any action, in this case no ITP and no implementation of an HCP. No new construction would occur under this alternative; hence, Phase II of the project would not be built. The Project would be operated in a manner that does not result in take of listed bats. Under these operating restrictions, the existing 67 turbines with a nameplate capacity of 100.5 MW would generate up to approximately 639,000 megawatt-hours (MWh) per year. A monitoring and adaptive management plan and an APP¹⁴ would be implemented to monitor bird and bat mortality and to determine the effectiveness of operating restrictions in reducing such mortality.

In typical NEPA analysis, the No-Action Alternative and affected environment are both baselines for comparison, but they are not synonymous. The affected environment describes the present setting for which the proposed action will take place and have effect. The effects of the No-Action Alternative are estimated from the current condition and are carried into the future (through analysis of direct, indirect and cumulative effects), as would be the case for any alternative being considered.

In NEPA analysis, the "No-Action" alternative can include one of several possible scenarios. The first scenario is an alternative in which the proposed activity does not take place (i.e. no project built) and compares the resulting environmental impacts of no action with the proposed action and additional alternative actions. For the BRE project, because 67 turbines are already constructed and operating under a court order, there is no practical value in evaluating a "no project built" alternative.

Another scenario considers the no-action alternative as a "no change" or continue operating "as is" alternative with no change in operations or management. This scenario applies to the circumstances surrounding BRE's Project. BRE's Phase I 67-turbine wind project is an existing condition with operational restrictions that avoid the take of listed bats in the absence of an HCP/ITP. Consequently, Alternative 1 is a "no change" alternative.

Under the No-Action Alternative, the 67-turbine Project would operate as under the status quo¹⁵. Turbine operations would stop 30 minutes before sunset to 15 minutes after sunrise from April 1 through

¹⁴ BRE has indicated they would implement their APP regardless of whether or not an ITP is issued.

¹⁵ We recognize that the status quo is a product of a court-approved consent decree. The Service does not presuppose what the court might do if the Service were to deny the permit. Rather, we provide this no-action alternative as best reflecting the operating

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November 15. Accordingly, the Project would be operated in such a manner that no take of endangered or threatened species would occur, thus precluding the need for an ITP. BRE would forego the added benefits associated with the addition of Phase II (construction and operation of the proposed 33 turbines). There would be no risk to Indiana bats or Virginia big-eared bats associated with Project operations. BRE would not implement steps to obtain off-site conservation to mitigate the potential take of Indiana bat and Virginia big-eared bat. Thus Alternative 1 would have an overall neutral effect on the Indiana and Virginia big-eared bat: no take would occur, and no mitigation or other conservation measures would be implemented specifically for Indiana or Virginia big-eared bats. In addition, there would be no unlisted bat mortality because turbines would not operate at night during the bat active season.

The existing WVPSO siting certificate for the Project indicates that BRE would conduct 3 years of post-construction mortality surveys to assess the Project's impacts on bats and birds. If the Project causes significant levels of bat or bird mortality and adaptive management techniques are proven effective and economically feasible in reducing such mortality, BRE would make a good faith effort to implement facility-wide adaptive management strategies to reduce mortality levels. Under the No-Action Alternative, post-construction and adaptive management studies thus would be implemented. Because the Project would not operate at night from April 1 through November 15, risks would be eliminated for bats. It is unknown, however, whether the seasonal night-time turbine operating restrictions would benefit birds under this alternative. Under BRE's APP, post-construction monitoring would determine whether turning off turbines at night from April 1 through November 15 would benefit birds. If the Project caused significant levels of bird mortality, adaptive management measures would be implemented to reduce mortality if they are proven effective and financially feasible.

regime at the Project pursuant to the Court order and stipulation, thereby allowing a better basis to compare impacts. As will be noted in Chapter 5, we also provide details on the impacts to the human environment if both phases of the Project were to become fully operational, unencumbered by any restrictions that would benefit ESA-listed species. As described below, this alternative was dismissed because it would not satisfy the agency's goal of minimizing or mitigating impacts of take under the ESA. But we include the relevant information to allow a more robust comparison.

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Table 3-1. Alternatives considered for detailed analysis for the Beech Ridge Wind Energy Project Habitat Conservation Plan. For the Proposed Action and each action alternative, the turbine blades would be feathered (pitched) to rotate at <2 revolutions/minute when wind speeds are below the cut-in speed, thus minimizing bat and bird mortality.

Alternative	Construction Type	Energy Capacity with Curtailment	Operations	Permit Term (years)	Implement HCP	Implement RMAMP	Implement APP
Alternative 1: No-Action	No new construction	100.5 MW nameplate capacity; up to ~639,000 MWh/year	67 turbines would operate unrestricted 73% of time (6,364 hours per year) at normal cut-in speed of 3.5 m/s. Turbines will be turned off from 30 minutes before sunset to 15 minutes after sunrise from April 1 through November 15.	None	No	Yes	Yes
Alternative 2: Proposed Action	33 turbines and associated infrastructure	186 MW nameplate capacity; up to ~1,542,000 MWh/year	100 turbines will operate 95% of time (8,295 hours per year). Turbines will be restricted so that blades move less than 2 rpms when wind speeds are below the raised cut-in speed set at 4.8 m/s from 30 minutes before sunset for 5 hours from July 15 through October 15.	25	Yes, with offsite mitigation	Yes	Yes
Alternative 3: Additional Covered Species	33 turbines and associated infrastructure	186 MW nameplate capacity; up to ~1,184,000 MWh/year	100 turbines would operate 73% of time (6,364 hours per year) at normal cut-n speed of 3.5 m/s. Turbines will be restricted so that blades move less than 2 rpms when wind speeds are below a raised cut-in speed set at 6.5 m/s from 30 minutes before sunset to 15 minutes after sunrise from April 1 through October 15.	25	Yes, with on-site (or off-site) mitigation.	Yes	Yes
Alternative 4: Phase I Only	No new construction	100.5 MW nameplate capacity; up to ~832,000 MWh/year	67 turbines would operate 95% of time (8,295 hours per year): Turbine will be restricted so that blades move less than 2 rpm when wind speeds are below a raised cut-in speed set at 4.8 m/s from 30 minutes before sunset for 5 hours from July 15 to October 15.	25	Yes; lower take estimates would warrant reduced offsite mitigation measures.	Yes	Yes

3.2.1.1 *Alternative 1 Summary*

Alternative 1 meets the Service's goals and objectives for protecting and conserving the Indiana bat and Virginia big-eared bat and their habitats in context of the Project for the continuing benefit of the people of the United States. Under this alternative, the Project operations do not pose risks to listed bats because the turbines are turned off at night during the bat-active season for the life of the Project. The No-Action Alternative would be the alternative implemented if the Service denies BRE the ITP.¹⁶

3.2.2 *Alternative 2: Proposed Action – ITP with Full Implementation of Habitat Conservation Plan*

Under Alternative 2 (Proposed Federal Action), the Service would issue a 25-year ITP that would authorize incidental take of Indiana bat and Virginia big-eared bat associated with: 1) construction of 33 turbines and associated infrastructure (Phase II), 2) operation of 100 turbines (the existing 67 Phase I turbines plus the 33 additional Phase II turbines), and 3) eventual decommissioning of the entire project. BRE would implement an HCP that includes:

1. measures to reduce take of listed bats (turbine feathering at low wind speeds and raised cut-in speeds of 4.8 m/s for 12 weeks of the year during fall);
2. off-site conservation measures for the listed bats; and
3. a research, monitoring, and an adaptive management plan (RMAMP) to test and measure the effectiveness of turbine operations in reducing listed bat mortality.

Under Alternative 2, BRE also will implement an APP similar to the No-Action alternative. Turbine operating restrictions imposed by the court order, settlement agreement, and modified stipulation would be lifted and more energy would be generated than the No-Action Alternative. Alternative 2, consisting of a total of 100 turbines with a nameplate capacity of up to 186 MW, has the potential to generate a maximum of 1,542,000 MWh of electricity per year with operating restrictions (Table 3-1).

The Project, as described in the WVPSC Application and Siting Certificate, originally consisted of the construction and operation of 124 turbines on Beech Ridge. As a result of discussions and negotiations with environmental organizations, as reflected in the January 26, 2010, settlement agreement, the Project was reduced to 100 turbines. Of these 100 turbines, 67 are built and currently operating pursuant to the judicial order and modified stipulation to the settlement agreement.

Under the Proposed Action, 33 additional turbines will be constructed upon issuance of the ITP. Construction will likely be completed within 2 years after ITP issuance, and commercial operation will be expected to commence upon completion of construction. About 124 acres of land will be disturbed during construction of the 33 additional turbines. The operational footprint of Phase II will be approximately 21 acres. Together with Phase I, the complete 100-turbine Project will affect 71 acres for the life of the Project (Table 3-2). BRE predicts that the ITP will need to be in effect for 25 years to address the time from start of Project construction through decommissioning. The Project components described for Phase I of the Project largely apply to Phase II as well.

¹⁶ See footnote number 13.

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Table 3-2. Estimates of total ground disturbance associated with Phase I and Phase II construction and operation of the Beech Ridge Wind Energy Project.. Temporarily affected acres are those areas cleared, reclaimed, and then allowed to revert to forest. “Permanently” affected acres are those areas cleared and converted to project facilities for the life of the Project. While turbines, pads, and buildings will be removed at the end of the project, these disturbed areas will be graded and revegetated at the request of the landowner; thus some areas, such as roads, may remain after the life of the project. For purposes of this EIS, these areas are treated as if they will result in permanent impacts (worst case scenario).

Disturbance type	Phase I – 67 turbines (already built)		Phase II – 33 turbines (not yet constructed)		Total proposed Project – 100 turbines	
	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)
Turbine assembly areas/pads ¹	100	9	49	5	149	14
Existing roads to be upgraded ²	39	--	29	--	68	22
New access roads to be constructed ³	43	16	21	8	64	24
Staging area and concrete batch plant ⁴	12	0	12	0	12	0
Electrical and communication line trenches ⁵	8	8	3	3	11	11
Overhead transmission line ⁶	140	11	19	2	159	13
Substation, O&M building, permanent MET towers ⁷	6	6	3	3	9	9
Total	336	50	124	21	460	71

¹ Assumes a 150-ft radius during construction minus 40-ft x 120-ft crane pad plus a 20-ft radius permanently maintained area for operational purposes.

² Assumes existing road width to be increased by an additional 40 ft during construction and reclaimed to 16 ft wide for Project operations.

³ Assumes new roads to be 60 ft wide during construction and reclaimed to 16 ft wide for Project operations.

⁴ Phase I staging area and batch plant were located in agricultural and reclaimed following construction. Same area will be used for Phase II and reclaimed following construction.

⁵ Disturbance areas for those portions of electrical collection system solely used for that purpose are not located in road ROW. Trenches up to 4 ft wide during construction; all trenches to be completely reclaimed for Project operations.

⁶ Existing transmission line is 14 mi, of which 11.5 mi runs through native habitat. Permanent impact includes an 8-ft access road. Phase II will require 1.6 mi of supplementary line. Construction includes a 100-ft ROW; permanent ROW is a 50-ft ROW.

⁷ Assumes 1 acre for substation, 2 acres for O&M building, and 1.5 acres for 4 permanent MET towers (2 for each Phase).

3.2.2.1 Phase II Construction

BRE estimates the actual construction period will be approximately 6 to 9 months. BRE predicts Phase II construction could begin immediately after ITP issuance, or as long as 1.5 years after issuance of the ITP, pending completion of all other necessary federal, state, and local approvals. Prior to construction of the additional 33 turbines, BRE will conduct the following steps:

1. order all necessary components, including wind turbine generators, foundation materials, electrical cable, and transformers;
2. identify final turbine locations;
3. complete an American Land Title Association survey to establish locations of structures and roadways; and
4. complete soil borings, testing, and analysis for proper foundation design and materials.

Phase II includes construction and operation of an additional 33 turbines using a turbine model yet to be determined. The 33 additional wind turbines will have a maximum 100-m (328-ft) rotor diameter with a maximum rotor swept area of approximately 7,875 m² (84,454 ft²). The rotor speed will be 9.75 rpm to

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16.25 rpm, and all rotors will rotate in the same direction. The nacelles (the fiberglass structures that house the gear boxes, generators, etc.) for the 33 additional turbines will be mounted on monopole towers with a maximum hub height of 100 m (328 ft). Maximum height of rotor will be 150 m (492 ft) above ground. Each tower will be made either of a steel design similar to the towers described for Phase I or with a steel lattice structure covered in architectural fabric to create a monopole tower.

BRE will ensure that the turbine rotors (both the existing 67 Phase I turbines and the 33 Phase II turbines) remain fully feathered whenever wind speeds are below cut-in speed. Fully feathered blades are pitched (rotated) so that the blade edge points directly into the wind, reducing blade rotation speeds to less than 2 rpm.

Phase II will be constructed using standard construction procedures and equipment used for other wind projects in the eastern U.S. Listed in typical order of occurrence, construction will entail the following activities:

- access road and pad construction;
- wind turbine foundation excavation and pouring concrete foundations for turbine towers, MET towers, transformers pads;
- electrical collection and communications system placement;
- tower erection, nacelle and rotor installation;
- testing and commissioning; and
- final road grading, erosion control, and site clean-up.

A construction staging and laydown area containing Project offices, equipment, and employee parking was developed on approximately 8 acres of agricultural field for Phase I of the Project. This same staging and laydown area will be utilized during construction of the additional 33 turbines. A temporary concrete batch plant will be located on a 4-acre area adjacent to this staging and laydown area.

A water well was installed at the staging and laydown area to serve the concrete batch plant. Water utilized for dust suppression will be taken from local perennial creeks and ponds within the Project area. Portable self-contained restroom facilities will be provided and used by contractor personnel while on site. These facilities will be delivered, maintained, and removed by a third-party contractor.

Access Roads and Crane Pads

Upgrading existing roads and constructing new roads for Phase II will result in 50 acres of ground disturbance. After construction is completed, new roads will affect 8 acres and remain operational for the life of the Project (Table 3-2).

Existing roads will be upgraded and new roads will be constructed in accordance with industry standards for wind Project roads and local building requirements. The roads will accommodate all-weather access by heavy equipment during construction and long-term use during O&M. The 4 mi of new roads will be located in consultation with the landowner to minimize disturbance, maximize transportation efficiency, and avoid sensitive resources and unsuitable topography, where feasible. All new roads will be constructed specifically for Project construction and O&M.

Roads will be designed, built, surfaced, and maintained to provide safe operating conditions at all times. The minimum travel way for access roads will be 16 ft. All roads will include road base, surface materials, appropriate drainage, and culverts. Surface disturbance will be contained within road ROWs, which will average 60 ft along turbine/crane access roads. Disturbance width may increase in rugged topography due to cuts and fills necessary to construct and stabilize roads on slopes.

Topsoil removed during road construction will be stockpiled in elongated rows within road ROWs. Topsoil will be re-spread on cut-and-fill slopes, and these areas will be revegetated as soon as possible after road construction is complete.

