WYOMING INDUSTRIAL DEVELOPMENT INFORMATION AND SITING ACT

SECTION 109 PERMIT APPLICATION

BOSWELL SPRINGS PROJECT

INDUSTRIAL SITING COUNCIL DOCKET DEQ/ISC 15-05

August 2017

SUBMITTED BY:

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Attention: Mac Lowry

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ICF. 2017. Boswell Springs Project. Wyoming Industrial Development Information and Siting Act Section 109 Permit Application. Docket DEQ/ISC 15-05. August. (ICF 00436.15.) Fort Collins, CO. Prepared for Boswell Wind, LLC, Vancouver, BC.

Contents

Tables and Figures

Figure **Page**

Application Checklist

Table ES-1. Section 109 Permit Application Checklist and References

Requirement[1]	Application Package Reference
1. Application Kit	
(a) Application Fee	Provided with transmittal letter
(b) Compliant transmittal letter i. Designating a point of contact (W. S. 35-12-109 (a) (i) and Rule I ii. Certifications of W. S. 35-12-109 (a) (ii) and Rule I iii. Attestation that the company has the financial capability to construct, operate, decommission and reclaim the facility	Provided.
(c) A .pdf of the application	Provided to ISD
(d) A .pdf of the socio-economic study, if separate from the application	Included in Application
(e) 60 copies of the application	70 copies provided
(f) The final opinion of the State Engineer, if required	Not required
(g) A copy of an environmental impact study or environmental assessment, at in its current stage, if required.	Not required
2. Application Instructions	
(a) Deliver on the agreed day and time.	Delivered as agreed
(b) Do not distribute the Application to anyone outside the Applicant's team. Public release must come from DEQ/ISD since DEQ/ISD must perform that task (W.S. 35-12-110 (a) (ii)), and receipt of the application identifies those local governments in the area of site influence (see references to 35- 12-110 (a) (ii) elsewhere in the act).	Acknowledged
(c) The socio-economic study, if a separate document, may be distributed to the public and in advance of the Application.	Acknowledged
(d) A partial or incomplete Application may constitute a filing. A limited fragment on one topic, a table or a figure, for discussion purposes, is not a filing.	Acknowledged
(e) Inquiries by the Applicant to DEQ/ISD for information or guidance on the Application form and content should be put in writing. DEQ/ISD will respond in writing.	Acknowledged
(f) Waiver of any content is not recommended.	Acknowledged
(g) Completeness will be determined by DEQ/ISD. However, comments and concerns from the readership may entail additional information or clarification.	Acknowledged

[1] Requirements presented per "Application Checklist for a Section 109 Application with DEQ/Industrial Siting Division", version November 9, 2015 with updates to reflect 2017 revised rules.

Requirement[1]	Application Package Reference
(h) The most important features are: i. Area of site influence recommendation, ii. Adequate housing and locations, iii. Workforce by quarter of construction, iv. Estimates of taxes, and v. Completeness in Application content, and the Application Kit	Acknowledged
3. Rule I, Section 6. General Format of Application or Request for Waiver.	
In accordance with W.S. 35-12-107 and W.S. 35-12-109, the applicant shall abide by the following rules and conditions:	
(a) Prior to submitting its application or request for waiver, each applicant shall confer with the division to determine the number of copies of the application or request for waiver to be filed with the division. The applicant shall file a minimum of forty (40) copies of the application with the division. The applicant shall not be required to file more than seventy-five (75) copies of the application without prior approval of the Council.	
Was this covered in the Pre-application meeting?	
Were the specified number received?	Yes, 70 copies provided
(b) The application or request for waiver shall be typed, printed, or otherwise legibly reproduced on 8 ½-inch by 11-inch paper. Maps, drawings, charts, or other documents that are bound in the application or request for waiver shall be cut or folded to 8 ½-inch by 11-inch size. All pages in an application or request for waiver shall be consecutively numbered.	
Does the Application exist in this format?	Yes
(c) The application or request for waiver shall be verified by the applicant as to its truth and accuracy, upon oath or affirmation. Such application or request for waiver shall be signed by whomever of the following is applicable: a managing partner, the proprietor, a responsible executive officer, or designated manager.	
An eligible signor is one who is able to bind the company (e.g. president or officer given that authority by bylaws).	
Does the transmittal letter contain this assertion?	
Does the transmittal letter contain the company's request for a permit or waiver of a permit to construct and operate the facility?	
Does the letter contain an attestation that the company has the financial capability to construct, maintain, operate, decommission and reclaim the facility?	Yes to all items
(d) The applicant shall notify the Division immediately whenever it submits an application or receives a permit or approval subsequent to submitting an application under the Act which would require a material change in the design or location of the industrial facility. Such notification by the applicant may constitute a request for amendment pursuant to W.S. 35-12-106(c) and Section 16 of these rules if the division determines that such differences materially change the nature, location or impact of the proposed industrial facility.	
Was this covered in the Pre-application meeting?	Yes

Requirement[1]	Application Package Reference
(e) An applicant may apply for a permit to construct an industrial facility in phases over an extended period.	
Was this covered in the Pre-application meeting?	Yes, not applicable to this Project
Page number in the Application:	
(f) As part of the application, the applicant shall submit a summary of the entire application. The summary shall reference supporting data and analysis.	
Does the summary exist?	Yes, see Executive Summary
Does the summary reference the supporting data and analysis?	
(g) Whenever the act or these rules require information concerning the industrial facility to be submitted to the Council and the applicant is required to submit the same or similar information to another state, federal or local agency having jurisdiction, the applicant may submit the information to the Council in the same format required by the other agency.	
Was this covered in the Pre-application meeting?	
Was this convenience used?	
If so, for DEQ/AQD? BLM? Other	Not applicable to this Project.
A separate document? or copied into the Application on page	
(h) Applicants may fulfill informational requirements of the regulations and the Act by describing the area of jurisdiction covered by other regulatory agencies in the state.	Yes, Section 6 includes regulatory jurisdiction for each resource analyzed
Was this discussed at the Pre-application meeting?	
Is there a perfunctory statement that acknowledges the informational requirement, states the jurisdiction, and states the name and location of the detailed information?	
4. Requirements of W. S. 35-12-109: (notice the interpretation and details below, Requirements of Rule I, Section 9.)	
(a) An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain the following information:	
(i) The name and address of the applicant, and, if the applicant is a partnership, association or corporation, the names and addresses of the managers designated by the applicant responsible for permitting, construction or operation of the facility.	
Does the name and service address appear?	
Is the name and contract information of the point of contact stated?	Yes, see Section 2.1
(ii) The applicant shall state that to its best knowledge and belief the application is complete when filed and includes all the information required by W.S. 35-12-109 and the rules and regulations, except for any requirements specifically waived by the council pursuant to W.S. 35-12-107;	
This affirmative statement should be in the Application if the transmittal letter is separate.	See Section 2.0
Page number in the Application.	The clause referencing Section 107 does not apply.
(iii) A description of the nature and location of the facility;	
Page number in the Application:	See Section 2.3

Requirement[1]	Application Package Reference
(iv) Estimated time of commencement of construction and construction time; **This must be included with the figure showing the job classifications at the site by quarter** **It may be provided in a text statement also.** **Was this Applicant advised during the Pre-application meeting about required filings noting changes in the Application for filing requests for changes in construction schedule?**	Yes, see Section 3.1 and Table 5-3
(v) Estimated number and job classifications, by calendar quarter, of employees of the applicant, or contractor or subcontractor of the applicant, during the construction phase and during the operating life of the facility. **Critical information.** **Was an example provided at the Pre-application meeting?** **Page number in the Application:** Estimates shall include the number of employees who will be utilized but who do not currently reside within the area to be affected by the facility; Critical information. **Was an example provided at the Pre-application meeting?** **Page number in the Application:**	Yes, see Section 5.2 (Tables 5-3 and 5-4)
(vi) Future additions and modifications to the facility which the applicant may wish to be approved in the permit; **Critical information.** **Was this discussed at the Pre-application meeting?** **Page number in the Application:**	Yes, see Section 2.14
(vii) A statement of why the proposed location was selected; **Page number in the Application:**	See Section 2.2
(viii) A copy of any studies which may have been made of the environmental impact of the facility; **This means any environmental impact statement or environmental assessment in any stage. Only one copy – hardcopy or .pdf needs to be supplied with the Application. Was this done?**	Supporting technical reports have been provided as appendices. There is no environmental impact statement or environmental assessment.
(ix) Inventory of estimated discharges including physical, chemical, biological and radiological characteristics; **Refer to Rule I, Section 4, Paragraph (h), above.** **Staff believe that this is not an unbounded requirement, but refers to regulated and/or those discharges in which reasonably informed person would be concerned, including carbon dioxide.** **Page number in the Application:**	See Sections 2.11 and 6.1
(x) Inventory of estimated emissions and proposed methods of control; **Refer to Rule I, Section 4, Paragraph (h), above.** **Staff believe that this is not an unbounded requirement, but refers to regulated and/or those discharges in which reasonably informed person would be concerned, including dust and carbon dioxide.** **Page number in the Application:**	See Section 6.2.3.1

Requirement[1]	Application Package Reference
(xi) Inventory of estimated solid wastes and proposed disposal program;	
This does not require estimates of volume.	See Sections 2.11, 5.3.5.4, 7.1.3.11, 7.1.3.12
Page number in the Application:	
(xii) The procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions or discharges;	
Was this discussed at the Pre-application meeting?	
Was the condition about re-opening the Permit explained?	Yes, see Sections 7.1 and 7.2
Page number in the Application:	
(xiii) Preliminary evaluations of or plans and proposals for alleviating social, economic or environmental impacts upon local government or any special districts which may result from the proposed facility, which evaluations, plans and proposals shall cover the following:	
Provide a listing of meetings with State agencies, town meetings with the public and meetings with local government officials in which the project was explained, comments gathered and solicited.	Included in Sections 5 and 6 (see following items for details)
Page number in the Application:	
(A) Scenic resources;	
Page number in Application:	See Section 6.11
(B) Recreational resources;	
Page number in Application:	See Section 6.13
(C) Archaeological and historical resources;	
Page number in Application:	See Section 6.12
(D) Land use patterns;	
Page number in Application:	See Sections 5.3.1 and 6.14
(E) Economic base;	
Page number in Application:	See Section 5.3.2
(F) Housing;	
Critical information.	
The Application must provide evidence that adequate lodging exists for the workforce.	
Page number in Application:	See Section 5.3.4
(G) Transportation;	
Page number in Application:	See Section 6.15
(H) Sewer and water facilities;	
Page number in Application:	See Section 5.3.5.3
(J) Solid waste facilities;	See Sections 2.11 and 5.3.5.4
Page number in Application:	
(K) Police and fire facilities;	See Sections 5.3.5.5 and 5.3.5.6
Page number in Application:	

Requirement[1]	Application Package Reference
(M) Educational facilities; **Page number in Application:**	See Sections 5.3.5.10
(N) Health and hospital facilities; **Page number in Application:**	See Sections 5.3.5.7
(O) Water supply; **Page number in Application:**	See Section 5.3.5.3 and 6.5
(P) Other relevant areas. **Page number in Application:**	See Sections 5.3.5.8, 5.3.5.9, 5.3.6, 5.3.7
(xiv) Estimated construction cost of the facility; **Page number in Application:**	See Section 5.3.2.5
(xv) What other state or federal permits and approvals are required; **This is expected to be a list of permits, issuing agencies, and status.** **Page number in Application:**	See Section 3.7
(xvi) Compatibility of the facility with state or local land use plans, if any; **This can be shown by a letter or land use permit from the cognizant jurisdiction in an appendix.** **Page number in Application:**	See Section 6.14.3
(xvii) Any other information the applicant considers relevant or required by council rule or regulation; **Was this discussed at the Pre-application meeting?** **This is not an ambiguous or unbounded requirement, but is requires disclosure of material information for a particular situation.** **Page number in Application:**	No known additional requirements discussed for this Project.
(xviii) A brief description of the methods and strategies the applicant will use to maximize employment and utilization of the existing local or in-state contractors and labor force during the construction and operation of the facility. **Was this and the relevant permit condition discussed at the Pre-application meeting?** **Page number in Application:**	Yes, see Section 5.2.2
5. Rule I Section 8. Application Information to be Submitted.	
In accordance with W.S. 35-12-109, the application shall contain the information required by the act with respect to both the construction period and online life of the proposed industrial facility and the following information the Council determines necessary: **Narrative statement on the operational life is on page.** **Any narrative statement of the construction period is on page.** **The construction period as the x-axis of the labor chart is on page.**	For operational life, see Section 2.7; For construction period, see Section 3.1; For labor chart, see Table 5-3

