

SWCA

# Draft Environmental Assessment for the Heart of Texas Wind Project Habitat Conservation Plan

SWCA Project Number 34502

November 2016

**SUBMITTED TO:**

U.S. Fish and Wildlife Service  
10711 Burnet Road, Suite 200  
Austin, Texas 78757

**SUBMITTED BY:**

SWCA Environmental Consultants  
6200 UTSA Blvd.  
Suite 102  
San Antonio, Texas 78249



**DRAFT ENVIRONMENTAL ASSESSMENT  
FOR THE HEART OF TEXAS WIND PROJECT HABITAT  
CONSERVATION PLAN**

Prepared for

**U.S. Fish and Wildlife Service**  
10711 Burnet Road, Suite 200  
Austin, Texas 78757

Prepared by

**SWCA Environmental Consultants**  
6200 UTSA Blvd.  
Suite 102  
San Antonio, Texas 78249  
[www.swca.com](http://www.swca.com)

SWCA Project No. 34502

November 4, 2016

*This page intentionally left blank.*

# CONTENTS

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Project Background.....</b>	<b>3</b>
2.1. Project Description.....	3
2.2. Covered Activities and Permit Term .....	5
<b>3. Purpose and Need for the Proposed Federal Action.....</b>	<b>5</b>
<b>4. Alternatives Considered.....</b>	<b>6</b>
4.1. Alternative A (Preferred Alternative) .....	6
4.1.1. Avoidance and Minimization Measures.....	6
4.1.2. Mitigation Measures .....	8
4.1.2.1. Mitigation Ratios and Amount of Mitigation.....	8
4.1.2.2. Permanent Conservation .....	8
4.1.3. Monitoring and Adaptive Management .....	9
4.1.4. Reporting.....	9
4.1.5. Funding .....	9
4.1.6. Changed Circumstances .....	10
4.2. Alternative B (No Action).....	10
4.3. Alternatives Eliminated from Further Analysis .....	10
4.3.1. USFWS Considered Alternatives.....	10
4.3.1.1. Reduced Mitigation.....	10
4.3.1.2. Additional Mitigation.....	11
4.3.2. Applicant Considered Alternatives .....	11
<b>5. Environmental Setting.....</b>	<b>11</b>
5.1. Project Area .....	11
5.2. Regional Environmental Setting .....	12
5.3. Resources Considered for Detailed Analysis.....	12
5.3.1. Vegetation .....	13
5.3.2. General Wildlife.....	15
5.3.3. Black-capped Vireo (BCVI) .....	15
5.3.3.1. Life History .....	15
5.3.3.2. Habitat.....	16
5.3.3.3. Abundance and Distribution .....	16
5.3.4. State-Protected Species .....	18
5.4. Resources Not Considered for Detailed Analysis.....	18
5.4.1. Air Quality .....	18
5.4.2. Cultural Resources .....	18
5.4.3. Energy and Depletable Resource Requirements and Conservation Potential .....	19
5.4.4. Environmental Justice .....	19
5.4.5. Farmland and Soils.....	19
5.4.6. Geology.....	19
5.4.7. Land Use .....	20
5.4.8. Noise .....	20
5.4.9. Other Threatened, Endangered, or Candidate Species.....	20

5.4.10.	Other State-Protected Species.....	22
5.4.11.	Public Health and Safety.....	23
5.4.1.	Socioeconomics .....	23
5.4.2.	Visual and Aesthetic Resources.....	23
5.4.3.	Water Resources .....	23
<b>6.</b>	<b>Environmental Consequences.....</b>	<b>24</b>
6.1.	Analysis Framework .....	24
6.2.	Reasonably Foreseeable Projects.....	25
6.3.	Summary of Potential Impacts.....	26
6.4.	Effects Analysis .....	27
6.4.1.	Vegetation Communities.....	27
6.4.1.1.	Alternative A (Preferred Alternative) .....	27
6.4.1.2.	Alternative B (No Action).....	28
6.4.1.3.	Cumulative Effects.....	28
6.4.2.	General Wildlife.....	29
6.4.2.1.	Alternative A (Preferred Alternative) .....	29
6.4.2.2.	Alternative B (No Action).....	31
6.4.2.3.	Cumulative Effects.....	32
6.4.3.	Black-capped Vireo.....	32
6.4.3.1.	Alternative A (Preferred Alternative) .....	32
6.4.3.2.	Alternative B (No Action).....	35
6.4.3.3.	Cumulative Effects.....	35
6.4.4.	State-Protected Species .....	36
6.4.4.1.	Alternative A (Preferred Alternative) .....	36
6.4.4.2.	Alternative B (No Action).....	36
6.4.4.3.	Cumulative Effects.....	37
<b>7.</b>	<b>Conclusions .....</b>	<b>37</b>
<b>8.</b>	<b>References .....</b>	<b>38</b>

## FIGURES

<b>Figure 1.</b>	Location of the Proposed Project. ....	2
<b>Figure 2.</b>	Proposed design of the Project. ....	4
<b>Figure 3.</b>	NLCD land cover types for the Project Area. ....	14
<b>Figure 4.</b>	Suitable black-capped vireo habitat within the Project Area. ....	17
<b>Figure 5.</b>	Schematic of impact zones applied to the Proposed Project. ....	33

## TABLES

<b>Table 1.</b>	Mitigation Ratios for the Proposed Project .....	8
<b>Table 2.</b>	Land Cover Types within the Project Area.....	13
<b>Table 3.</b>	Federal Special Status Species Occurring in McCulloch County, Texas.....	21
<b>Table 4.</b>	State-Protected Species Occurring in McCulloch County, Texas.....	22
<b>Table 5.</b>	Summary of the Potential Environmental Consequences .....	26
<b>Table 6.</b>	Land Cover Types Affected by the Project* .....	27
<b>Table 7.</b>	Change in land cover within the cumulative Project Area from 2001 to 2011. ....	29
<b>Table 8.</b>	Standard Noise Levels of Commonly Used Construction Equipment .....	31

*This page intentionally left blank.*

# 1. INTRODUCTION

This Environmental Assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321-4327) regarding the proposed issuance of an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA or Act) to Heart of Texas Wind, LLC (the Applicant) for construction and operation of the Heart of Texas Wind Project (Proposed Project) located in McCulloch County, Texas. The Applicant submitted a Habitat Conservation Plan (HCP) that proposes actions to minimize and mitigate unavoidable incidental take of the endangered black-capped vireo (BCVI, *Vireo atricapilla*) (the “Covered Species”).

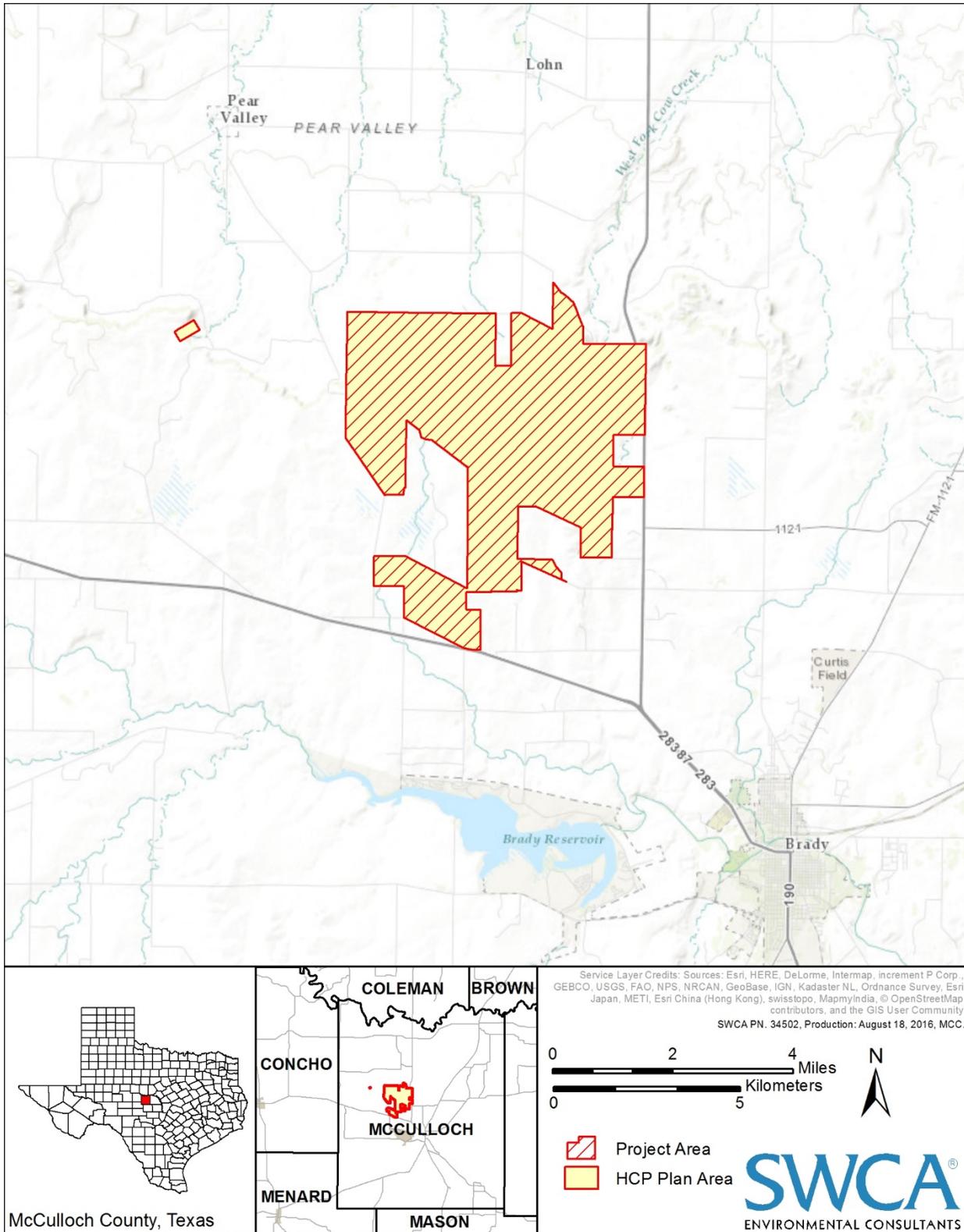
The requested ITP would provide exceptions to the prohibitions of take of the Covered Species that may result from specific otherwise lawful activities (the “Covered Activities”) for a period of 30 years. The Covered Activities include clearing for construction of turbine pads, access roads, underground medium voltage collection cables (MV collection cables), a substation, overhead high voltage transmission line, and other necessary infrastructure; installation of turbines and other infrastructure; and ongoing operations and maintenance of the Proposed Project within an approximately 10,808 acre site (Plan Area) located in McCulloch County, Texas (Figure 1).

Project actions would result in loss and temporary removal or modification of an estimated 725 acres of occupied BCVI habitat. The loss or degradation of this habitat could incidentally take BCVI via harm or harassment, as defined by federal regulation at 50 Code of Federal Regulations (CFR) 17.3. Take via directly killing or wounding individual BCVI is also possible albeit unexpected with the application of the Applicant’s proposed avoidance and minimization measures. The Applicant does not own the property that constitutes the Plan Area, but instead leases the use of the area from private landowners.

The Applicant’s HCP describes the Covered Activities associated with the Proposed Project and the measures the Applicant would take to minimize and mitigate the impacts of the proposed taking to the maximum extent practicable (SWCA Environmental Consultants [SWCA] 2016). Proposed conservation measures include seasonal clearing restrictions during BCVI breeding season, post-construction habitat restoration, and permanent conservation through one or more of the following options, as described by the U.S. Fish and Wildlife Service (USFWS 2013a): permittee-responsible mitigation lands, conservation banks, or third party mitigation lands.

Section 9 of the Act prohibits the “take” of federally listed species and defines take as any action that “harass[es], harm[s], pursue[s], hunt[s], shoot[s], wound[s], kill[s], trap[s], capture[s], or collect[s] such a species or to attempt[s] to engage in any such conduct.” The Act defines “incidental” take as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, and Section 10(a)(1)(B) provides for the issuance of ITPs to authorize such take. Under Section 10(a)(2)(A), any application for an ITP must include a “conservation plan” that details, among other things, the impacts of the incidental take allowed by the ITP on affected species and how the impacts of the incidental take will be minimized and mitigated.

This EA examines the impact that issuance of an ITP (Proposed Federal Action) and approval of the HCP is expected to have on the human environment.



**Figure 1.** Location of the Proposed Project.

## 2. PROJECT BACKGROUND

### 2.1. Project Description

The Proposed Project is a wind power generation facility located on approximately 10,762 acres of private land in McCulloch County, Texas. Figure 2 shows the anticipated layout of the Proposed Project; however, the final layout is subject to change within the Plan Area. The entirety of the Plan Area is included in the ITP.

Within the Plan Area, the Applicant would install up to 70 wind turbine generators capable of generating 2.0- to 3.5-megawatts each. Turbines would have a 110- to 130-meter rotor width, an 80- to 100-meter hub height, and operate at approximately 60 decibels (dBA) at the base. The Applicant would construct each turbine on a concrete spread foot foundation that is approximately 64 feet in diameter by approximately 9 feet in depth. Of this total, approximately one-third of the foundation (20 feet in diameter) would be above grade and consist of a concrete pedestal to attach steel tower sections that support the turbine. The remaining foundation would be constructed below ground, backfilled, and reseeded.

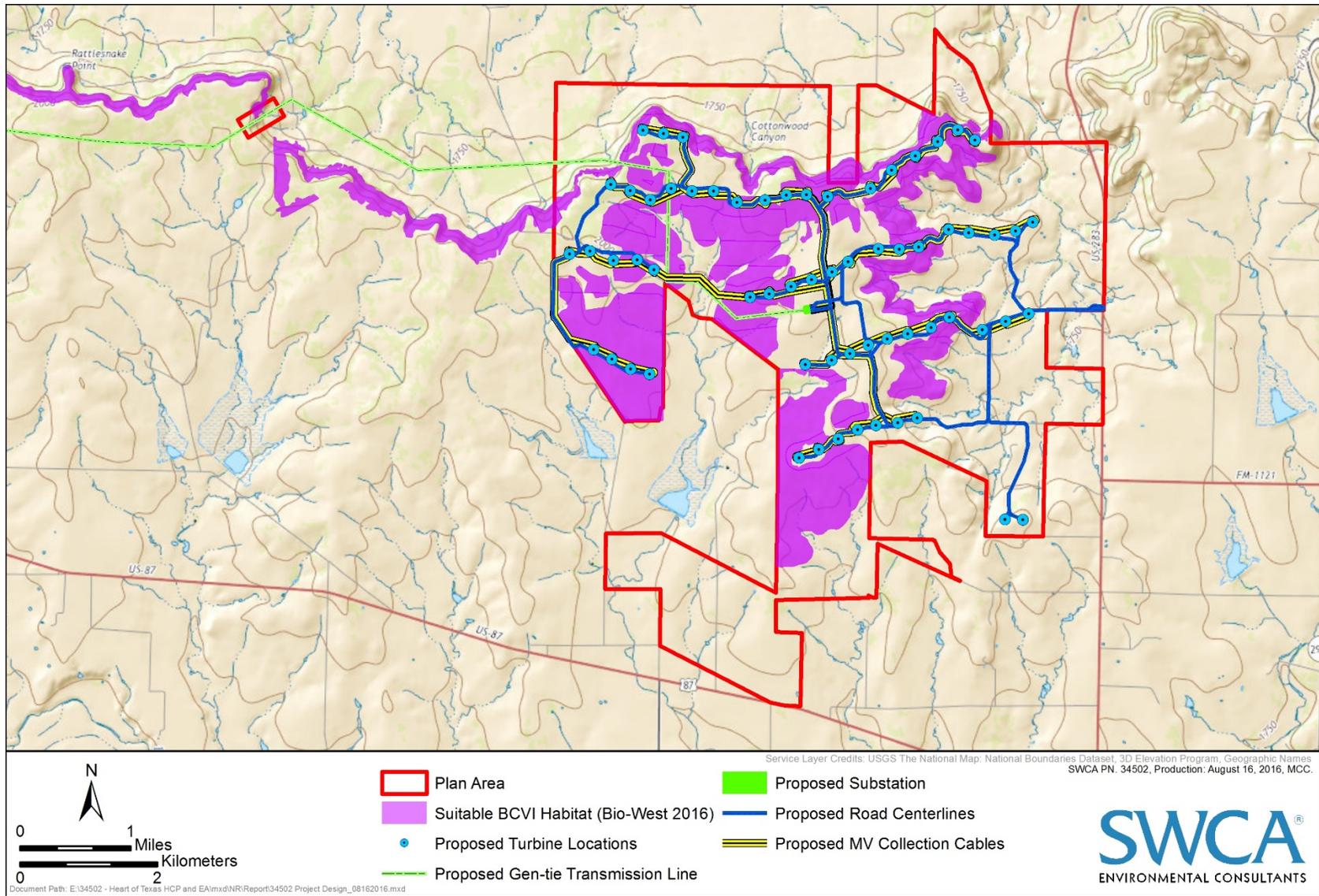
Temporary workspaces, with a radius of approximately 200 feet centered on each turbine, would also be required to facilitate construction. These workspaces would be cleared during construction and reseeded once construction is complete, if topsoil was disturbed.