Temporary ground disturbances will include the following:

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- 40-ft x 120-ft crane pads at each turbine site extending from the roadway to the turbine foundation graded to a minimum of 1%;
- 44 ft of gravel roadway on either side of the permanent roadway (60 ft total width) for the cranes;
- turning areas for oversized equipment at certain county and local road intersections;
- 150-ft radius area centered on turbine foundation graded to a maximum of 10% for rotor laydown;
- trenching to install underground electrical system; and
- storage/stockpile areas.

For Project construction and O&M, traffic will be restricted to those roads developed for the Project and designated existing roads. Use of unimproved roads will be restricted to emergency situations. Speed limits will be set to 25 miles per hour (mph) to ensure safe and efficient traffic flow and minimize the potential for animal/vehicle collisions. Signs will be placed along the roads as necessary to identify speed limits, travel restrictions, and other standard traffic control measures.

Turbine Tower, Meteorological Tower, and Transformer Construction

The foundations for the 33 turbines will be constructed as described for the Phase I turbines (see Section 1.2.2); they will be based on geotechnical surveys and may include spread footers of deep foundations. Foundations will be excavated using a backhoe, forms installed, and concrete poured. Turbine towers will be anchor-bolted to concrete foundations. Anchor bolts will be embedded in the concrete, and the foundations will be allowed to cure prior to tower erection.

Up to 2 permanent, self-support (unguyed) MET towers will be erected for Phase II. Permanent MET towers will be 80 m (262 ft) tall and installed on 1-m (3.3-ft) diameter pier foundations. MET tower and transformer construction procedures will follow that as described for Phase I (see Section 1.2.2).

Communications and Collection System

Underground electrical and communications cables will be placed in approximately 4-ft deep trenches located primarily along the Project access roads and within the access road disturbance areas. In some cases, trenches will run from the end of 1 turbine string to the end of an adjacent string to link more turbines together via the underground network. Electric collection and communications cables will be placed in the trench using trucks. First, electrical cables will be installed, and then the trench will be backfilled partially prior to placement of the communications cables. Trenches will be backfilled and the area re-vegetated concurrently with other construction areas.

Tower Erection, Nacelle and Rotor Installation

Turbine tower assembly and erection will occur within the laydown area at each turbine site. Tower bottom sections will be lifted with a crane and bolted to the foundation, and then the middle and top sections will be lifted into place and bolted to the section below. Once the tower is erected, first the nacelle and then the rotor will be hoisted into place.

Testing and Commissioning

Testing involves mechanical, electrical, and communications inspections to ensure that all systems are working properly. Performance testing will be conducted by qualified wind power technicians and include checks of each wind turbine and the Supervisory Control and Data Acquisitions (SCADA) system prior to turbine commissioning. Electrical tests of the Project (i.e., turbines, transformers, and collection system) and transmission system (i.e., transmission line and substation) will be performed by qualified electricians to ensure that all electrical equipment is operational within industry and manufacturer's tolerances and installed in accordance with design specifications. All installations and inspections will comply with applicable codes and standards.

Final Road Grading, Erosion Control, and Site Clean-up

Once construction of the 33-turbine phase is complete, all disturbed areas will be graded to the approximate original contour, and any remaining trash or debris will be properly disposed off-site. Areas disturbed during construction will be stabilized and reclaimed using appropriate erosion control measures, including site-specific contouring, reseeding, or other measures agreed to by the landowner and designed

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and implemented in compliance with the Project's approved SWPPPs. Areas that are disturbed around each turbine will revert to the original land use after construction except for a 20-ft radius area around each turbine that BRE will maintain for O&M purposes.

During final road grading, surface flows will be directed away from cut-and-fill slopes and into ditches that outlet to natural drainages. BRE has prepared and implemented 2 SWPPPs and will prepare additional SWPPP(s) for the 33-turbine phase, as required by the WVDEP. The plans will include standard sediment control devices (e.g., silt fences, straw bales, netting, soil stabilizers, check dams) to minimize soil erosion during and after construction.

Following construction, BRE will ensure that all unused construction materials and waste are picked up and removed from the Project area. Contractors will provide trash barrels or dumpsters to collect all construction-related waste for proper disposal at an approved facility. Waste incineration will not occur. While BRE does not anticipate the use of any liquid chemicals within the Project area, BRE will inspect and clean up the Project area following construction to ensure that no solid (e.g., trash) or liquid wastes (e.g., used oil, fuel, turbine lubricating fluid) were inadvertently spilled or left on-site. Cleanup crews will patrol the construction site on a regular basis to remove litter. Final site cleanup will be performed prior to shifting responsibilities to O&M crews.

Construction Mitigation Measures

BRE and its contractors will comply with all federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel will be instructed on: (1) federal and state laws regarding cultural resources, and sensitive plants and wildlife, including collection and removal; and (2) the importance of these resources along with the purpose and necessity of protecting them.

Soils. No construction or routine maintenance activities will be conducted when soil is too wet to adequately support construction equipment (i.e., if such equipment creates ruts in excess of 4 inches deep). Certified weed-free straw mulches, certified weed-free hay bale barriers, silt fences, and water bars will be used to control soil erosion. Soil erosion control measures will be monitored, especially after storms, and will be repaired or replaced if needed. Surface disturbance will be limited to that which is necessary for safe and efficient construction. All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with landowner easement agreements. Construction activities in areas of moderate to steep slopes (15-20%) will be avoided to the extent possible.

Noise. Effective exhaust mufflers will be installed and properly maintained on all construction equipment. BRE will require construction contractors to comply with federal limits on truck noise. BRE will require contractors to use pile driving equipment that has the least noise impact and restrict pile driving to weekdays between 7 AM to 7 PM. Construction activities will take place primarily during daylight hours.

Construction contractors will be required to ensure their employee and delivery vehicles are driven responsibly. Night-time construction work will be minimized, and when it does occur, it generally will be limited to relatively quiet activities. Construction during church hours will be limited. The affected community will be notified in advance of any blasting activity, and blasting will be limited to daylight hours and will follow all state and federal rules, regulations, and laws.

Air Quality/Noise. All vehicles and construction equipment will be maintained to minimize exhaust emissions and will be properly muffled to minimize noise. Disturbed areas will be watered as necessary to suppress dust. Construction-related concrete batch plants will acquire the appropriate authorization for operation from the WVDEP Air Quality Office.

Surface and Ground Water Protection. To satisfy the requirements of an NPDES permit, a SWPPP will be prepared to ensure that erosion is minimized to the fullest extent practicable. BRE will comply with the BMPs outlined in the SWPPP, as well as all maintenance and monitoring conditions of the NPDES

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permit. SWPPPs will be kept at all construction sites, as well as in the construction contractors' offices. To minimize damage to the land surface and property, work crew and equipment movements will be limited to the Project site; this includes confining traveling on access routes to that which is necessary for safe and efficient construction. When weather and ground conditions permit, construction-caused deep ruts will be repaired. Ruts, scars, and compacted soils will be loosened and levelled using a ripper or disc or other landowner-approved method. Damage to ditches, roads, and other features of the land will be repaired. Water bars or small terraces will be constructed along access road ditches on hillsides to minimize water erosion and to facilitate natural revegetation.

BRE will continue to comply with all federal regulations for crossing of Waters of the U.S., as per 33 CFR 323. To minimize impacts associated with water crossings, BRE will implement the following measures:

1. Refueling and staging will occur at least 300 ft from the edge of a channel bank at all stream channels;
2. Sediment control measures will be utilized; and
3. Vegetation disturbance will be limited to that which is necessary for construction.

BRE will require that its contractors avoid physical disturbance to riparian vegetation. Equipment and vehicles will not cross riparian areas during construction, operation, or decommissioning activities. Existing bridges or fords will be used to access the ROW on either side of riparian areas.

The wind turbines and facility appurtenances will be built on ridges to avoid surface water features and designated floodplains. Wind turbines will not be placed in areas containing Waters of the U.S.

BRE will develop a groundwater protection plan (GPP) as part of the SWPPP that will be kept on-site during all construction activities. The GPP details procedures that will be used to protect groundwater resources, such as using double-walled tanks or providing secondary containment. Wind turbines will not be sited within 500 ft of occupied structures and existing water wells.

Vegetation Resources. BRE will implement BMPs during construction of the Project to protect vegetation, topsoil, and adjacent resources and to minimize erosion. Practices will include containing excavated material, protecting exposed soil, stabilizing restored material, and re-vegetating areas as necessary. BRE plans to utilize existing roads and previously disturbed lands (from mining and/or other construction activities) for some of the turbine foundation sites to reduce vegetation impacts.

Surface disturbance will be limited to that which is necessary for safe and efficient construction. All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with landowner easement agreements. Removal or disturbance of vegetation will be minimized through site management (e.g., utilizing previously disturbed areas, designating limited equipment/materials storage yards and staging areas, scalping) and reclaiming all disturbed areas not required for operations.

BRE will use mechanical measures to control noxious weeds in all surface-disturbed areas. Herbicides will not be used to control unwanted vegetation at the Project or transmission line ROW. Equipment will be washed at a commercial facility prior to construction and on-site during construction if weeds are encountered in the Project area.

Roads, portions of roads, crane paths, and staging areas not required for operation and maintenance will be restored to the original contour and made impassable to vehicular traffic. Areas to be reclaimed will be contoured, graded, and seeded as needed to promote successful revegetation, provide for proper drainage, and prevent erosion.

Threatened and Endangered Species. To minimize potential take of roosting Indiana bats, most tree clearing for Phase II construction will occur when Indiana bats are not expected to be within the Project area. BRE commits to limiting its tree clearing during construction of the expansion area to the period between November 15 and April 1, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 15. Tree clearing will occur in the Phase II Project area (Figure

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1-4). The additional 30 to 45 days are needed to provide BRE flexibility should weather, deep snow, or ice prevent clearing or create safety issues for construction workers. The clearing of up to 15 acres of trees outside of the hibernation period will be conducted within 5 years of the 2010 bat mist-netting survey, during which no Indiana bats were captured so as to reduce the likelihood of impacting tree-roosting Indiana bats.

Visual Resources. To minimize adverse aesthetic effects, BRE designed the layout of the Project to position turbines more than 3,000 ft from permanent residences. Most turbine locations are more than 1 mi from existing residences. BRE will locate turbines within Phase II of the project a minimum of at least 3,000 feet from residences to the extent feasible. To further minimize adverse aesthetic effects, turbines will be coated/painted a non-reflective white, and turbines will be lighted only as required by FAA regulations. A low-voltage light activated by a motion sensor will be installed at the entrance door of each turbine. Security lighting at the O&M building will be kept to the minimum required. The lights have motion sensors so they operate only when needed, and the lights are down-shielded to minimize light emission into the sky, thus minimizing impacts to night-time viewsheds. Existing roads will be used for construction and maintenance where possible, minimizing the need for new road cuts. Access roads created for the Project will be located along ridge tops when possible to minimize visible cuts and fills.

Cultural Resources. Architectural resource inventories and effects analyses were completed on all land in the Phase II expansion area proposed for surface disturbance. In addition, cultural resource specialists conducted a desktop analysis and site reconnaissance for archaeological resources in the Phase II Project area. On-the-ground archaeological resource inventories will be conducted at actual ground disturbance sites when these sites have been identified. Any cultural resource (historic or prehistoric site or object) discovered by BRE or any person working on its behalf will be immediately reported to BRE. BRE will suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Service. An evaluation of the discovery will be made by the Service in consultation with BRE, the SHPO, tribes and other interested parties to determine appropriate actions to prevent the loss of significant cultural or scientific values. BRE will be responsible for the cost of evaluation, and any decision as to proper mitigation measures will be made by the Service after consulting with BRE and other interested parties. BRE is responsible for meeting WVPSC requirements for consultation with the SHPO pursuant to state law, whereas the Service is responsible for satisfying requirements for federal consultation with the SHPO, tribes, and other interested parties pursuant to the NHPA.

Traffic. BRE requires its contractors to conform to all safety requirements for maintaining the flow of public traffic. BRE will conduct construction operations so as to offer the least possible obstruction and inconvenience to public traffic.

Fire Suppression and Control. During construction of Phase I, BRE designed and now implements a fire protection system using best industrial practices; this system is in accordance with all applicable fire safety codes. BRE coordinates with fire, safety, and emergency personnel to promote efficient and timely emergency preparedness and response. BRE's designated fire representative is in charge of fire control during construction and operation of the Project. The fire representative ensures that each construction crew has appropriate types and amounts of firefighting tools and equipment, such as extinguishers, shovels, and axes available at all times. At all times during construction and operation, BRE requires that satisfactory spark arresters be maintained on internal combustion engines. This same fire protection system will be implemented for Phase II construction and operation.

3.2.2.2 Phase I and Phase II Operations, Maintenance, Decommissioning, and General Mitigation

BRE is responsible for and will perform Project O&M for the life of the Project, which is anticipated to be up to 25 years. BRE and the turbine supplier will control, monitor, operate, and maintain the Project by means of the SCADA system and regularly scheduled on-site inspections. BRE anticipates that approximately 7 to 20 O&M staff will be employed for the life of the Project.

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For the term of the ITP, BRE will adjust the cut-in speed for all 100 turbines from 3.5 m/s (7.7 mph) to 4.8 m/s (10.6 mph) for the time of night from 30 minutes before sunset for 5 hours during the 12-week period from mid-July to mid-October (referred to as BRE's Curtailment Plan). These turbines will also be feathered up to the point that the cut-in speed is reached; thus, there will only be minimal rotation of turbine blades (<2 rpm) at winds below the cut-in speed. Changing turbine cut-in speeds during this period of the year will help avoid key periods of bat activity around the Project, reducing potential take of covered species and all bat species. If research and monitoring results show that this proposed Curtailment Plan is not meeting the HCP's goals and objectives, BRE will modify the Curtailment Plan to employ more restrictive operations (e.g., raising the cut-in speed, extending the hours or dates of curtailment) (see Project HCP, Appendix C: RMAMP, Section 5.2.1). However, BRE's Curtailment Plan will be modified only with the written agreement of the Service.

Public Access and Safety

Public Access. Public access to private lands is restricted by the landowner in accordance with easement agreements. The substation and O&M building is fenced as required for public safety; no other fencing is proposed at this time. Safety signing will be posted around those towers where needed, transformers and other high-voltage facilities, and along roads in conformance with applicable state and federal regulations.

Structure Lighting. The FAA typically requires every structure taller than 200 ft above ground level (agl) to be lighted. In the case of wind power developments, the FAA allows a strategic lighting plan that provides ample visibility to aviators but does not require lighting every turbine. BRE has an approved lighting plan for the 67-turbine phase and will develop a lighting plan for the 33-turbine phase to be submitted for FAA approval. An estimated 20 to 25% of the Project's turbines will be designated for lighting with medium intensity dual red synchronously flashing lights for night-time use and, if needed, for daytime use.