Requirement[1]	Application Package Reference
(a) The application shall state the name, title, telephone number, and post office address of the person to whom communication in regards to the application shall be made.	
If this is stated in the transmittal letter, then the transmittal letter needs to be physically part of the Application.	
Point of contact name, phone, mailing address, and service address is on page.	See cover page and Section 2.1
(b) A description of the specific, geographic location of the proposed industrial facility. The description shall include the following:	
(i) Preliminary site plans at an appropriate scale indicating the anticipated location for all major structures, roads, parking areas, on-site temporary housing, staging areas, construction material sources, material storage piles and other dependent components; and	
Critical information.	
Was this discussed in the Pre-application meeting?	
This pertains of all features of the project, including both the construction site, remote offices, yards, offloading facilities, staging areas, etc.	Yes, see Sections 2.3 - 2.5 and Map 2-2 in Appendix A
Page number in Application:	
(ii) The area of land required by the industrial facility and a land ownership map covering all the components of the proposed industrial facility.	See Section 2.5 and Map 2-2 in Appendix A
Page number in Application:	
(c) A general description of the major components of the proposed industrial facility such as boilers, steam generators, turbine generators, cooling facilities, production equipment, and dependent components.	
If a power plant, must state the method of cooling.	See Section 2.7 for applicable items
Page number in Application:	
(d) A description of the operating nature of the proposed industrial facility, the expected source and quantity of its raw materials, and energy requirements. The description shall include, but is not limited to, the following:	
Page number in Application:	See Sections 2.7, 2.9 and 3.5
(i) The proposed on-line life of the industrial facility and its projected operating capacity during its on-line life; and, for transmission lines exceeding one hundred fifteen thousand (115,000) volts included as part of the proposed industrial facility, a projection indicating when such lines will become insufficient to meet the future demand and at what time a need will exist to construct additional transmission lines to meet such demands; and	
Page number in Application:	See Section 2.7 and 3.5
(ii) Products needed by facility operations and their source.	
Was this discussed at the Pre-application meeting?	
Page number in Application:	
This is not intended to be an unbounded requirement.	Yes, see Section 2.9
(iii) Estimated material costs for the project.	See Section 5.3.8.4

Requirement[1]	Application Package Reference
(e) A statement that shall be a reasonable estimate of the calendar quarter in which construction of the industrial facility will commence, contingent upon the issuance of a permit by the Council.	
Page number in Application:	See Section 3.1
(f) A statement that shall be a reasonable estimate of the maximum time period required for construction of the industrial facility and an estimate of when the physical components of the industrial facility will be ninety (90) percent complete, and the basis for that estimate.	
Page number in Application:	See Section 3.1
(g) The applicant shall identify what it deems to be the area of site influence and recommends as the local governments primarily affected by the proposed industrial facility as defined in Sections 2(c) and (b), respectively, of these regulations.	
The immediately adjoining area(s) and local governments shall also be identified with a statement of the reasons for their exclusion from the list of area(s) or local governments primarily affected by the proposed industrial facility.	
Was this discussed at the Pre-application meeting?	
Critical information.	
It is expected that the Application will show the Study Area, the recommended Area of Site Influence (a polygon) and the included counties, cities, and towns – local governments primarily affected (a list). Main reasons for inclusion in the Area of Site Influence are: lodging for in-migrating workforce and facilities constructed or used by the project including vacant land for lay-down yards or parking.	Yes, see Sections 5.1 and 5.2 and Map 5-1 in Appendix A
Page number in the Application:	
(h) Using tables, provide a detailed tally of the estimated work force to construct and to operate the facility showing the following information:	
(i) All workers providing direct labor and direct support; (safety, supervision, inspection) at the work site;	See Section 5.2 and Table 5-3
Page number in the Application:	
(ii) Information by calendar month and year from the commencement of construction through the first year of operation;	See Section 5.2 and Table 5-3
Page number in the Application:	
(iii) Identify and provide totals of those which are construction and those which are permanent;	
Page number in the Application:	See Sections 5.2.1 and 5.2.4
(iv) Identify and provide quarterly totals of the number, job classification and recurrence; of those which are estimated to be in- migrating (from outside the study area at the time of hire for the facility) and of those pre-existing employees of the applicant engaged in construction;	
Page number in the Application:	See Tables 5-3 and 5-4
(v) Provide estimates of wages; and	
Page number in the Application:	See Section 5.2.3

Requirement[1]	Application Package Reference
(vi) Provide estimates of paid benefits including per diem and paid fees.	
Page number in the Application:	See Section 5.2.3
(i) An evaluation of the social and economic conditions in the area of site influence. The social and economic conditions shall be inventoried and evaluated as they currently exist, projected as they would exist in the future without the proposed industrial facility and as they will exist with the facility.	
Page number in the Application:	
Prior to submitting its application, each applicant shall confer with the administrator to define the needed projections, the projection period and issues for socioeconomic evaluation. The evaluation may include, but is not limited to:	
Was this Discussed in the Pre-application meeting?	Yes, see Section 5.3
(i) Land use designation of the site location, including whether or not the use of the land by the industrial facility is consistent with state, intrastate, regional, county and local land use plans, if any. The analysis shall include the area of land required and ultimate use of land by the industrial facility and reclamation plans for all lands affected by the industrial facility or its dependent components;	See Section 5.3.1 and Section 6.14
Page number in the Application:	
(ii) A study of the area economy including a description of methodology used. The study may include, but is not limited to, the following factors:	See Section 5.3.2
(A) Employment projections by major sector;	See Section 5.3.2.4 and Table 5-9
Page number in the Application:	
(B) Economic bases and economic trends of the local economy;	
Page number in the Application:	See Section 5.3.2.3
(C) Estimates of basic versus non-basic employment;	
Page number in the Application:	See Section 5.3.2.3
(D) Unemployment rates;	See Section 5.3.2.3
Page number in the Application:	
(iii) A study of the area population including a description of methodology used. The study may include, but is not limited to, an evaluation of demographic characteristics for the current population and projections of the area population without the proposed industrial facility;	See Section 5.3.3
Page number in the Application:	
(iv) An analysis of housing facilities by type, including a quantitative evaluation of the number of units in the area and a discussion of vacancy rates, costs, and rental rates of the units. The analysis should include geographic location, including a quantitative evaluation of the number of units in the area required by the construction and operation of the proposed industrial facility and a discussion of the effects of the proposed industrial facility on vacancy rates, costs, and rental rates of the units. Specific housing programs proposed by the applicant should be described in detail;	See Section 5.3.4
Page number in the Application:	

Requirement[1]	Application Package Reference
(v) An analysis of transportation facilities containing discussion of roads (surface, type), and railroads (if applicable). An analysis of effects on transportation facilities including effects on service levels of roads, haul routes for materials and supplies, increased rail traffic at grade crossings, and intersection of new access roads with existing roads;	See Section 6.15
Page number in the Application:	
(vi) Public facilities and services availability and needs, which may include, but are not limited to:	See Section 5.3.5
(A) Facilities and personnel required for the administrative functions of government including specific new demands or increases in service levels created by the proposed industrial facility;	See Section 5.3.5.2
Page number in the Application:	
(B) Sewer and water distribution and treatment facilities including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels;	See Section 5.3.5.3
Page number in the Application:	
(C) Solid waste collection and disposal services including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels;	See Section 5.3.5.4
Page number in the Application:	
(D) Existing police and fire protection facilities including specific new demands or increases in service levels created by the proposed industrial facility;	See Sections 5.3.5.5 and 5.3.5.6
Page number in the Application:	
(E) An analysis of health and hospital care facilities, services and personnel including specific new demands or increases in service levels created by the proposed industrial facility;	
Page number in the Application:	See Section 5.3.5.7
(F) Human service facilities, programs and personnel, including an analysis of the capacity to meet current demands and a description of problems, needs, and costs of increasing service levels;	
Page number in the Application:	See Section 5.3.5.8
(G) An analysis of user-oriented community recreational facilities and programs and urban outdoor recreational opportunities including specific new demands or increases in service levels created by the proposed industrial facility;;	
Page number in the Application:	See Section 5.3.5.9

Requirement[1]	Application Package Reference
(H) Educational facilities, including an analysis based upon enrollment per grade, physical facilities and their capacities and other relevant factors with an assessment of the effect that the new population will have on personnel, programs and facilities;	
Page number in the Application:	See Section 5.3.5.10
(I) Problems due to the transition from temporary, construction employees to operating workforces should be addressed. Changes in levels of services required as a result of the proposed industrial facility should specifically be addressed. Cumulative impacts of the proposed industrial facility and other developments in the area of site influence should be addressed separately. This assessment should examine increased demands associated with the construction and operational phases of the proposed industrial facility, as well as effects on the level of services as the construction or operational workforces decline;	
Page number in the Application:	See Section 5.3.6
(J) A copy of any studies that may have been made of the social or economic impact of the industrial facility.	
Page number in the Application:	
Was this clarified in the Pre-application meeting?	
This instruction must be taken literally. It refers to a study done about the project, the object of the requested permit. In general, all relevant studies should be cited in the Application and listed in good form in the References Section.	Yes, IMPLAN inputs and socioeconomic analyses are contained in the application.
(vii) A fiscal analysis over the projection period for all local governments and special districts identified by the applicant as primarily affected by the proposed industrial facility, including revenue structure, expenditure levels, mill levies, services provided through public financing, and the problems in providing public services. If modeling software is used, then identifying the software program and providing a summary table of the data set inputs (including any multipliers) for the analysis required. The analysis may include, but is not limited to:	
Page number in the Application:	
This should be in a table.	
Note that this section pertains to those governments in the Recommended Area of Site Influence. Such is required. One expects the Application to cover the local governments in the Study Area.	
Note that this includes special districts and joint powers boards.	
It is assumed that revenues equal expenditures and postponed expenditures (fund balances). Page number in the Application:	See Section 5.3.8 and Appendix H
(A) An estimate of the cost of the facility with separate line item for the estimated material costs.	
Page number in the Application:	See Section 5.3.8.4

Requirement[1]	Application Package Reference
(B) An estimate of the cost of the sales and use taxes to be paid directly by the applicant to construct the facility. This estimate should be broken down by year.	
Page number in the Application:	See Section 5.3.8.2
(C) If a facility is located in more than one county, the estimate under subsection (B) above shall be broken down by year and for each affected county.	
Page number in the Application:	
Was this covered in the Pre-application meeting?	
Sales and use tax includes lodging tax, sales and use taxes, and any resort taxes. The literal statement is the cost basis, not the calculation.	
Refer to the relevant Permit condition.	
Critical information.	
This is a forecast estimate, not actual payments.	
Page number in the Application:	Yes, see Section 5.3.8.2
(D) Estimates of impact assistance payments which will result from the project.	
Page number in the Application:	
Critical information.	
Was this discussed at the Pre-application meeting?	
Was the estimate for impact assistance funds requested and provided?	
Page number in the Application:	Yes, see Section 5.3.8.4
(E) An estimate of the cost of components of the industrial facility which will be included in the assessed value of the industrial facility for purposes of ad valorem taxes for both the construction and operations periods. This estimate should include a breakdown by county if the components of the industrial facility will be located in more than one county.	
Page number in the Application:	
Critical information.	
Were examples provided at the Pre-application meeting?	
Page number in the Application:	Yes, see Section 5.3.8.1
(j) An evaluation of the environmental impacts. The items shall be noted and evaluated as they would exist if the proposed industrial facility were built. Each evaluation should be followed by a brief explanation of each impact and the permit issued that regulates the impact. If the impact is not regulated by a state regulatory agency or federal land management agency, the application must include plans and proposals for alleviating adverse impacts. Cumulative impacts of the proposed industrial facility and other projects in the area of site influence should be addressed separately.	
Page number in the Application:	See Section 6.1 through Section 6.15, and Chapter 7