Underground cables (“MV collection cables”) would collect power generated by the turbines. Where feasible, the Applicant would place MV collection cables along access roads. During construction of the Proposed Project, the Applicant would clear 30-foot-wide MV collection cable rights-of-way (ROWs). After construction, the Applicant would reduce the maintained ROW width to a maximum of 20 feet to allow for continued access.

The MV collection cables would transport power from turbines to a new substation constructed within a fenced, permanently cleared 5-acre (or less) area. Within the substation fence, the Applicant would install a medium voltage electrical bus, electrical protection equipment, metering, communication equipment, and a main power transformer. A 345-kilovolt overhead transmission generation tie line (Gen-tie Line) would transport power from the Proposed Project. The approximately 8-mile-long Gen-tie Line would connect to a switching station outside of the Plan Area to deliver power to the Electric Reliability Council of Texas (ERCOT) transmission system. Only approximately 3.8 miles of the proposed Gen-tie Line occurs within the Plan Area. The remainder of the Gen-tie Line occurs on adjacent lands.<sup>1</sup> The Applicant would require a cleared construction ROW of 100 feet to construct the overhead Gen-tie Line; this ROW would be maintained clear to facilitate access during operations.

---

<sup>1</sup> Only a small portion (+/- 2,000 feet) of the proposed Gen-tie Line outside of the Project Area occurs within 500 feet of potentially suitable BCVI habitat, as mapped by Bio-West (2016c). The Plan Area includes this segment of the proposed Gen-tie Line.



**Figure 2.** Proposed design of the Project.

The Applicant would use approximately 20 miles of improved or new access roads within the Plan Area for construction, operations and maintenance, and decommissioning activities. A 76-foot-wide cleared road ROW would be required during construction, which would be reduced to 16 feet after construction to allow for continued access. The Applicant would use existing private access roads to the extent practical. However, upgrades to existing roads or new road construction could be required to provide sufficient access to the Proposed Project. New roads would typically be constructed within a 40-foot-wide cleared ROW to allow for movement of the main erection crane. Upon the completion of construction, the permanent road would be reduced to 16 feet in width, with 3- to 4-feet of drainage ditches on either side. Disturbed areas (including drainage ditches) would be hydro-seeded with native grasses.

The Applicant would develop and implement a Bird and Bat Conservation Strategy (BBCS) to document its actions to avoid, minimize, and compensate for potential impacts to birds and bats during the design, construction, and operation of the Project. The BBCS would be prepared within one year of ITP issuance and would describe how the Applicant has and would adhere the 2012 voluntary Land-based Wind Energy Guidelines prepared by the USFWS (USFWS 2012). The Applicant would coordinate with the USFWS, as appropriate, in the development of the BBCS and to share findings from monitoring activities.

## **2.2. Covered Activities and Permit Term**

The USFWS is considering issuance of a 30-year permit to authorize incidental impacts to Covered Species associated with the construction, operation, maintenance, mitigation, and decommissioning of the Proposed Project. Covered Activities include, but may not be limited to: the removal or modification of vegetation; installation and removal of wind turbines and pads; construction of new access roads; upgrade or improvement of existing access roads; installation and removal of MV collection cables; construction and removal of substations and similar structures; operation and maintenance of the Project (including emergency repairs and responses); restoration of soils and vegetation in disturbed areas; and beneficial management and monitoring activities within permittee-responsible conservation lands, if applicable. If a 10(a)(1)(A) scientific research and recovery permit is issued for activities that may be needed to manage any permittee-responsible conservation lands established under this HCP, then duplicate coverage under the ITP associated with this HCP would not be needed.

## **3. PURPOSE AND NEED FOR THE PROPOSED FEDERAL ACTION**

The Proposed Federal Action considered in this EA is issuance of the ITP under Section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA) to the Applicant to authorize incidental take of BCVIs that may result from Covered Activities.

The USFWS's need for action is to respond to the Applicant's HCP and application for an ITP related to activities that have the potential to result in take of BCVIs, pursuant to the ESA Section 10(a)(1)(B) and its implementing regulations and policies. The USFWS's purpose in considering the Applicant's application is to ensure that the HCP complies with the USFWS's addendum to the *Handbook for Habitat Conservation Planning and Incidental Take Permitting Process* (also known as the 5-point policy; USFWS 2000) and that the HCP meets the legal criteria for issuance of an ITP. As a condition of receiving an ITP, an Applicant must prepare and submit to the USFWS for approval an HCP containing the mandatory elements of Section 10(a)(2)(A). An HCP must specify the following:

- The impact that would likely result from the taking

- What steps the Applicant would take to minimize and mitigate such impacts, the funding available to implement such steps, and the procedures to be used to deal with unforeseen circumstances
- What alternative actions to such taking the Applicant considered, and the reasons why such alternatives are not proposed to be utilized
- Such other measures that the Secretary may require as being necessary or appropriate for the purposes of the plan

## **4. ALTERNATIVES CONSIDERED**

This EA examines the impact that issuance of an ITP (Proposed Federal Action) and approval of the HCP is expected to have on the human environment. With respect to this EA, the USFWS identified two alternatives for consideration:

- Alternative A (Preferred Alternative) – Issuance of the requested Section 10(a)(1)(B) ITP contingent on the implementation of the Heart of Texas Wind Project HCP
- Alternative B (No Action) – An ITP pursuant to Section 10(a)(1)(B) of the ESA would not be issued by the USFWS, and the USFWS would not approve the Applicant’s HCP

These two alternatives are discussed in the following sub-sections of this chapter and are analyzed in chapters 5 and 6 of this EA. Section 4.3 reviews alternatives that were considered but eliminated from detailed analysis, along with an explanation of why these alternatives were dismissed from consideration.

### **4.1. Alternative A (Preferred Alternative)**

Alternative A (Preferred Alternative) is the USFWS’s Proposed Federal Action of issuance of a Section 10(a)(1)(B) 30-year ITP (from the date of issuance) to the Applicant to authorize incidental taking of BCVIs that may result from Covered Activities. Covered Activities are discussed in Section 2.2 of this EA and Section 4.0 of the HCP.

Authorization of take under this alternative, as described in Chapter 5 of the HCP, would be measured in terms of the loss or modification of 725 acres of occupied BCVI habitat. With the issuance of a Section 10(a)(1)(B) ITP, the Applicant would implement the HCP to minimize and mitigate the impacts of the potential take. The implementation of the HCP would include avoidance, minimization, and mitigations measures, as summarized in Sections 4.2.1 and 4.2.2, below.

Under Alternative A (Preferred Alternative), the purpose and need for the Proposed Federal Action would be satisfied. The USFWS would have the assurance that the Applicant would implement measures to minimize and mitigate for impacts of any potential taking of BCVIs to the maximum extent practicable.

#### **4.1.1. Avoidance and Minimization Measures**

During Proposed Project design, potential take associated with the Covered Activities was minimized by micro-siting the locations of wind turbines and other infrastructure so that the Proposed Project would impact as little suitable BCVI habitat as practicable. Under Alternative A (Preferred Alternative), the following measures would also be implemented during construction, operation, and maintenance to further minimize impact to BCVI (see HCP Section 6.2 for additional details):

- Observe seasonal clearing restrictions, except in emergency situations, in areas of suitable BCVI habitat so that habitat is only removed during the non-breeding season between September 1 and March 14.
- Initiate all clearing between September 1 and March 1 to minimize potential harassment of BCVI that may return early.
- Observe speed limits of 20 miles per hour (mph) for all Proposed Project-related personnel in areas of suitable BCVI habitat within the Project Area during the BCVI breeding season (between March 15 and August 31). The Applicant would place signage along private access roads to alert personnel of the restriction.
- Allow BCVI habitat removed during construction to regrow where further vegetation or ground disturbance during operation of the facility is not necessary. The Applicant would use industry standard best practices for restoring disturbed vegetation and soils after construction, including:
  - removing temporary structures and materials, such as site trailers, pad base, and underground cables;
  - ripping soils compacted by vehicles and equipment with a grader and tractor;
  - replacing stored top soils onto de-compacted areas;
  - broadcast seeding, hydromulching, or drill seeding (as appropriate based on soil type) grasses over restoration areas;
  - follow-up inspections to confirm compliance with restoration specifications, that typically include 70% seed growth after 2 weeks; and
  - punch-list rework to address any areas that do not meet specification.
- Treat red-imported fire ant (*Solenopsis invicta*) mounds within the BCVI habitat restoration areas on a quarterly basis for one year following construction with a selective fire ant bait insecticide that is labeled for use in agricultural sites.
- Restrict non-emergency maintenance and repair activities within 300 feet of suitable BCVI habitat that involve heavy equipment or large vehicles to the non-breeding season between September 1 and March 14. The USFWS may lift this restriction if the Applicant demonstrates with a presence/absence survey conducted in accordance with USFWS protocols during the same BCVI breeding season as the planned activity that BCVI do not use suitable habitat within 300 feet of the limits of the planned activity.
- Train Proposed Project-related personnel and on-site staff or contractors prior to their start of work in the Plan Area to be aware of and properly implement HCP-required restrictions and other conservation measures as soon as practicable prior to the start of construction. As part of this measure, the Applicant would prepare a training packet that describes the basic identification and biology of the BCVI, the regulatory status of the BCVI and requirements of the ESA, and the on-site conservation measures described herein. Training would also occur as necessary over the duration of the Proposed Project to orient new personnel prior to their start of work in the Plan Area.

## 4.1.2. Mitigation Measures

### 4.1.2.1. MITIGATION RATIOS AND AMOUNT OF MITIGATION

All suitable BCVI habitat within the Plan Area that is directly or indirectly impacted by the Covered Activities would be off-set by mitigation. Consistent with other BCVI HCPs approved by the USFWS, proposed mitigation ratios consider the relative magnitude of Proposed Project impacts to BCVI, given the ecological differences between direct vs. indirect impacts; long-term vs. short-term habitat loss; and whether suitable BCVI habitat has demonstrated use by the species (Table 1). On the basis of the 2016 presence/absence survey results (Bio-West 2016a) and in coordination with USFWS, this EA assumes that all suitable BCVI habitat within the Plan Area is occupied by the species unless additional data becomes available to refine this assessment, which would require review and approval by the USFWS. If for some reason the Applicant chooses to complete additional presence/absence surveys, the Applicant would coordinate with the USFWS on the areas to be surveyed and how the results of the survey affect the mitigation amount.

**Table 1.** Mitigation Ratios for the Proposed Project

	Acres of Suitable BCVI Habitat Impacted	Occupied or Presumed Occupied (Unsurveyed) Habitat	Surveyed Suitable Habitat without Demonstrated Occupancy
<b>Direct Habitat Loss</b>	122.39		
Long-term Loss	30.53	2:1	1:1
Short-term Loss	91.86	1:1	0.5:1
<b>Indirect Habitat Modification</b>	602.62	0.5:1	0.25:1

The mitigation ratios in Table 1 would be used to calculate the amount of permanent BCVI conservation needed to offset take. The actual amount of mitigation provided by the Applicant would depend on the final layout of the Proposed Project. However, under current Proposed Project understanding, the Applicant would provide up to 454 acres of permanent BCVI conservation (see HCP Sections 5.1.3 and 6.3.3 for details). The Applicant would implement the required mitigation prior to conducting Covered Activities.

### 4.1.2.2. PERMANENT CONSERVATION

The USFWS would review the mitigation package provided by the Applicant, which would be provided prior to construction and in a form consistent with USFWS guidelines for the establishment, management, and operation of BCVI mitigation lands (USFWS 2013a).

In general, mitigation would occur in areas of suitable BCVI habitat with demonstrated occupancy that are permanently protected from land uses or activities not compatible with the conservation of the species (at least to the extent that the ability to restrict such uses is within the control of the mitigation provider). Mitigation lands would be managed to minimize or alleviate other threats and regularly monitored to support adaptive management practices. The delivery of mitigation by the Applicant would involve one or more of the following options, as described by the USFWS (2013a): permittee-responsible mitigation lands, conservation banks, or third party mitigation lands. The Applicant could choose to use one or more of these options to satisfy its mitigation obligations, subject to USFWS approval.

If the Applicant opts to implement its own permittee-responsible mitigation or work with a third party to implement a specific conservation transaction, the Applicant would coordinate with USFWS to provide the necessary documentation, real estate assurances, and financial assurances specified in the USFWS mitigation guidance (USFWS 2013a) that are necessary to secure USFWS approval for the establishment of a BCVI preserve. Currently, this is the Applicant's preferred mitigation option and the Applicant is pursuing a conservation opportunity within the Plan Area.

If the Applicant opts to purchase BCVI conservation credits from a USFWS-approved third-party conservation bank, the Applicant would negotiate purchase prices and other details of the credit transaction directly with the conservation banker. If necessary to purchase credits from a conservation bank that does not include the Plan Area in its primary service area, the Applicant would coordinate with the USFWS to obtain any required approvals.

### ***4.1.3. Monitoring and Adaptive Management***

The USFWS would receive annual reports from the Applicant that disclose the results of both compliance monitoring and effectiveness monitoring (USFWS 2000; see Section 4.1.4). To measure the effectiveness of habitat restoration measures, the Applicant would evaluate BCVI habitat conditions the fifth year following implementation of the post-construction habitat restoration measures. The habitat evaluation would determine whether restored conditions meet the definition of suitable BCVI habitat, as described in Campbell (2003). Results from this habitat evaluation would be provided to the USFWS during annual reporting. The implications of the habitat evaluation on possible changes to the conservation program are discussed as a changed circumstance (see Section 4.1.6).

Additional monitoring would occur at the mitigation site in accordance with the management plan associated with the mitigation option pursued.

Adaptive management would also be incorporated into the operating conservation program based on the form of permanent BCVI conservation chosen. Details on this topic can be found in HCP Section 6.4.2.

### ***4.1.4. Reporting***

Over the duration of the ITP, the USFWS Austin Ecological Services Field Office would receive a report of HCP-related activities from the Applicant by February 28 of each year. This annual report would document the implementation of HCP-related activities, the outcome of monitoring activities both on the Plan Area and within any mitigation site, and any measures taken in response to changed circumstances conducted during the preceding calendar year.

### ***4.1.5. Funding***

The total cost to implement the HCP, including funds set aside to address contingencies and changed circumstances, is estimated at approximately \$5,684,985 (see HCP Section 9.0 for a detailed cost breakdown). However, this cost estimate may represent the high-end of potential costs for implementing this HCP, as some portion of "short-term" habitat losses are likely to remain so; emergency responses that remove or may remove active BCVI nests are unlikely to occur; and additional micro-siting is likely to reduce impacts to BCVI habitat.