Structural Failure and Ice Throw. Turbine structural failures include tower collapse and blade shear. Blade shear occurs when a turbine blade detaches and is thrown due to the spinning motion. Ice throw occurs when ice builds up on a turbine blade and either sheds straight to the ground or is thrown if the turbine is spinning. In the rare event of structural failure or ice throw, danger to public safety is expected to be minimal. The required setbacks from residential structures and roads are established to minimize this potential impact.

The following security measures have been incorporated into the Project to reduce the chance of physical and property damage, as well as personal injury, at the site.

- Phase I turbines are a minimum of 3,500 ft from residences that are not participating in the Project (i.e., do not lease land to BRE for Project development and operation) and a minimum of 425 ft from public ROWs. Although the 425-ft distance exceeds the safety setback of 388 ft (1.1 times full turbine height), ice throw has been documented to distances of 500 ft. County Route 10/1 is the only public road that is less than 500 ft from a turbine, and this road has an average daily traffic of 30 vehicles.
- Phase II turbines will be a minimum of 3,500 ft from non-participating residences and a minimum of 545 ft from public ROWs (the expansion turbines may be up to 489 ft in total height).
- Security measures will be taken during the construction and operation of the Project, including temporary (safety) and permanent fencing, warning signs (including signs warning of high voltage), and locks on equipment and wind power facilities.

Turbines will sit on solid steel enclosed tubular towers in which all electrical equipment will be located, except for the pad-mounted transformer. Access to the tower is only through a solid steel door that will be locked when not in use.

Occupational Safety. BRE prepared emergency response plans that comply with Occupational Safety and Health Administration regulations. All construction and operational personnel will be trained to handle emergency situations that could arise at the site.

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Lightning Protection and Grounding. To protect the wind turbines from damage caused by lightning strikes and to provide grounding for electrical components of the wind turbine, an electrical grounding system will be installed at each turbine location. Parts of the grounding system are built into the wind turbine blades, nacelle, and tower. In addition, a buried grounding system will be constructed as part of the wind turbine foundation pad. Design of the buried grounding system will consider local soil electrical conductivity conditions to ensure that electricity from lightning strikes will be dissipated into the ground. The design of the grounding system will also comply with all applicable local electrical codes.

Hazardous Materials. The only hazardous chemicals anticipated to be on-site are the chemicals contained in diesel fuel, gasoline, coolant (ethylene glycol), and lubricants in machinery. BRE and its contractors will comply with all applicable hazardous material laws and regulations existing or hereafter enacted or promulgated regarding these chemicals and will implement a Spill Prevention, Control, and Countermeasure Plan (SPCCP), as necessary. Hazardous chemicals contained in diesel fuel, gasoline, ethylene glycol, and lubricants will not be stored in or near any stream; nor will any vehicle refuelling or routine maintenance occur in or near streams. When work is conducted in and adjacent to streams, fuels and coolants will be contained in the fuel tanks and radiators of vehicles or other equipment.

Operations and Maintenance

BRE will perform Project O&M for the life of Project, which is anticipated to be up to 25 years. BRE and the turbine supplier will control, monitor, operate, and maintain the Project by means of the SCADA system, and regularly scheduled on-site inspections will be conducted. BRE anticipates that approximately 7 to 20 O&M staff will be employed throughout the life of the Project.

All maintenance activities would occur within areas previously disturbed by construction; no new ground disturbance will occur during O&M of the Project. Turbine maintenance is typically performed up-tower (i.e., O&M personnel climb the towers and perform maintenance within the tower or nacelle and access the towers using pick-up trucks, so no heavy equipment is needed). In the unlikely event a large crane would be needed for maintenance, vegetation would be cleared within the area previously disturbed during construction to provide for safe and efficient operation of the crane, but no tree removal or soil disturbance would be necessary. Ground-disturbing activities may include occasional access to underground cable or communications lines.

Vegetation within 130 ft of turbines that are monitored for wildlife mortality will be regularly mowed to improve searcher efficiency. The transmission line route and other Project areas will be inspected for hazard trees that may pose safety threats or potentially damage Project facilities. Hazard trees will be trimmed or cut as needed. Inspections and tree-cutting will occur between November 15 and March 31 to avoid additional risks to Indiana bats and other tree-roosting bats except for those times when there are imminent threats to public safety.

Decommissioning and Restoration

BRE has a contractual obligation with the landowner to remove turbines and foundations if and when the Project is no longer viable for operation, and if BRE determines the site cannot be retrofitted with replacement turbines. BRE's WVPSC siting certificate includes an obligation to maintain a Decommissioning Fund sufficient to cover the cost of the removal of all improvements to 4 ft below grade. The fund has been established with the Greenbrier County Commission.

Within 90 days after the Service announces a final decision on BRE's application for an ITP, BRE will decommission 10 turbine foundations that were built as part of Phase I but for which future construction of associated turbines was later prohibited as part of the settlement agreement.

At the end of the Project's useful life, BRE expects to explore alternatives for decommissioning the Project. One option may be to continue operation of the Project, providing energy under a new long-term contract with a power purchaser or on a merchant basis. In that case, BRE would reapply for new or amended permits to retrofit and upgrade turbines and the power system to allow the Project to continue to operate for additional years.

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If the Project is not replaced or repowered after 25 years, the following sequence will be implemented for removal of components:

- Turbines, transmission line, and substation would be dismantled and removed;
- Pad-mounted transformers would be removed;
- All turbine and substation foundations would be removed to a depth of 4 ft;
- Disturbed areas and access roads would be graded to the original contour as near as practicable at the request of the landowner; and
- BRE will use the seed mixes¹⁷ described in Table 3-3 for reclaiming ground disturbances.

¹⁷ BRE has an obligation to consult landowners and use seed mixes at the request of the landowner. The Service recommends use of native seed mixes and has requested that BRE ask landowners to consider restoring disturbed areas using native seed.

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Table 3-3. Seed mixtures used for reclamation at the Beech Ridge Wind Energy Project.

Mix #1 – Contractors Gold (species percentage)	Mix #2 – Erosion Gold (species percentage)
Annual rye (49.0%)	Annual rye (47.7%)
Red fescue (29.4%)	Fawn tall fescue (14.4%)
Perennial rye (19.6%)	AllSport II perennial rye (19.1%)
	Trefoil (7.6%)
	Med red clover (9.5%)
	Other crop seed (1.1%)
	Inert matter (1.2%)

The Decommissioning Fund for Phase I is already in place; this would be updated to include Phase II as the 100-turbine Project approaches commercial operation. The Decommissioning Fund covers dismantling of the turbines and towers, as well as land reclamation, monitoring of revegetation success, and reseeding if needed to ensure revegetation success. Ground-cover (vegetation) must cover at least 70% of the given disturbed area before the SWPPP can be terminated based on specific state reclamation requirements. BRE has engaged an independent expert to calculate the funds needed for decommissioning. This value is based on resale or salvage value of the Project components. This estimate will be re-assessed periodically and reported to the WVDPSC.

General Avoidance and Minimization Measures, and Mitigation Measures

As part of the Project, BRE proposes to implement a host of practices designed to avoid, minimize, and mitigate impacts to the environment. These measures, which include conditions of various permits and environmental laws, are summarized below. These measures are described as part of the Phase II Project (BRE's commitments to avoid, minimize, and mitigate impacts to the environment) and would also be implemented under Alternative 2 or Alternative 3.

Construction, Operations, and Maintenance Practices. BRE and its contractors will comply with all federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural and ecological resources, including (1) federal and state laws regarding antiquities and plants and wildlife, including collection and removal, and (2) the importance of these resources and the purpose and necessity of protecting them. This information is disseminated through the contractor hierarchy to ensure that all appropriate staff members are aware of the correct procedures and responsibility to report (see Section 3.2.2 in the Project's RMAMP for wildlife handling and reporting procedures).

Ground Disturbance and Erosion Control. SWPPPs will be prepared to ensure that erosion is minimized during storm events, and they will be kept on-site at all construction sites, as well as in the construction contractors' offices. BRE and its contractors will implement the SWPPPs. In order to minimize damage to the land surface and property, they will limit the movement of crews and equipment to the Project site, including access routes, to that which is necessary for safe and efficient construction. When weather and ground conditions permit, deep ruts, scars, and compacted soils caused by construction will be loosened and levelled. Damage to ditches, roads, and other features of the land will be repaired. Water bars or small terraces will be constructed along access road ditches on hillsides to minimize water erosion and to facilitate natural revegetation.

Restoration and Reclamation. Roads, portions of roads, crane paths, and staging areas not required for O&M will be restored to the original contour and made impassable to vehicular traffic. Areas to be reclaimed will be contoured, graded, and seeded as needed to promote successful revegetation, to provide for proper drainage, and to prevent erosion. Seed mixtures used for reclamation of Phase II will likely be similar that used for Phase I and based on requirements or recommendations by WVDEP or specific requests by the landowner. BRE intends to maintain areas needed for O&M clear of trees.

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Contamination. Construction activities will be performed using standard construction BMPs so as to minimize the potential for accidental spills of solid material, contaminants, debris, and other pollutants. Excavated material or other construction materials will not be stockpiled or deposited within 305 ft of streams.

Waste Materials. No burning or burying of waste materials will occur at the Project site. The contractor will be responsible for the removal of all waste materials from the construction area. BRE will dispose of all contaminated soil and construction debris in approved landfills in accordance with appropriate environmental regulations.

Air Quality. All vehicles and construction equipment will be maintained to minimize exhaust emissions. Disturbed areas will be watered as necessary to suppress dust. Construction-related concrete batch plants will acquire the appropriate authorization for operation from the WVDEP Air Quality Office. Authorization will be acquired prior to the commencement of construction.

Noise. Effective exhaust mufflers will be installed and properly maintained on all construction equipment. BRE will require construction contractors to comply with federal limits on truck noise. BRE will require contractors to use pile-driving equipment that has the least noise impact and to restrict pile driving to weekdays between 7 a.m. to 7 p.m. Construction activities will take place mostly during daylight hours. Night-time construction work will be minimized, and when it does occur, it generally will be limited to relatively quiet activities. Construction during church hours will be limited. The affected community will be notified in advance of any blasting activity, and blasting will be limited to daylight hours and will follow all state and federal rules, regulations, and laws.

Cultural Resources. Pursuant to federal NHPA compliance, any effects to historic resources by the construction of the 33-turbine expansion and operation of the 100-turbine Project will be avoided, minimized, and mitigated using measures approved by the Service, in consultation with the SHPO, BRE, and other consulting parties (such as interested Tribes). BRE will be responsible for the cost of proper avoidance, minimization, and mitigation measures prescribed by the Service. BRE will be responsible for compliance with state requirements for cultural resource protection.

Similar to the MOA prepared for the Phase I Project (provided in Appendix K), BRE will enter into an MOA with the Service, WVDCH, WVPSC, interested tribes, and any other interested parties to address cultural resources issues associated with the Phase II 33-turbine expansion. These parties will execute the MOA prior to issuance of the final ITP. The consultation process defined in the MOA will be implemented after ITP issuance but prior to construction, including, but not limited to, completion of required archaeological surveys.

Vegetation. To minimize impacts to vegetation, BRE will implement BMPs during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored material, and re-vegetating areas as necessary. Plans to utilize existing roads within the Project area with little development of new access roads and the use of existing areas of previously disturbed land resulting from mining or construction activities for a portion of the turbine foundation sites will reduce vegetation impacts within the Project area. In addition, BRE will undertake the following measures.

- Surface disturbance will be limited to that which is necessary for safe and efficient construction.
- All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Removal or disturbance of vegetation will be minimized through site management (e.g., by utilizing previously disturbed areas, and designating limited equipment/materials storage yards and staging areas) and by scalping and reclaiming all disturbed areas not required for operations.

No construction or routine maintenance activities will be conducted when soil is too wet to adequately support construction equipment (i.e., if such equipment creates ruts in excess of 4 inches). Certified

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weed-free straw mulches, certified weed-free hay bale barriers, silt fences, and water bars will be used to control soil erosion. Soil erosion control measures will be monitored, especially after storms, and will be repaired or replaced if needed. Surface disturbance will be limited to that which is necessary for safe and efficient construction. All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements. Construction activities in areas of moderate to steep slopes (~15-20%) will be avoided, where possible.

BRE will use mechanical measures to control noxious weeds in all surface-disturbed areas. Equipment will be washed at a commercial facility prior to construction and on-site during construction if weeds are encountered in the Project area. No herbicides will be used to control vegetation.

Surface and Ground Water Protection. The Project has been designed to avoid direct impacts (both temporary and permanent) to surface water features. Two SWPPPs were prepared for the Project, and the WVDEP approved coverage under the Stormwater Construction General Permit.

Conditions contained in the permits require weekly inspections, as well as inspections after 0.5 inch or greater rainfall, and prompt reporting and repair of any problems with silt fences or other erosion control measures. Construction of the 33 additional turbines will be regulated and approved by the WVDEP. A specific SWPPP, NPDES Permit, and GPP will be submitted to and approved by the WVDEP for those activities associated with the construction of the additional 33 turbines prior to construction.

BRE has indicated that water withdrawal from streams for the purposes of dust control will be accomplished in a manner that preserves stream flows during withdrawal. Water will only be taken from local perennial streams and ponds.

BRE will continue to comply with all federal regulations concerning the crossing of Waters of the U.S., as listed in Title 33 CFR Part 323. The wind turbines and ancillary facilities will be built on ridges, which avoid the surface water features and designated floodplains. Wind turbines will not be placed in areas containing Waters of the U.S. Refuelling and staging will occur at least 91 m (300 ft) from the edge of a channel bank at all stream channels. Sediment control measures will be utilized. Vegetation disturbance will be limited to that which is necessary for construction. BRE will require that its contractors span riparian areas located along the transmission line ROW and avoid physical disturbance to riparian vegetation. Equipment and vehicles will not cross riparian areas on the ROW during operation or decommissioning activities. Existing bridges or fords will be used to access the ROW on either side of riparian areas. During construction of the additional 33 turbines, riparian areas will be avoided, where feasible. If avoidance is not feasible, activities within riparian areas will be conducted in conformance with WVDEP SWPPP requirements.

BRE developed a groundwater protection plan as part of the SWPPPs that will be implemented and kept on-site during all construction activities. A new plan, specific to the construction of the 33 additional turbines, will be developed in accordance with WVDEP regulations and included with the new SWPPP. Wind turbine locations will not impact the use of existing water wells because the turbines will not be sited within 500 ft of occupied structures.

The USACE will provide jurisdictional determination for Phase II upon receiving the final construction plans from BRE. It is likely that most, if not all, jurisdictional waters will be avoided. Once the layout for the 33 turbines has been finalized, an impact assessment will be submitted to the USACE, and the required authorizations and permits, including any mitigation and compensation, will be confirmed.

General Wildlife. Project construction will minimize fragmenting wildlife habitat through the use, where practical, of lands already disturbed. Tree clearing will be limited to that which is necessary for Project construction and to the period between November 15 and March 31 (outside the nesting season for most birds). With exception, up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14. Project construction will minimize the addition of new roads by using existing roadways. In addition, the Project has implemented the Avian Power Line Interactive Committee (APLIC

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1996) recommendations to ensure that designs will minimize raptor collision and electrocution risks associated with electrical generation, transmission, and distribution.