Requirement[1]	Application Package Reference
Cumulative impacts of the proposed industrial facility and other developments in the area of site influence should be addressed separately. This assessment should examine increased demands associated with the construction and operational phases of the proposed industrial facility, as well as effects on the level of services as the construction or operational workforces decline; **Critical information.** **This pertains to co-incident or overlapping construction with other Industrial Siting projects. Notice should be made of any economic shocks regardless of cause occurring or expected to occur in the Recommended Area of Site Influence during the construction time frame.** **Were work force estimates given to the Applicant for co-incident or overlapping projects?** **Page number in the Application:**	See Section 5.3.7. Information was compiled through contacts with local agencies.
(k) The applicant shall describe the procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions and discharges from the proposed facility. **Page number in the Application:**	
Was this discussed at the Pre-application meeting?	Yes, see Chapter 7
Typically, questions have been raised about disposal of abandoned buildings, awareness/sensitivity orientation for Game & Fish regulations, driver safety, and trespass/littering. **Page number in Application:**	See Section 3.6 for site decommissioning
(l) The applicant shall provide certification that all local governments in the study area were provided notification of the facility, a description of the proposed project and an opportunity to ask the applicant questions regarding the proposed project at least thirty (30) days prior to the submission of the application. The certification shall include a description of the actual process used. **Page number in the Application:**	See Section 4.2.1 and Appendix E
(m) For a permit application, the applicant shall provide a description of land use and changes to land use as a result of the project. Such will include: (i) The project site, transportation routes, utilities, and collector systems. (ii) County land use plans and zoning, if any. (iii) Changes to agricultural production as a consequence of the project. **Page number in the Application:**	See Section 6.14
(n) For a permit application, the applicant shall provide the following: (i) An evaluation of potential impacts together with any plans and proposals to alleviate potential impacts. The evaluation shall include a recent survey for threatened and endangered and rare species of concern (flora & fauna), as identified in the state wildlife action plan prepared by the Wyoming Game and Fish Department, found at the site location. **Page number in the Application:**	See all of Section 6, specifically Sections 6.8 and 6.9 and Appendix J

Requirement[1]	Application Package Reference
(ii) An evaluation of the potential impacts to terrestrial and aquatic wildlife and any plans or proposals to alleviate potential impacts.	See Sections 6.8, 6.9, 6.10, and Appendix J
Page number in the Application:	
(o) The applicant shall provide a description of the methods and strategies to maximize employment and utilization of the existing local or in-state contractor and labor force during the construction and operation of the facility.	
Page number in the Application:	See Section 5.2
(p) The applicant shall provide a description of the impact controls and mitigating measures proposed to mitigate and alleviate adverse environmental, social and economic impacts associated with the construction and operation of the proposed industrial facility including:	
(i) Monitoring programs to assess effects of the proposed industrial facility and the overall effectiveness of impact controls and mitigating actions.	
(ii) Impact controls and mitigating measures proposed by the applicant to alleviate adverse environmental, social and economic impacts associated with construction and operation of the proposed industrial facility.	See Chapter 7
(q) The applicant shall provide a description and quantification of the mitigated and unmitigated impacts that will result from the construction and operation of the proposed facility on the affected local governments and special districts. Such description shall include:	See Section 5.3.8.4
(i) Quantification of fiscal impacts, regardless of amount, on all items contained in Wyoming Statute 35-12-109 (a)(xiii)(A)-(S).	
(ii) Projection of when, by calendar month, the unmitigated impacts will occur in the affected communities.	
(iii) Projection, by calendar month, of fiscal impact in affected communities.	
The application shall contain information demonstrating the applicant's financial capability to construct, maintain, operate, decommission; and reclaim the land of the facility.	
Such documentation, if requested, shall be held confidential to the extent authorized by Wyoming law and shall include:	
Page number in the Application:	See Section Appendix C
Commitment letters from the principal investors of the project, which may be conditioned on issuance of required state and local permits; or	
Page number in the Application:	See Section Appendix C

Requirement[1]	Application Package Reference
For applicants whose securities are publicly traded and are required to publicly disclose financial statements, provide any one of the following:	
Method Used by Applicant:	
Date and Correspondence of the Disclosure:	
(A) General audited financial statements for the most recent year end;	
(B) Most recent credit rating reports for the financing company as published;	
(C) Reports by chartered financial analysts as published. or	
(D) For applicants whose securities are not publically traded, provide financial statements of the majority financial contributors.	See Section Appendix C

Requirements presented per "Application Checklist for a Section 109 Application with DEQ/Industrial Siting Division", version November 9, 2015.

Acronyms and Abbreviations

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
ACSD#1	Albany County School District #1
AQD	WDEQ - Air Quality Division
Alterra	Alterra Power Corporation
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BLM	Bureau of Land Management
BMPs	Best management practices
Boswell Wind	Boswell Wind LLC
CCSD#2	Carbon County School District #2
CFR	Code of Federal Regulations
CO	Carbon monoxide
CRA	Cultural Resource Analysts, Inc.
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted sound pressure level
DNL	Day-night average noise level
EA	Environmental Assessment
ECP	Eagle Conservation Plan
EIA	Energy Information Administration
EMS	emergency management services
EPA	U.S. Environmental Protection Agency
EPC	Engineering, Procurement, and Construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HMAs	Hunter Management Areas
HUC	Hydrologic Unit Code
Hz	Hertz
IBC	International Building Code
IEC	International Electrotechnical Commission
IMPLAN	Impact Analysis for Planning
Intermountain Wind	Intermountain Wind, LLC
ISA	Industrial Development Information and Siting Act
ISC	Industrial Siting Council

ISD	Industrial Siting Division
IUCN	International Union for Conservation of Nature
KOPs	key observation points
kV	kilovolt
KW	soil erodibility factor
LOS	level of service
MBTA	Migratory Bird Treaty Act
MCE	maximum considered earthquake
met	meteorological
MWh	Megawatt-hours/year
NAAQS	National Ambient Air Quality Standards
NHD	National Hydrologic Dataset
NHPA	National Historic Preservation Act
NO2	nitrogen dioxide
NOI	Notice of Intent
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	nationwide permit
O&M	Operations and Maintenance
O3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	lead
PFYC	Potential Fossil Yield Classification
PHMA	Priority Habitat Management Areas
PM10	particulate matter size 10
PM2.5	particulate matter size 2.5
RCRA	Resource Conservation and Recovery Act
RLA	reconnaissance-level assessment
RMP	Plan Resource Management Plan
RPS	renewable portfolio standards
RV	recreational vehicle
SCADA	Supervisory Control and Data Acquisition
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SO2	Sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures
SSURGO	Soil Survey Geographic
SWPPP	Stormwater Pollution Prevention Plan
TSP	total suspended particulate

U.S.	United States
U.S.C.	nited States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
W.S	Wyoming Statute
WAQSR	Wyoming Air Quality Standards and Regulations
WARSSS	Watershed Assessment of River Stability and Sediment Supply
WDEQ	Wyoming Department of Environmental Quality
WECS	Wind Energy Conversion System
WGFD	Wyoming Game and Fish Department
WISDOM	Wyoming Interagency Spatial Database and Online Management
WOGCC	Wyoming Oil and Gas Conservation Commission
WSEO	Wyoming State Engineer's Office
WSGS	Wyoming State Geological Survey
WY	Wyoming
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System
µPa	micropascals

Executive Summary

Boswell Wind, LLC (Boswell Wind) has prepared this permit application in accordance with Wyoming (WY) Statute (W.S.) § 35-12-109 of the Industrial Development Information and Siting Act (ISA) (W.S. §§ 35-12-109 et seq.). This application is for the proposed construction and operation of the Boswell Springs Project (Project) in Albany County, WY. The Project is located entirely on privately owned lands that have been leased for this purpose (Appendix B).

The Project includes all aspects of engineering, project planning, site surveying, purchase, and construction of all equipment and facilities necessary for a fully operational wind development project. Boswell Wind would select an engineering, procurement and construction (EPC) contractor(s) with expertise in the wind energy industry, preferably in WY.

This application includes the information required by W.S. § 35-12-109 as well as the rules and regulations implementing the ISA. The Letter of Transmittal has been submitted under separate cover to the Wyoming Department of Environmental Quality (WDEQ), Industrial Siting Division (ISD), along with the application fee.

ISD Jurisdiction and Construction Cost

Project development was initiated by Intermountain Wind LLC (Intermountain Wind) in 2008. Intermountain Wind attended a Jurisdictional Meeting with the ISD on October 14, 2015. A follow-up phone call was held on November 12, 2015. The purpose of these meetings was to discuss the project and review the information provided by Intermountain Wind pursuant to the jurisdictional checklist developed by ISD. Based on the Project's proposed number of wind turbines, the proposed energy production, and the estimated cost of construction, the ISD issued a letter on November 17, 2015 providing notice of jurisdiction from the Industrial Siting Council for the Project (W.S. § 35-12-102 (vii)), (Appendix F [*Agency Correspondence*]). Ownership of the Project was subsequently transferred to Boswell Wind in 2017 and ISD was notified of the change in ownership and point of contact for the Project in an email dated June 13, 2017.

Location

The proposed Project is located in Albany County, 10 miles north of Rock River, WY, and 15 miles east of Medicine Bow, WY, at elevations ranging from 6,713 to 7,192 feet (Map 2-1 in Appendix A [*Project Maps*]). The Project will be located on approximately 21,596 acres of leased private fee lands that are owned by a single landowner (Appendix B). Primary access to the Project is via Interstate 80 (I-80) (located about 50 miles south of the Project), United States (U.S.) Highway 30, and Fetterman Road. The site is relatively flat and is characterized by rolling plains with hills, cuestas, mesas, and terraces. The site is dominated by grassland with pockets of sagebrush in the northwestern and northeastern portions of the site. There are existing roads to and throughout the Project Area, which is largely undeveloped and mainly used for cattle ranching.

Land Use

The private lands within the Project Area are primarily used for livestock grazing. In general, the Project would allow for continued livestock use of the Project Area. However, increased fugitive dust or introduction of weeds unpalatable of poisonous to livestock could temporarily affect

livestock operations at the project site during construction. All project development activity would occur in accordance with the landowner lease agreement through ongoing coordination. Following project construction, existing uses would continue at the discretion of the landowner while the Project provides additional income for the leasing landowner. The Project does not involve any state- or federally-owned or -managed lands.

Project Components

Primary project components include between 110 and 170 wind turbine generators (WTGs), an underground 34.5 kilovolt (kV) collection system, a 230 kV substation, a network of access roads, and an Operations and Maintenance (O&M) building. Meteorological (met) towers and a Supervisory Control and Data Acquisition (SCADA) system will also be constructed.

Construction Schedule

Construction of the Boswell Springs Project is anticipated to begin in May 2018 and continue through November 2020. Road improvements, road construction, and geotechnical investigations are anticipated to occur between May and November of 2018, followed by foundation and electric collection system construction between May and October 2019, and installation and wiring of WTGs between April and October 2020. The anticipated construction completion date for the Boswell Springs Project is November 2020.

Construction and Operation Workforce Requirements

Boswell Wind estimates that an average of 98 workers would be employed at the site during the 31-month construction period commencing May 2018 and ending November 2020. Most employment would occur between the months of May and November each year, with a peak employment estimated at 236 workers between June and August 2020.

During operations, up to 15 employees would be employed by the project. Most of these employees would be wind turbine technicians. See Section 5.2 for additional detail on construction and operations workforce estimates.