The Applicant would incur most of these costs prior to the start of Covered Activities and any incidental take, including all costs associated with the implementation of the mitigation measures. Only the costs associated with installing signage for speed limits, ongoing reporting and coordination, effectiveness monitoring, and contingency funding would occur after Covered Activities have begun and incidental take

may have occurred. To assure the USFWS that the funding for these post-take operational measures is available, the Applicant would set aside \$37,000 in a separate banking account prior to the start of Covered Activities or issue a letter of credit to a third party for that amount. To assure the USFWS that additional mitigation for the contingency and emergency responses is available, the Applicant would also either secure up to an additional 110 acres of permanent BCVI conservation lands prior to the start of Covered Activities or set aside \$1,102,185 in a separate banking account or via issuance of a letter of credit to a third party.

Use of any funds set aside for this purpose would be restricted to HCP implementation. The Applicant could repurpose unused contingency funds or acres after any changed circumstances related to the restoration of short-term habitat losses or emergency responses have been resolved.

#### **4.1.6. Changed Circumstances**

The HCP identifies provisions to address potential changes in circumstances that could affect BCVIs (e.g., a change in project design or documented BCVI collision fatality at a wind power facility). If circumstances were to change, the Applicant would implement the changed circumstances provisions included in the HCP (HCP Section 8.1).

### **4.2. Alternative B (No Action)**

NEPA requires evaluation of a “no action” alternative, which serves as a baseline for comparison of potential project effects. Under the No Action Alternative for the Proposed Project, an ITP pursuant to Section 10(a)(1)(B) of the ESA would not be issued by the USFWS, and the USFWS would not approve the Applicant’s HCP. The Applicant could elect either not to proceed with construction of the Proposed Project or to proceed with construction without an ITP or an HCP. If construction occurs, the USFWS assumes that the Applicant would construct the Proposed Project in a manner that complies with the ESA and avoids take of BCVI. The No Action Alternative in this EA analyzes the impacts of both of these scenarios. In either scenario, the conservation measures described in the HCP would not be implemented.

The No Action Alternative does not satisfy the purpose and need for the Proposed Federal Action, as identified in Section 3. Under the No Action Alternative, USFWS would not authorize incidental take of BCVIs as a result of the Proposed Project and the USFWS would not have the assurance that conservation of BCVIs would occur to the maximum extent practicable. Although the No Action Alternative does not satisfy the purpose and need for the Proposed Federal Action, inclusion of the No Action Alternative is prescribed by the federal Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14(d)) and is carried forward for analysis in the EA.

### **4.3. Alternatives Eliminated from Further Analysis**

#### **4.3.1. USFWS Considered Alternatives**

##### **4.3.1.1. REDUCED MITIGATION**

During the alternative development process, the USFWS considered a different reduced-mitigation alternative. Under the reduced-mitigation alternative, mitigation would have been provided at a lower ratio for unoccupied habitat. However, as noted in Section 4.1.2, a presence/absence survey was conducted in 2016 (Bio-West 2016d) and the results indicated that black-capped vireos are occupying the area in relatively high densities. This EA and the Applicant’s HCP both assume that all suitable BCVI habitat within the Plan Area is occupied by the species. Therefore this alternative was not carried forward for analysis.

#### **4.3.1.2. ADDITIONAL MITIGATION**

Development of an additional alternative providing all mitigation for direct habitat loss at a 2:1 ratio was considered during preparation of the EA. This alternative would meet the Proposed Project purpose and need, but the USFWS Habitat Conservation Planning Handbook (USFWS 1996; p. 3-19) states that mitigation should be “commensurate with the impacts they address.” The Applicant has committed to allowing certain categories of impacted areas within the Plan Area to re-vegetate and to monitor those areas at 5 years post-construction. If re-vegetation is successful additional mitigation would not be needed. If re-vegetation is not successful then additional mitigation would be provided through changed circumstance 8.1.3 in the HCP. Therefore this alternative was not carried forward for analysis.

#### **4.3.2. Applicant Considered Alternatives**

The Applicant considered a (1) No Take Alternative and (2) Maximum Build alternative to the proposed Project that would respectively (1) eliminate all clearing and construction activities, as well as turbines, access roads, MV collection cables, and substations within 300 feet of occupied BCVI habitat or (2) increase power generation, thereby also increasing estimated turbines, access roads, MV collection cables, and substations. These alternatives (described in HCP Section 10) are outside the decision space of the USFWS; that is, the USFWS cannot legally select Applicant alternative siting or design plans. Therefore, these alternatives were not carried forward for consideration.

### **5. ENVIRONMENTAL SETTING**

The affected environment identified in this EA establishes the current environmental setting for resources the USFWS considers affected by the proposed alternatives, including the No Action Alternative (USFWS 2003). As mentioned in Section 4.2, the Applicant must consider the No Action Alternative, which serves as a baseline to evaluate the impacts (negative or beneficial) of the Proposed Federal Action.

The U.S. Department of the Interior National Environmental Policy Act Procedures (516 DM 3) provides guidance on environmental impact analysis (such as being conducted in this EA) and states that “the level of detail and depth of impact analysis should normally be limited to that needed to determine whether there are significant environmental effects.” Additionally, CEQ regulations states that “impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues... there should be only enough discussion to show why more study is not warranted. (40 CFR 1502.02(b)).

Sections 5.1 and 5.2 define the EA’s geographic scope and regional environmental setting. Section 5.3 identifies the resources and issues that the Proposed Federal Action and its alternatives may affect. Later sections of this EA further describe these effects in detail and in proportion to their significance. Section 5.4 identifies the resources not carried forward for further evaluation in this EA, along with rationale as to why more study is not warranted.

#### **5.1. Project Area**

For consistency with the HCP, this EA uses the HCP’s Plan Area for analysis purposes, which consists of the 10,762-acre area containing wind power generation facility and an additional 46 acres associated with a 2,000-foot segment of the Gen-tie Line within which BCVIs and other affected resources could experience direct or indirect effects from the Project. The Project Area for cumulative effects varies by resource and is defined within each effect analysis.

## 5.2. Regional Environmental Setting

McCulloch County, Texas, is entirely within the Central Great Plains Level III (i.e., “national scale”) ecoregion (Griffith et al. 2007). Grasslands with low trees and shrubs once characterized the Central Great Plains ecoregion. Currently much of this region functions as cropland (Griffith et al. 2007).

National scale ecoregions are sub-divided regionally into Level IV ecoregions. The Project Area lies entirely within the Limestone Plains Level IV ecoregion (Griffith et al. 2007). The gray and tan limestone beds of the Limestone Plains contrast from the red beds of various neighboring ecoregions. Mixed grasses and shrubs are common within the ecoregion, while trees are typically sparse. Common plants in this ecoregion include honey lotebush (*Ziziphus obtusifolia*), agarita (*Mahonia trifoliolata*), mesquite (*Prosopis glandulosa*), and tree cholla (*Opuntia imbricata*). Scattered plateau live oak (*Quercus fusiformis*) and Ashe juniper (*Juniperus ashei*) are often found growing amongst mesquite shrub (Griffith et al. 2007).

Historical climate records from the Brady, Texas, weather station, located approximately 5 miles southwest of the Project Area, suggest that mean annual precipitation (from 1893 to 2013) in the region was approximately 25.5 inches, with precipitation peaks occurring in May to June and again in September to October. January mean temperatures (min./max.) range between 32°F and 59°F, while July mean temperatures range between 70°F and 95°F (Western Regional Climate Center 2015). Severe or high-impact weather events, including flash floods and periods of drought, are common (Nielsen-Gammon 2008). Kunkel et al. (2013) suggest that the southern U.S. Great Plains (which includes the State of Texas) will experience a trend towards lower precipitation and higher temperatures in the future due to climate change.

## 5.3. Resources Considered for Detailed Analysis

The USFWS reviewed all human environment<sup>2</sup> resources that the Proposed Federal Action could affect. This review determined which resources should be carried forward in this EA for further detailed analysis and which resources could be eliminated from detailed analysis (see Section 5.4). The resources identified with the potential to be affected by the Proposed Federal Action above an insignificant level, either adversely or beneficially, are listed below, as well as described in greater detail later in this Chapter and analyzed in detail in Chapter 6.

- **Vegetation:** Any surface disturbance associated with the Project could affect the composition and productivity of vegetation resources. This resource is discussed in Section 5.3.1.
- **General Wildlife:** Alteration or loss of wildlife habitat, as well as human activity, traffic, and noise associated with the Project could affect, either adversely or beneficially, general wildlife within the Project Area. This resource is discussed in Section 5.3.2.
- **BCVIs and State Protected Species:** As with general wildlife above, activities associated with the Project could potentially impact BCVIs and state-protected species occupying habitat affected by the Proposed Federal Action. These resources are discussed in Sections 5.3.3 and 5.3.4.

---

<sup>2</sup> The human environment is defined by CEQ as the natural and physical environment, and the relationship of people with that environment (1508.14).

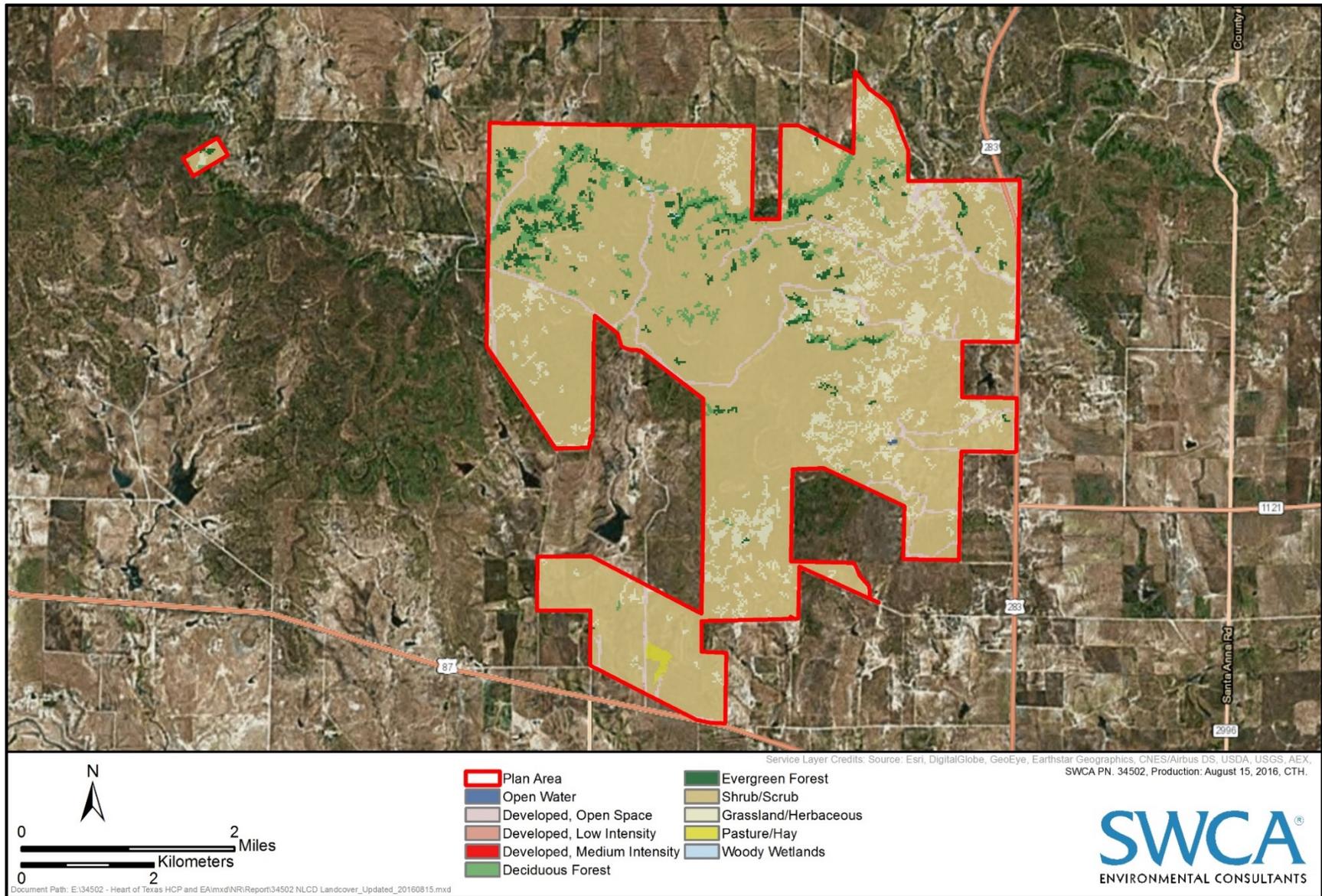
In addition, the CEQ issued new greenhouse gas emissions and climate change guidance for Proposed Federal Actions in August of 2016. This guidance recommends that federal agencies disclose project-generated greenhouse gas emissions and assess how likely climate change scenarios may alter Proposed Project effects. Quantification of greenhouse gas emissions was deemed not warranted due to the fact that emissions would be negligible and only produced intermittently during construction through the use of heavy equipment and machinery to clear vegetation and install equipment. However, impacts of climate change to analyzed resources is addressed by resource in Sections 6.4.1 to 6.4.4.

### 5.3.1. Vegetation

The National Land Cover Database (NLCD), last updated in 2011, serves as a resource for assessing land use and land cover in the United States (Homer et al. 2015). As mapped by the NLCD, shrub/scrub vegetation communities cover 8,725 acres (81%) of the Project Area. Approximately 1,576 acres (15%) is composed of other open herbaceous cover or forested cover. Less than 1% of the Project Area has developed land cover. Table 2 summarizes the representation of each cover type within the Project Area and Figure 3 shows the distribution of NLCD land use and land cover types.

**Table 2.** Land Cover Types within the Project Area

NLCD Land Use/Land Cover Type	Acres in the Project Area	Percent of the Project Area
<b>Shrub/Scrub</b>	8,725	80.75%
<b>Grassland/Herbaceous</b>	950	8.79%
<b>Developed, Open Space</b>	458	4.24%
<b>Deciduous Forest</b>	383	3.54%
<b>Evergreen Forest</b>	242	2.24%
<b>Pasture/Hay</b>	26	0.24%
<b>Developed, Low Intensity</b>	16	0.15%
<b>Developed, Medium Intensity</b>	2	0.02%
<b>Woody Wetlands</b>	2	0.02%



**Figure 3.** NLCD land cover types for the Project Area.

### **5.3.2. General Wildlife**

Wildlife species expected to utilize habitats in the Project Area include a number of terrestrial grassland, woodland and shinnery birds, mammals, reptiles, and some amphibians that are typically abundant to common in both undeveloped and suburban settings (Kutac and Caran 1994). Based on Texas Parks and Wildlife Department (TPWD 2016) hunting permits available in McCulloch County, local mammals include white tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), desert cottontail rabbit (*Sylvilagus audubonii*), jackrabbits (*Lepus californicus*), and javelina (*Tayassu tajacu*). Bird species include mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), wood duck (*Aix sponsa*), black duck (*Anas rubripes*), blue-winged teal (*Anas discors*), northern bobwhite quail (*Colinus virginianus*), and turkey (*Meleagris gallopavo*) (TPWD 2016).

Commonly found reptiles and amphibians found in McCulloch County include the bullsnake (*Pituophis catenifer*), checkered gartersnake (*Thamnophis marcianus*), western diamond-backed rattlesnake (*Crotalus atrox*), Texas spiny lizard (*Sceloporus olivaceus*), greater earless lizard (*Cophosaurus texanus*), ornate box turtle (*Terrapene ornata*), western narrow mouthed toad (*Gastrophryne olivacea*), and Texas toad (*Bufo speciosus*) (Dixon 2013).

Bat species that may migrate through the Project Area or forage in woodland areas include the cave myotis (*Myotis velifer*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (Mammals of Texas 2015).

Wildlife associated with aquatic, riparian, or wetland habitats are not expected to occur on the Project Area due to a lack of such natural habitats within the property.