BRE consulted and coordinated with the Service and WVDNR to identify mitigation measures to minimize impacts to bats in general and migratory birds. BRE's RMAMP addresses post-construction monitoring for bats and birds (described briefly below and in detail in the Project HCP, Appendix C). This plan was peer-reviewed by bat experts, as well as reviewed by the Plaintiffs and by members of the TAC. BRE will conduct post-construction mortality monitoring in accordance with the requirements of the proposed ITP, as well as in accordance with separate requirements of the WVPSC siting certificate. The WVPSC siting certificate requires BRE to consult with the TAC to evaluate the results of post-construction monitoring and make recommendations to the WVPSC regarding the need for continued monitoring or changes to the monitoring strategy. If significant levels of bat or bird mortality occur, BRE shall apply proven cost-effective adaptive management measures to reduce such mortality. [It should be noted that the Service is not a member of the TAC. However, recommendations of the TAC or decisions by BRE or the WVPSC will not preclude the Service from exerting its independent regulatory authority with respect to the laws and regulations the Service enforces (e.g., ESA, MBTA, and BGEPA).

Avian Resources

Avoidance and Minimization Measures. The Project's APP (provided in Appendix B) focuses primarily on avoidance and minimization of impacts to birds through site selection and project design and construction. These measures include, but are not limited to, the following:

1. Siting the Project in a location that has not been identified as a major bird migration corridor or stop-over area;
2. Using previously disturbed areas and existing roads to minimize habitat loss and fragmentation;
3. Minimizing new road construction and width of road upgrades;
4. Conducting most tree clearing when birds are not nesting;
5. Surveying for and avoiding impacts to active nests;
6. Burying communication cables to avoid bird collisions;
7. Using raptor-safe transmission lines;
8. Using state-of-the-art turbine technology and lighting that minimizes bird collision risk (including unguyed tubular towers, slow-rotating upwind rotors, and red-flashing lights);
9. Minimizing lighting on buildings to avoid attracting birds to the site;
10. Controlling carrion on the Project site so as not to attract avian scavengers;
11. Using unguyed MET towers for the phase II expansion area;¹⁸
12. Monitoring bird mortality to determine its significance and to determine the effectiveness of the bat curtailment strategy in also reducing bird mortality; and
13. Implementing additional studies, operational changes, and habitat protection should significant bird mortality occur.

Post-Construction Monitoring and Adaptive Management. The WVPSC siting certificate issued for the Project required a post-construction eagle and osprey study to be conducted. Based on an agreement with the TAC, BRE will contribute to an ongoing eagle study conducted by West Virginia University to meet this requirement for eagles. BRE also conducted spring/fall 2011 and winter/spring 2012 surveys in the Phase I and Phase II Project areas to further address ospreys, eagles, and other raptors in the Project area.

¹⁸ Two existing MET towers for Phase I of the Project have guy wires. The Service has recommended that BRE install diverters or high-visibility markers on the wires to reduce bird mortality. BRE has declined to do so.

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As part of the Project's APP, BRE will implement a post-construction monitoring, adaptive management, and reporting program to estimate and evaluate avian mortality resulting from the Project. The program will follow the protocol presented in the Project's RMAMP (see Appendix C of the Project HCP).

BRE will analyze bird mortality monitoring data to address the following information needs:

1. Determine bird fatality rates for the Project.
2. Determine fatality rates for bird species of concern.
3. Compare estimated bird fatality rates to predicted fatality rates.
4. Evaluate bird fatalities within the project site in relation to site characteristics.
5. Compare bird fatality rates to those from existing projects in similar landscapes with similar species composition and use.
6. Determine the composition of fatalities in relation to migrating and resident birds at the site, and
7. Assess whether bird fatality data suggest the need for measures to reduce impacts.

In addition, BRE's O&M personnel will conduct weekly searches, year-round, for the presence of eagle carcasses and large-scale mortality events. During the HCP mortality monitoring period (April through November), O&M personnel will drive to all non-search turbines to check for readily-observable carcasses. Outside of the HCP monitoring period (i.e., December through March) O&M personnel will inspect areas around Project turbines for readily-observable carcasses.

BRE's adaptive management plan, presented in detail in the RMAMP (Appendix C of the Project HCP), includes evaluating baseline migratory bird mortality rates and effects of various turbine operational protocols on migratory bird fatality rates as well as for bats. The RMAMP includes multiple years of testing various turbine operational protocols and effects on estimated fatality rates. Monitoring will be conducted daily to evaluate relationships between bird fatality rates and weather. Monitoring will include investigations into probable causes of large-scale fatality events that could trigger the need for adaptive management, including weather events, turbine conditions, lighting, and other considerations.

The APP includes the following adaptive management thresholds and responses to significant events:

1. If documented fatalities are lower or not different than predicted and are not significant, no mitigation will be conducted.¹⁹
2. If fatalities are greater than predicted and are likely to be significant, BRE will meet and confer with the Service and the applicable actions presented below will be carried out. If a particular cause can be identified, BRE will develop specific mitigation measures in consultation with the Service to address the occurrence.

If a bald or golden eagle fatality occurs at the project, the following actions will be taken:

1. Working with a trained and permitted wildlife biologist, BRE will promptly identify and secure the carcass at the place of its discovery. BRE will obtain a global positioning system location and take at least three pictures of the carcass, including identifying characteristics, and placement of the carcass in relation to any project infrastructure. BRE will notify the Service prior to the removal and storage of the carcass unless Service personnel cannot be reached and the carcass will be compromised. The carcass will be properly stored after its discovery until it can be transferred to state or federal authorities.

¹⁹ While the LWEG indicate that no further monitoring is needed under this scenario, BRE has committed to life-of-project monitoring in Appendix C in the HCP and will continue to monitor and report on bird mortalities.

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2. BRE will notify the Service within one business day after the discovery of the eagle fatality.
3. BRE will meet and confer with the Service to investigate, using available data, the circumstances under which the fatality occurred.
4. BRE will work with the Service to evaluate available data concerning the event and, as appropriate, identify and implement avoidance or mitigation measures to reduce the risk of future mortalities.
5. BRE will conduct follow-up post-construction monitoring in the season in which the fatality occurred during the subsequent year of operations to assess whether avoidance or mitigation measures are effective at reducing impacts on eagles.

If new information becomes available that suggests that take of bald and/or golden eagles by the project is likely, BRE will investigate and implement measures to minimize this risk. In addition, should significant mortality of any bird species of concern occur, avoidance and minimization actions that may be taken under adaptive management include the following:

1. Removing/modifying the source(s) of bird attraction.
2. Implementing turbine operational protocols designed to reduce bird fatalities at turbines that data show are likely to take bald and/or golden eagles, or have shown higher than average fatality rates, including:
3. raising cut-in speeds (define cut-in speed, time of day, days of the year, turbines affected)
4. curtailment (define time of day, days of the year, weather triggers [e.g., storm front], biological triggers [e.g., fall migration for large flocks of a particular species], and turbines affected)
5. Implementing technological solutions. If bird mortalities exceed the above-defined adaptive management triggers and new techniques or technology become available that are cost-effective and feasible to implement, BRE will evaluate whether to replace or augment the measures detailed in the APP with these new approaches.
6. Negotiating with transmission line owners to retrofit power poles to adhere to APLIC guidelines (APLIC 2006).

The APP is based on the assumption that impacts to migratory birds can be effectively avoided and reduced through cost-effective operational adjustments. However, if during monitoring operational restrictions are not effective at avoiding and minimizing impacts and significant impacts to eagles or other migratory birds occur, then BRE will consider the potential for off-site mitigation to offset documented impacts, including possible off-site habitat preservation and/or restoration. The off-site mitigation project to be completed to mitigate impacts to Indiana bats (see Section 5.0 in the HCP) will also benefit migratory birds and thus may off-set a portion of any adverse effect from the project. Alternatively, if off-site mitigation is infeasible or ineffective and specific research needs addressing migratory bird mortality are identified, BRE could facilitate such research to take place as a form of mitigation.

3.2.2.3 *Beech Ridge Wind Energy Project Habitat Conservation Plan*

Covered Activities

This section provides a summary of Project-related activities for which BRE has requested a permit to authorize take of Indiana bat and Virginia big-eared bat. Covered Activities, as defined in Section 1.4 of the Project HCP and Section 2 of the Project IA, include the following:

1. Operation of the existing 67 turbines and to-be-constructed 33 turbines (100 turbines) for up to 25 years of the life of the Project. The physical operation of the turbines (spinning rotors and associated changes in air pressure in the rotor-swept area) may result in the take of covered species.

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2. Construction of 33 additional turbines and associated infrastructure, including, but not limited to, roads, staging areas, and a batch plant. Construction activities may take Indiana bats if such construction involves destruction of a tree with roosting Indiana bats.
3. Conversion of 124 acres of forested lands to grass/shrublands. An additional 21 acres will remain un-vegetated for the life of the Project.²⁰ Habitat conversion may affect suitable foraging habitat for Indiana bat.
4. Maintenance and decommissioning of the 100-turbine Project (and all associated facilities, including, but not limited to, the substation and transmission line). It is possible that maintenance or decommissioning activity (e.g., tree removal for safety reasons) could result in take of covered species, but this is unlikely.

Currently, the Project consists of 67 turbines that were brought online between April 1 and August 15, 2010. The final 33-turbine phase will be constructed after issuance of the ITP. Commercial operation of the final 33 turbines is expected to occur immediately upon completion of construction. BRE anticipates that the Project will be operated for up to 25 years.

Take of Covered Species

To estimate the amount of take of Indiana bats, BRE and the Service used the best available scientific information on little brown bats to inform a surrogate model. Based upon this model, BRE estimates that covered activities may take annually between 0 and 5 Indiana bats based on 100 turbines, or between 0 and 125 Indiana bats over the term of the 25-year permit, prior to implementing a turbine operation curtailment plan to reduce bat mortalities. Based on the Project's location at the edge of Virginia big-eared bat range, BRE estimated that covered activities may take annually between 0 and 1 Virginia big-eared bats based on 100 turbines, or an aggregate of approximately 14 individuals, over the life of the permit in the absence of avoidance and minimization strategies prior to implementing a turbine operation curtailment plan. Section 4.1.3 in the Project HCP provides a summary of the available information on little brown bats and an explanation of the surrogate model used to estimate take. Scientific information and details on the surrogate model used to develop the take estimates are provided in Section 4 of the Project HCP.

To avoid potential take of roosting Indiana bats, BRE will limit tree-clearing to the period between November 15 and March 31, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14. Tree clearing will occur in the expansion area (Figure 1-4). The additional 30 to 45 days are needed to provide BRE flexibility should weather, deep snow, or ice prevent clearing or create safety issues for construction workers. The clearing of up to 15 acres of trees outside of the hibernation period will be conducted within 5 years of the 2010 mist-netting survey, during which no Indiana bats were captured so as to reduce the likelihood of impacting roosting Indiana bats.

After accounting for the implementation of proposed Curtailment Plan, BRE submitted an ITP application requesting authorization of the take levels described below, which are based on the modeled annual take.

While testing the Curtailment Plan, BRE estimates the 100-turbine Project could take the following numbers of Indiana bats:

- up to 5 Indiana bats per year during years 1-3;
- up to 2.5 Indiana bats per year during years 4-25; and
- the aggregate take of up to 70 Indiana bats during the permit term (5 bats x 3 years + 2.5 bats x 22 years = 70 bats).

While testing the Curtailment Plan, BRE estimates the 100-turbine Project could take the following numbers of Virginia big-eared bats:

- up to 1 Virginia big-eared bats per year during years 1-3;
- up to 0.5 Virginia big-eared bats per year during years 4-25; and

²⁰ Construction of the 67 turbines for Phase I (336 acres of converted habitat and 50 acres permanently un-vegetated) is not a covered activity.

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- the aggregate take of up to 14 Virginia big-eared bats during the permit term (1 bat x 3 years + 0.5 bats x 22 years = 14 bats).

During years 1-3, BRE will develop baseline bat mortality estimates, i.e., mortality estimates from fully operational turbines (see Section 2.0 in the RMAMP) that will be used to judge success with meeting the biological goal of significantly reducing mortality of covered species and all bats in an effective manner consistent with the best available science (see Section 5.0 in the HCP and Section 2.0 in RMAMP).

BRE is requesting authorized take for this Project of an aggregate of 70 Indiana bats and 14 Virginia big-eared bats (based on adjusted fatality estimates) over the Permit Term, in which case BRE will not be out of compliance with the permit take authorization unless take exceeds these limits. However, given that bat mortality will undoubtedly vary during the Permit Term, 3 potential thresholds will trigger a meet and confer with the Service:

1. In any year, if Indiana bat adjusted fatality estimates exceed 5, or
2. In any given year, if Virginia big-eared bat adjusted fatality rate estimates exceed 1, or
3. In 3 consecutive years, if adjusted fatality estimates for all bats exceed the 90% confidence interval²¹ of baseline levels established during Years 1-3 of the ITP. Mean adjusted fatality rates will be determined for fully operational turbines; the means will have associated confidence intervals. If the mean rates documented in Years 4-25 exceed the 90% confidence intervals of the means established in Years 1-3, the threshold is met and further discussions will take place.

Avoidance, Minimization, and Mitigation Measures

BRE has defined the biological goals of the HCP as follows.

1. Significantly minimize bat mortality consistent with the best available scientific information.
2. Avoid/minimize potential take of covered species over the term of the ITP by implementing turbine operational protocols learned through the RMAMP in consultation with the Service.
3. Mitigate unavoidable impacts to covered species by implementing habitat restoration or protection measures in key Indiana bat habitats within the Appalachian Mountain Recovery Unit and in key Virginia big-eared bat habitats within the breeding population nearest the project.

To significantly minimize bat mortality consistent with the best available scientific information (Goal 1), BRE will:

1. Implement the RMAMP;
2. Determine baseline bat mortality conditions at the Project and identify turbine operational protocols that will reduce bat mortality during periods of high activity during the first 3 years of the ITP, and
3. Implement BRE's Curtailment Plan in an attempt to reduce bat fatalities using best management practices supported by science (Arnett et al. 2010; citing a reduction of bat fatalities of 44 to 93% when using specified cut-in-speeds).

To evaluate the effectiveness of minimization over the term of the ITP (Goal 2), BRE will implement the monitoring and adaptive management measures defined in the RMAMP. These measures are intended to detect take of the covered species and/or changes in bat mortality over the term of the ITP and to permit BRE to implement operational protocols to ensure that BRE does not exceed the authorized level of take of covered species provided in the ITP.

²¹ Confidence intervals are used to indicate the accuracy of the estimate, which is not the true value. The interval is used to illustrate how far the estimate is likely to be from the true value. In this particular case, the user, BRE, has selected a 90% confidence interval. Based on the sample evidence, this means that if the same population is sampled on numerous occasions and fatality rate estimates are made on each occasion, the resulting interval or range of fatality rates across multiple occasions would include the true value 90 times out of 100.