Transportation

The majority of the workforce and construction materials trips are likely to originate in Albany and Carbon counties. Primary access to the Project is via Interstate 80 (located about 50 miles south of the Project), U.S. 30/U.S. 287, and Fetterman Road. Workforce and delivery vehicles are expected to use these roads, all of which currently operate at level of service (LOS) of A, which indicates smooth and efficient traffic operations. In response to review comments on the Albany County WECS Permit Application, Boswell Wind adopted Albany County's recommendation to transport oversized loads on Wyoming Highway 13 between I-80 and U.S. 30/U.S. 287, instead of through Laramie. See Appendix N (*Traffic Study*) for more information about traffic in the Project Area.

All of the road and foundation materials will be sourced in Wyoming as close to the project site as possible. Turbine components may originate from different locations depending on the final selected turbine supplier. Boswell Wind anticipates that the majority of the Project's components will be trucked to the project site and that Albany County will be the primary point of delivery for these components. However, the turbine supplier will make a determination of the feasibility of rail based upon transportation logistics, including the availability of trailers and rail cars at the time of

delivery. Materials transported via rail are expected to be offloaded at a transload site located in South Laramie, WY, operated and owned by Union Pacific Railroad. From there, materials would be transported by truck on I-80 and U.S. 287.

Though impacts to traffic during construction may result in occasional inconvenience to area residents, such impacts are not anticipated to substantially impair the health, safety, or welfare of the public.

Public Involvement Activities

Communications about the project were conducted via telephone, email, and/or in-person meetings with local governments in the recommended area of site influence to present and discuss the proposed Project. Intermountain Wind held meetings with representatives from Albany and Carbon counties, the town of Medicine Bow, and the town of Rock River. Presentations were made for the county commissioners and town councils in these jurisdictions, and a public information meeting was held in the town of Rock River. All of these meetings were intended to provide an overview of the project, present the preliminary project layout, and discuss any questions or concerns they may have. Coordination efforts also included communication with local public works employees and agencies regarding water and waste disposal plans; and emergency management agencies. Additional information on public involvement is provided in Chapter 4.

Socioeconomic Assessment

The recommended area of site influence for the project was identified in consultation with the ISD and includes the counties of Albany and Carbon and the communities of Rock River, Laramie, Medicine Bow, Hanna, and Elk Mountain.

The primary drivers of potential socioeconomic effects associated with construction and operation of the proposed Boswell Springs project are the direct construction and operating employment, associated payroll, local expenditures with construction and operations materials and services, and recurrent public sector revenues generated by the Project. Costs associated with construction of the Project are estimated at $495 million. More details on the assumptions and economic modeling are included in Chapter 5.

Based on estimates for direct construction expenditures, sales and use taxes collected over the period of construction is estimated to be approximately $28.8 million, with $19.2 million collected by the state and $9.6 million collected locally. Between $168,000 and $182,000 in lodging taxes would be collected during the period of construction in Albany and Carbon counties, from temporary lodging of non-local workers.

During operations, an estimated $3.3 to $4.6 million in annual property taxes would be paid to Albany County taxing jurisdictions for the first year of operations. Property taxes would be paid over a 30-year expected life of the project, but decrease over time due to depreciation and decreased future income stream from the project. Over $1 million per year in wind production tax collections occur after first three years of production (the project would be exempt for the first three years), with 60 percent of the tax collected distributed to Albany County.

Increases in public expenditures would offset some of the revenues, but such expenditures would likely be minor due to the limited incremental demands on public facilities and services from the

Project. Other economic benefits of the Project would include land lease revenues to private landowners.

Although the Project would have a relatively small construction and operation workforce, there is a potential for additional burden to be placed on the limited resources for existing emergency response, fire suppression, law enforcement, and emergency medical care. Measures have been recommended in Chapter 7 to offset these potential impacts on community services. The Project is not anticipated to substantially affect local government services, water, wastewater, or other public infrastructure in the study area. The average construction workforce anticipated by quarter is provided in Table ES-2. See Appendix O (*Emergency Response Plan*) for more information about emergency response associated with the Boswell Springs Project.

Table ES-2. Average Construction Workforce by Quarter

	2018			2019				2020			
Activity	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Alterra Construction Management	2	2	2	2	3	4	3	2	4	4	4
Contractor Supervision	8	8	5	0	5	7	0	0	10	12	6
Road Construction	35	35	20	0	0	0	0	0	0	0	0
Geotechnical Investigation	0	4	8	0	0	0	0	0	0	0	0
Foundation Construction	0	0	0	0	30	45	15	0	0	0	0
Electric Collection Construction	0	0	0	0	50	75	23	0	0	0	0
Offload Turbines	0	0	0	0	0	0	0	0	33	17	0
Erect WTGs	0	0	0	0	0	0	0	0	52	65	33
Tower Wiring	0	0	0	0	0	0	0	0	37	65	18
Install Substation	0	0	0	0	8	37	20	0	0	0	0
Install O&M Building	0	0	0	0	0	0	0	0	17	20	20
Concrete Supply	0	0	0	0	10	30	10	0	0	0	0
Concrete Pumping	0	0	0	0	2	6	1	0	0	0	0
Security	1	2	1	0	2	4	3	2	4	4	4
Reclamation	3	9	4	0	0	0	0	0	0	20	25
Site Medical Staff	1	2	1	0	2	3	1	0	3	3	3
WTG Supplier Staff	0	0	0	0	0	0	0	0	18	23	14
Total	**50**	**62**	**41**	**2**	**112**	**210**	**76**	**4**	**177**	**233**	**126**

Environmental Impacts Analysis

There are a variety of environmental benefits to wind energy development, including reduced emissions of criteria pollutants, nominal need for water, and limited surface disturbance. Specifically for the Boswell Springs Project, Western Environmental Services and Testing, Inc. conducted a Phase 1 Environmental Review for the Project Area in 2007. The review concluded that the property appeared to be in very good environmental condition and there were no recommendations for mitigation.

Several wildlife surveys have been conducted in the Project Area to assess existing wildlife in the vicinity of the Boswell Springs project to facilitate Project planning (Appendix J *[Wildlife Reports]*). Using a conceptual layout to estimate impacts, it is anticipated that construction of the Project

would result in approximately 872 acres of short-term surface disturbance (approximately 4 percent of the Project Area). Following construction, temporary use areas would be reclaimed and reseeded, and long-term impacts would be reduced to 148 acres (less than 1 percent of the Project Area). Removal of vegetation would potentially take away some forage for big and small game as well as birds that use the Project Area. Migratory birds are more common in the Project Area than raptors. Potential direct impacts to birds and bats include fatalities due to collisions with turbines and guy wires. A bird and bat conservation strategy would likely be developed for this Project, which would be expected to reduce potential impacts from operations on bat species.

There are no occupied sage-grouse leks in the Project Area, there is one undetermined nest located on the northwestern edge of the Project Area, and the Project Area is not within a Priority Habitat Management Areas (PHMA) (core only).

Additional resource surveys for soils and geology, as well as wetlands and other waters of the U.S. have been or will be completed to document and characterize baseline conditions of the Project Area and to further assess potential effects of the Project on these resources.

Cultural Resource Analysts, Inc. (CRA) conducted a Class III cultural resources pedestrian survey for the Project in the fall of 2015 around proposed construction and operations locations. Two sites and seven isolated resources were newly recorded by CRA in the 2015 survey area. Neither of these sites is recommended as eligible for the National Register of Historic Places (NRHP). Appendix M (*Cultural Class III Report*) includes the cultural resources survey report.

Due to the flat to gently rolling topography, limited surface water, homogenous color of the grasslands, homogenous adjacent scenery, and limited cultural modifications, the scenic quality of the Project Area is determined to be in the Common classification. Three key observation points (KOPs) were analyzed for visual resources, as depicted in Appendix L (*Visual Simulations*). It is anticipated that development of the Project would cause visual contrast with the predominantly natural character of the existing landscape; however, in the context of the region, these impacts to scenery and impacts to people would be consistent with other existing wind energy projects in the overall viewshed and characteristic landscape.

Boswell Wind would mitigate impacts to area roads through road improvements completed prior to construction, road maintenance activities during construction, and where necessary, road repairs following construction, as specified in the County Road Use Agreement and State Road Damage Agreement to be executed prior to construction. Though impacts to traffic during construction may result in occasional temporary inconvenience to area residents, such impacts are not anticipated to substantially impair the health, safety, or welfare of current and expected inhabitants in the area of site influence. Operation of the proposed Project would result in negligible impacts to roads and a slight increase in light vehicle traffic on Fetterman Road. Traffic data and analysis are included in Chapter 6 and Appendix N (*Traffic Study*).

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Chapter 1
Purpose, Need, and Benefit

1.1 Purpose

The purpose of the Boswell Springs Project is to build and operate a 320 to 400 MW wind energy facility on approximately 21,596 acres of private land in Albany County, WY (Map 2-1, Appendix A). Boswell Wind has executed Power Purchase Agreements with PacifiCorp to deliver renewable electrical energy produced by the Project to their regional transmission grid.

The Boswell Springs site has been studied extensively since 2008 and is expected to result in a powerful, consistent wind energy resource. It is also located near existing transmission system infrastructure, which results in lower interconnection costs, making development of the Project more economically feasible.

1.2 Need

Boswell Wind's objective for the Project is to help meet the projected future need for power from renewable energy sources. The Energy Information Administration (EIA) projected that renewable-generated electricity will account for 15 to 18 percent of total U.S. electricity generation by 2040, with wind generation anticipated to become the largest renewable generation source (EIA 2015). This growth partially results from the need to meet state mandates associated with renewable portfolio standards (RPS), which require a specific percentage of non-hydroelectric renewable energy generation added to a state's energy generation portfolio. Although 29 U.S. states plus Washington D.C. have adopted some form of mandatory RPS requirement, Wyoming does not have state RPS requirements. However, Wyoming wind projects have benefitted from the existence of an RPS in nearby states and RPS targets are anticipated to rise substantially in most states (Clean Energy States Alliance 2013).

Aside from meeting RPS mandates, wind and other fuel-free renewables deliver a stable-priced product over very long timeframes that could partially hedge or insulate a utility provider's portfolio of generating assets against the risk of rising fuel costs over the long-term (Lawrence Berkeley National Laboratory 2013a). With the presence of multiple interstate transmission projects proposed for construction in Wyoming in the next few years, such as PacifiCorp's Gateway Energy projects, the viability and interest of increasing wind generation in Wyoming to feed into those transmission systems has substantially improved.

1.3 Benefits

The Project will result in a variety of benefits for the state and local communities in addition to diversifying the energy generation portfolio in the region. Many of the state and local benefits are economic in nature, primarily resulting in additional tax revenues for the affected counties and the state of Wyoming. Wind power also provides environmental benefits, by generating electricity

without direct emissions of greenhouse gases or criteria pollutants and with very little water use. Importantly, wind power diversifies the regional power mix, thereby protecting against future adverse impacts (be they environmental, cost-related, and/or security-related) from any single technology or fuel (Lawrence Berkeley National Laboratory 2013a) for both consumers and the Wyoming economy.

1.3.1 Economic Benefits

The primary drivers of economic benefits associated with construction and operation of the proposed Boswell Springs Project include direct construction and operating employment, associated payroll, local expenditures with construction and operations materials and services, and recurrent public sector revenues generated by the Project. These factors support additional indirect and induced effects in the regional economy, through what is commonly referred to as the "multiplier effect."

Sales and use taxes collected over the period of construction are estimated to be approximately $28.8 million, with $19.2 million collected by the state and $9.6 million collected locally. Most of these tax collections would occur in 2018. It is estimated that between $168,000 and $182,000 in lodging taxes will be collected during the period of construction in Albany and Carbon counties, from temporary lodging of non-local workers.