### **5.3.3. Black-capped Vireo (BCVI)**

The USFWS listed the BCVI as an endangered species in 1987 due to loss of habitat and nest parasitism by the brown-headed cowbird (*Molothrus ater*) (USFWS 1987). The USFWS has not designated critical habitat for this species. The USFWS's mitigation guidance for the BCVI places the Project Area within the BCVI Central Recovery Region (USFWS 2013b). In 2013, the USFWS (2013c) reported in a 90-day finding that the status of the BCVI merits downlisting the species from endangered to threatened status, but the USFWS has yet to publish a proposed rule to implement this recommendation.

#### **5.3.3.1. LIFE HISTORY**

BCVI are small insectivorous songbirds that arrive in Texas between mid-March and mid-April to establish breeding territories (USFWS 2007). Migration to their wintering grounds, located along the Pacific slopes of Mexico, occurs in September (USFWS 1991). For the purposes of this HCP, the BCVI breeding season is defined as March 15 through August 31 (USFWS 2013a).

Males establish territories ranging in size from 1 to 10 acres, with an average size of 2 to 4 acres (Campbell 2003; Graber 1957). BCVI territories tend to be clustered within suitable habitat (USFWS 1991). A positive relationship between cluster size, survivorship, and reproductive success has been found (USFWS 1991). However, the clustering behavior of BCVI can cause areas of suitable habitat to be unoccupied due to individuals remaining in close to proximity to one another and not utilizing the habitat in its entirety (McFarland et al. 2013). Conspecific attraction is thought to cause much of this clustering behavior, though the quality and vegetation structure of a habitat could also affect distribution (McFarland et al. 2013). Site fidelity is also common among BCVI, as birds return to the same site year after year, or another close by (Campbell 2003). Individual BCVIs in smaller clusters of birds tend to disperse to other sites more frequently (Graber 1957; USFWS 1991).

Threats to the BCVI include low reproductive success, loss of habitat, and grazing by wild and domestic herbivores (USFWS 2007). Brown-headed cowbirds are the main nest predator of BCVI nests, responsible for much of the low reproductive success witnessed in some populations of the species (Smith et al. 2012). Although brown-headed cowbird populations have decreased in recent years, they still pose a major threat to nesting BCVI (USFWS 2007). The threat of red-imported fire ants as a nest predator on BCVI populations is also on the increase (USFWS 2007).

### **5.3.3.2. HABITAT**

Patches of low, scrubby shrubs and deciduous trees of irregular height typify the breeding habitat of BCVI (McFarland et al. 2013). Breeding habitat is variable in vegetation and structure across the breeding range of the BCVI, but often has a distinctive patchy structure (USFWS 2007). Generally, the deciduous scrubs extend from the ground to about 6 feet off the ground with 30% to 60% coverage over the total area. Though highly variable, common vegetation within Texas BCVI habitat includes shin oak (*Quercus sinuata*), Texas oak (*Quercus buckleyi*), sumac (*Rhus* spp.), and other deciduous shrub and tree species (Campbell 2003). BCVI also use dense foliage areas around widely spaced clusters of tall trees in open woodlands and woodland edge habitat with taller canopy heights (Maresh 2005). Geology and soils can greatly influence BCVI habitat. Eroded gullies, shallow soils, or rocky substrates appear to support appropriate vegetation communities for BCVI (USFWS 1991). BCVI habitat in Texas is often found on limestone soils of the Edwards Plateau, Eastern Trans-Pecos, or through the Cross Timber and Prairies (USFWS 2013a).

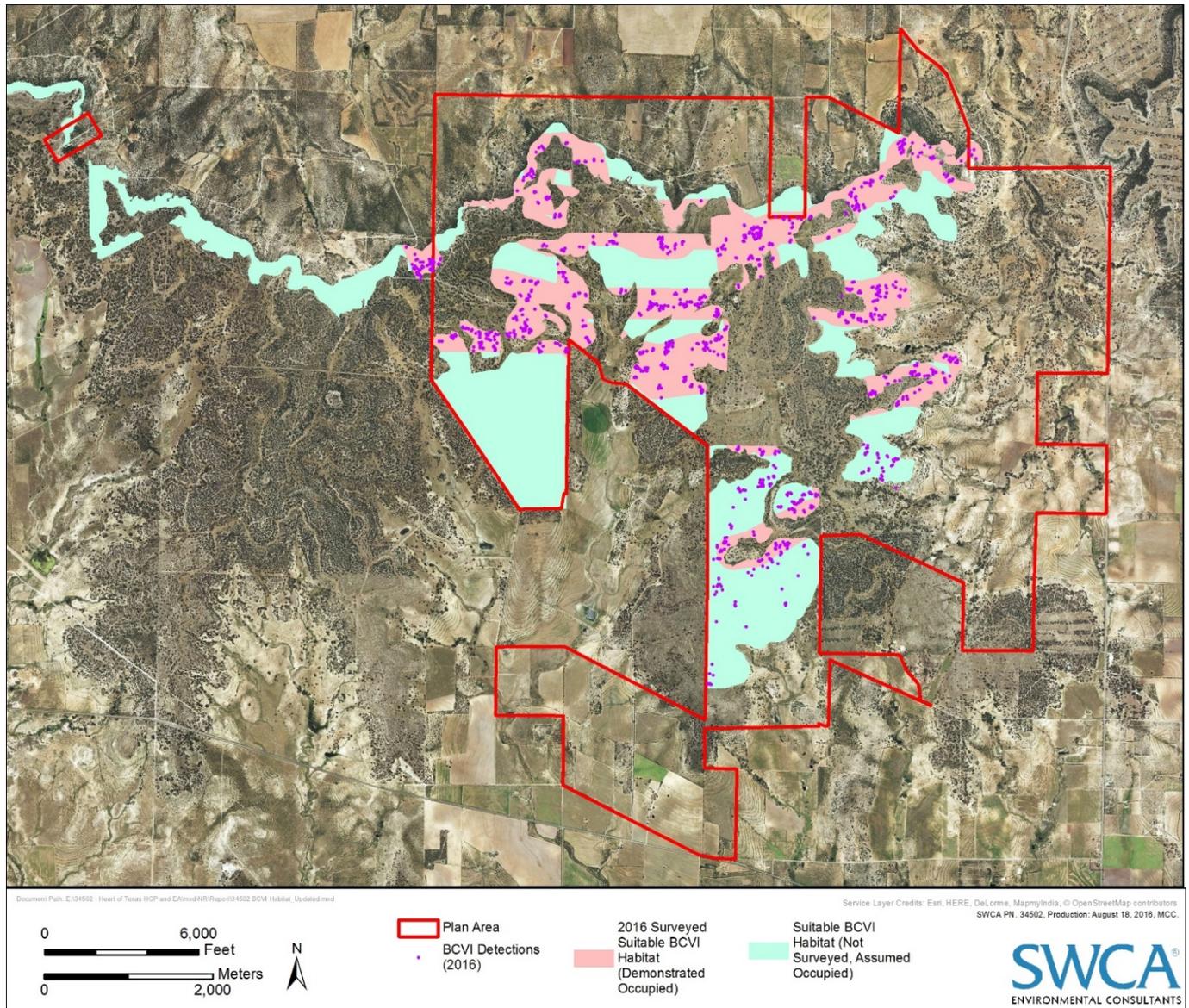
BCVI generally occupy early successional vegetation types within the eastern portion of its range (where the Project Area is located), which is maintained through fire or moderate grazing activities (Wilkins et al. 2006). In the western portion of the BCVI range, suitable habitat structure tends to be a mature stage and maintained by the abiotic characteristics of the area (Farquhar and Gonzalez 2005).

Bio-West (2015, 2016b) completed a habitat assessment of the Project Area and found approximately 3,843 acres (36%) of the Project Area to be suitable BCVI habitat (Figure 4). As described by Bio-West (2015, 2016b), suitable BCVI habitat within the Project Area consists of dense under- and mid-story vegetation composed primarily of shin oak along ridgelines and slopes.

### **5.3.3.3. ABUNDANCE AND DISTRIBUTION**

Wilkins et al. (2006) estimate the range-wide BCVI population to include 6,269 males. The counties comprising the BCVI Central Recovery Region (USFWS 2013b), which contains the Project Area, were estimated to contain 288 BCVI males (Wilkins et al. 2006). Wilkins et al. (2006) report only one documented BCVI male within McCulloch County, Texas.

Bio-West conducted a presence/absence survey for the BCVI, following USFWS protocols (USFWS 2010), across approximately 1,840 acres of the Project Area during the 2016 breeding season. The survey area covered most areas of suitable BCVI habitat within 900 feet of the Proposed Project layout. Over the course of the presence/absence survey, Bio-West recorded 1,126 detections of BCVIs that Bio-West believes to be associated with approximately 146 individual BCVI territories (Bio-West 2016a).



**Figure 4.** Suitable black-capped vireo habitat within the Project Area.

### **5.3.4. State-Protected Species**

Based on an evaluation of state-protected species occurring in McCulloch County, Texas, only the Texas horned lizard (*Phrynosoma cornutum*) has potential to occur on the Project Area (see Section 5.4.10 for details). The Texas horned lizard is listed as threatened in the State of Texas. This species is primarily found in desert or semi-arid climates where it prefers loose sand or loamy soil types (TPWD 2015a). These species are docile and have a long history of being captured for use as pets in the State of Texas, but this practice is now banned with the listing. One major threat to this species is the invasion of red imported fire ants, which outcompete their primary food source, harvester ants, and result in increased use of pesticides, which decrease food sources for the lizard (International Union for Conservation of Nature and Natural Resources 2015).

## **5.4. Resources Not Considered for Detailed Analysis**

Resources not considered for detailed analysis are those that are not expected to be affected by the Proposed Action or the alternative actions.

### **5.4.1. Air Quality**

The Clean Air Act requires that the U.S. Environmental Protection Agency (USEPA) set air quality standards, referred to as the National Ambient Air Quality Standards (NAAQS). Areas that do not meet the NAAQS are referred to as *non-attainment* areas. McCulloch County is currently in attainment status for all criteria pollutants (USEPA 2012).

The Project Area is located within a rural part of Texas and is not in the immediate vicinity of any large-scale point source emissions (e.g., from industrial plants and fossil fuel-fired power plants) or substantial non-point source emissions (e.g., from automobiles and trucks along major transportation corridors). It is anticipated that the only potential impact to air quality would occur intermittently during construction through the use of heavy equipment and machinery to clear vegetation and install equipment. These emissions would be minimized through the use of standard construction best management practices and once construction is complete no additional air quality impacts would be expected. Since air quality effects would be negligible and consistent across alternatives, this issue was not carried forward for analysis.

### **5.4.2. Cultural Resources**

A desktop search of the Texas Archeological Sites Atlas was conducted to identify historic properties listed in the National Register of Historic Places (NRHP) and/or designated State Antiquities Landmarks (SALs), as well as previously recorded prehistoric archeological site locations and cultural resources (Bio-West 2016c) in the Project Area. No historic properties listed in the NRHP and/or designated SALs were identified. However, 11 archeological sites and cultural resources were identified within the Project Area.

During a cultural resource field study conducted in 2016 (Bio-West 2016c), 31 previously known and newly found cultural resources were identified within the Project Area. Nine of these sites were considered eligible for the NRHP, but all could be avoided by spanning the site or by access road reroutes and realignment of collection system infrastructure. No historic buildings or areas around them would be present inside the area of potential effect (APE) of the Proposed Project or transmission line right-of-ways.

Given these findings, the Proposed Project, if constructed, would have no potential impact related to Central Texas regional and/or site specific history or prehistory and is not considered for further analysis. The Project would be designed to avoid direct impacts to any significant cultural resources eligible or potentially

eligible for listing in the National Register of Historic Places as historic properties and/or State Antiquities Landmarks (Bio-West 2016c). An indirect visual impact within the leased area would occur due to introduction of above-the-ground wind turbines and transmission line structures; however, impacts would not be adverse due to the lack of historic properties. A request for concurrence of above findings has been submitted to the Texas Historical Commission. Agency concurrence that no historic properties would be affected was received on November 2, 2016 (Antiquities Planning & Consulting 2016).

### **5.4.3. Energy and Depletable Resource Requirements and Conservation Potential**

The Project would not affect scarce or depletable energy resources. Therefore, this issue is not considered for further analysis.

### **5.4.4. Environmental Justice**

Executive Order 12646 issued in 1994 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority communities and low-income communities.

For the purpose of this EA, a minority community is defined as one where the minority population (persons classified as non-white or Hispanic) of the local census block exceeds 50% of the total population for that tract. A low-income community for the purpose of this EA is defined as one where the percentage of persons within the local census tract classified by the U.S. Census Bureau as living below the poverty level exceeds the overall percentage for McCulloch County.

U.S. Census Bureau data from the 2010 census and the estimates from the 2007–2014 American Community Survey indicate that an environmental justice population does not exist in the vicinity of the Project. The minority population of McCulloch County Census Tract [CT] 9505 consists of only 10% of the population, and only 8% of the population in the McCulloch County CT 9505 lives below poverty levels, as compared to 23% for the county. Therefore, environmental justice was not considered as an issue for further analysis.

### **5.4.5. Farmland and Soils**

The Natural Resources Conservation Service (NRCS) characterizes eligible farmland as being “prime,” or “unique or of “statewide or local importance.” The designations are based on NRCS soil types and are protected by federal and state legislation. Soils considered to be prime, unique, and of statewide importance are present within the Project Area and include Frio clay loam, Karnes loam, Nuvalde-Mereta complex, Rowena clay loam, and Leeray clay. However, Part 523.10 of the Farmland Protection Policy Act (FPPA) Manual stipulates that projects utilizing private lands and having no federal funding are not subject to the FPPA. Therefore, this issue was not carried forward for further analysis.

### **5.4.6. Geology**

Approximately 49% of the Project Area is underlain by Edwards Limestone, with Antlers Sand (28%), and Thrifty and Graham Formations (12%), accounting for the majority of the remaining subsurface geology. Neither the authorization of incidental take of BCVI, nor the implementation of the HCP is expected to affect this underlying geology. Therefore, this resource is not considered for further analysis.

### **5.4.7. Land Use**

Aerial imagery and the McCulloch County Appraisal District map indicate large tracts of land in excess of 100 acres are contained within and adjacent to the Project Area, which suggests land uses in the general vicinity of the Project are mostly rural. Ranches and single-family residences are scattered throughout the Project Area and are likely used for farming, hunting, and ranching purposes. Cattle or other domestic animals are currently grazed throughout much of the Project Area.

A portion (725 acres) of the 10,808-acre Project Area would be used for energy development for the duration of the wind farm's operation. However, this land use represents less than 1% of the overall land available in McCulloch County and the wind farm lease would not be exclusive; other existing land uses would continue to be allowed within the Project Area. Additionally, lands used for energy development could be made available after decommissioning and site restoration for other land uses. Therefore, this issue was not considered for further analysis.

### **5.4.8. Noise**

The Project Area is located in a largely undeveloped area. Traffic from local residents travelling along U.S. Route (US) 373 (east side of the Project Area) and US 87 (southern border of Project Area) are the primary sources of ambient noise in the vicinity; however, these roads are not major travel corridors. Noise from agricultural and land management operations, such as the operation of equipment and machinery for brush management, access road maintenance, and similar activities, are also expected to occur occasionally.

Under all alternatives, temporary, intermittent noise impacts from the use of equipment and machinery to clear vegetation and install equipment would occur. Additionally, operation of turbines would result in a steady long-term, modeled noise source of approximately 60 decibels at turbine sites (Renewable Energy Systems Americas Inc. [ResAmerica] 2016). However, modeled noise levels drop significantly (down to 45 to 50 dBA) within roughly 0.25 mile of the noise source and generally return to ambient sound levels (<40 dBA) within several miles of the noise source (ResAmerica 2016). Modeled sound levels at surrounding residences within 2 miles of the Project Area range from 37 to 49 dBA, which is at or within 10 dBA of ambient noise conditions and would likely be marginally noticeable to affected residents. In general, an increase in 20 dBA over ambient conditions is considered a significant change in sound (Bolt, Beranek and Newman, Inc. 1973).