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To mitigate unavoidable impacts to covered species (Goal 3), BRE will select and implement habitat restoration and protection projects that satisfy specified mitigation criteria (provided below). To the extent such measures are not in place prior to a permit decision, BRE will establish a trust fund account to assure that mitigation is implemented within 2 years of ITP issuance.

On-Site Avoidance and Minimization Measures

Project Layout. The original design of the Project called for construction and operation of 124 turbines at the site. As a result of discussions and negotiations with environmental organizations as reflected in a January 26, 2010, settlement agreement, the Project was reduced from 124 turbines to 100 turbines. Using the same approach for estimating take applied in Section 4.1.3 of the HCP, the estimated potential take associated with a 124-turbine project would have been roughly 25% greater (6.25 Indiana bats per year) than the current proposed Project. Additionally, BRE eliminated previously permitted turbine sites within the eastern portions of the Project based on their proximity to known and historical Indiana bat hibernacula and the general area where many caves are located.

Project Construction. To avoid potential take of roosting Indiana bats, tree clearing for the 33-turbine phase will occur when Indiana bats are not expected to be within the Project area. BRE commits to limiting its tree clearing during construction of the expansion to the period between November 15 and March 31 when bats are not expected to be active in the Project area. As explained above, up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14.

Project Operations. Previous studies have documented that the majority of bat fatalities at wind turbines occur in low wind speeds during late-summer and fall migration periods (Arnett et al. 2008). There are 5 known turbine operation/bat fatality studies conducted to date (Baerwald et al. 2009, Arnett et al. 2010, Good et al. 2011, Young et al. 2011c; O. Behr, University of Erlangen, unpublished data). These studies indicate that the number of bat fatalities can be reduced by curtailing operations (raising cut-in speeds or partially feathering blades) at low wind speeds. Under the RMAMP, BRE will conduct similar studies to identify how turbine operational protocols can be used to reduce Indiana bat and all bat fatalities.

Curtailment Plan. To avoid and minimize take of covered species, BRE proposes to adjust the turbine cut-in speed on all Project turbines from 3.5 m/s (7.8 mph) to 4.8 m/s (10.7 mph) for a 12-week period from July 15 through October 15 each year and for the time of night commencing 30 minutes before sunset for a period of 5 hours (BRE's Curtailment Plan). BRE estimates that this avoidance and minimization strategy will reduce potential take of Indiana and Virginia big-eared bats by 50%.

Research, Monitoring, and Adaptive Management Plan

BRE will implement an RMAMP (see HCP, Appendix C) to develop an optimal Project operations regime for minimizing potential take of Indiana bat and Virginia big-eared bat. The overall goals of the RMAMP include the following aspects.

1. Evaluate the effectiveness of BRE's Curtailment Plan and other turbine operational protocols (e.g., changing turbine cut-in speeds during various times of the night) to achieve the biological goals of the HCP for reducing covered species and other bat mortality.
2. Use post-construction monitoring to:
 - a. refine estimates of the amount of all bat fatalities,
 - b. identify the circumstances and conditions under which fatalities occur (monitoring component), and
 - c. continue to determine the most effective operational protocols to achieve the biological goals of the HCP for reducing covered species and other bat mortality.
3. The first 3 years of the RMAMP will include intensive monitoring using methods for wind projects based on recommendations from the Wind Turbine Guidelines Advisory Committee (USFWS 2010), daily casualty searches at 30 Project turbines, and surveys to measure potential biases (searcher efficiency, carcass removal, carcass distribution). Intensive monitoring may continue beyond 3 years if HCP goals have not been met. Annual monitoring during interim years (see Section 3.2.4 in the RMAMP) will be less intensive but will involve formal carcass searches to be

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conducted weekly at 24 turbines. Mortality surveys will be conducted by trained personnel and will also be designed to ensure that avoidance/minimization strategies put in place during intensive studies are functioning effectively.

4. Evaluate the research and monitoring results to either deem the avoidance/mitigation strategies successful at achieving Biological Goals 1 and 2 or to refine the research and monitoring to attain the these goals. It is BRE's intent that the avoidance/minimization strategies will be deemed successful after Year 1; however, the adaptive management strategy contained in the RMAMP allows for modification to operational protocols to improve and refine the avoidance/minimization strategy in successive years of the ITP.

At the conclusion of 3 years of intensive monitoring, BRE will implement facility-wide the turbine operational protocols that best achieve the biological goals of the HCP for reducing bat mortality, including operating the Project so as to not exceed the aggregate incidental take limits of 70 Indiana bats and 14 Virginia big-eared bats.

In addition to the 3 years of intensive research and monitoring, annual monitoring will be completed as described in the RMAMP (see HCP, Appendix C). BRE has designed their annual monitoring to measure impacts to birds and bats from the facility and to confirm the occurrence of major changes in fatalities from the first 3-year intensive monitoring program. A major change is defined as a statistically significant increase in the mean adjusted fatality rates for all bat species from the mean adjusted fatality rates measured during the first 3 years of the intensive study (see Section 4.0 in the RMAMP). Annual monitoring will include weekly fatality monitoring in each year of the ITP to detect changes in all bat fatalities and to correlate annual monitoring with intensive monitoring results. In the event that a major change is documented during any year of the ITP, BRE will consult with the Service regarding the need for further intensive monitoring and implementation of additional avoidance and minimization measures. The Adaptive Management Process is described in detail in the RMAMP.

Off-Site Conservation

Details on implementing the conservation fund are described in Section 6.0 the Project HCP, including, but not limited to, payment terms, funding amounts, reporting, and administration. The objectives for off-site conservation and how they are to be achieved are discussed in this section.

To mitigate the effects of unavoidable incidental take of listed bats, BRE proposes to establish a habitat conservation fund used to support conservation efforts for Indiana bat and Virginia big-eared bats based on objectives specified in the 2 species Recovery Plans (Bagley 1984, USFWS 2007). The goal of these projects will be to contribute to the conservation of Indiana bats and Virginia big-eared bats by protecting priority habitat, either winter hibernacula or summer maternity colonies or roosts.

BRE has been working with the Service and WVDNR to identify 2 specific conservation projects suitable for mitigating unavoidable impacts to listed bats. A suitable off-site conservation area for the Indiana bat has been identified in West Virginia, but at this time BRE has not been able to complete the acquisition. So as to not to interfere with ongoing negotiations with the landowner, the specific location of the project is not being disclosed at this time. The site includes an extensive cave network occupied by Indiana and other bats, a river, and a high quality forest buffer of approximately 300 acres that occurs within a larger, intact forest ecosystem with high species diversity. The cave is not currently infected by WNS. In addition, a bat gating project to benefit Virginia big-eared bats also has been identified at a different location in West Virginia. BRE will continue to work with the Service and others to complete these mitigation projects. In the event that BRE is unable to complete these mitigation projects described above, BRE will pursue alternative mitigation projects in consultation with the Service. The characteristics of suitable mitigation are further described below. Both of the aforementioned projects meet these criteria.

In consultation with the Service, BRE has developed criteria for identifying acceptable conservation projects to be undertaken and completed within 2 years of permit issuance. Proposed Indiana bat and Virginia big-eared bat conservation projects will be evaluated based on the following guidelines, objectives, and criteria. The term "protection" is further defined in the HCP (Appendix H of Project HCP),

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including a detailed description of mandatory restrictions and provisions that must be included in any legal conveyance of a property-interest, in perpetuity.

Indiana Bat Mitigation

Option 1 – Funding Acquisition and Hibernaculum Protection. BRE may fund the protection (through fee title acquisition or conservation easement) of an Indiana bat hibernaculum and adjacent high-quality habitat that protects the hibernaculum in perpetuity from ongoing and future adverse threats and land management activities. Project criteria are as follows:

1. The project should be located within the Appalachian Mountain Recovery Unit.
2. The site should be a Priority 1, 2, 3, or 4 hibernaculum that supports Indiana bats. Preference will be for a hibernaculum that is not infected by WNS and currently supports multiple bat species and at least 70 Indiana bats.
3. In addition to the cave itself, a minimum 0.25-mi buffer around each entrance for the hibernaculum will be protected, which is approximately 126 to 160 acres, depending on circular or rectangular protection delineated in relationship to 1 opening as the central point. For a hibernaculum with multiple entrances, the main entrance will be the central point of protection. BRE will evaluate threats to entrances. Cave gates would be installed if it is determined that gates would remove or reduce threats. Depending on the context of the surrounding landscape, larger buffers may be warranted to remove threats to roosting and foraging habitat from logging, urban development, mining, road construction, and other activities.
4. BRE will conduct a threats-analysis of the hibernaculum to identify any proximal land management practices that may adversely affect bats in the cave. The threats analysis will utilize readily available, existing information or information available from the landowner regarding current and potential future conditions and activities within and surrounding the cave. Eliminating these kinds of threats will help to ensure bat survival in the cave and adequate habitat buffer such that bats leaving the cave do not have to travel far to find abundant roosting and foraging habitat.
5. Hibernaculum will have a non-federal landowner (public or private) who is willing to sell the property and/or a protective easement.
6. Focus will be on a hibernaculum that is not already in public ownership or has no perpetual protective easements in place.
7. If human activity poses a threat to bats in the cave, then entrances will be gated in conjunction with the easement or land acquisition.
8. New landowner or easement holder must be willing to protect and maintain the cave so that it continues to serve as a hibernaculum for bats.
9. Easement or land acquisition must account for all encumbrances (e.g., utility easements, mineral rights). The Service will evaluate the parcel to ensure any encumbrances do not defeat the purpose of the acquisition.
10. BRE will prepare a hibernaculum protection plan to be referenced in the conveyance document. Protection plan will identify measures necessary to protect hibernaculum.

Protecting a Priority 1, 2, 3, or 4 hibernaculum that supports Indiana bats and removing threats that affect survivorship will improve the chances for the long-term survival of the population in the cave to promote stability and perhaps growth. Protection of such caves in perpetuity would not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the Project.

Option 2 – Fund Acquisition and Protection of Maternity Colony and Enhancement of Roost/Foraging Habitat. In the event that Option 1 cannot be achieved, BRE will fund the acquisition or purchase of a conservation easement to protect Indiana bat maternity areas, including roosting or foraging habitat; implement silvicultural measures to create corridors between known roosting habitats; improve known foraging areas; or reforest woodlots (blocks of habitat). Project criteria are as follows.

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1. Mitigation projects will occur at sites that are known to be used by Indiana bats (i.e., documented roost trees present) or assumed to have a very high likelihood of being used based on proximity to known roosting, foraging sites (e.g., within 2.5 mi of known colonies).
2. Suitable habitat may consist of roosting or foraging habitat; reforestation of corridors between known roosting habitats, reforestation of foraging areas, or reforestation of woodlots (blocks of habitat).
3. Ability to manage a sustainable supply of roost trees (e.g., creating snags in areas where snags are limiting).
4. Mitigation projects must be contiguous habitat and in an amount agreeable to both the Service and BRE.
5. Mitigation projects will occur within the Appalachian Mountain Recovery Unit.
6. Projects will be conducted where summer habitat is located.

For Indiana bats, the average maternity colony size is 60 to 80 reproductive females (USFWS 2007). By protecting a known Indiana bat maternity colony and removing threats that affect survivorship, the long-term survival of the population in the maternity colony remains stable or potentially increases. Protection of such maternity colonies in perpetuity would thus not only increase the likelihood that bats in the maternity colony survive over time and continue contributing to the local population; it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm.

Option 3 – Fund Implementation of a Hibernaculum Gate. In the event that BRE can achieve neither Option 1 nor Option 2, BRE will fund an effort to gate a hibernaculum to protect Indiana bats from human disturbance in perpetuity. Hibernaculum criteria are as follows.

1. The cave will be located within the Appalachian Mountain Recovery Unit.
2. The cave must be a Priority 1, 2, 3, or 4 hibernaculum that is known to support Indiana bats. Preference will be for a cave that is not infected by WNS, supports multiple bat species, and supports at least 70 Indiana bats.
3. BRE will conduct a threats-analysis of the hibernaculum to identify any proximal land management practices that may adversely affect bats in the cave.
4. The cave will have a landowner (public or private) who is willing to allow the gate and can ensure implementation of a gate maintenance plan. The Service or their third-party will have future access to the site to monitor bat populations and bat use of the cave.
5. If there are multiple cave entrances for a hibernaculum, each entrance will be gated.
6. BRE will prepare a hibernaculum protection plan.

By protecting a Priority 1, 2, 3, or 4 hibernaculum that supports or has the potential to support Indiana bats and removing threats that affect survivorship, the long-term survival of the population in the cave remains stable or increases. Protection of such caves in perpetuity would thus increase the likelihood that bats in the cave survive over time. Protection of such caves in perpetuity would thus not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population, it would also help to offset the impacts of the potential take of the bats during the operation of the wind farm.

Virginia Big-Eared Bat Mitigation

To compensate for unavoidable impacts to Virginia big-eared bats, BRE will fund implementation of a gating project at a known hibernaculum to facilitate protection of Virginia big-eared bats from human disturbance in perpetuity. Project criteria are as follows.

1. The project will be located within the area occupied by the same genetically isolated population where the impact will occur.
2. The hibernaculum is known to support or capable of supporting at least 14 Virginia big-eared bats. Preference will be for caves that support multiple bat species.
3. BRE will conduct a threats analysis to determine that human activity is a threat to bats in the cave.

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4. The cave must have a landowner (public or private) who is willing to have the project implemented and can ensure implementation of the gate maintenance plan. The Service or their third party should have future access to the site to monitor bat populations and/or use of the cave.
5. If there are multiple cave entrances for a hibernaculum, each entrance will be gated.
6. BRE will prepare a cave gating plan.

By protecting a hibernaculum that supports Virginia big-eared bats and removing threats that affect survivorship, the long-term survival of the population in the cave remains stable or increases. Protection of such caves in perpetuity will not only increase the likelihood that bats in the cave survive over time and continue contributing to the local population, it would also help to offset the impacts of the potential take of the bats during the operation of the Project.

Management of Mitigation Efforts and Cost Estimate

BRE agrees that the annual management costs will cover property management tasks, including preserving general habitat functions for the species, maintenance and installation of cave gates to prevent human access (in the event the project is cave protection), timber management for roost trees (in the event the project is maternity habitat protection), and monitoring for species benefits.

Based on these estimates, BRE concludes that at a cost of \$785,500 or less, including transaction costs and a management fund, it could acquire or otherwise protect about 300 acres of suitable habitat that would result in the protection of more than 70 Indiana bats and other bats species per year, using current cave counts and other estimates. This amount of habitat would also be sufficient to protect an assemblage of maternity trees plus a buffer or a cave entrance or entrances plus a buffer. In addition, in the event the selected conservation project does not also benefit Virginia big-eared bat, BRE will provide \$25,000 to fund additional Virginia big-eared bat cave-gating projects.