During operations, an estimated $3.3 to $4.6 million in annual ad valorem taxes (property taxes) will be paid to Albany County taxing jurisdictions for the first year of operations. Property taxes will be paid over a 30-year expected life of the Project, but decrease over time due to depreciation and decreased future income stream from the Project. Over $1 million per year in wind production tax collections are anticipated to occur after the first three years of production (the Project would be exempt for the first three years), with 60 percent of the tax collected distributed to Albany County.

1.3.2 Environmental Benefits

While all forms of energy development—from coal and nuclear generation to wind generation—have positive and negative environmental impacts, there are multiple environmental benefits from wind generation.

Wind power generates abundant economic energy with no emissions. Water is not required to generate electricity from wind, as water use is typically isolated to an onsite maintenance facility during operations. Conversely, other forms of energy generation, like coal burning and nuclear, require a significant amount of water for cooling processes employed during long-term operations.

There are also several land use benefits associated with wind generation. While a wind project can span many acres, the amount of area disturbed is relatively low (typically 2-5 percent of the Project Area). While turbines persist in the viewshed, human activity at the site is relatively minimal during operations. In addition, existing uses at the site such as ranching can continue during operations.

Chapter 2
Applicant and Facility Description

Boswell Wind intends to construct, own, and operate a 320 to 400 MW wind energy generation project on approximately 21,596 acres of privately-owned property leased to Boswell Wind (Appendix B, *Land Owner Authorizations*). The Project Area is located in Albany County, 10 miles north of Rock River and 15 miles east of Medicine Bow, WY. Project development was initiated by Intermountain Wind LLC (Intermountain Wind) in 2008. Agency coordination, baseline surveys, and supporting technical documents for this permit application were prepared on behalf of Intermountain Wind between 2009 and 2016. Ownership of the Project was subsequently transferred to Boswell Wind in 2017.

The proposed Project would develop between 110 and170 WTGs and meets the Wyoming ISA statutory definition of an Industrial Facility (W.S. §35-12-102(E)(I)). The ISD issued a letter on November 17, 2015 providing notice of jurisdiction and ISD's determination that an ISC permit is required for construction and operation of the Project. Boswell Wind asserts, to the best of its knowledge and belief, that this application is complete and includes all the information required by W.S. 35-12-109 and the ISC's rules and regulations.

2.1 Applicant Information

The applicant for the Boswell Springs Project is Boswell Wind, LLC, an indirect subsidiary of Alterra Power Corp (Alterra), and the designated point of contact for Boswell Wind, LLC is:

Mr. Paul Rapp, Vice President, Development
Boswell Wind, LLC
c/o Alterra Power Corp
1100 - 888 Dunsmuir Street
Vancouver, BC V6C 3K4
Telephone: + 604.669.4999

2.1.1 Financial Assurance

2.1.1.1 Company Overview

Incorporated in 2008, Alterra and its subsidiary companies are engaged in the development, construction and operation of renewable power projects. Alterra is a global renewable energy company that manages eight power plants totaling 825 MW of hydro, wind, geothermal and solar generation capacity in Canada, the USA and Iceland. Alterra owns a 385 MW share of this capacity, generating over 1,700 GWh of clean power annually. Alterra also has an extensive portfolio of development projects and a skilled team of developers, builders and operators to support its growth plans.

2.1.1.2 Financing Plan

Alterra, on behalf of Boswell Wind, LLC, expects to finance the Project with a combination of equity, loans and a tax equity investment that is intended to qualify for the federal Production Tax Credit incentive. Alterra has received indicative financing terms from several parties and has strong relationships with multiple tax equity investors whom have all shown initial interest in participating in the Project. Alterra is publically traded on the Toronto Stock Exchange (TSX:AXY) and has many methods of sourcing capital for its equity contributions to the Project. The equity contributions for this Project are expected to be sourced on behalf of Boswell Wind, LLC from a mix of working capital, expansion of its existing holding company financings, equity-related issuances, and other debt raised at the Alterra corporate level. Alterra is confident in its ability to raise all the capital necessary to fully construct the Project. Additional information on Alterra's financial capability is included in (Appendix C, *Financial Assurance*). The statements made in this Section 2.1.1.2 with respect to Alterra's intentions constitute forward looking statements within the meaning of applicable securities laws, are subject to the risks and assumptions set forth in Alterra's public disclosure record and undue reliance should not be placed on such statements by prospective investors in securities of Alterra.

2.1.1.3 Construction Contractor

Boswell Wind will contract with an engineering, procurement and construction (EPC) contractor(s) for construction of the Project. The final selection of an EPC contractor(s) will be based on the contractor's industry reputation, work quality, and relevant experience, with a preference for those with experience in Wyoming. Additional considerations will include an ability to meet the construction schedule while maintaining high standards of safety and quality and a commitment to using local labor and resources wherever possible.

2.1.1.4 Operations and Maintenance Plan

The turbine supplier will be expected to provide ongoing O&M services as part of the turbine supply agreement.

2.1.1.5 Warranty

Boswell Wind anticipates entering into agreements with the WTG vendor, which will include warranties to ensure all equipment is new and free from defects in material, workmanship, and title; typically this warranty period is for two years. The two-year warranty period on a turbine generally begins when construction of that turbine is completed. Any turbine repair during this two-year period is then warranted for a period of twelve months from the date of repair or until the end of the original warranty period, whichever is later. Similarly, Boswell Wind anticipates the construction contractor will also warrant its material and workmanship for one to two years.
The WTGs have a design life of approximately 30 years, which exceeds the minimum projected operational life of the Project facilities.

2.1.1.6 Decommissioning and Reclamation

Facility decommissioning and site reclamation are described in detail in Section 3.6 *(Site Decommissioning and Reclamation)* and in Appendix D.1 *(Decommissioning and Reclamation Plan*). Specific decommissioning and reclamation requirements will be based on Boswell Wind's

commercial agreements with its lessees, Albany County wind energy permit requirements, and the requirements of the applicable ISC statutes and regulations. A cost estimate for decommissioning and reclamation is included as Appendix D.2 (*Decommissioning Cost Estimate*). Boswell Wind will provide financial assurances sufficient to assure complete decommissioning and site reclamation of the facility in accordance with the requirements of Section 9(d) of the Industrial Development Information and Siting Rules and Regulations.

2.2 Site Selection

The Project site was selected for the following reasons:

1. The site offers access for up to 400 MW of generation.
2. The Project Area experiences consistently unidirectional winds with low turbulence, giving the Project access to turbines that are generally reserved for lower wind speed sites.
3. Proximity to interconnect with the PacifiCorp System at the existing Freezeout Substation near Medicine Bow, WY.
4. There are minimal environmental impacts anticipated at the Project Area. The U.S. Fish and Wildlife Service (USFWS) has indicated that the Project is located in an area with low eagle use, which has been confirmed by surveys. The Wyoming Game and Fish Department (WGFD) has agreed that the potential for the occurrence of and impacts to other sensitive species is low.

2.3 Nature and Location of the Facility

The proposed Project is located in Albany County, 10 miles north of Rock River, WY, and 15 miles east of Medicine Bow, WY, at elevations ranging from 6,713 to 7,192 feet. The main access to the Project will be via Interstate 80 (located about 50 miles south of the Project), U.S. Highway 30, and Fetterman Road, which bisects the Project Area. The site is relatively flat and is characterized by rolling plains with hills, cuestas, mesas, and terraces. The site is dominated by grassland with pockets of sagebrush in the northwestern and northeastern portions of the site. There are a few riparian emergent wetlands along Sevenmile Creek and Spring Creek, but no large bodies of open water exist within the site. The Project Area is largely undeveloped and mainly used for cattle ranching. Stock handling areas, roads and fences, and stock ponds and reservoirs are the primary constructed features currently onsite.

2.4 Preliminary Site Plan

Boswell Wind has developed a preliminary site plan that shows the site boundary, development areas where up to 170 turbines would be located, and the general locations where the substation, laydown areas, arterial roads and the O&M building would be located. The preliminary site plan is presented as Map 2-2 in Appendix A.

2.5 Land Ownership

The overall area under consideration for the Boswell Springs Project consists of approximately 21,596 acres (34 square miles) of privately-owned property. The Project will be located on leased private fee lands owned by a single landowner (Appendix B). Table 2-1 identifies the leased private lands in the Project Area. Figure 2-2 in Appendix A depicts landowners within the Project Area and adjacent to the Project boundary.

Table 2-1. Leased Private Lands in the Project Area[1]

Township	Range	Sections	Description
22 North	74 West	5 & 7	ALL
22 North	74 West	6	Lot 2; SE/4NE/4; SW/4NE/4; NW/4; SE/4; SW/4
22 North	75 West	1, 3, 4, 5, 6, 7, 9, 11, 15 & 16	ALL
22 North	75 West	2	Lots 2, 3, 4
22 North	75 West	8	NE/4; NW/4; SW/4
22 North	76 West	1 & 12	ALL
23 North	74 West	29, 30, 31, & 32	ALL
23 North	75 West	25, 26, 27, 29, 30, 31, 32, 33, 34, 35 & 36	ALL
23 North	75 West	28	SE/4SE/4; SW/4SE/4; SW/4
23 North	76 West	25 & 36	ALL

[1] There is only one surface landowner within the Project boundary.

While there is only one landowner affected by the Project, Intermountain Wind mailed notifications to landowners within two miles adjacent to the Project boundary in November 2015. Additionally, Albany County notified adjacent landowners within five miles of the Project in April 2016 as part on the county permit process. Community outreach efforts and notifications are discussed in Section 4.2.3 and copies of the notices sent are included in Appendix E, *Notices*.

2.6 Mineral Ownership

As required by W.S. 35-12-105(f) and ISC Rules, Chapter 1, Section 9(g) [Additional Application Requirements for Wind Energy Facilities], K2 Land & Minerals Company was commissioned to conduct a mineral title search and prepare a report identifying all record owners of mineral rights located on or under the lands where the Project will be constructed (see Appendix B.5, *Mineral Rights Holders*). A total of ten mineral rights holders where identified and provided with first-class letters with notice of Intermountain Wind's intent to construct a wind project. The written notice provided a general description of the proposed Project, a legal description of the property within the Project Area, and the name and phone number of an Intermountain Wind representative to contact for additional information. Notices about the Project were also published in the Laramie Boomerang on November 18, 2015 and December 23, 2015. Refer to Appendix E, *Notices)* for copies of the notification letters, notices, and mailing lists.

2.7 Project Overview

The Boswell Springs Project will be owned and operated by Boswell Wind, LLC. The electrical generation capacity of the Boswell Springs Project as currently designed ranges from 320 MW to 400 MW. The Project is anticipated to have an operational life of approximately 30 years. The operational life may be extended depending on the overall condition of the infrastructure and the market conditions.

Facilities and related infrastructure associated with the proposed Project will include WTGs, an underground 34.5 kV collection system, a 230 kV substation, a network of access roads, and an O&M building. Met towers and a SCADA system will also be constructed. These components are described in more detail below.

2.7.1 Wind Turbine Generators

Boswell Wind is evaluating options for WTGs for the Boswell Springs Project; however, all models under consideration have the same general configuration that includes a single-rotor, three-bladed upwind horizontal-axis design on a tubular tower. The turbine models under consideration have rotor diameters between 100 and 150 meters and hub heights between 80 and 100 meters tall. Generally, these turbines use active yaw control to keep the blades pointed into the wind. Typical specifications for the WTGs under consideration are provided in Table 2-2 below.

Table 2-2. Typical Specifications for Wind Turbine Generators

WTG Component	Typical Specification
Nameplate capacity	2.0 – 4.0 MW
Towers	Tubular steel
Hub height	80 to 100 meters
Blades	50 to 75 meters
Rotor diameter	100 to 150 meters
Drivetrain	Gearbox with two planetary stages and one helical stage
SCADA	Condition Monitoring System

SCADA Supervisory Control and Data Acquisition

Crane pads are needed to provide adequate workspace to maneuver a commercial crane to install the turbine components. Each turbine location will have an associated crane pad. The typical construction disturbance area will be approximately 1.6 acres at each turbine location. Following construction, the majority of the crane pad will be reclaimed and revegetated. The permanent footprint is expected to be approximately 0.2 acres per turbine.