Given the size of the Proposed Project, construction- and operation-related noise would be expected to dissipate over short distances and not adversely affect surrounding residents or land uses. Therefore, this issue was not considered for further analysis with regards to human impacts. Noise impacts to wildlife are discussed in Sections 6.4.2 to 6.4.4.

### **5.4.9. Other Threatened, Endangered, or Candidate Species**

Table 3 provides a list of species protected by the ESA or that are candidates for future protection and that may occur within McCulloch County, Texas (TPWD 2015b; USFWS 2015). The Applicant evaluated the habitat requirements and known distributions of each of these species and assessed their likelihood of occurrence within the Project Area. Except for the BCVI, the Project Area generally lacks suitable habitat for the species in Table 3 and their occurrence in the Project Area is not expected.

**Table 3.** Federal Special Status Species Occurring in McCulloch County, Texas

Species Name	Listing Status*	Habitat Characteristics	Occurrence in Project Area
<b>Birds</b>			
Black-capped Vireo ( <i>Vireo atricapilla</i> )	FE	Rocky limestone areas with shrub vegetation reaching to ground level. Often combined with open, sparse tree canopy (Campbell 2003)	Known—See Section 5.3.3
Golden-cheeked Warbler ( <i>Setophaga chrysoparia</i> )	FE	Closed-canopy juniper-oak woodlands (TPWD 2015b)	None—Vegetation requirements are not met on the Project Area. Avian surveys and habitat assessments did not detect the presence of this species (Bio-West 2015; West, Inc. 2015).
Interior Least Tern ( <i>Sterna antillarum athalassos</i> )	FE	Sand and gravel bars within braided streams (TPWD 2015b)	None—Project Area lacks necessary habitat to support the species.
Piping Plover ( <i>Charadrius melodus</i> )	FE	Wintering and migratory habitat includes beaches, tidal sandflats, mudflats, algal mats, washover passes, and small dunes (USFWS 2015)	None—Project Area does not include necessary migratory habitats
Red Knot ( <i>Calidris canutus rufa</i> )	FT	Coastal marine and estuarine with large areas of intertidal sediments (USFWS 2015)	None—Migratory habitat not available within Project Area
Whooping Crane ( <i>Grus Americana</i> )	FE	Utilize wetlands for roosting grounds and croplands for nearby feeding ground, typically within 1 kilometer (USFWS 2015)	Highly Unlikely—Project Area lacks typical migratory stop-over habitat of wetlands and croplands. At least one large off-site pond occurs less than 1 km from the boundary of the Plan Area; however, none of the ponds is closer than 2 km from any of the actual impact areas within the Plan Area.
<b>Mammals</b>			
Gray Wolf ( <i>Canis lupus</i> )	FE	Formerly known in forests, brushlands, and grasslands (TPWD 2015b)	None—extirpated from Texas
Red Wolf ( <i>Canis rufus</i> )	FE	Formerly found in brushy and forested areas (TPWD 2015b)	None—extirpated from Texas
<b>Aquatic Invertebrates</b>			
Smooth Pimpleback ( <i>Quadrula houstonensis</i> )	C	Small to moderate streams and rivers with mixed mud, sand, and fine gravel substrate (TPWD 2015b)	None—Project Area lacks aquatic habitat
Texas Fatmucket ( <i>Lampsilis bracteata</i> )	C	Streams and rivers with sand, mud, and gravel substrates (TPWD 2015b)	None—Project Area lacks aquatic habitat
Texas Fawnsfoot ( <i>Truncilla macrodon</i> )	C	Short stream reaches of the Colorado and Brazos River Basins (USFWS 2015)	None—Project Area lacks aquatic habitat
Texas Pimpleback ( <i>Quadrula petrina</i> )	C	Mud, gravel, and sand substrates with slow flow rates (TPWD 2015b)	None—Project Area lacks aquatic habitat

\* FE=Federally Endangered; FT=Federally Threatened; C=Federal Candidate for Listing (USFWS 2015). Updated with the publication of a 12-month Finding that listing of the Sprague's pipit is not warranted (81 Federal Register [FR] 19527).

TPWD = Texas Parks and Wildlife Department; USFWS = U.S. Fish and Wildlife Service

### 5.4.10. Other State-Protected Species

Table 4 provides a list of state-protected species occurring in McCulloch County, Texas. Aside from the Texas horned lizard, all other state-protected species are not likely to reside within the Project Area. The two subspecies of peregrine falcon could utilize the Project Area temporarily as a stopover during migration, but the Project would result in minimal (<1%) long-term foraging habitat removal. Since the species would have sufficient surrounding vegetation for use during stop-overs, they were not considered for further analysis.

**Table 4.** State-Protected Species Occurring in McCulloch County, Texas

Species Name	Listing Status*	Habitat Characteristics**	Occurrence in Project Area
<b>Birds</b>			
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	FDL/ST	Uncommon winter resident, migrant through the region, and very scarce breeding season resident; Found primarily near rivers, impoundments, and lakes, hunts live prey, scavenges, and pirates food from other birds.	Highly Unlikely—Potential for occasional individual to migrate through the area; Lack of large bodies of water believed likely to preclude regular occurrence; Stock ponds in Project Area if holding ducks could attract eagles if passing through the area
American Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	FDL/ST	Migrates across Texas from northern breeding areas in United States and Canada to winter along coast and farther south; <i>F.p. anatum</i> is a year round resident and local breeder in west Texas and occupies a wide range of habitats during migration.	Moderate—Project Area offers no breeding habitat or unique migratory habitat (such as landscape edges), but is likely to be visited by this species during spring and fall migration
Peregrine Falcon ( <i>Falco peregrinus</i> )	FDL	Migrates across Texas from northern breeding areas in United States and Canada to winter along coast and farther south; Because the subspecies are not easily distinguishable at a distance, reference is typically made only to the species level.	Moderate—Project Area offers no breeding habitat or unique migratory habitat (such as landscape edges), but is likely to be visited by this species during spring and fall migration
Zone-tailed hawk ( <i>Buteo albonotatus</i> )	ST	Open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers	None—Project Area lacks appropriate woodland vegetation and aquatic habitat
<b>Aquatic Invertebrates</b>			
False spike mussel ( <i>Quadrula mitchelli</i> )	ST	Probably medium to large rivers; substrates varying through mixtures of sand, gravel and cobble	None—Project Area lacks aquatic habitat
<b>Reptiles</b>			
Texas horned lizard ( <i>Phrynosoma cornutum</i> )	ST	Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees	Likely—Project Area contains suitable habitat and harvester ants (primary food source)
Concho water snake ( <i>Nerodia paucimaculata</i> )	FDL	Texas endemic in Concho and Colorado river systems; shallow fast-flowing water with a rocky or gravelly substrate preferred; adults can be found in deep water with mud bottoms	None—Project Area lacks aquatic habitat

\* FDL= Federally Delisted; SE = State Endangered; ST = State Threatened

\*\* Texas Parks and Wildlife Department 2015b.

### **5.4.11. Public Health and Safety**

The Proposed Project is not expected to affect public health and safety since it would be designed and constructed in accordance with all applicable local, state, and federal regulations. Therefore, public health and safety issues are not considered for further analysis.

#### **5.4.1. Socioeconomics**

The Project Area lies within a sparsely populated part of McCulloch County (2010 McCulloch County CT 9505), having a population density of approximately 2.0 people per square mile. The total population for McCulloch County is 8,220 (U.S. Census Bureau 2010). According to the Texas Water Development Board (TWDB), the population of McCulloch County is expected to increase by approximately 9% over the next 25 years (TWDB 2015). However, population estimates for 2014 actually show a slight (1%) decrease in total population since 2010 (U.S. Census Bureau 2016). McCulloch County's primary economic industries include farming, ranching, recreation, retail, and education (U.S. Census Bureau 2016). The top three employers consist of Brady Independent School District, Loadcraft Industries, and Walmart (Brady/McCulloch County Chamber of Commerce 2015).

The Proposed Project would provide county tax revenue as well as potential employment and income for some residents. It is estimated that during construction the Proposed Project would provide 300 to 400 jobs, while operation would employ three to five staff (Splettstosser 2016). Depending on the size of the final design, it is also estimated that the Proposed Project would provide an average of \$128,000 to \$425,000 in tax payments to McCulloch County per year of operation (Splettstosser 2016). Based on an estimated 3,827 residents in the county labor force, assuming all positions were employed by local residents construction could increase short-term employment by up to 10%. However, long term, the Proposed Project would have a negligible (0.1%) impact on employment conditions locally or within the region due to the low number of operation-related jobs. McCulloch County reported \$3.18 million in tax revenue during the 2014 fiscal year; therefore, Project contributions could increase the County tax base by an estimated 3% to 13%. However, since the Proposed Project—and any associated socioeconomic benefits—would likely occur irrespective of issuance of an ITP, the issue was not considered for further analysis.

#### **5.4.2. Visual and Aesthetic Resources**

Any alternative for the Proposed Project that would involve the construction of wind turbines and supporting infrastructure would be visible on the landscape. However, views of the local landscape that could be affected (i.e., shrub/scrub habitat) are prevalent throughout in the Project Area and broader McCulloch County. Surrounding rural land uses are also expected to be compatible with views of the wind farm. Therefore, this resource was not considered for detailed analysis.

#### **5.4.3. Water Resources**

Approximately 65 artificial impoundments (likely stock ponds) exist within the boundaries of the Project Area, but no natural wetlands or mapped floodplains are present (USFWS 2014; Bio-West 2016d). One stream, Cow Creek, would be avoided or impacted below Nationwide Permit thresholds. Therefore, no impacts to water resources are expected and the issue is not considered for further analysis.

## 6. ENVIRONMENTAL CONSEQUENCES

### 6.1. Analysis Framework

The scope of a NEPA analysis associated with a habitat conservation plan addresses “the direct, indirect, and cumulative effects of the *proposed incidental take* and the *mitigation and minimization measures* proposed from implementation of the HCP” (USFWS and National Marine Fisheries Service 1996, page 5-1, emphasis added). In this case, the proposed incidental take involves the removal or alteration of vegetation used by the BCVI and the conservation measures include seasonal clearing restrictions during BCVI breeding season, post-construction habitat restoration, and permanent conservation of BCVI habitat.

An *effect* is defined by NEPA regulations as either a direct result of an action that occurs at the same time and place as the action or is an indirect result of an action that occurs later in time or in a different place and is reasonably foreseeable (40 CFR 1508.8). *Cumulative effects* are the incremental environmental impact or effect of the action considered together with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7).

The purpose of an environmental assessment is to determine whether the proposed action has significant effects on the quality of the human environment. The potential significance of an effect should be considered in the context of the effect and the relative magnitude or intensity of the effect.

It is important to keep in mind that NEPA regulations require the analysis of “no action” as a benchmark that enables decision makers to assess the relative magnitude of environmental effects of the action alternatives (USFWS 2003). If no difference is anticipated for the future condition under the No Action Alternative and the action alternatives, then the action may be said to have no effect.

For the purposes of this analysis, the following general definitions also apply:

- **Type of Effect:** Beneficial effects are those that are reasonably likely to improve the status or condition of a resource, while adverse effects are those that would degrade or cause a decline in the status or condition of a resource.
- **Duration of Effect:** Short-term effects are temporary conditions relevant only during or for a short time after completion of activities (i.e., duration of several weeks). Medium-term effects would be expected to persist over a period of years. Long-term effects would be expected to be permanent conditions or at least persist for a decade or more.
- **Intensity of Effect:** Negligible effects are those that cannot be reasonably expected to have a measurable effect on the condition or status of the resource. Minor effects may have a detectable, but very limited effect on the resource, but would not reasonably be expected to significantly influence the overall condition or status of the resource. Moderate effects would likely have measurable effects on the identified resource that could also influence the overall condition or status of the resource. Major effects would have a readily apparent and substantial influence on the overall condition or status of a resource.
- **Geographic Scale of Effect:** Effects may influence a resource only within the boundary of the Project Area (project scale effect) or extend beyond the limits of the Project Area. Local scale effects would influence the affected resources on adjacent properties or the immediate vicinity of the Project Area. Regional scale effects would generally be felt more broadly across the county or adjacent counties, while global effects would apply to the entire geographic extent of the resource.

## 6.2. Reasonably Foreseeable Projects

The Proposed Federal Action would issue an ITP under Section 10(a) of the ESA that would authorize take of the BCVI associated with the direct or indirect disturbance of up to 725 acres of suitable habitat over a period of 30 years. This EA also examines other likely trends and “reasonably foreseeable”<sup>3</sup> projects that could, along with the Proposed Federal Action, cumulatively result in effects to area resources. Aside from the Proposed Project, there are no other reasonably foreseeable projects that are anticipated to occur within the Project Area. However, farming, ranching, and hunting on Project Area lands are anticipated to continue in the future.

Outside of the Project Area, there ten communities (city, town, or unincorporated community) in McCulloch County, including Brady, Texas (the county seat). The City of Brady’s 2013 Comprehensive Plan, among other goals, promotes lake recreation supplemented with single family residential development around Brady Lake, located roughly 3 miles south of the southern edge of the Project Area.

RES Americas has also proposed to develop another wind energy generation project in McCulloch County, referred to as the Rattlesnake Wind Project. The Rattlesnake Wind Project is anticipated to consist of 53 to 69 wind turbines which when operational will be capable of generating between 124 MW and 273 MW depending on final turbine technology selection. Additional Rattlesnake Wind Project facilities will include an operations and maintenance facility, a substation, and a 16 mile, 345kV high-voltage transmission line to connect the project to the existing electrical grid.

The Rattlesnake Wind Project is situated adjacent to the Proposed Project on approximately 12,000 acres of private lands, comprised almost entirely of rangeland (>90 %), utilized for grazing, hunting and off-road recreation which have been leased under a 30 year wind lease. The Rattlesnake Wind Project is not considered a connected action, as the Proposed Project and Rattlesnake Wind Project are not financially and functionally interdependent.

Although not identified in area planning documents, additional energy development (oil and gas, pipelines, transmission), rural residential development, and road maintenance and construction activity are other likely future trends in that may occur outside of the Project Area.

---

<sup>3</sup> Defined as projects that have been approved or are included in short- to medium-term planning and budget documents prepared by government agencies.

### 6.3. Summary of Potential Impacts

A brief summary of the potential direct and indirect environmental consequences of the alternative actions is provided in Table 5. More complete descriptions of potential environmental effects are included in the following sections.

**Table 5.** Summary of the Potential Environmental Consequences

Resource	Alternative A (Preferred Alternative)	Alternative B (No Action Alternative)
Vegetation Communities	Clearing of 155 acres of vegetation* during construction; 46 acres of long-term vegetation removal and 109 acres of short-term vegetation removal (direct effects). Indirect effects from dust deposition, vegetation trampling from vehicles, equipment, and human activity, or the introduction of new, invasive or exotic species to 610 acres (see Section 6.4.1). Permanent conservation of up to 454 acres of BCVI habitat.	Reduced alteration to vegetation composition, abundance, and diversity as compared to the Preferred Alternative if construction occurs. No effects to vegetation if the Proposed Project is not constructed.  No benefits to plant communities from preservation of BCVI habitats.
Wildlife Communities	Clearing of 155 acres of wildlife habitat during construction; 46 acres of long-term habitat removal and 109 acres of short-term habitat removal (direct effects). Indirect project-related increases in noise, human activity, and traffic to 610 acres (see Section 6.4.2).  Permanent conservation of up to 454 acres of BCVI habitat.	Reduced alteration to wildlife habitat as compared to the Preferred Alternative if construction occurs. No effects to wildlife habitat if the Proposed Project is not constructed.  No benefits to species from preservation of BCVI habitats.
Black-capped Vireo ( <i>Vireo atricapilla</i> )	Clearing or modification of up to 725 acres of suitable BCVI habitat (direct and indirect effects; see Section 6.4.3).  Permanent conservation of up to 454 acres of BCVI habitat.	The USFWS assumes that the Applicant would comply with the ESA and avoid take of BCVI by avoiding development within 300 feet of BCVI habitat; therefore, there would be no effect to the species under this alternative if construction occurs. No effects to BCVI if the Proposed Project is not constructed.
State-Protected Species	Creation of suitable habitat for Texas horned lizard through long-term conversion of 4 acres of woodland and post-construction revegetation of 109 acres of cleared land (direct effects; see Section 6.4.4). Indirect project-related increases in noise, human activity, and traffic.  Permanent conservation of up to 454 acres of BCVI habitat.	Reduced species benefits – from land conversion to open habitat – and species risks due to vehicle collision or equipment strikes as compared to the Preferred Alternative if construction occurs. No effects to the species if the Proposed Project is not constructed.