HCP Reporting

During the term of the ITP, BRE will submit annual reports to the Service by February 15 of each year. These reports will track compliance with permit terms and conditions, as well as report on the effectiveness of measures to avoid, minimize, and mitigate adverse effects to Indiana and Virginia big-eared bats. In addition, during the first 3 years of post-construction monitoring, BRE will submit a report to the WVPSC and TAC twice each year containing the results of post-construction monitoring. BRE will send copies of these reports to the Service concurrently with their submittal to the WVPSC and TAC. These monitoring reports will be filed on or before January 30 and July 31 each year unless the WVPSC specifies otherwise.

Changed Circumstances

Changed circumstances refer to changes affecting a species or geographic area covered by an HCP that can reasonably be anticipated and that can be planned. As per the HCP Handbook (USFWS and NMFS 1996), the ITP applicant must discuss measures to address such changes over time, usually through adaptive management for the covered species. BRE has identified the following potential changed circumstances in advance and developed strategies for dealing with them. Hence, adjustments can be made as necessary without having to amend the HCP. Changed circumstances are described briefly below and in more detail in Section 8.2 of the Project HCP.

Impacts of WNS on covered species

The occurrence of WNS and declines in the Appalachian Mountain Recovery Unit of Indiana bat or in the rangewide population of Virginia big-eared bat constitute foreseeable changed circumstances that warrant consideration in the Project HCP. WNS has been confirmed in nearby bat populations, but it is difficult to predict at this time what the long-term effects of WNS will be on listed bats and all other cave-dwelling bats.

Related to WNS, this changed circumstance would be triggered by a specified reduction in the Appalachian Mountain Recovery Unit of Indiana bat and in the rangewide population of Virginia big-eared bat. The levels of reduction will be measured against the populations evaluated in the Service's Biological

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Opinion prepared at the time of the issuance of the ITP. The levels of reduction have not yet been determined at the time of publication of this DEIS because populations models are still under development. The levels of reduction will be determined by the time of publication of the final EIS.

In the event the Appalachian Mountain Recovery Unit of Indiana bats or the rangewide population of Virginia big-eared bat declines by an agreed amount below the population levels evaluated in the Biological Opinion issued by the Service for the ITP, then the Service will notify BRE of this circumstance, and the parties will meet and confer over potential changes to the HCP to address this changed circumstance. In the event take has not occurred or is unlikely to occur, no changes to the HCP will be required. However, if take has occurred and is reasonably certain to occur in the future, the parties will discuss the need for, and implement as appropriate, additional operational restrictions to avoid and/or minimize potential take.

Elevated Annual Take Due to Changing Environmental Conditions

The HCP has estimated that potential take of Indiana bats at the Project as a result of turbine operations could range up to 5.0 bats per year during research and development of avoidance/minimization measures and up to 2.5 bats per year after implementation of avoidance/minimization measures. The presence of Indiana bats in the Project area over the life of the permit is uncertain. Future Indiana bat occurrence may be influenced by the potential expansion or contraction of the species' range and local population size due to recovery actions or changes in habitat utilization as a result of WNS, climate change, or other factors. Hence, the distribution and occurrence of Indiana bat in or near the Project could change. Change in population could also include the establishment of a maternity colony near the Project. As a result, it is appropriate to plan for potential exceedence of take of 5.0 Indiana bats per year during the term of the ITP.

In the event that take of Indiana bats exceeds 5.0 in any year during Years 4 through 25 of the ITP, or if BRE, in consultation with the Service, has reason to believe that the aggregate take of covered species may be exceeded, BRE will notify the Service and confer over potential adjustments to its research study design. Discussions will include joint agreement on subsequent years to focus on those specific areas of the Project or time of year demonstrating the highest likelihood of take based on the new information. Through this process, BRE will intensively evaluate geographic areas of the site containing the species, including seasonal and temporal presence of the species, and it will develop and implement turbine-specific operational protocols to reduce take in these areas.

Listing of New Species

In the event of any future listing of bats or other species as threatened or endangered, BRE will confer with the Service over the need to amend the ITP as described in Section 8.4.2 of the Project HCP. In the event of a future candidate species designation, BRE will confer with the Service over the need to pursue an amendment of the Project HCP to include these as covered species and incorporate appropriate conservation measures.

Populations of cave-dwelling bats in the eastern and central U.S. are declining due to WNS and other factors. In particular, northern long-eared bat, eastern small-footed bat, and little brown bat have experienced declines in recent years due to a variety of factors. If one or more of these species becomes listed during the permit term, BRE will comply with the ESA and will avoid take or seek to include such newly listed species as covered species in the ITP. Such measures may include turning off turbines or other restrictions during the time of year and night when bats are active.

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Changed Technology/Techniques

Over the 25-year life of the permit, advances in wind turbine technology and techniques to avoid or minimize bat mortality are reasonably foreseeable. Over time, techniques that deter bats from collisions with turbines may prove effective in reducing bat mortality. Turbine configuration, new turbine and/or blade designs, or automated changes in turbine operation may also prove useful in reducing bat mortality at wind turbines. If new techniques or technology become available, are cost effective, feasible to implement, and meet the biological goals of the Project HCP, BRE will take action to apply them to the Project facility.

Indiana Bat Maternity Colony within 2.5 Mi of the Project Area

The Project area is located in an area surrounded by a matrix of second- and third-growth upland forest with small openings and forest roads. Such areas provide potential foraging habitat, travel corridors, and maternity roost trees for Indiana bats. Whereas summer mist-netting efforts did not capture Indiana bats in habitat close to the Project, Indiana bat-like calls were collected on acoustic detectors in the Project area during late-July in 2005 and 2010. The elevation and cold night-time temperatures characteristic of the Project area may reduce but do not eliminate the likelihood that maternity areas occur or will develop in the Project area. Hence, it is possible that a maternity colony exists or could develop within or near the Project area over the term of the permit. The presence of a maternity colony may increase the likelihood of take and exceed the amount of authorized take of Indiana bats.

Finding a reproductive female or young-of-the-year juvenile Indiana bat fatality while monitoring Project operations during the maternity season (May 15 to August 15) could indicate the presence of a maternity colony on covered lands. Such an event (maternity take event) may constitute a changed circumstance requiring additional surveys and further minimization measures. A single maternity take event occurring during the implementation of conservation and mitigation measures pursuant to changed circumstances shall be considered covered take under the ITP as long as BRE remains in compliance with the provisions of the HCP, Implementing Agreement, and the ITP. Prior to, and after a single maternity take event, take of males occurring at any time or a female or young-of-the-year occurring outside the maternity season (May 15 to August 15) shall remain authorized under the ITP as long as BRE remains in compliance with the condition of the HCP, Implementing Agreement, and ITP. The Service reserves the right under 50 CFR § 17.22(b)(8) to revoke the ITP in the event the permitted activity is found by to be inconsistent with the criterion set forth in 16 USC § 1539(a)(2)(B)(iv) and the inconsistency has not been remedied in a timely fashion.

Upon such an occurrence, BRE will immediately raise turbine cut-in speeds to 6.9 m/s (15.2 mph) from 0.5 hour before sunset to 0.25 hour after sunrise during the maternity season (May 15 to August 15) at all turbines within 5 mi of the turbine where the maternity take event occurred. Thereafter and in consultation with the Service, BRE will develop and implement final operational adjustments during the maternity season known to be effective in avoiding Indiana bat mortality. Results of a post-construction mortality study where cut-in speeds were tested showed an Indiana bat was killed when the cut-in speed was 5.0 m/s (Good et al. 2011). Take of *Myotis* bats may have occurred when turbine cut-in speed was 6.5 m/s (E. Baerwald, personal communication with BRE as cited in Project HCP).

If a maternity take event occurs, BRE will promptly notify the Service and implement surveys to determine if a maternity colony is present within 2.5 mi of the Project. Survey methods and efforts will be determined by BRE in consultation with the Service, and may include more than 1 year of surveys if the colony is not initially found. If a maternity colony is discovered within 2.5 mi of the Project and thereafter its existence is confirmed by the Service, BRE will evaluate Indiana bat movement in and around the maternity colony, assess the effects of Project operations on the maternity colony, and implement, as appropriate, operational adjustments to reduce risk to the maternity colony. If take has already occurred and the maternity colony is found, or if the colony is not found despite intensive searches and take occurs more than once during any rolling 10-year period, then BRE will consult with the Service and implement operational adjustments to reduce risk to the maternity area. (See Section 8.2.5 of the Project HCP for additional details).

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If a maternity colony is not found despite multiple years of intensive habitat searches and mist-netting, the Service may determine that it is unlikely that a maternity colony is present and that the additional maternity season restrictions on operations can be lifted.

3.2.2.4 Proposed Action Summary

Within the context of this Project, the Proposed Action meets the Service's purpose and need for providing a means to conserve the habitats and ecosystems of the Indiana bat and Virginia big-eared bat. The Proposed Action's compensation for the unavoidable Project impacts to covered species is to be achieved through suitable mitigation that will satisfy the goals and objectives outlined for the off-site conservation.

Alternative 2 would serve the Applicant's need to meet the requirements of the District Court Order that ruled that the Applicant obtain an ITP and implement an HCP to operate the Project at night during the bat-active season. In the absence of an ITP, the Project would be unlawful if take of either endangered bat occurred.

3.2.3 Alternative 3: Additional Covered Species Addressed in ITP and Habitat Conservation Plan

Under the Additional Covered Species Alternative, a 25-year ITP pursuant to Section 10 (a)(1)(B) of the ESA would be issued for the BRE Project. The Project would be constructed as described for the Proposed Action: the Phase II 33-turbines would be constructed, and all 100 turbines operated and eventually decommissioned. Like the other alternatives, Alternative 3 would implement a research, monitoring and adaptive management plan, as well an APP, to reduce bat and bird mortality. On-site or near-site protection and management of bat maternity areas would be implemented, as well as off-site protection of bat hibernacula (Table 3-1).

Under Alternative 3, the BRE HCP would include as covered species the Indiana bat, Virginia big-eared bat, and 3 additional bat species (little brown bat, northern long-eared bat, and eastern small-footed bat). These species would be treated as if they were listed; that is, avoidance, minimization, and mitigation measures would be implemented for these species as if they were currently listed under the ESA. Should these species be listed as endangered or threatened under the ESA within the period of the ITP (25 years), the ITP would automatically cover these species for take without requiring a permit amendment.

Because reproductive individuals of the 3 currently unlisted bat species have been detected on site in mist-nets, it is assumed the Project area provides maternity areas for these bats. Upon issuance of the ITP, project operations would be modified as described below (higher cut-in speeds) to avoid and minimize mortality of the 3 additional covered species and to reduce impacts to breeding individuals for the duration of the ITP (25 years). Habitat protection would include areas to benefit the 3 additional covered species, as well as the Indiana bat and Virginia big-eared bat. These avoidance, minimization, and mitigation measures would occur regardless of whether any of the 3 unlisted bat species are listed during the life of the permit.

Because of higher cut-in speeds, Alternative 3 would generate less electricity than the Proposed Action. Alternative 3 (100 turbines with 186 MW nameplate capacity) has the potential to generate a maximum of 1,184,000 MWh of electricity per year with operating restrictions, approximately 1.8 times more energy than the No action alternative (Table 3-1).

Habitat Assessment in the Project Area

Implementation of Alternative 3 would include mist-netting to locate maternity areas for each of the 3 unlisted bats. Qualified biologists would capture bats (preferably reproductive females and males), attach radio transmitters, and track the marked bats to identify roost sites and delineate foraging areas. Delineated habitats would be used to evaluate specific areas of the Project that may pose the greatest risks to covered species.

3.2.3.1 Modified Operations Protocol

Under this alternative, BRE's Curtailment Plan and RMAMP would be modified to implement a 6.5 m/s cut-in speed as opposed to 4.8 m/s as the initial rate for curtailment. Furthermore, all 100 turbines would operate at 6.5 m/s from 30 minutes before sunset through 15 minutes after sunrise during the period April 1 through October 15, which is the presumed period for which Indiana bats are active. Changing turbine cut-in speeds during this time would cover the full season of all bat activity around the Project, thus reducing potential take of covered species and all bat species. Curtailment studies in North America have shown that turbines with raised cut-in speeds between 5.0 m/s and 6.5 m/s and reduced rotor speeds (rpm) on calmer nights kill an average of 76% fewer bats (range of 50 to 87% reduction in overall bat mortality) than normally operating turbines over the course of one fall migration season (Baerwald et al. 2009, Arnett et al. 2011, Good et al. 2011).

If the Project's research and monitoring results show that this proposed Curtailment Plan does not reduce overall bat mortality by at least 76%, BRE would conduct additional research on further modifying operations until the goal of 76% is reached (e.g., use of higher cut-in speeds, bat deterrents, different turbine colors). On the other hand, if the Project's research and monitoring results show that this proposed Curtailment Plan reduces overall bat mortality by at least 76%, then BRE would have the option of operating the turbines in this way for the life of the Project or conducting additional research to determine if the same or better reduction in mortality could be achieved by modifying the Curtailment Plan to employ less restrictive operations. Less restrictive operations could include some combination of lowering the cut-in speed, reducing the length of the seasonal curtailment period (fewer days/year), reducing the nighttime hourly period (fewer hours/night), and curtailing specific turbines that pose the greatest risk to the 3 additional covered species (based upon locating maternity colonies, assessing habitat, and tracking bat activity patterns and habitat use with radio telemetry). Less restrictive operations would be adopted for the life of the Project only if they were demonstrated to achieve greater than or equal to 76% reduction in all bat mortalities.

Additionally, the Curtailment Plan would be modified to implement expanded avoidance and minimization measures to protect roosting and brooding sites within and proximal to the Project area should they be identified. The habitat assessment may identify roost/maternity sites occupied by any of the 3 additional covered species. If this is the case, the Curtailment Plan would be further modified to include a plan for curtailing specific turbines that pose the greatest risk to these additional covered species during the entire period bats are active (April 1 through November 15). First, turbines within a specified distance (agreed upon by BRE and the Service based on results of field study) of delineated summer roosting or maternity habitat would operate at a cut-in speed of 6.5 m/s. Second, turbines within a specified distance (agreed upon by BRE and the Service based on results of field study) of an identified active roost would not operate from July 15 to November 15. Because information is extremely limited on the commuting distances of these 3 species during the maternity season, specified distances between inoperative turbines and active roosts would be determined based on the results of telemetry studies to be performed for the additional covered species.

3.2.3.2 Habitat Protection

Habitat conservation measures would be implemented for Indiana bat and Virginia big-eared bat as described for the Proposed Action. Additional habitat protection measures would be implemented for the 3 additional covered species using the information derived from the field surveys described above (Section 3.2.3.1). The HCP would include measures to protect suitable roost/maternity habitat for the additional covered species on or near the Project site (if feasible). It is important to note that habitat protection measures implemented on or near the Project area may increase the incidence of bat use and, in turn, increase risks to bats.