A reinforced concrete foundation will support each tower. It is anticipated that the foundations will be approximately 55 feet in diameter and seven to eight feet deep. The majority of the foundation is located underground and only the "collar" section at the base of the wind turbine tower is visible after construction. The actual foundation design for each turbine will be determined by a licensed engineer based on site-specific geotechnical information, structural loading requirements, final engineering design, specifications of the selected turbine model, and vendor approval. The turbine

foundations will be spaced approximately 1,000 to 1,500 feet apart in each row. Rows of turbines will be spaced approximately 2 to 3 rotor diameters apart.

The primary components of WTGs include the rotors, nacelle, tower structure, transformers, and the aviation lighting system. Details about these specific components can be found online. Refer to the American Wind Energy Association website for details: http://www.awea.org/.

Upon completion of construction, all associated systems, controls, and safety equipment will be calibrated and tested. Qualified technicians, turbine vendor commissioning experts, and electricians, will test and inspect all WTG components, transformers, communications systems, and the substation to ensure compliance with design specifications and that they are working properly and safely. Every WTG and all associated equipment will be inspected and tested upon individual completion before being placed into service.

2.7.2 Power Collection System

A network of collection power cables will be installed along and between turbine arrays to collect power generated by individual wind turbines and route it to the collector substation. Collection power cables will be buried. The collector substation, located on the Boswell Springs site, will convert the electricity to transmission voltage (230 kV) for delivery to the electrical power grid.

The Project electrical system will therefore consist of the following key elements:

1. A collector system that collects energy from each WTG and delivers the power through a network of electrical conductors to the project substation.
2. A project substation that transforms energy delivered by the collector system from 34.5 kV to 230 kV.

2.7.3 SCADA System

A SCADA system will be installed to collect operating and performance data from each WTG and provide remote monitoring and operation of the turbines when appropriate. The turbines will be linked to one or more central computers via a fiber optic network installed in the electrical collector line trenches. The host computer(s) is expected to be located in the substation building control room in the Boswell Springs Project site. The SCADA software will consist of applications developed by the turbine vendor and/or a third party SCADA vendor.

Upon completion of construction, all associated systems, controls, and safety equipment will be calibrated and tested. Qualified technicians, turbine vendor commissioning experts, and electricians, will test and inspect all WTG components, transformers, communications systems, and the substation to ensure compliance with design specifications and that they are working properly and safely. Every WTG and all associated equipment will be inspected and tested upon individual completion before being placed into service.

2.7.4 Meteorological Towers

There are three existing met towers currently on site. Two were erected in 2007, and one was built in 2015. All three will be replaced with new 80-meter met towers within the project site for the purpose of collecting met data and forecasting conditions. Permanent met towers will be lattice

structures with concrete foundations and no guy wires. Similar to the WTG towers, the met towers will be lit and marked per Federal Aviation Administration (FAA) guidance. The number and location of the permanent met towers will be determined in consultation with the turbine vendor.

2.7.5 Operations and Maintenance Building

An approximately 2,500-square foot maintenance building will be constructed within the Project's boundaries. This building will include space for offices, bathroom and kitchen facilities, a break room, a storage area, and a garage for vehicles and equipment warehousing and maintenance.

2.7.6 Access Roads

Fetterman Road (State Highway 61) bisects the Project Area and will provide the main access route for construction, operation, and maintenance vehicles. Based on numerous site assessments and resources surveys, access roads have been located and designed to avoid and minimize sensitive resources. Fetterman Road will be reconstructed to a width of 26 feet. All new and existing internal roads used to access the proposed turbine arrays will be approximately 17-20 feet wide (where necessary), graded and graveled to facilitate access by construction vehicles. All of the road and foundation materials will be sourced in Wyoming as close to the project site as possible.

2.8 Point of Delivery – Goods and Services

The construction and operation of the Project will result in the purchase of goods and services, both for the Project and for the needs of the associated construction and operations workforce. Commercially reasonable efforts will be used to procure goods and services for construction activities from local, regional, and national vendors. All of the road and foundation materials will be sourced in Wyoming as close to the project site as possible. Turbine components may originate from different locations depending on the final selected turbine supplier. Boswell Wind anticipates that the majority of the Project's components will be trucked to the project site and that Albany County will be the primary point of delivery for these components. However, the turbine supplier will make a determination of the feasibility of rail delivery based upon transportation logistics, including the availability of trailers and rail cars at the time of delivery.

2.9 Raw Material and Energy Requirements

Table 2-3 estimates the amounts of aggregate and concrete required for construction and operation of the Boswell Springs Project. Material estimates are based on the maximum of 170 WTGs being constructed for the Project. Construction and operation of the Project would also require diesel fuel and gasoline for operation of construction equipment, light-duty trucks, and maintenance vehicles.

Table 2-3. Material Estimates for the Project

Material	Construction Year 1	Construction Year 2	Construction Year 3	Operations Annually
Aggregate (cubic yards)	50,000	200,000	25,000	-
Concrete (cubic yards)	0	70,000	4,000	-

2.10 Water Use Estimates

Water use estimates for construction and operation of the Project is summarized in Table 2-4. Water use estimates for construction are based on the maximum of 170 WTGs being constructed for the Project. Water for construction will be obtained from municipal water sources and trucked to the project site. Boswell Wind anticipates that most water used for construction will be obtained from the town of Rock River. If needed, additional water may be obtained from the town of Medicine Bow. Based on the estimated construction water balance calculations, the Project water needs do not exceed the 800 acre-foot per year statutory threshold of W.S. §35-12-108; therefore, the Project will not require a Wyoming State Engineer's Office (WSEO) water supply yield analysis or opinion (see Section 6.5 for more information).

Water for the long-term operation of the O&M building will be obtained from a new residential-type water supply well on leased private lands. Water use for operations will be limited to the maintenance building for restrooms, sinks, hand washing stations, showers, internal/external hose, and dishwasher. Based on reasonable water use assumptions for the maintenance building and an estimated operation staff of 15 full-time employees, operational water use would be approximately 435,000 gallons per year, or approximately 1 acre-foot.

Table 2-4. Water Use Estimates for the Project

Material	Construction Year 1	Construction Year 2	Construction Year 3	Operations Annually
Water (gallons/acre-feet)	5,000,000 / 14	16,000,000 / 50	135,000 / <1	435,000 / 1

2.11 Waste Management

During construction, portable toilets and sinks would be provided for onsite sewage handling; these would be pumped and cleaned weekly by a contracted waste company. Boswell Wind will install an onsite septic system for collection and treatment of sanitary waste at the O&M building for long-term operation of the facility.

The Project could generate the following types of solid wastes:

- Turbine packaging materials (e.g., plywood crates, pallets, plastic bags and wrapping, tarps)
- Construction debris (e.g., scrap steel, concrete, wood forms, erosion control materials)
- Motor oil, gasoline, diesel, and antifreeze associated with construction and maintenance equipment
- Turbine lubricant oil

- Transformer oil
- Oily Rags
- Paint
- Miscellaneous office waste from maintenance building (e.g., paper, food packaging/scraps)
- Steel, concrete, and other materials that comprise the Project facilities when decommissioned

Any solid wastes generated by Project construction would be promptly removed from the Project Area and disposed of by licensed waste haulers in licensed and approved facilities according to local regulations and procedures. There are four roll-off companies near the Boswell Springs site: Waste Connections, Waste Management, Rock River Disposal, and Dumpster Source. The contracted waste hauler will remove the portable dumpsters depending on the construction activities. No hazardous wastes will be generated during construction of the Project. Refer to Chapter 7 for more information on waste management.

2.12 Erosion Control and Stormwater Management

The Project will adhere to all erosion control and reporting measures prescribed in the Wyoming Pollutant Discharge Elimination System (WYPDES) Large Construction General Permit for stormwater discharges and the Project-specific Stormwater Pollution Prevention Plan (SWPPP). The SWPPP prepared for the proposed Project will focus on sedimentation and erosion controls during construction and will set forth a schedule for regular inspections of appropriate controls at the construction site. Refer to Chapter 7 for more information on avoidance and minimization of erosion and sedimentation.

2.13 Transportation and Traffic

Peak construction traffic for the transport of the construction workforce and delivery of materials and equipment is expected to occur between March 2018 and March 2019. Boswell Wind will consult with Town of Rock River, City of Laramie, Albany County, the local Wyoming Department of Transportation (WYDOT) District and others, as appropriate, to ensure the execution of a well-coordinated transportation plan that will minimize risks and inconvenience to the public. Prior to construction, Boswell Wind intends to enter into a Road Improvement Agreement with Albany County to address the improvement of Fetterman Road, and a Road Damage and Maintenance Agreement with Albany County to ensure that County roads that are impacted by construction traffic are properly maintained and repaired. Refer to Section 6.15 *(Transportation)* for more information on transportation.

2.14 Future Additions and Modifications to the Facility

Boswell Wind currently has no plans to add additional phases or modify the proposed facilities.

2.15 Applicant Commitments

Commitments made to local governments include the following:

1. Boswell Wind LLC and Albany County will enter into a road improvement agreement addressing the improvement of Fetterman Road to a standard agreed upon by the parties and based upon the traffic impact study included in this application as Appendix N. If Palmer Canyon Road is used for construction of the Boswell Springs Project, it will also be included in the road improvement agreement.
2. Boswell Wind LLC and Albany County will enter into a road damage and maintenance agreement that will address impacts to County roads caused by traffic from the Boswell Springs Project.
3. Proof of commercial general liability insurance covering bodily injury and property damage with the limits of at least one million dollars per occurrence and one million dollars in aggregate will be provided to Albany County before construction activities begin.

Chapter 3
Construction, Operations, and Decommissioning

This section is intended to provide information on the construction, operations and decommissioning of the proposed Boswell Springs Project.

3.1 Construction Schedule

Construction of the Boswell Springs Project is anticipated to begin in May 2018 and continue through November 2020. Road improvements, road construction, and geotechnical investigations are anticipated to occur between May and November of 2018, followed by foundation and electric collection system construction between May and October 2019, and installation and wiring of WTGs between April and October 2020. Based on the estimate of worker-months to complete construction of the project, it is estimated that the physical components of the industrial facility will be 90 percent complete in September 2020. The anticipated construction completion date for the Boswell Springs Project is November 2020.

3.2 Construction Workforce Estimate

Boswell Wind estimates that an average of 98 workers would be employed at the site during the 31-month construction period commencing May 2018 and ending November 2020. Most employment would occur between the months of May and November each year, with a peak employment estimated at 236 workers between June and August 2020.

3.2.1 Estimated Number and Job Classification

The estimated number of jobs for Project construction is summarized by job classification in Table 3-1 below. Estimated workforce requirements during the quarterly construction schedule is provided in Table 5-3.

Table 3-1. Estimated Jobs by Job Classification

Job Classification	Worker-months
Project Managers	179
Engineer	53
Foreman	105
QA/QC	158
Administrative	32
Safety/Site Security	63
Iron/Steel Workers	116
Cement Masons/ Concrete Finishers	63
WTG Technician Assistants	242
Turbine Technicians	53

Job Classification	Worker-months
Electricians	358
Lineman	32
Rigger	47
Plant Operator	21
Equipment Operator	510
Truck Driver	431
Mechanic	53
Laborer	516
Total	**3,032**

WTG wind turbine generator

3.2.2 Local and Non-local Workforce

Boswell Wind has established 20 percent minimum of the workforce over the course of construction as a local hiring goal, and estimates that approximately 20 percent of the construction workforce may be supplied from the local workforce currently present in Albany and Carbon Counties during peak employment months. For the purpose of this analysis, a conservative estimate was used for 80 percent of the construction workforce sourced from outside this two-county area that would require temporary housing during peak employment months. During non-peak employment months, the share of employees hired locally could be higher because the locally available workforce would likely be a greater share of Project workforce needs.

3.3 Operations Workforce Employment

During operations, up to 15 employees would be employed by the Project. Most of these employees would be wind turbine technicians.