\* Based on NLCD data that considers all vegetation types present. Therefore, this number is slightly higher than acreage reported for the BCVI analysis, which only considers impacts to vegetation types that are suitable for BCVI.

## 6.4. Effects Analysis

### 6.4.1. Vegetation Communities

#### 6.4.1.1. ALTERNATIVE A (PREFERRED ALTERNATIVE)

Table 6 provides a detailed breakdown of project effects to vegetation under the Preferred Alternative, by type of impact and vegetation type (see Figure 5 in Section 6.4.3.1 for a graphic representation of the impact zones applied for this EA). Covered Activities would remove a total of approximately 155 acres of vegetation during the construction phase of the Proposed Project when the Applicant clears vegetation for new or expanded access roads, connecting lines, turbine pads, and the substation and Gen-tie Line. Some of the vegetation clearing is only needed to facilitate the initial construction of the Project, and the Applicant would accomplish this clearing with a Hydro-Ax or similar machine that causes minimal damage to root systems.

The Applicant would restore 109 acres of this cleared area following construction activities and allow vegetation to regrow in areas not needed for long-term access. Therefore, the majority of the anticipated loss of vegetation would be short-term (approximately 5 years or less). Upon decommissioning of the Proposed Project and after the removal of the facility, the Applicant would restore the remainder (46 acres) of cleared areas.

**Table 6.** Land Cover Types Affected by the Project\*

NLCD Land Use/Land Cover Type	Direct Short-Term Loss (acres) / Percent of Project Area	Direct Long-Term Loss (acres) / Percent of Project Area	Indirect Habitat Modification (acres) / Percent of Project Area
<b>Shrub/Scrub</b>	90.3 / 1.0%	40.9 / 0.5%	482.6 / 5.5%
<b>Grassland/Herbaceous</b>	0.9 / 0.1%	0.7 / 0.1%	21.3 / 2.2%
<b>Developed, Open Space</b>	5.3 / 1.2%	0.9 / 0.2%	18.0 / 3.9%
<b>Deciduous Forest</b>	9.8 / 2.6%	2.9 / 0.8%	58.7 / 15.3%
<b>Evergreen Forest</b>	2.4 / 1.0%	1.1 / 0.5%	28.9 / 11.9%
<b>Pasture/Hay</b>	0 / 0%	0 / 0%	0 / 0%
<b>Woody Wetlands</b>	0 / 0%	0 / 0%	0 / 0%
<b>Total</b>	<b>108.7 / 1.0%</b>	<b>46.5 / 0.4%</b>	<b>609.5 / 5.6%</b>

\* Excludes open water and low- to high-intensity developed land uses due to lack of vegetation

Proposed Project construction and site restoration actions would convert 4 acres of deciduous or evergreen forest to open grassland or shrub cover, long term. Such impacts would be considered minor as there would be limited alteration to vegetation composition, abundance, and diversity due to the small acreages of affected vegetation relative to the larger landscape.

An estimated 610 acres of vegetation adjacent to (within 300 feet of) construction areas could also experience indirect effects from dust deposition, vegetation trampling from vehicles, equipment, and human activity, or the introduction of new, invasive or exotic species. Dust can affect plant photosynthesis, respiration, and transpiration, potentially leading to a decrease in plant growth (e.g. Thompson et al. 1984). However, this impact would be short term—typically limited to the heaviest period of construction—and would be minimized by the application of industry-standard best practices for dust control procedures. The

introduction of vehicles, equipment, and construction or maintenance crews to the Project Area could also damage individual plants or introduce exotic or invasive species to construction sites and surrounding areas. However, the Applicant would conduct follow-up inspections to ensure compliance with restoration specifications. Therefore, it is expected that weed populations would be controlled and that overall, these indirect effects would result in negligible alteration to vegetation composition, abundance, and diversity.

As noted in Section 5.2, projected increasing temperatures and decreasing precipitation could result in decreased vegetation growth and increase the likelihood of insect or disease outbreaks and wildfires. The magnitude of effect from removal or disturbance of up to 765 acres of vegetation for the Proposed Project could increase if climatic shifts alter the abundance and distribution of vegetation communities within the Project Area. However, disturbed vegetation types are very common across the greater landscape (see Table 2). Therefore, implementation of the Proposed Project is not anticipated to lead to significantly greater impacts to vegetation under likely climate scenarios.

Proposed mitigation to offset BCVI impacts on conservation lands could include vegetation management actions such as managing woody vegetation or grazing management. These mitigation actions, if implemented, could result in limited alteration to vegetation composition, abundance, and diversity due to the small acreages of affected vegetation relative to the larger landscape. Proposed mitigation could also provide negligible beneficial vegetation effects, however, by contributing to the permanent protection and management of up to 454 acres of BCVI suitable habitat within the region. Alternative A would prohibit future development and land use conversions and maintain protected vegetation communities over the long term. Therefore, although the intent of the proposed mitigation is to protect BCVIs, some vegetation communities associated with mitigation lands would also experience an incidental benefit.

#### **6.4.1.2. ALTERNATIVE B (NO ACTION)**

Under the No Action Alternative, the Applicant would either elect not to proceed with construction of the Proposed Project or to construct and operate the Proposed Project without issuance of an ITP or an HCP. If no construction occurred, there would be no project-related effects to vegetation communities, although vegetation could still be impacted by ongoing activities in the Project Area. If the Applicant chose to construct and operate the Proposed Project without issuance of an ITP or an HCP, however, the Proposed Project would result in the clearing or disturbance of vegetation in a manner that avoids take of BCVI during construction, operation, and maintenance. The extent of potential vegetation clearing or disturbance under this scenario is unknown. However, the USFWS assumes that the Applicant would avoid development within 300 feet of BCVI habitat. Consequently, it is likely that alteration to vegetation composition, abundance, and diversity would be reduced as compared to the Preferred Alternative.

If the project were constructed, the No Action Alternative would not offset impacts to BCVI through the implementation of mitigation measures. Therefore, vegetation communities under Alternative B would not benefit, via protection from future loss or disturbance from on-site activities, from the preservation of BCVI habitats through land conservation.

#### **6.4.1.3. CUMULATIVE EFFECTS**

The cumulative vegetation Project Area for this EA consists of seven HUC-12 subwatersheds that overlap the Project Area and reasonably foreseeable actions identified in Section 6.2. Combined, these subwatersheds cover 183,066 acres. Land uses within this Project Area are similar to the Proposed Project, consisting largely of low-density residential homes and rural lands used for private farming, hunting, and ranching purposes. The Project Area also contains historic oil/gas activity; dry holes, permitted locations, plugged oil wells, and plugged gas wells were identified in the vicinity of the Rattlesnake Wind Project (URS 2008).

The predominant cumulative impacts to vegetation resources would be the removal of vegetation from implementation of the Proposed Project combined with unrelated past, present and reasonably foreseeable future activities. Construction of the Rattlesnake Wind Project would disturb or remove an estimated 562 acres (<0.5%) of vegetation in the Project Area. Other potential reasonably foreseeable trends in the Project Area include additional energy development (oil and gas, pipelines, transmission), rural residential development, and road maintenance and construction activity, as well as ongoing farming, ranching, and hunting. These activities have not been quantified, but are expected to result in limited vegetation clearing impacts based on historic land cover trends. From 2001 to 2011, land cover in the cumulative Project Area (based on NLCD data) changed minimally as a result on ongoing land uses (Table 7). Although medium and high intensity development increased while vegetation acreage decreased for some cover types, only a small number of acres were affected.

**Table 7.** Change in land cover within the cumulative Project Area from 2001 to 2011.

NLCD Land Use/Land Cover Type*	2001 Acres	2011 Acres	Percent Change
<b>Developed, Open Space</b>	9,620	9608	-0.1%
<b>Developed, Low Intensity</b>	355	357	0.5%
<b>Developed, Medium Intensity</b>	40	49	23.1%
<b>Developed High Intensity</b>	4	5	18.0%
<b>Barren Land (Rock/Sand/Clay)</b>	1	1	0.0%
<b>Deciduous Forest</b>	3,278	3,282	0.1%
<b>Evergreen Forest</b>	3,082	3,058	-0.8%
<b>Shrub/Scrub</b>	111,468	111,176	-0.3%
<b>Grassland/Herbaceous</b>	20,178	20,508	1.6%
<b>Pasture/Hay</b>	3,499	3,456	-1.2%
<b>Cultivated Crops</b>	31,527	31,586	0.2%
<b>Woody Wetlands</b>	4	4	0.0%

\* Homer et al. 2015. Excludes open water due to lack of vegetation

Long-term, the Proposed Project would only add 46 acres of vegetation removal to past, present, and reasonably foreseeable disturbance (see Table 6 for breakdown by land cover type), which collectively would represent less than 1% of the total vegetation in the cumulative Project Area. Therefore, project effects, when considered in conjunction with other reasonably foreseeable trends, would not yield significant cumulative impacts to vegetation based on the small acreages of affected vegetation relative to the larger landscape.

## **6.4.2. General Wildlife**

### **6.4.2.1. ALTERNATIVE A (PREFERRED ALTERNATIVE)**

As discussed in the preceding section on vegetation impacts (Section 6.4.1), Covered Activities associated with the Preferred Alternative would result in the short-term removal of up to approximately 155 acres of vegetation which can provide shelter, breeding, and foraging habitat for woodland, grassland, and shrubland species (see Table 6 in Section 6.4.1.1 for a breakdown by habitat type). These changes would likely be beneficial to some species and negative to others. In particular, changes in edge habitat could adversely

impact species that rely on woodland features, although other species that use more open habitats could benefit from vegetation clearing activities.

Long term, the Proposed Project would convert 4 acres of deciduous or evergreen forest to grassland or shrub habitat and remove approximately 46 acres of habitat for the duration of the wind farm's operation, although this habitat would ultimately be restored following project decommissioning. The long-term conversion or removal of habitat could displace wildlife that currently uses this habitat for breeding, cover, foraging, and movement. The addition of roads, MV collection cables, turbines, and other infrastructure would also fragment existing continuous habitat, and could displace individual species from patches that become too small to sustain them. This displacement could lead to reduced physical condition and health of affected individuals, but would not affect the long-term viability of local populations because of the high proportion of similar habitat that occurs in the Project Area.

Proposed Project development could, in addition to previously discussed direct habitat changes, indirectly decrease habitat quality through the introduction of weeds or increase potential for collisions causing wildlife injury or mortality. Post-construction, the Applicant would conduct follow-up inspections to ensure compliance with site restoration specifications. Therefore, it is unlikely that project-induced weeds would lead to an overall reduction in habitat health.

Vehicle and equipment operation could result in mortality of smaller-bodied or slow-moving species—such as rodents, reptiles or amphibians—taking shelter in an area cleared or excavated or in the path of moving vehicles. Impacts to these species would be considered minor or negligible as the impacts would be localized and would not affect the species on a broader population landscape level. Speed limits within those portions of the Project Area that contain suitable BCVI habitat would be set at 20 mph during the BCVI breeding season (March 15 through August 31), to reduce the possibility of wildlife suffering death or injury as a result of vehicle collision.

Proposed Project-induced increases in human activity (e.g., increased noise and movement) could also result in wildlife displacement or altered behavior during construction and operation of the wind farm. Wildlife can be negatively impacted by human-produced noise, including changes in vigor and productivity, especially if disturbed during critical times of year such as breeding and wintering (Knight and Cole 1995; Gabrielsen and Smith 1995).

Proposed Project construction and operation activity would include the use of heavy equipment and vehicle traffic, which produce a typical range of sound from 55–85 dBA at 50 feet from the noise source (Table 8). Project turbines would also continuously operate at 60 dBA (at the base).

Since the Project Area and surrounding land is rural in nature with low ambient noise levels, the No Action Alternative would likely increase current noise levels by up to 50 dBA during construction and by up to 20 dBA during operation. However, most noise (excluding turbines) would be produced sporadically and temporarily, and all noise sources would only impact species that are in the range (0.25 to 0.5 mile) of the produced sound. Due to the high proportion of similar habitat that occurs in the Project Area, any species displaced due to human noise and activity would likely be able to use equivalent suitable habitat available on adjacent lands.

During operation, it is possible for individuals of any of the bird or bat species present or migrating through the Project Area to collide with Proposed Project turbines, although that potential is expected to be greater for species that regularly fly well above ground than for those that usually remain low or concealed in vegetation. However, the Applicant would implement the USFWS's voluntary Land-based Wind Energy Guidelines (USFWS 2012) to avoid and/or minimize potential impacts to birds and bats during the design and operation of the Project, including relevant best management practices. Therefore, although individual

birds or bats may be injured or killed, impacts to these species are not expected to be significant at the population level.

As noted in Section 5.2, projected increasing temperatures and decreasing precipitation could result in changes to the availability and distribution of wildlife habitat and species in the Project Area. The Proposed Project would reduce available habitat and increase habitat fragmentation for certain species, which could exacerbate wildlife effects experienced by wildlife under climate warming trends. However, the magnitude of effect is anticipated to be limited, given the small project footprint-size relative to available habitat within the Project Area.

Contributing to the perpetual protection and management of up to 454 acres of BCVI habitat would preserve and manage vegetation capable of providing shelter, breeding, and foraging habitat for a variety of wildlife species. Although the mitigation measure only seeks to offset take of BCVIs, other wildlife species present in the same location would also be protected from future development and habitat loss.

**Table 8.** Standard Noise Levels of Commonly Used Construction Equipment

Equipment	Typical Sound Level (dBA)			
	50 feet *	500 feet **	1,500 feet **	3,000 feet **
<b>Backhoe</b>	78–80	59	50	44
<b>Front end loader</b>	79–80	59	50	44
<b>Grader</b>	85	64	55	49
<b>Pickup truck</b>	55–75	54	45	39
<b>Dozer</b>	82–85	64	58	52
<b>Dump truck</b>	76–84	63	54	48
<b>Tractor</b>	84	63	54	48

\* Data from Federal Highway Administration (2006).

\*\* Estimated noise levels at distances away from the equipment item (beyond 50 feet) are conservative because the only attenuating mechanism considered was divergence of the sound waves in open air. In general, this mechanism results in a 6-dBA decrease in the sound level with every doubling of distance from the source.

#### 6.4.2.2. ALTERNATIVE B (NO ACTION)

Under the No Action Alternative, the Applicant would either elect to not proceed with construction of the Project or to construct and operate the Proposed Project without issuance of an ITP or an HCP. If no construction occurred, there would be no project-related effects to wildlife, although wildlife habitat and individual species could still be impacted by ongoing activities in the Project Area. Potential wildlife impacts if the Applicant chose to construct and operate the Proposed Project without issuance of an ITP or an HCP are primarily associated with the alteration and removal of vegetation during construction and maintenance. Under the No Action Alternative, wildlife communities that thrive within BCVI-preferred habitat conditions would not benefit indirectly from the permanent conservation of mitigation lands. However, overall, construction would not likely result in substantial reductions in wildlife populations or habitat in the region. The extent of potential vegetation clearing or disturbance under the No Action Alternative is unknown, but the USFWS assumes that the Applicant would avoid development within 300 feet of BCVI habitat. Consequently, it is likely that alteration to wildlife habitat would be reduced as compared to the Preferred Alternative.