If on-site or near-site protection is not feasible due to unwilling landowners or it creates an undesirable hazard to the species, then the HCP would include measures to protect suitable roost/maternity habitat or known hibernacula for the additional covered species off-site removed from the Project. In addition, BRE

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would enhance habitat by creating potential roost trees proximal to the nearest bat hibernacula. This habitat enhancement may provide an alternate site for roosting away from the Project.

3.2.3.3 *Alternative 3 Summary*

Alternative 3 meets the Service's purpose and need for providing a means to conserve the habitats and ecosystems depended on by the 5 covered species within the context of the Project. Alternative 3 includes compensation for the unavoidable Project impacts to covered species; compensation would be achieved through suitable mitigation that would satisfy the goals and objectives for on-site and off-site conservation. Alternative 3 meets the Service's purpose and need to ensure the long-term survival of the Indiana bat and Virginia big-eared bat through protection and management of the species and their habitat within the context of this Project. The revised curtailment protocol implements an initial cut-in speed of 6.5 m/s that has been demonstrated to reduce bat mortality by an average of 76% at other projects. This higher cut-in speed for those turbines proximal to known roost/maternity sites and identified suitable habitat is likely to increase the efficacy of avoidance and minimization measures for reducing take of covered species.

Alternative 3 would meet the Applicant's need to meet the requirements of the District Court Order that ruled that the Applicant obtain an ITP and implement an HCP to operate the Project at night during the bat-active season. In the absence of an ITP, the Project would be unlawful if take of any threatened or endangered bat occurred.

3.2.4 *Alternative 4: ITP with Full Implementation of Habitat Conservation Plan for Phase I Only*

Under Alternative 4, a 25-year ITP for Indiana and Virginia big-eared bats pursuant to Section 10 (a)(1)(B) of the ESA would be issued for operation and decommissioning of the existing 67-turbine Project; the Phase II 33-turbines would not be constructed. The Phase I Only Alternative would include the full implementation of the HCP as described for the Proposed Action. The curtailment measures would be the same as for the Proposed Action Alternative; however, the minimum number of listed bats protected at off-site mitigation sites would be less than the Proposed Action, commensurate with reduced mortality of listed bats under Alternative 4. Bat and bird mortality would be reduced by implementing the RMAMP and the APP. This alternative (67 turbines with 100.5 MW nameplate capacity) has the potential to generate a maximum of 832,000 MWh per year with operating restrictions.

For the 25-year term of the ITP, BRE would adjust the cut-in speed for all 67 turbines from 3.5 m/s (7.7 mph) to 4.8 m/s (10.6 mph) for the time of night from 30 minutes before sunset for 5 hours during the 12-week period from mid-July to mid-October (BRE's Curtailment Plan). Changing turbine cut-in speeds during this period of the year would help avoid key periods of bat activity around the Project, thus reducing potential take of covered species and all bat species. If research and monitoring results show that this proposed Curtailment Plan is not meeting the HCP's goals and objectives, BRE would modify the Curtailment Plan to employ more restrictive operations. However, BRE's Curtailment Plan would be modified only with the written agreement of Service.

This alternative would reduce the number of turbines BRE is proposing for the Project. Reducing the number of turbines would not necessarily eliminate the likelihood that Indiana bats or Virginia big-eared bats would be taken. A project of this size in proximity to known hibernacula still poses a likelihood of take of Indiana bats. However, the estimated number of bat fatalities would be lower for 67 turbines than that for 100 turbines, as described for the Proposed Action.

Alternative 4 would serve the Applicant's need to meet the requirements of the District Court Order that ruled that the Applicant obtain an ITP and implement an HCP to operate the Project at night during the bat-active season. In the absence of an ITP, the Project would be unlawful if take of either endangered bat occurred.

3.2.4.1 *Take of Covered Species*

Using scientific information on little brown bats to inform a surrogate model, BRE estimated that covered activities may take annually between 0 and 5 Indiana bats based on 100 turbines, or between 0 and 125 Indiana bats over the term of the 25-year permit, prior to implementing a turbine operation curtailment plan to reduce bat mortalities. Based on the Project's location at the edge of Virginia big-eared bat range, BRE estimated that covered activities may take annually between 0 and 1 Virginia big-eared bats based on 100 turbines, or an aggregate of approximately 14 individuals, over the life of the permit in the absence of avoidance and minimization strategies that include BRE's Curtailment Plan. Section 4 of the HCP provides a summary of the available information on little brown bats and the surrogate model used to estimate take. These estimates can be used to estimate potential take of covered species for the 67-turbine project. It is estimated that the 67-turbine project implementing the HCP would take annually between 0 and 3.4 Indiana bats and between 0 and 0.7 Virginia big-eared bats per year over the life of the project.

To avoid potential take of roosting Indiana bats, BRE will limit tree-clearing to the period between November 15 and March 31, except that up to 15 acres may be cleared between April 1 and May 15 or between October 15 and November 14. Tree clearing will occur in the expansion area shown on Figure 1-4. The additional 30 to 45 days are needed to provide BRE flexibility should weather, deep snow, or ice prevent clearing or create safety issues for construction workers. The clearing of up to 15 acres of trees outside of the hibernation period will be conducted within 5 years of the 2010 mist-netting survey, during which no Indiana bats were captured so as to reduce the likelihood of impacting roosting Indiana bats.

After accounting for the implementation of the proposed Curtailment Plan, BRE submitted an ITP application requesting authorization of the take levels described below, which are based on the modeled annual take.

While testing the Curtailment Plan, BRE estimates the 67-turbine Project could take the following numbers of Indiana bats:

- up to 3.4 Indiana bats per year during years 1-3;
- up to 1.7 Indiana bats per year during years 4-25; and
- the aggregate take of up to 47.0 Indiana bats during the permit term (3.4 bats x 3 years + 1.7 bats x 22 years = 47.0 bats).

While testing the Curtailment Plan, BRE estimates the 67-turbine Project could take the following numbers of Virginia big-eared bats:

- up to 0.7 Virginia big-eared bats per year during years 1-3;
- up to 0.3 Virginia big-eared bats per year during years 4-25; and
- the aggregate take of up to 14.0 Virginia big-eared bats during the permit term (0.7 bats x 3 years + 0.3 bats x 22 years = 9.0 bats).

During years 1-3, BRE will develop baseline bat mortality estimates, i.e., mortality estimates from fully operational turbines (see Section 2.0 in the RMAMP), that will be used to judge success with meeting the biological goal of significantly reducing mortality of covered species and all bats in an effective manner consistent with the best available science (see Section 5.0 in the HCP and Section 2.0 in RMAMP).

Under Alternative 4, the ITP would authorize take for this Project of an aggregate of 47 Indiana bats and 9 Virginia big-eared bats (based on adjusted fatality estimates) over the Permit Term, in which case BRE would not be out of compliance with the permit take authorization unless take exceeds these limits. However, given that bat mortality will undoubtedly vary during the Permit Term, 3 potential thresholds will trigger a meet and confer with the Service:

1. In any year, if Indiana bat adjusted fatality estimates exceed 3.4, or
2. In any given year, if Virginia big-eared bat adjusted fatality rate estimates exceed 0.7, or

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3. In 3 consecutive years, if adjusted fatality estimates for all bats exceed the 90% confidence interval²² of baseline levels established during Years 1-3 of the ITP. Mean adjusted fatality rates will be determined for fully operational turbines; the means will have associated confidence intervals. If the mean rates documented in Years 4-25 exceed the 90% confidence intervals of the means established in Years 1-3, the threshold is met and further discussions will take place.

Under Alternative 4, an ITP would be issued contingent upon implementation of the conservation plan set forth in the Project HCP, albeit with some degree of reduced mitigation measures for off-site conservation. Because the number of turbines would decrease, the estimate of take for Indiana bats and Virginia big-eared bats correspondingly would decrease. Off-site mitigation for these impacts to covered species would need to support 47 Indiana bats and 9 Virginia big-eared bats in perpetuity. The mechanisms for establishing off-site mitigation would be conducted as specified in Alternative 2.

3.2.4.2 Alternative 4 Summary

Alternative 4 meets the Service's purpose and need for providing a means to conserve the habitats and ecosystems depended on by the covered species within the context of the Project. Alternative 4 includes compensation for the unavoidable Project impacts to covered species; compensation would be achieved through suitable mitigation that would satisfy the goals and objectives for off-site conservation. Alternative 4 meets the Service's purpose and need to ensure the long-term survival of the Indiana bat and Virginia big-eared bat through protection and management of the species and their habitat within the context of this Project.

Alternative 4 would fulfill the Applicant's need to meet the requirements of the District Court Order that ruled that the Applicant obtain an ITP and implement an HCP to operate the Project at night during the bat-active season. In the absence of an ITP, the Project would be unlawful if take of either endangered bat occurred.

3.3 Alternatives Eliminated from Detailed Analysis

NEPA requires that federal agencies thoroughly consider and objectively evaluate all reasonable alternatives and briefly explain the basis for eliminating those alternatives that were not retained for detailed analysis (40 CFR 1502.14). Early discourse between the Service and BRE on potential minimization and mitigation measures resulted in an initial list of potential alternatives for achieving the purpose and need. Some of these alternatives were later determined to not meet the purpose and need, have potentially significant adverse impacts to air quality and climate, or have environmental impacts that would be similar to the proposed action. Other alternatives could not be legally undertaken, or were found to be lacking in sufficient protection for the covered species or other wildlife resources, or included conservation measures that were not practicable given the magnitude of potential effects. Therefore, a number of alternatives were considered but eventually dismissed from detailed analysis for reasons summarized below.

3.3.1 Full Project Build-Out, Unrestricted Operations, and No ITP/HCP

Under the Unrestricted Operations Alternative, an ITP pursuant to Section 10 (a)(1)(B) of the ESA would not be issued for development of the BRE Project, and an HCP would not be implemented. Phase II would be constructed as described for the Proposed Action. The facility would operate without seasonal or daily operational restrictions on the existing Phase I (67 existing wind turbines) and proposed Phase II (33 proposed turbines) project components. The Project would operate at the standard 3.5 m/s cut-in speed, the minimum wind speed at which turbines would generate electricity. In addition, BRE would

²² Confidence intervals are used to indicate the accuracy of the estimate, which is not the true value. The interval is used to illustrate how far the estimate is likely to be from the true value. In this particular case, the user, BRE, has selected a 90% confidence interval. Based on the sample evidence, BRE is confident that if the same population is sampled on numerous occasions and fatality rate estimates are made on each occasion, the resulting interval or range of fatality rates across multiple occasions would include the true value 90 times out of 100.

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forego all other conservation measures not otherwise required by the WVPSC siting certificate. BRE would forego establishment of a fund to facilitate conservation projects.

The Unrestricted Operations Alternative would not meet the Service's purpose and need for avoiding and minimizing take of Indiana bats and Virginia big-eared bats. As discussed above, BRE has estimated that the Project may result in the take of up to 5 Indiana bats and 1 Virginia big-eared bat per year. This alternative would not result in implementation of conservation measures that are rationally related to the potential level of take that could occur as a result of Project operations. Implementation of this alternative would include no conservation benefits to the Indiana bat and Virginia big-eared bat through habitat protection and enhancement of known Indiana bat habitat, or through research to locate unknown Indiana bat habitat.

This alternative would not meet the Applicant's need to meet the requirements of the District Court Order that ruled that the Applicant obtain an ITP and implement an HCP to operate the Project at night during the bat-active season. In the absence of an ITP, the Project would be unlawful if take of either endangered bat occurred.

In conclusion, the Unrestricted Operations Alternative is not a reasonable alternative to consider for detailed analysis in this DEIS.

3.3.2 ITP with Full Implementation of HCP and Reduced Permit Term

The Reduced Permit Term Alternative would be implemented as described for the Proposed Action with an ITP term for 10 years as opposed to 25 years. The RMAMP would also be modified to reflect implementation for a 10-year period. Upon nearing the end of the 10-year period, BRE would seek an extension of the ITP if they saw fit. The length of the renewal period would be decided at the time that BRE seeks the modification and would be based on the results of the RMAMP. At the time of the request for a permit renewal, greater certainty would be known about the effectiveness of turbine operational curtailment measures to reduce bat fatalities. The initial permit would authorize less take than the Proposed Action, but if renewed, would likely have similar long-term effects as the Proposed Action, including its adaptive management strategy.

Under this Alternative, an ITP would be issued contingent upon implementation of the conservation plan set forth in the Project HCP. Therefore, this alternative would meet the Service's purpose and need to provide a means to conserve the habitats and ecosystems depended on by the covered species within the context of the Project. The Reduced Permit Term Alternative also meets the Action agency goals of avoiding and minimizing take of Indiana bats and Virginia big-eared bats.

This alternative was dropped from further consideration because it is primarily a permit processing alternative that would not clearly reduce take over the long term, would create an additional administrative burden, and would likely have similar long-term effects as the Proposed Action Alternative. The annual review process outlined in the RMAMP, which would be implemented under any of the action alternatives, provides for a system of checks and balances for reducing uncertainty regarding the effectiveness of operational curtailment. This review process will implement procedures for evaluating the effectiveness of the HCP and ensuring that take levels specified in the ITP are not exceeded. Because it does not provide substantially different protection for listed bats beyond what is proposed in the retained alternatives, this alternative was dropped from consideration.

3.3.3 Alternative Project Location

Under this alternative, the Project would be sited at a different location to minimize potential for take of listed species. During the Project development process, BRE took into consideration environmental concerns, including listed species.

Alternative sites for the Project in the region are unlikely to eliminate the potential for impacts to listed species. Alternative high-elevation ridgelines within the nearby region would likely have similar potential

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for impacts to Indiana bats as the current site. Alternative high-elevation ridgeline sites also may have a low potential for affecting maternity colonies but have potential to impact migrating Indiana bats. Lower elevation sites could be closer to suitable maternity habitat and other non-industrial sites could have greater habitat impacts. Alternative sites could position the Project closer to occupied bat caves than the proposed site increasing the risks to bats. This would be particularly problematic for Virginia big-eared bat if the alternate site was closer to an occupied cave for that species.

Moving the Project to another high elevation location in West Virginia or another state would not necessarily eliminate the likelihood that Indiana bats or Virginia big-eared bats would be affected. BRE selected their proposed Project location because of its wind energy development potential. In BRE's application to the WVPSC, the Reasons for Siting and Siting Criteria Sections described the Beech Ridge site as an ideal location for siting a wind energy project due to available wind, access to the bulk transmission grid, willing land lease participants, site accessibility, compatible land use characteristics, and limited sensitive ecological resources (as indicated in the BRE Application to WVPSC, Sections Siting Rule 3.1.a.2 and Siting Rule 3.1.g.1.a).

This alternative was dropped from consideration because impacts would likely be the same or greater to listed bats as the Proposed Action. In addition, because Phase I of the Project is already built, it is not practicable to build the project in another location.