3.4 Construction Activities

Boswell Wind will hire a contractor(s) to conduct every phase of the EPC contract for the Boswell Springs Project. A general overview of the construction activity sequencing is provided in the sections below.

3.4.1 Access Roads

Fetterman Road will be reconstructed to a width of 26 feet. All new and existing internal roads used to access the proposed turbine arrays will be constructed or widened to approximately 17- 20 feet, graded and graveled to facilitate access by construction vehicles. A network of access roads to wind turbine locations will be constructed. Access roads will be designed by a licensed engineer and roads will be compacted to meet equipment loading and hauling requirements.

3.4.2 Tower Foundations

Each turbine will be supported by a reinforced concrete foundation. The actual foundation design for each turbine will be determined by a licensed engineer based on site-specific geotechnical information, structural loading requirements, final engineering design, and specifications of the selected turbine model. Foundations are expected to have a diameter of approximately 55 feet and a depth of approximately seven to eight feet.

Following construction of the wind turbine foundation, the wind turbine site will be cleared and graded for wind turbine installation. The wind turbine site will then be compacted as needed using compaction rollers and water trucks. If required for stabilization based on soil conditions, an aggregate surface will be placed across the wind turbine site using belly-dump trailers, bulldozers, and motor graders.

Each wind turbine site will have a designated crane pad location for wind turbine installation. Crane pads will be cleared by bulldozers and compacted using compaction rollers and water trucks as needed. After the installation of the crane pad, the wind turbine installation site is ready for delivery of turbine components and is released for turbine construction.

3.4.3 Tower Assembly

Turbine components will be delivered to each pad foundation. The Project proposes 80- to 100-meter towers. Towers are prefabricated and delivered in sections. Cranes will be brought on site to lift the tower sections, nacelle, rotor hub and blades from trucks and place them near the tower foundation. Once all of the turbine foundations are completed and the turbine components have been brought to the site, the first step will be to lift and secure the down-tower electrical assembly and secure it to the foundation. The tower sections will be installed over this equipment. Once the nacelle is placed on the top of the newly constructed tower, the rotor blades will be bolted to the rotor hub, lifted by a construction crane, and connected to the main shaft of the turbine nacelle.

3.4.4 Power Collection System

A network of collection power cables will be installed underground in trenches that will link turbine arrays in order to collect power generated by the individual wind turbines and route it to the collector substation. The collector substation, located on the Boswell Springs site, will convert the electricity to transmission voltage (230 kV).

3.4.5 Turbine Commissioning and Testing

Upon completion of construction, all associated systems, controls, and safety equipment will be calibrated and tested. Qualified technicians, turbine vendor commissioning experts, and electricians, will test and inspect all WTG components, transformers, communications systems, and the substation to ensure compliance with required design specifications and that they are working properly and safely. Every WTG and all associated equipment will be inspected and tested upon individual completion before being placed into service.

3.5 Operation and Maintenance Activities

Boswell Wind will have O&M staff onsite to manage the Project once the facility is producing commercially available energy. Maintenance for WTGs, transformers, the substation, and the collection system are described in Sections 3.5.1 through 3.5.3 below.

3.5.1 Wind Turbine Generators

To maximize performance and detect potential malfunctions, routine maintenance will be performed on the WTGs. O&M procedures will be established prior to the Project's commercial operation date and will define specific routine maintenance and inspection activities in accordance with the WTG manufacturer's recommendations. Scheduled routine maintenance will be conducted on each WTG every six months. Routine maintenance performed by O&M personnel will include periodically replacing lubricating fluids, checking parts for wear and recording operating parameters. Other inspection and maintenance operations will be performed on roads, pads, and trenched areas to ensure that erosion control measures are functioning properly. Repairs to the Projects' facilities will be conducted by the O&M staff, with the assistance of contracted personnel as needed.

Each WTG will be continually monitored by the SCADA system, which reports all major aspects of operation through fiber optic communication lines linking the WTGs to the O&M building and, potentially, a remote operations center. Alarm systems will be designed to trigger in the event operational characteristics fall outside of predefined limits. Each WTG has an automatic system to shut down the rotor in the event of malfunction or excessive wind speeds. Any problems that arise are immediately reported to onsite O&M personnel for correction.

3.5.2 Transformers and Substation

Step-up transformers, substation, and WTG transformers will be maintained as part of the normal O&M activities in accordance with North American Electric Reliability Corporation standards.

In general, transformers located at each WTG are inspected visually and via infrared scans every 6 to 12 months. The oil in WTG transformers is sampled once per year. Substation transformers receive visual inspections and infrared scans at least once per year (but may be inspected weekly or monthly as part of O&M staff duties) and oil sampling once every five years. Based on sample results, transformers may require complete filtering. Filtering typically occurs every ten years. Substation safety equipment is inspected every three to six months; batteries, chargers, and building HVAC equipment are checked every six months; disconnect switches have their operation and alignment inspected annually. The operation of interrupting equipment (e.g., breakers, re-closers) is inspected annually and their timing and calibration is assessed every five years. Protective relays are generally tested and calibrated every five years unless more frequent assessments are required by the interconnecting utility. In the event that a transformer or other device fails, replacement of the equipment will be accomplished as quickly as possible.

3.5.3 Underground Collection Line

Underground collection lines are relatively maintenance-free, but will be maintained as needed. Depending on the method of installation, maintenance of the buried collector lines is typically

limited to an approximate five-foot to ten-foot wide linear corridor, with protective material placed both above and below the electrical and fiber optic lines. Upon back-filling, the surface is reclaimed and revegetated. All electrical terminations are to be located above ground in appropriate weather-tight, secure electrical enclosures to facilitate ease of maintenance.

3.6 Site Decommissioning and Reclamation

This section provides information on the methodology and financial cost statement of decommissioning and reclaiming the Project. Boswell Wind requests several variances from certain prescriptive decommissioning and reclamation requirements listed in the ISC Rules, Chapter 1, Section 9; these variance requests are included in Section 3.6.3. As required by agencies and landowners, Boswell Wind will provide assurances that the plans can be implemented.

3.6.1 Site Decommissioning

Decommissioning is a step-by-step, methodical deconstruction process, which involves removing and disposing of the Project's turbines and associated facilities and infrastructure. With some exceptions, site decommissioning involves the reverse of site construction. Decommissioning of the Boswell Springs Project is expected to follow a standard procedure, which typically includes the following:

- All turbines will be dismantled and either relocated to other wind energy projects or sold for scrap value;
- Electronic equipment will be recycled whenever possible. If not, it will be disposed of in landfills or properly licensed hazardous waste facilities as appropriate (some electronics are considered hazardous waste due to the presence of heavy metals);
- Transformers and electrical control devices will be reused in other applications or sold as scrap after fluid removal;
- Turbine foundations will be removed down to a depth of four feet (48 inches) and backfilled with stockpiled subsoil and topsoil;
- Access roads, rock or gravel in the electrical substation, transformer pads, and building foundations will be removed and recycled if no longer needed or wanted by the landowners;
- Land areas covered in rock, gravel, or building/tower footprints will be restored to a natural grade (which includes ameliorating soil compaction that might have resulted from project uses) and reseeded or replanted with native vegetation or pasture grasses following consultation with current landowners;
- Electrical substation and storage building will be dismantled, including inspection for and remediation of any environmental contamination;
- Demolition or removal of equipment facilities will meet applicable environmental and health regulations, and economically recoverable materials will be salvaged;
- All disturbed areas will be reclaimed and restored so prior land uses can be resumed.

A cost estimate for decommissioning and reclamation certified by a licensed Wyoming engineer has been provided as part of the application (see Appendix D.2). The decommissioning and site

reclamation plan and associated cost estimates submitted as part of the application will be updated and submitted to the ISC every five years after the date of permit issuance until the completion of final reclamation. Facility decommissioning and reclamation will begin within 12 months after the facility ceases to produce electricity.

Boswell Wind will obtain security to serve as collateral to guarantee appropriate decommissioning. This will be in the form of a surety bond, certificate of deposit, corporate guarantee or other form acceptable to the WDEQ and the Industrial Siting Council (ISC) prior to construction. The value of the security will reflect the gross decommissioning and reclamation costs contained in the decommissioning and reclamation plan.

3.6.2 Reclamation

Following construction, interim reclamation will include revegetation of temporary surface disturbance with seed mixes agreed upon with the landowner.

After decommissioning the disturbed areas will be reclaimed and returned to as nearly as practicable pre-Project land uses (grazing). Final reclamation will include regrading or re-contouring, soil amendments, and reseeding disturbed areas with agreed upon seed mixes, and controlling noxious weeds. Refer to Appendix D for the preferred seed mixes for both interim and final reclamation depending on the various ecological site conditions throughout the Project Area.

3.6.3 Decommissioning and Reclamation Variance Requests

Chapter 1, Section 9 of the ISC Rules contain prescriptive measures that appear to conflict with the private landowner's long-term use of the Project site. Boswell Wind is requesting a variance for the following items pertaining to decommissioning and reclamation.

Foundations. Chapter 1, Section 9(a)(i) of the ISC Rules require removal of the wind turbine foundations to a depth of 48 inches. In many instances, removing 48 inches of the foundation below grade will require removing the entire pedestal plus a significant portion of the underlying and much larger mat foundation. This will require a large amount of additional surface disturbance as well as generating additional inert (i.e., concrete) landfill waste. There is also minimal, if any, reclamation benefits from removing the upper portions of the mat foundation. Boswell Wind requests a variance from the ISC requirement to remove wind turbine foundations to a depth of 48 inches to allow for removal of only the pedestal portion of the foundation.

Underground Cable. Chapter 1, Section 9(a)(i) of the ISC Rules require the removal of underground cable. Similar to removing turbine mat foundations, removing underground cabling will require significant additional surface disturbance for little subsequent benefit. While all other components of the underground collector or transmission system will be decommissioned and removed, pulling cable out of the ground, which is generally buried at a depth of approximately 36 inches, will unnecessarily disturb previously reclaimed areas. This may have the effect of impacting decades of successful revegetation growth and soil stabilization. Given the land use within the Project Site, which is primarily ranching, there is little or no benefit to removing the cable as the future land use will be unaffected by the presence of the cable. Boswell Wind requests a variance from the ISC requirement to remove underground cabling to allow for underground cabling to remain undisturbed.

Removal of buildings and roads. The ISC rules require that all Project facilities be completely removed and reclaimed. However, the private landowner may desire to have these facilities remain on-site after the Project ceases production. Boswell Wind requests a variance from the ISC requirement to remove all project facilities to allow for buildings and roads to remain at the discretion of the landowner.

Reclamation Seed Mixes. The ISC rules contain specific requirements for reclamation seed mixes. However, the private landowner may desire to have the area reclaimed with seed mixes more appropriate to the desired use of the property (e.g., ranching) after the Project ceases production. Boswell Wind requests a variance from the ISC requirements pertaining to specific seed mixes for reclamation to allow for modifications to the reclamation seed mixes within the ecological site profile at the discretion of the landowner.