### 6.4.2.3. CUMULATIVE EFFECTS

The cumulative wildlife Project Area for this EA is the same as for vegetation, consisting of seven HUC-12 subwatersheds that overlap the Project Area and reasonably foreseeable actions identified in Section 6.2. Land uses are as discussed in Section 6.4.1.4.

The predominant cumulative impacts to wildlife resources would be the removal of habitat from implementation of the proposed Project combined with unrelated past, present and reasonably foreseeable future activities.

Construction of the Rattlesnake Wind Project would disturb or remove approximately 562 acres (<0.5%) of vegetation in the Project Area<sup>4</sup>. Other potential reasonably foreseeable trends in the Project Area include additional energy development (oil and gas, pipelines, transmission), rural residential development, and road maintenance and construction activity, as well as ongoing farming, ranching, and hunting. These activities have not been quantified, but are expected to result in limited vegetation clearing impacts based on historic land cover trends. From 2001 to 2011, land cover in the cumulative Project Area (based on NLCD data) changed minimally as a result on ongoing land uses (Table 7).

The Proposed Project would add approximately 109 acres of short-term wildlife habitat removal and 46 acres of long-term habitat removal to past, present, and reasonably foreseeable disturbance (see Table 6 for breakdown by land cover type), which collectively would represent less than 1% of the total wildlife habitat in the cumulative Project Area. Therefore, project effects, when considered in conjunction with other reasonably foreseeable trends, would not yield significant cumulative impacts to wildlife based on the small acreages of affected vegetation relative to the larger landscape.

### 6.4.3. *Black-capped Vireo*

#### 6.4.3.1. ALTERNATIVE A (PREFERRED ALTERNATIVE)

Direct effects from implementation of the HCP include BCVI habitat removal, degradation, and fragmentation. Indirect effects could occur from increased potential for predation, including predation by the red imported fire ant (*Solenopsis invicta*), increased brood parasitism, and competition or changes in the structure or composition of adjacent habitat, which may affect foraging activity.

Given the circumstances of the Proposed Project and the ecology of the BCVI, it is not possible to precisely estimate the number of individual BCVIs that could be taken as a result of the Covered Activities. However, up to 725 acres of occupied BCVI habitat would be removed or modified by Proposed Project construction, which comprises approximately 19% of the total estimated potential BCVI habitat (3,843 acres) within the Project Area and approximately 7% of the Project Area's total land cover. Of this total, 122 acres of occupied BCVI habitat would be cleared during construction for new or expanded access roads, connecting lines, turbine pads, and the substation and Gen-tie Line.

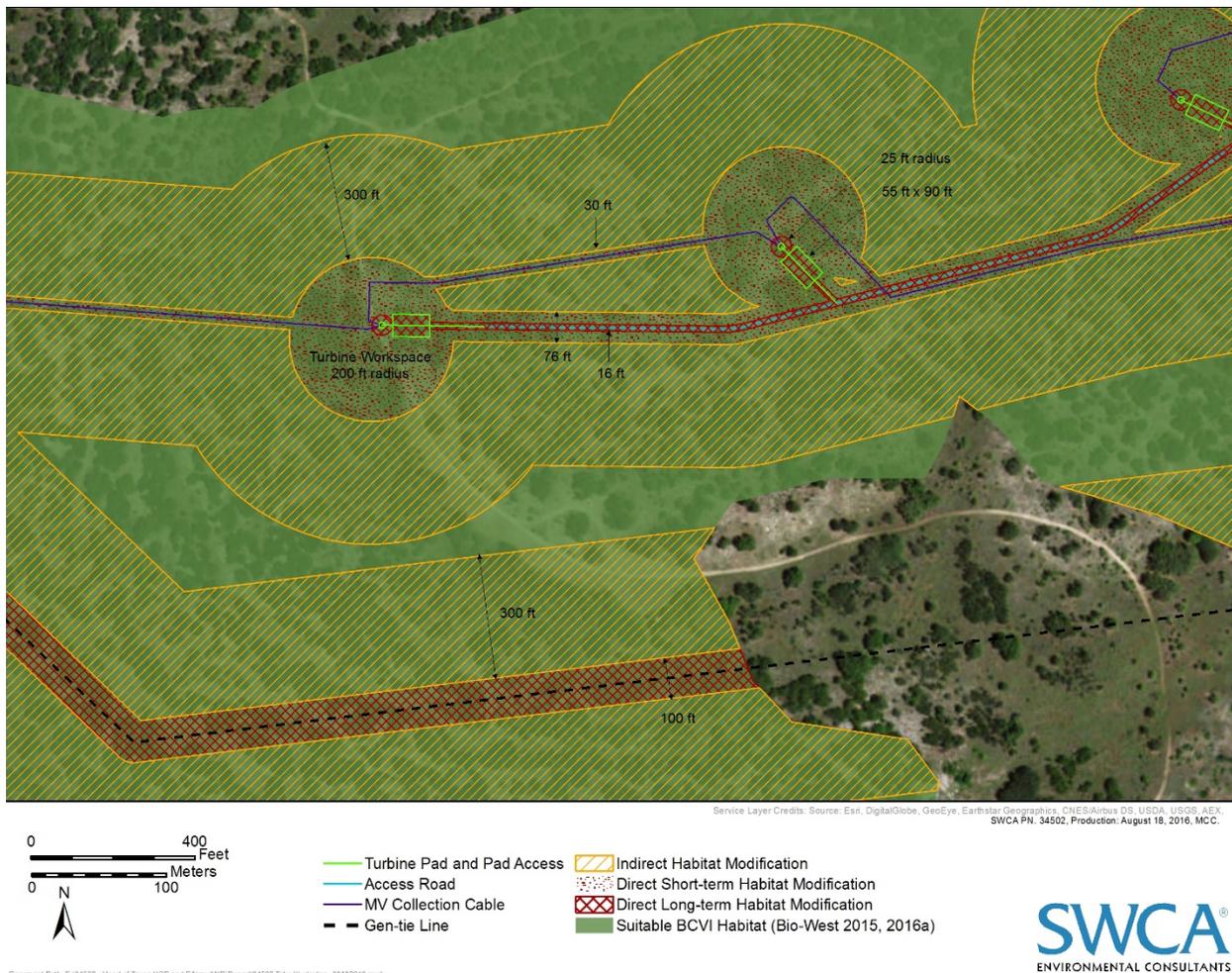
The Applicant has proposed to restore approximately 92 acres once construction is complete to allow suitable BCVI habitat to regrow (Figure 5). It is unknown whether the restoration of BCVI habitat within the temporarily disturbed areas will be successful. Suitable BCVI habitat may regrow in temporarily disturbed areas because the methods proposed to remove the habitat are anticipated to cause minimal damage to shrub root systems. Additionally, some research (e.g., Reemts and Cimprich 2014) has indicated that mechanical vegetation removal can be beneficial to BCVI habitat quality.

---

<sup>4</sup> Please note that removal of wildlife habitat does not include BCVI habitat. BCVI suitable habitat was not removed during construction of the Rattlesnake Wind Project and project construction occurred in compliance with 300-foot buffer requirements for activities occurring near BCVI suitable habitat.

The Applicant has addressed the uncertainty regarding BCVI habitat restoration through a changed circumstance. The Applicant would evaluate BCVI habitat conditions in areas classified as undergoing short-term habitat loss during the fifth year following implementation of the post-construction habitat restoration measures. If the results of this habitat evaluation demonstrate that suitable BCVI habitat has not regenerated over all or portions of the restoration area, the Applicant has committed to either provide additional BCVI mitigation for those areas that failed to regenerate or request an extension of the evaluation period from the USFWS. The Applicant would provide any additional mitigation within 1 year of notification by USFWS that this changed circumstance has occurred.

Habitat would be removed outside of the BCVI breeding season (March 15 through August 31) and all clearing will be initiated before March 1<sup>st</sup>. Therefore, the removal of BCVI habitat would not directly kill or wound any individual birds or eggs, or destroy active nests present in the Project Area. It is possible that habitat removal when the species is not present could cause take through harm; although, this outcome is not certain and depends on the specific circumstances of the activity at the time it is conducted.



**Figure 5.** Schematic of impact zones applied to the Proposed Project.

Individual BCVIs could be harmed or killed from collisions with vehicles or facilities during project construction, operation, and maintenance. Speed limits within those portions of the Project Area that contain suitable BCVI habitat would be set at 20 mph during the BCVI breeding season (March 15 through August 31) to reduce the possibility of any individual BCVI suffering death or injury as a result of vehicle collision.

While it is also possible that individual BCVIs could collide with spinning turbines, there are no published fatality records from BCVI striking wind turbines (Erickson et al. 2014); therefore, the risk of any such collision and subsequent take would be low.

The introduction of new development onto the property in the form of wind turbines and associated facilities presents stressors not previously present that could result in nest abandonment, increase in cowbird presence, changes in territory size, changes in foraging behavior, etc. that may rise to the level of take. Construction of the Proposed Project could also result in indirect effects to BCVIs through habitat fragmentation and reduction in habitat patch sizes, creation of habitat edges, introduction of noise and human activity; and introduction of shadow flicker. In general, the USFWS considers areas of suitable BCVI habitat within 300 feet of direct impacts to be indirectly impacted. Indirect impacts are generally related to harassment, which may occur over the life of the project. Applying this convention to the Covered Activities, the Proposed Project would indirectly impact 603 acres of suitable BCVI habitat.

Prime BCVI habitat is thought to occur in patches of at least 250 acres (USFWS 2013a). The removal of suitable BCVI habitat during construction would fragment some of the remaining habitat and reduce habitat patch sizes. Additional suitable habitat is available within the Project Area and BCVIs may utilize alternative local habitat. The creation of edge habitat could influence abundance or nesting success or increase the risk of cowbird nest parasitism to BCVIs. BCVI nest parasitism rates are closely tied to cattle grazing intensity (Koloszar and Horne 2000; Kostecke et al. 2003), which would not be influenced by construction of the Proposed Project. However, additional edge habitat would be created as a result of the Proposed Project by removing occupied breeding habitat in linear swaths for turbine and roadway construction.

The Proposed Project could disturb or displace BCVIs due to localized noise, lighting, and human or vehicle activity associated with construction, operation, or maintenance tasks. Most of this activity would be intermittent and of short duration, with the exception of continuous turbine operation. The potential for project-related noise and human activity to significantly disturb BCVIs would be reduced by scheduling routine maintenance activities to be performed outside of the BCVI breeding season to the maximum extent practicable.

*Shadow flicker* is caused by the blades of operating wind turbines repetitively casting shadows across slices of the landscape. This effect is still theoretical in nature and the impact of shadow flicker, if any, on the BCVI is unknown.

If, in the future, a decision is made to decommission the Proposed Project, all components would be removed and the site would be reseeded. Because decommissioning activities would occur only in areas already cleared or disturbed, it is not anticipated that BCVIs would be directly affected. Decommissioning activities could indirectly affect BCVIs through temporary, localized noise and human or vehicular activity. These effects would be similar to those described above for operation and maintenance tasks. In the long term, Proposed Project decommissioning would maintain or potentially improve BCVIs habitat through the removal of Proposed Project infrastructure and reseeded of disturbed areas.

As noted in Section 5.2, projected climate changes could result in impacts to BCVI if increasing temperature and decreasing precipitation result in a decrease in the availability and distribution of BCVI habitat in the Project Area. Approximately 31 acres of BCVI habitat would be removed for the duration of the Proposed Project, which could exacerbate effects experienced by BCVI under climate warming trends. However, the magnitude of effect is anticipated to be limited, given the small project footprint size relative to available BCVI habitat.

To offset potential BCVI take, under Alternative A (Preferred Alternative) the Applicant would implement all avoidance and minimization measures described in the HCP (SWCA 2016). The Applicant would also

fund and provide permanent conservation for the BCVI through one or more of the following options: permittee-responsible mitigation lands, conservation banks, or third party mitigation lands. The USFWS has assumed that these actions would result in a long-term net conservation benefit to the species and offset authorized take.

#### **6.4.3.2. ALTERNATIVE B (NO ACTION)**

Under the No Action Alternative, the Applicant would either elect not to proceed with construction of the Proposed Project or to construct and operate the Proposed Project without issuance of an ITP or an HCP. If no construction occurred, there would be no project-related effects to BCVI, although habitat and individual species could still be impacted by ongoing activities in the Project Area.

If construction occurs, loss and temporary removal or modification of vegetation would occur within the Project Area. However, the USFWS assumes that the Applicant would comply with the ESA and avoid take of BCVI by avoiding development within 300 feet of BCVI habitat; therefore, there would be no effect to the species under this alternative.

#### **6.4.3.3. CUMULATIVE EFFECTS**

The Project Area falls within the mapped, 24-county BCVI Central Recovery Region which, in part due to its large size, contains highly varied land uses ranging from low-density residential homes and rural lands used for private farming, hunting, and ranching purposes to high-density residential and commercial development. Since analysis of impacts to suitable BCVI habitat at this scale would not result in meaningful analysis, the cumulative BCVI Project Area for this EA is constrained to suitable BCVI habitat within McCulloch County. The USFWS in 2004 identified McCulloch County as containing 62,717 acres of potential BCVI habitat (USFWS 2004). The USFWS reported observations of 33 BCVI from McCulloch County between 2009 and 2014; although, additional information about the location and nature of these observations was not provided (Christina Williams, USFWS, pers. comm.).

The predominant cumulative impacts to BCVI would be the removal or disturbance of suitable habitat from implementation of the Proposed Project combined with unrelated past, present and reasonably foreseeable future activities. Potential reasonably foreseeable trends in the Project Area include additional energy development (oil and gas, pipelines, transmission), rural residential development, and road maintenance and construction activity, as well as ongoing farming, ranching, and hunting. These activities have not been quantified, but are expected to result in limited vegetation clearing impacts based on historic land cover trends. From 2001 to 2011, land cover in the vegetation and wildlife cumulative Project Area (based on NLCD data) changed minimally as a result on ongoing land uses (Table 7).

Construction of the Proposed Project would result in modification or removal of 725 acres of suitable BCVI habitat. However, collectively this disturbance would affect less than 1% of potential BCVI habitat within McCulloch County. Additionally, under Alternative A (Preferred Alternative) the Applicant would implement all avoidance and minimization measures described in the HCP (SWCA 2016), as well as fund and provide permanent conservation for the BCVI through one or more of the following options: permittee-responsible mitigation lands, conservation banks, or third party mitigation lands. These actions would result in a long-term net conservation benefit to the species and offset authorized take.

For these reasons, when considered in conjunction with other reasonably foreseeable activities, the Proposed Project would not result in significant cumulative impacts to the species.

## **6.4.4. State-Protected Species**

### **6.4.4.1. ALTERNATIVE A (PREFERRED ALTERNATIVE)**

Texas horned lizards occur in areas where vegetation is sparse; therefore, if construction occurs, the long-term conversion of 4 acres of deciduous or evergreen forest to grassland or shrub habitat and the revegetation of 109 acres of land cleared during construction under the Preferred Alternative could create new habitat for the species. As discussed under section 6.4.2.1, however, project-induced increases in human activity (e.g., increased noise and movement) could result in individual displacement or harm from equipment or vehicle strikes, if any members of the species happened to be present or take shelter near proposed roads and construction areas.

Texas horned lizards are active from April to July. Therefore, implementation of seasonal BCVI clearing restrictions and low speed limits within the Project Area during the BCVI breeding season (between March 15 and August 31) would indirectly benefit the lizard by reducing the possibility of death or injury as a result of vehicle collision or equipment strikes. Consequently, the potential for mortality is extremely low and, as a result, the Project would be expected to have a minor effect on the species.

As noted in Section 5.2, projected increasing temperatures and decreasing precipitation could result in changes to the availability and distribution of wildlife habitat and species in the Project Area. Given Texas horned lizard preference for desert or semi-arid climates, likely climate change scenarios that shift habitats toward more desert environments (through higher temperatures and lower precipitation) could expand habitat availability for the species. This habitat conversion, along with Proposed Project-related habitat conversion, could result in a negligible benefit to the species over time.