3.3.4 Alternative Energy Sources for Electricity Generation

Under this alternative, the Project would be constructed using a different technology to generate electricity. During the Project development process, BRE evaluated the potential for using coal and natural gas technologies to generate electricity in West Virginia. These technologies would have permitted BRE to build the Project at a specific West Virginia location in McDowell County that was further from known Indiana bat and Virginia big-eared bat habitat, consequently reducing the potential for take. However, using fossil fuels to generate electricity raises a significant number of additional potential environmental impacts, including significant concerns regarding air pollution and greenhouse gas emissions caused by fuel combustion and damage to water quality and wildlife habitat during fuel exploration and production. As noted in an October 2009 National Academy of Sciences report, "the life-cycle damages of wind power are small compared with those from coal and natural gas." Consistent with this conclusion, BRE determined that while using coal or natural gas technology for the Project may have reduced the potential for take of Indiana bats and Virginia big-eared bats, it would have significantly increased the Project's overall negative impacts on the environment. Additionally, BRE's purpose of and need for producing clean, renewable energy would not be achieved.

3.4 Alternatives Comparison

This section summarizes the evaluation of retained alternatives discussed in detail in Chapter 5 Environmental Consequences. Reasonable alternatives determined to avoid and/or minimize adverse effects to Indiana bats and Virginia big-eared bats and other resources were compared and contrasted based on results of the detailed analysis.

Table 3-4 summarizes the key environmental impacts projected to occur as a result of implementing the No-Action Alternative and each of the Action Alternatives. These impacts and others are presented in full detail in Chapter 5.0 Environmental Consequences.

The Service has not selected a preferred alternative for the proposed action at this time. The Service 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 Final EIS or Record of Decision.

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Table 3-4. BRE alternatives comparison.

Resource	DEIS Section No.	Alternative 1: No-Action Alternative – No-ITP/HCP	Alternative 2: Proposed Action - ITP with Full Implementation of HCP	Alternative 3: Additional Covered Species – ITP and HCP with Additional Measures and Restricted Project Operations	Alternative 4: ITP with Full Implementation of HCP for Phase I Only	Discarded Alternative: Unrestricted Operations for 100-Turbine Project – No ITP/HCP
Geologic Resources: Topography, Geology, and Soils	5.1	50 acres converted to built facilities and loss of soil productivity for life of Project.	124 acres of temporary disturbance; risk of soil erosion during construction and reclamation; 71 acres converted to built facilities and loss of soil productivity for life of Project.	124 acres of temporary disturbance; risk of soil erosion during construction and reclamation; 71 acres converted to built facilities and loss of soil productivity for life of Project.	50 acres converted to built facilities and loss of soil productivity for life of Project.	124 acres of temporary disturbance; risk of soil erosion during construction and reclamation; 71 acres converted to built facilities and loss of soil productivity for life of Project.
Noise	5.2	Short-term impacts from decommissioning; turbine noise at sensitive receptor locations estimated to be equivalent to measured ambient noise.	Short-term noise impacts from construction and decommissioning; turbine noise at sensitive receptor locations estimated to be equivalent to measured ambient noise.	Short-term noise impacts from construction and decommissioning; turbine noise at sensitive receptor locations estimated to be equivalent to measured ambient noise.	Short-term impacts from decommissioning; turbine noise at sensitive receptor locations estimated to be equivalent to measured ambient noise.	Short-term noise impacts from construction and decommissioning; turbine noise at sensitive receptor locations estimated to be equivalent to measured ambient noise.
Air Quality and Climate	5.3	Short-term effects due to equipment emissions for turbine decommissioning; up to ~639,000 MWh per year of emission-free energy; minor effects associated with maintenance vehicle emissions.	Short-term effects due to equipment emissions for turbine installation and decommissioning; up to ~1,542,000 MWh per year of emission-free energy; minor effects associated with maintenance vehicle emissions.	Short-term effects due to equipment emissions for turbine installation and decommissioning; up to ~1,184,000 MWh per year of emission-free energy; minor effects associated with maintenance vehicle emissions.	Short-term effects due to equipment emissions for turbine decommissioning; up to ~832,000 MWh per year of emission-free energy; minor effects associated with maintenance vehicle emissions.	Short-term effects due to equipment emissions for turbine installation and decommissioning; up to ~1,632,000 MWh per year of emission-free energy; minor effects associated with maintenance vehicle emissions.

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Resource	DEIS Section No.	Alternative 1: No-Action Alternative – No-ITP/HCP	Alternative 2: Proposed Action - ITP with Full Implementation of HCP	Alternative 3: Additional Covered Species – ITP and HCP with Additional Measures and Restricted Project Operations	Alternative 4: ITP with Full Implementation of HCP for Phase I Only	Discarded Alternative: Unrestricted Operations for 100-Turbine Project – No ITP/HCP
Water Resources: Groundwater, Surface Water, Floodplains, and Wetlands	5.4	67 turbines, O&M building, and other appurtenances result in 28 acres of impervious surface; surface water withdrawal for dust suppression during decommissioning (150,000 gallons per year for 1-2 years).	100 turbines O&M building, and other appurtenances result in 47 acres of impervious surface; well water withdrawal for cement mixing (290,000 gallons); surface water withdrawal for dust suppression during construction (1.8 to 2.7 million gallons for 1 year) and decommissioning (225,000 gallons per year for 2-3 years); increased risks of run-off and sedimentation into surface waters during construction.	100 turbines O&M building, and other appurtenances result in 47 acres of impervious surface; well water withdrawal for cement mixing (290,000 gallons); surface water withdrawal for dust suppression during construction (1.8 to 2.7 million gallons for 1 year) and decommissioning (225,000 gallons per year for 2-3 years); increased risks of run-off and sedimentation into surface waters during construction.	67 turbines, O&M building, and other appurtenances result in 28 acres of impervious surface; surface water withdrawal for dust suppression during decommissioning (150,000 gallons per year for 1-2 years).	100 turbines O&M building, and other appurtenances result in 47 acres of impervious surface; well water withdrawal for cement mixing (290,000 gallons); surface water withdrawal for dust suppression during construction (1.8 to 2.7 million gallons for 1 year) and decommissioning (225,000 gallons per year for 2-3 years); increased risks of run-off and sedimentation into surface waters during construction.
Vegetation	5.5	Project to occupy 50 acres of forest land for 25 years.	Construction to affect 124 acres of native vegetation; Project to occupy 71 acres of forestland for 25 years.	Construction to affect 124 acres of native vegetation; Project to occupy 71 acres of forestland for 25 years.	Project to occupy 50 acres of forest land for 25 years.	Construction to affect 124 acres of native vegetation; Project to occupy 71 acres of forestland for 25 years.

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Wildlife and Fisheries	5.6	Localized fragmentation; displacement of some terrestrial wildlife; 50 acres of forest converted to developed facility.	Construction will adversely affect small, slow-moving wildlife and create short-term disturbance to most terrestrial animals. Localized fragmentation; displacement of some terrestrial animals; 71 acres of forest converted to developed facility.	Construction will adversely affect small, slow-moving wildlife and create short-term disturbance to most terrestrial animals. Localized fragmentation; displacement of some terrestrial animals; 71 acres of forest converted to developed facility.	Localized fragmentation; displacement of some terrestrial wildlife; 50 acres of forest converted to developed facility.	Construction will adversely affect small, slow-moving wildlife and create short-term disturbance to most terrestrial animals. Localized fragmentation; displacement of some terrestrial animals; 71 acres of forest converted to developed facility.
Birds	5.7	No new habitat loss. Project operation predicted to kill ~10,000 birds for life of project. APP will implement measures to reduce bird mortality if significant.	Project construction would cause short-term displacement to most birds. Localized fragmentation; displacement of some forest birds; 71 acres of forest converted to developed facility. Project operation predicted to kill ~14,300 birds for life of project. APP will implement measures to reduce bird mortality if significant.	Project construction would cause short-term displacement to most birds. Localized fragmentation; displacement of some forest birds; 71 acres of forest converted to developed facility. Project operation predicted to kill ~14,300 birds for life of project. APP will implement measures to reduce bird mortality if significant.	No new habitat loss. Project operation predicted to kill ~10,000 birds for life of project. APP will implement measures to reduce bird mortality if significant.	Project construction would cause short-term displacement to most birds. Localized fragmentation; displacement of some forest birds; 71 acres of forest converted to developed facility. Project operation predicted to kill ~14,300 birds for life of project. No APP.

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Bats	5.8	No new habitat loss. Project operation would not harm or kill bats. No habitat protection or conservation measures implemented to benefit bats.	Project construction may affect suitable bat habitat. Project operation predicted to kill ~32,600 bats for life of project under the 4.8 m/s curtailment, particularly during migration; operational modifications implemented to reduce bat mortality; habitat protection and conservation measures implemented to compensate unavoidable effects to bats.	Project construction may affect suitable bat habitat. Project operation predicted to kill ~15,700 bats for life of project under the 6.5 m/s curtailment, particularly during migration; operational modifications implemented to reduce bat mortality; habitat protection and conservation measures implemented to compensate unavoidable effects to bats.	No new habitat loss. Project operation predicted to kill ~21,900 bats for life of project, under the 4.8 m/s curtailment, particularly during migration; operational modifications implemented to reduce bat mortality; habitat protection and conservation measures implemented to compensate unavoidable effects to 5 species of bats, including 3 currently unlisted species.	Project construction may affect suitable bat habitat. Project operation predicted to kill ~62,300 bats for life of project, particularly during migration; no operational modifications to reduce bat mortality; no habitat protection and conservation measures to compensate impacts to bats.

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Indiana Bat	5.8	Project operation would not harm or kill Indiana bats, No habitat protection or conservation measures implemented to benefit recovery of Indiana bats.	Project construction may affect suitable roosting habitat. Project operation has the potential to harm or kill 70 Indiana bats, particularly during migration; operational modifications implemented to reduce the likelihood of Indiana bat mortality; habitat protection and conservation measures implemented to compensate unavoidable effects to Indiana bats.	Project construction may affect suitable roosting habitat. Project operation has the potential to harm or kill 30 Indiana bats under the 6.5 m/s curtailment, particularly during migration; operational modifications implemented to reduce the likelihood of Indiana bat mortality; habitat protection and conservation measures implemented to compensate unavoidable effects to Indiana bats.	Project operation has the potential to harm or kill 39 Indiana bats, particularly during migration. Habitat protection and conservation measures would benefit recovery of Indiana bats.	Project operation predicted to kill 125 Indiana bats, particularly during migration. No curtailment. No habitat protection and conservation measures.
Virginia Big-eared Bat	5.8	Project operation would not harm or kill Virginia big-eared bats. No habitat protection or conservation measures implemented to benefit Virginia big-eared bats.	Project operation predicted to kill 14 Virginia big-eared bats during 4.8 m/s curtailment. Habitat protection and conservation measures implemented to compensate unavoidable effects to Virginia big-eared bats.	Project operation predicted to kill 6 Virginia big-eared bats under the 6.5 m/s curtailment, particularly during migration. Habitat protection and conservation measures would benefit recovery of Virginia big-eared bats.	Project operation predicted to kill 8 Virginia big-eared bats, particularly during migration. Habitat protection and conservation measures would benefit recovery of Virginia big-eared bats.	Project operation predicted to kill 25 Virginia big-eared bats. No curtailment. No habitat protection and conservation measures.

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Socioeconomics	5.9	Additional income derived from construction jobs; additional tax revenue for municipalities and school districts; opportunity to provide renewable electric power resulting in a stabilizing effect on electricity prices. No disproportionate effects predicted to occur for low-income or minority populations.	Additional income derived from construction jobs; additional tax revenue for municipalities and school districts; opportunity to provide renewable electric power resulting in a stabilizing effect on electricity prices. No disproportionate effects predicted to occur for low-income or minority populations.	Additional income derived from construction jobs; additional tax revenue for municipalities and school districts; opportunity to provide renewable electric power resulting in a stabilizing effect on electricity prices. No disproportionate effects predicted to occur for low-income or minority populations.	Additional income derived from construction jobs; additional tax revenue for municipalities and school districts; opportunity to provide renewable electric power resulting in a stabilizing effect on electricity prices. No disproportionate effects predicted to occur for low-income or minority populations.	Additional income derived from construction jobs; additional tax revenue for municipalities and school districts; opportunity to provide renewable electric power resulting in a stabilizing effect on electricity prices. No disproportionate effects predicted to occur for low-income or minority populations.
Land Use and Recreation	5.10	50 ac of managed forest replaced by utility development. No impacts to developed or nature-based recreational areas and associated visitor experiences.	71 ac of managed forest would be replaced by utility development. No impacts to developed or nature-based recreational areas and associated visitor experiences.	71 ac of managed forest would be replaced by utility development. No impacts to developed or nature-based recreational areas and associated visitor experiences.	50 ac of managed forest would be replaced by utility development. No impacts to developed or nature-based recreational areas and associated visitor experiences.	71 ac of managed forest would be replaced by utility development. No impacts to developed or nature-based recreational areas and associated visitor experiences.
Visual Resources	5.11	Moderate change in viewshed of ridgeline; no adverse impacts to sensitive visual resources.	Moderate change in viewshed of ridgeline; potential adverse impacts to sensitive visual resources.	Moderate change in viewshed of ridgeline; potential adverse impacts to sensitive visual resources.	Moderate change in viewshed of ridgeline; no adverse impacts to sensitive visual resources.	Moderate change in viewshed of ridgeline; potential adverse impacts to sensitive visual resources.

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Cultural Resources	5.12	No identified impacts to cultural resources.	Impacts to unknown archaeological resources to be avoided; adverse impacts to historic resources will be mitigated.	Impacts to unknown archaeological resources to be avoided; adverse impacts to historic resources will be mitigated.	No identified impacts to cultural resources.	Impacts to unknown archaeological resources to be avoided; adverse impacts to historic resources will be mitigated.
Communications	5.13	No impacts to telecommunications facilities. No adverse impacts to television and radio broadcasts, microwave transmission, and military radar.	No impacts to telecommunications facilities. No adverse impacts to television and radio broadcasts, microwave transmission, and military radar.	No impacts to telecommunications facilities. No adverse impacts to television and radio broadcasts, microwave transmission, and military radar.	No impacts to telecommunications facilities. No adverse impacts to television and radio broadcasts, microwave transmission, and military radar.	No impacts to telecommunications facilities. No adverse impacts to television and radio broadcasts, microwave transmission, and military radar.
Transportation	5.14	Short-term impacts to existing roads during decommissioning.	Short-term impacts to existing roads during construction and decommissioning.	Short-term impacts to existing roads during construction and decommissioning.	Short-term impacts to existing roads during decommissioning.	Short-term impacts to existing roads during construction and decommissioning.
Safety and Security	5.15	Potential adverse effects associated with turbine blade shear and ice throw are anticipated to be unlikely.	Potential adverse effects associated with turbine blade shear and ice throw are anticipated to be unlikely.	Potential adverse effects associated with turbine blade shear and ice throw are anticipated to be unlikely.	Potential adverse effects associated with turbine blade shear and ice throw are anticipated to be unlikely.	Potential adverse effects associated with turbine blade shear and ice throw are anticipated to be unlikely.