As part of Alternative A, the Applicant would preserve up to 454 acres of habitat to offset BCVI impacts. Although the mitigation measure only seeks to offset take of BCVIs, any state-listed species or their potential habitat present in the same location as mitigation lands would also be protected from future development. Additionally, RIFA treatment associated with Alternative A would reduce threats to the species' preferred food sources. Therefore, Alternative A (Preferred Alternative) could provide an indirect, negligible or minor benefit to the Texas horned lizard.

### **6.4.4.2. ALTERNATIVE B (NO ACTION)**

Under the No Action Alternative, the Applicant would either elect not to proceed with construction of the Proposed Project or to construct and operate the Proposed Project without issuance of an ITP or an HCP. If no construction occurred, there would be no project-related effects to Texas horned lizards, although habitat and individual species could still be impacted by ongoing activities in the Project Area.

If the Applicant chose to construct and operate the Proposed Project without issuance of an ITP or an HCP, however, the Proposed Project would result in the clearing or disturbance of vegetation in a manner that avoids take of BCVI during construction, operation, and maintenance. The extent of potential vegetation clearing or disturbance under this scenario is unknown. However, the USFWS assumes that the Applicant would avoid development within 300 feet of BCVI habitat. Consequently, it is likely that both species benefits—from land conversion to open habitat—and species risks due to vehicle collision or equipment strikes would be reduced as compared to the Preferred Alternative.

### **6.4.4.3. CUMULATIVE EFFECTS**

The cumulative state-protected species Project Area for this EA is the same as for vegetation and general wildlife, consisting of seven HUC-12 subwatersheds that overlap the Project Area and reasonably foreseeable actions identified in Section 6.2. Land uses are as discussed in Section 6.4.1.4.

The predominant cumulative impacts to state-protected species would be the removal of species habitat from implementation of the Proposed Project combined with unrelated past, present and reasonably foreseeable future activities.

For the purposes of this EA, construction of the Rattlesnake Wind Project is assumed to potentially increase Texas horned lizard habitat through forested land conversion to grassland and through revegetation in amounts equivalent to the Proposed Project (109 acres, based on known design components). Other potential reasonably foreseeable trends in the Project Area include additional energy development (oil and gas, pipelines, transmission), rural residential development, and road maintenance and construction activity, as well as ongoing farming, ranching, and hunting. These activities have not been quantified, but may increase or decrease Texas horned lizard habitat depending on the action. However, overall, habitat impacts are anticipated to be limited based on historic land cover trends. From 2001 to 2011, land cover in the cumulative Project Area (based on NLCD data) changed minimally as a result on ongoing land uses (Table 7).

Construction of the Proposed Project would not cumulatively add to habitat loss, because the Proposed Project would create new suitable habitat for Texas horned lizard through long-term conversion of 4 acres of woodland and post-construction revegetation of 109 acres of cleared land. Therefore, the Proposed Project, when considered in conjunction with other reasonably foreseeable projects, would not result in significant cumulative effects to the Texas horned lizard.

## **7. CONCLUSIONS**

The Proposed Federal Action is the Applicant's Preferred Alternative to issue an ITP for this project. Alternative A (Preferred Alternative) and Alternative B (No Action Alternative) would not have a significant direct, indirect, or cumulative effect on the human environment. The potential effects of the alternatives to environmental resources would be generally negligible to minor in nature.

## 8. REFERENCES

- Antiquities Planning & Consulting. 2016. REVISED Draft Report: A Cultural Resources Survey of the Heart of Texas Wind Farm and Transmission Line. McCulloch County, Texas Section 106 Review.
- Bio-West. 2015. Black-capped vireo habitat survey McCulloch County Texas [Memorandum]. Rosenberg, Texas.
- . 2016a. *Black Capped Vireo Protocol Survey – Heart of Texas Wind, LLC*. Prepared for Renewable Energy Systems Americas, Inc. Rosenberg, TX. 3 pp.
- . 2016b. *Black Capped Vireo Habitat Survey McCulloch County Texas*. Prepared for Renewable Energy Systems Americas, Inc. Rosenberg, TX. 2 pp———. 2016c. Heart of Texas Wind Farm Locale Cultural Resources Assessment [Memorandum]. Rosenberg, Texas.
- . 2016d. Wetland Delineation, Waters of the United States for the proposed Heart of Texas Project McCulloch County, Texas [Memorandum]. Rosenberg, Texas.
- Bolt, Beranek and Newman, Inc. 1973. Fundamentals and Abatement of Highway Traffic Noise, Report No. PB-222-703. Prepared for the Federal Highway Administration.
- Brady/McCulloch County Chamber of Commerce. 2015. McCulloch County Top Employers. Available at: <http://www.bradytx.com/pages/Demographics/>. Accessed January 2016.
- Campbell, L. 2003. Endangered and threatened animals of Texas: their life history and management. Texas Parks and Wildlife Department, Austin, Texas. 127 pp.
- Dixon, J.R. 2013. Amphibians and reptiles of Texas. Texas A&M Nature Guides- Third edition. College Station, Texas.
- Erickson W, Wolfe M, Bay K, Johnson D, and Gehring JL. 2014. A comprehensive analysis of small passerine fatalities from collision with turbines at wind energy facilities. *PLoS ONE* 9(9): e107491.
- Fahrig, L. and T. Rytwinski. 2009. Effects of roads on animal abundance: an empirical review and synthesis. *Ecology and Society* 14(1): 21. Available at: <http://www.ecologyandsociety.org/vol14/iss1/art21/>. Accessed October 11, 2015.
- Farquhar, C.C. and J.I. Gonzalez. 2005. *Breeding Habitat, Distribution, and Population Status of the Black-Capped Vireo in Northern Mexico*. Project WER65 Final Report. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- Federal Highway Administration. 2006. Construction Noise Handbook. Available at: [http://www.fhwa.dot.gov/environment/noise/construction\\_noise/handbook/](http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/). Accessed August 7, 2015.
- Gabrielsen, G.W., and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. In *Wildlife and Recreationists: Coexistence through Management and Research*, edited by R.L. Knight and K.J. Gutzwiller, pp. 95–107. Washington, D.C.: Island Press.

- Gordon, C., K. Karsten, A. Hale, G. Forcey, S. Turner, J. Grzybowski, B. Suson, J. Kuba, H. Greeney. 2010. *Reproductive Success of Black-Capped Vireos and Other Shrub-Nesting Passerines In Relation to Distance from Wind Turbines*. National Wind Coordinating Collaborative Research Meeting VIII, Lakewood, Colorado.
- Graber, J.W. 1957. *A bioecological study of the black-capped vireo (Vireo atricapillus)*. Ph.D. dissertation, University of Oklahoma, Norman.
- Griffith, G.E., S.B. Bryce, J.M. Omernik, and A. Rogers. 2007. *Ecoregions of Texas*. Texas Commission on Environmental Quality. Austin, TX. 125p.
- Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K. 2015. Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345-354
- International Union for Conservation of Nature and Natural Resources. 2015. The IUCN Red list of threatened species. Available at: <http://www.iucnredlist.org/details/64072/0>. Accessed January 2016.
- Knight, R.L., and D.N. Cole. 1995. Wildlife responses to recreationists. In *Wildlife and Recreationists: Coexistence through Management and Research*, edited by R.L. Knight and K.J. Gutzwiller, pp. 51–69. Washington, D.C.: Island Press.
- Koloszar, J.A. and J.S. Horne. 2000. The spatial and temporal response of brown-headed cowbirds to a reduction in cattle stocking rates – final analysis. *Endangered species and management at Fort Hood, Texas: 1999 annual report*. Revised edition. Fort Hood Project, The Nature Conservancy of Texas, Fort Hood, Texas.
- Kosciuch, K., L. Nagy, R. Young, B. Gunderman, and B. Gibson. 2013. Black-capped vireos and wind energy: an opportunity for compatibility? American Wind Energy Association WindPower conference, Chicago, IL.
- Kostecke, R.M., J.A. Koloszar, and D.C. Dearborn. 2003. Effect of a reduction in cattle stocking rate on brown-headed cowbird activity. *Wildlife Society Bulletin*, 31:1083-1091.
- Kunkel, K.E, L.E. Stevens, S.E. Stevens, L. Sun, E. Janssen, D. Wuebbles, M.C. Kruk, D.P. Thomas, M. Shulski, N. Umphlett, K. Hubbard, K. Robbins, L. Romolo, A. Akyuz, T. Pathak, T. Bergantino, and J.G. Dobson. 2013: *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment. Part 4. Climate of the U.S. Great Plains*, NOAA Technical Report NESDIS 142-4, 82 pp.
- Kutac, E.A. and S.C. Caran. 1994. *Birds and other wildlife of south central Texas: a handbook*. University of Texas Press, Austin, TX. 203 pp.
- McFarland, T., H. Matthewson, J. Groce, M. Morrison, and R. Wilkins. 2013. A Range-wide Survey of the Endangered Black-capped Vireo in Texas. *Southeastern Naturalist*. 12(1): 41-60
- Mammals of Texas. 2015. *The Mammals of Texas - Online Edition*. Available at: <http://www.nsr.ttu.edu/tmot1/ordchiro.htm>. Accessed January 2016.

- Maresh, J. 2005. *Census and Monitoring of Black-capped Vireo in Texas*. Final Report: Project WER61, Grant No. E-15. Texas Parks and Wildlife Department, Austin, Texas.
- Nielsen-Gammon, J.W. 2008. The changing climate of Texas. *in* The impact of global warming on Texas, J. Schmandt, J. Clarkson, and G.R. North, eds. University of Texas Press. Austin, Texas. 33 pp.
- Reemts, C.M. and D.A. Cimprich. 2014. Restoring early-successional shrubland habitat for black-capped vireos using mechanical mastication. *Natural Areas Journal*, 34(4):400-407.
- Renewable Energy Systems Americas Inc. (ResAmerica). 2016. Noise Emission Study. Unpublished. Broomfield, Colorado.
- Smith, K.N., J.W. Cain III, M.L. Morrison, and R.N. Wilkins. 2012. Nesting ecology of the black-capped vireo in southwest Texas. *The Wilson Journal of Ornithology*, 124(2):277-285.
- Splettstosser, D. 2016. Personal communication between Sue Wilmot, SWCA with Danny Splettstosser on January 5, 2016.
- SWCA Environmental Consultants (SWCA). 2016. Heart of Texas Wind Project Habitat Conservation Plan. Austin, Texas.
- Texas Parks and Wildlife Department (TPWD). 2015a. Wildlife Fact Sheet for Texas Horned Lizard (*Phrynosoma cornutum*). Available at: <http://tpwd.texas.gov/huntwild/wild/species/>. Accessed October 2, 2015.
- . 2015b. Annotated county lists of rare species- McCulloch County. Last revision: March 3, 2015.
- . 2016. Outdoor Annual hunting seasons by county. Available at: <https://tpwd.texas.gov/regulations/outdoor-annual/regs/counties/mcculloch>.
- Texas Water Development Board (TWDB). 2015. 2016 Regional water plan- Population & water demand projections. Available at: <https://www.twdb.texas.gov/waterplanning/data/projections/2017/popproj.asp>. Accessed: September 2015.
- Thompson, J.R., P.W. Mueller, W. Fluckiger, and A.J. Rutter. 1984. The effect of dust on photosynthesis and its significance for roadside plants. 1984. *Environ. Pollut. Set. A*. 0143-1471/84. Elsevier Applied Science Publishers Ltd, England.
- U.S. Census Bureau (USCB). 2010. 2010 census. Census summary file 1, geographic header record G001. Available at: <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>. Accessed: September 2015.
- . 2016. Selected Economic Characteristics. 2010 – 2014 American Community Survey 5-Year Estimates. Available at: <http://factfinder.census.gov>. Accessed January 2016.
- U.S. Environmental Protection Agency (USEPA). 2012. Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards. Implementation of the 2008 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach, Attainment Deadlines and Revocation of the 1997 Ozone Standards for Transportation Conformity Purposes. Final Rules, May 21, 2012. *Federal Register* 77(98):30088–30273.

- U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service. 1996. Habitat conservation planning handbook. USFWS and NMFS, Washington, DC. November 1996.
- U.S. Fish and Wildlife Service (USFWS). 1987. Endangered and threatened wildlife and plants: Determination of the black-capped vireo to be an endangered species. *Federal Register* 52(193): 37420-37423.
- . 1991. Black-capped Vireo (*Vireo atricapillus*) Recovery Plan. USFWS, Austin, Texas. 74 pp.
- . 1996. Habitat Conservation Planning Handbook. Available at: <http://www.fws.gov/midwest/endangered/permits/hcp/hcphandbook.html>. Accessed April 2016.
- . 2000. The HCP Handbook Addendum or “Five Point Policy”. Available at: [http://www.fws.gov/midwest/endangered/permits/hcp/pdf/HCP Addendum.pdf](http://www.fws.gov/midwest/endangered/permits/hcp/pdf/HCP%20Addendum.pdf). Accessed December 2015.
- . 2003. Fish and Wildlife Service NEPA reference handbook. Available at: [www.fws.gov/r9esnepa/NEPA%20Handbook%20TOC.pdf](http://www.fws.gov/r9esnepa/NEPA%20Handbook%20TOC.pdf). Accessed December 2015.
- . 2004. USFWS’s Biological Opinion for the NRCS’s 2002 Farm Bill conservation program and effects on federally listed species. Arlington, Texas.
- . 2007. Black-capped vireo (*Vireo atricapilla*) 5-year review: Summary and evaluation. USFWS Arlington, Texas Field Office. Arlington, Texas.
- . 2010. USFWS Section 10(a)(1)(A) Scientific Permit Requirements for Conducting Presence/Absence Surveys and Habitat Assessments for Endangered Golden-cheeked Warblers. Last updated 01/13/10. USFWS Ecological Services Field Office, Austin, TX. 4 pp.
- . 2012. Land-based Wind Energy Guidelines. Available at: <http://www.fws.gov/ecological-services/energy-development/wind.html>. Accessed January 2016.
- . 2013a. Guidelines for establishment, management, and operations of golden-cheeked warbler and black-capped vireo mitigation lands. USFWS Southwest Region. July 1, 2013.
- . 2013b. *Guidelines for the Establishment, Management, and Operations of Golden-cheeked Warbler and Black-capped Vireo Mitigation Lands*. U.S. Fish and Wildlife Service Southwest Region.
- . 2013c. Endangered and threatened wildlife and plants; 90-day finding on a petition to delist or reclassify from endangered to threatened five southwest species. *Federal Register* 78(174): 55046-55051
- . 2014. National Wetland Inventory. Wetlands Data file for Google Earth. Last revised May 1, 2014. Available at: <http://www.fws.gov/wetlands/Data/Google-Earth.html>. Accessed September 2015.
- . 2015. Information, Planning, and Conservation (IPAC) System. Available at: <https://ecos.fws.gov/ipac/project/FVNY4EWMHRHDVB3U27LI2NFJ5U/resources>. Accessed September 2015.
- URS. 2008. Environmental (Non-avian) Fatal Flaw Analysis for the Proposed Rattlesnake Wind Farm and Transmission Line, McCulloch County, Texas [Technical Memorandum]. Austin, TX.

West, Inc. 2015. Rattlesnake Eagle Surveys Memo. Prepared for Renewable Energy Systems Americas, Inc. Austin, TX 3 pp.

Western Regional Climate Center. 2015. BRADY 2 SW, TEXAS Period of Record Monthly Climate Summary. Available at: <http://www.wrcc.dri.edu/cgi-bin/cliRECTM.pl?tx1017>. Accessed 11 December 2015.

Wilkins, N., R. Powell, A. Conkey, and A. Snelgrove. 2006. Population status and threat analysis for the black-capped vireo. Department of Wildlife and Fisheries Sciences, Texas A&M University. 146 pp.