3.7 List of Permits Required for Construction

Table 3-2. List of Permits Required for Construction

Jurisdiction	Permit/Decision	Status/Agent
Federal		
Federal Aviation Administration	Notice of Proposed Construction or Alteration (Form 7460-1)	Initiated using preliminary layout
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA) Section 404 – Individual or Nationwide Permit	Pre-construction notice may be needed per Nationwide Permit 12
U.S. Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasures (SPCC) Plan – SPCC Plan – Operation	Pending final design, Boswell Wind will file before construction begins
U.S. Fish and Wildlife Service (USFWS)	Eagle Conservation Plan (ECP) and Environmental Assessment (EA) for ECP	Boswell Wind is conducting eagle point counts and is in discussions with USFWS on project requirements
	Bird and Bat Conservation Strategy (BBCS)	Boswell Wind is conducting bird and bat use surveys and is in discussions with USFWS on project requirements
Federal Communications Commission	Private Operational Mixed Microwave License	Pending final design, Boswell Wind will file application prior to construction
State		
Wyoming State Engineer's Office	Temporary Water Use Agreement – for construction water trucked to Project Area; Permit to Appropriate Groundwater (U.W. 5 Form) – for new groundwater well providing water for O&M building.	Pending further refinement of water use requirements and final design of groundwater well, Boswell Wind will file before construction begins

Jurisdiction	Permit/Decision	Status/Agent
Wyoming Department of Environmental Quality	Wyoming Industrial Development and Siting Act/ Industrial Siting Council Order	Permit application filed August 2017
	Wyoming Pollutant Discharge Elimination System (WYPDES) – Large Construction General Permit (WYR10-0000)	Pending final design, Boswell Wind will file before construction begins
	General Permit for Temporary Discharge	Pending final design, Boswell Wind will file before construction begins
	Permit to Construct Small Wastewater Facilities (Septic Tanks and Leach fields)	Pending final design of the O&M building, depending on size of septic tank needed
	Section 401 Water Quality Certification	Pending final design, Boswell Wind will file in conjunction with CWA 404 Permit, if needed
	Air Quality Division – Temporary/ Portable Source Permit	Pending final design/ Boswell Wind will file before construction begins
	Water Quality Division – Temporary Increase in Turbidity Permit	Pending final design; permit review in conjunction with CWA 404 permit and 401 certification process/ Boswell Wind will file prior to construction, if necessary
	General Permit for Wetland Mitigation	Pending final design and wetlands reconnaissance survey, Boswell Wind will file prior to construction, if necessary
Wyoming Department of Transportation	Port of Entry Permit for Oversized/ Overweight Loads	Pending final design/Prior to construction when turbine delivery schedule is finalized
	Road Use Agreement	Pending final design/Prior to construction when turbine delivery schedule is finalized
	Meteorological Towers (met) Reporting System	Pending final design, Boswell Wind will file at least 10 days prior to raising structure
Local		
Albany County	Commercial Wind Energy Conversion Systems (WECS) Permit	WECS Permit was approved by the Albany County Board of County Commissioners on May 24, 2016.
	Road Improvement and Maintenance Agreement	Boswell Wind is in negotiations with Albany County and intends to enter into a Road Improvement Agreement and a Road Damage and Maintenance Agreement with the County prior to construction

Chapter 4
Public and Agency Involvement

The following sections describe efforts to coordinate with local governments, state and local agencies, and the affected communities.

4.1 Area of Site Influence and Area Primarily Affected

The area of site influence for the proposed Project includes Albany County and the communities of Rock River and Laramie as well as Carbon County and the communities of Medicine Bow, Hanna, and Elk Mountain. For the purposes of public outreach and the socioeconomic assessment, the local governments and joint powers boards located within these areas are assumed to be those primarily affected by construction and operation of the proposed Project. Refer to Section 5.0 (*Socioeconomic Assessment*) for a more detailed description of the area of site influence, area primarily affected, and study area relevant to the socioeconomic baseline and impacts analysis for the proposed Project.

4.2 Communication with Local Governing Bodies and Local Entities

Communications about the project were conducted via telephone, email, and/or in-person meetings with local governments in the recommended area of site influence to present and discuss the proposed Project. Intermountain Wind held meetings with representatives from Albany and Carbon counties, the town of Medicine Bow, and the town of Rock River. Presentations were made for the county commissioners and town councils in these jurisdictions. All of these meetings were intended to provide an overview of the project, present the preliminary project layout, and discuss questions about the Project. Coordination efforts also included communication with local public works employees and agencies regarding water and waste disposal plans; and emergency management agencies.

Intermountain Wind submitted an application for a Commercial Wind Energy Conversion Systems (WECS) Permit to Albany County on March 7, 2016. The project was on the agenda of the May 11, 2016, Albany County Planning and Zoning Commission Meeting. No public comments were provided or submitted in writing to the Commission during the public hearing portion of the meeting, and the Boswell Springs Wind Project was recommended for approval. The Albany County Board of County Commissioners subsequently approved the project at a hearing held on May 24, 2016. One representative from the Town of Rock River attended the hearing to offer support for the project.

Outreach and meetings with governing bodies, staff of local governments, and local entities within the recommended area of site influence are described in Table 4-1.

Table 4-1. Coordination with Local Governments and Entities

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
Carbon County Planning Department—Sid Fox, Kristy Rowan	9/23/2015	In person	Paul Martin (IMW), Melanie Martin (ICF), John Priecko (ICF)	Provide an overview of the project, present a preliminary project layout, and discuss any concerns or relevant considerations.
Albany County Planning Department—David Gertsch	10/14/2015	In person	Paul Martin (IMW), Melanie Martin (ICF), Tanya Copeland (ICF)	Provide an overview of the project, present a preliminary project layout, discuss the WECS permit application, and discuss any concerns or relevant considerations.
Albany County Planning Department – David Gertsch	10/26/2015	Letter	Paul Martin (IMW)	The purpose of this letter was to request an amendment to the Audio/Visual Warning System requirement.
Carbon County Planning and Zoning—Sid Fox, Kristy Rowan	11/2/2015	In person	Paul Martin (IMW)	Provide an overview of the project, present a preliminary project layout, and discuss any concerns or relevant considerations.
Town of Rock River Town Council	11/2/2015	In person	Paul Martin (IMW)	Provide an overview of the project, present a preliminary project layout, and discuss any concerns or relevant considerations.
Town of Medicine Bow Town Council	11/9/2015	In person	Paul Martin (IMW)	Provide an overview of the project, present a preliminary project layout, and discuss any concerns or relevant considerations.
Albany County Hospital District – Diana Roising	11/10/2015	Phone	Gretchen Pinkham (ICF)	Determine hospitals located near the Project Area for emergency response purposes. There is one hospital, a 24-hour trauma center, 3 critical beds, and hospital ambulance service.
Laramie Fire Department – Dan Johnson	11/12/2015	Phone	Gretchen Pinkham (ICF)	Determine fire services located near the Project Area for emergency response purposes. This fire department receives 4,000 calls per year, 80 percent of which are for emergency management services (EMS). This fire department has high angle rescue training. County fires are handled by the Albany Fire District #1; Centennial Department handles town fires; and Vitavo Department, Big Laramie Department, Little Laramie Department, and Tie Siding Department cover Ranch Land fires.

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
Waste Management Department	11/12/2015	Phone	Gretchen Pinkham (ICF)	Determine if a dumpster rental and pickup services were available for solid waste at the Project Area. The contact provided the location of the nearest waste management facility to the Project Area.
Albany County Commissioners	11/17/2015	In person	Paul Martin (IMW)	Provide an overview of the project, present a preliminary project layout, discuss the WECS permit application, and discuss any concerns or relevant considerations.
Albany County School District – Receptionist	11/16/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss traffic attributed to schools in the area.
Albany County Road and Bridge – Rob Fisher	11/16/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss traffic counts.
Albany County Planning – David Gertsch	11/19/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss general information and zoning rules in the County.
Albany County Road and Bridge – Mike Osterman	11/19/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss general information pertaining to traffic in the County.
Carbon County Commissioners	12/1/2015	In person	Paul Martin (IMW)	Provide an overview of the project, present a preliminary project layout, and discuss any concerns or relevant considerations.
Carbon County - Sid Fox	12/17/2015	Phone	Paul Martin (IMW)	Discuss project permitting.
Medicine Bow Conservation District – Joan McGraw	12/18/2015	Phone	Melanie Martin (ICF)	Discuss project permitting and resource concerns.
Laramie Rivers Conservation District – Tony Hoch	12/18/2015	Phone, email	Melanie Martin (ICF)	Discuss project permitting and resource concerns.
Albany County – David Gertsch	12/21/2015	Phone	Paul Martin (IMW)	Discuss project permitting.
Albany County Planning and Zoning Commission	5/11/2016	In Person	Paul Martin (IMW), Melanie Martin (ICF), Tanya Copeland (ICF)	Staff presentation by David Gertsch and Susan Adler to the Albany County Planning and Zoning Commission and public hearing on WECS Permit (WECS-01-16).

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
Albany County Board of County Commissioners	5/24/2016	In person	Paul Martin (IMW)	Special Meeting of the Board to consider WECS Permit (WECS-01-16). The WECS Permit (WECS-01-16) was unanimously approved.
Affected communities	8/11/2017	Letter	Mac Lowry (Alterra)	Notification to affected communities of the change in project ownership.

Alterra Alterra Power Corporation
IMW Intermountain Wind
n/a Not applicable

4.2.1 Notices to Affected Local Governments

A letter notification, including information about the Project and associated maps was sent to the affected local governments within the Project's recommended area of site influence by certified mail. This notification was mailed on November 13, 2015. Certified letters were mailed to local governments in the affected area, as required per the ISC rules and regulations (Chapter 1, Section 5 [b]). The mailing lists for noticing local governments, and copy of the notice that was mailed, the certified mail receipts, and certifications of the process used to notify local governments are included in Appendix E.1. An additional letter notification, notifying affected communities of the change in project ownership, was sent by courier on August 11, 2017 (Appendix E.1.5)

4.2.2 Communication with State and Federal Agencies

Intermountain Wind has met and Boswell Wind will continue to meet throughout the development process with state and federal agencies to provide information about the proposed Project. Agency coordination efforts include the State Historic Preservation Office (SHPO) to discuss preliminary archaeological data acquired for the area and identify agency concerns and regulatory requirements; WGFD, and the local USFWS office to discuss wildlife survey protocols; WDEQ to discuss the storm water management program; and WYDOT to coordinate transportation plans.

Outreach and meetings with state and local agencies are described in Table 4-2. Additional details of agency correspondence is provided in Appendix F, *Agency Correspondence*. Resource-specific information obtained through Intermountain Wind's coordination with these agencies is contained in other sections of this Application, as appropriate.

Table 4-2. State and Federal Agency Coordination

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
Wyoming Game and Fish Department (WGFD) – Vern Stetler	3/21/2008	Email	Paul Martin (IMW)	Introduce the project and discuss resource concerns.
WGFD – Scott Gamo and Matt Fry	5/19/2009	In person	Paul Martin (IMW)	Discuss agency requirements and resource concerns.
WGFD – Scott Gamo	8/25/2009	Letter	Kim Chapman (AES)	Details of biological survey approach.
WGFD - John Emmerich	10/2/2009	Letter	Kim Chapman (AES)	Correspondence confirming biological survey approach.
U.S. Fish and Wildlife Service (USFWS) - Scott Covington and Patricia Sweanor	Feb – March 2010	Email, phone	Kim Chapman (AES)	Correspondence on approach to raptor nest searching and monitoring protocols.
WGFD – Scott Gamo	3/22/2010	Phone	Paul Martin (IMW) Kim Chapman (AES)	Discussed study protocols including bats, wetlands and riparian areas, big game, reptiles and amphibians, and Species of Greatest Conservation Concern.
WGFD – Scott Gamo	3/18/2011	In person	Paul Martin (IMW) Kim Chapman (AES)	Discuss resource surveys.
USFWS – Peter Hanson, Mark Sattleberg, Scott Covington, Alex Schubert, Patricia Sweanor	3/18/2011	In person	Paul Martin (IMW)	Introduce the project, discuss agency requirements, and discuss resource concerns.
WGFD – Scott Gamo	1/11/2012	In person	Paul Martin (IMW)	Reintroduce the project and schedule to WGFD and to discuss biological survey work among other topics.
USFWS – Patricia Sweanor	1/11/2012	In person	Paul Martin (IMW)	Reintroduce the project and schedule to USFWS and to discuss the programmatic take permit for Golden Eagle, Golden Eagle research, and biological survey work among other topics.

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
WGFD – Scott Gamo	3/18/2015	In person	Paul Martin (IMW) Andrew Newman (ICF)	Discuss species of concern including mule deer, Golden Eagle mortality, bats, and the timing of the second season of biological sampling.
USFWS – Patricia Sweanor	6/15/2015	In person	Paul Martin (IMW) Andrew Newman (ICF) Kim Chapman (AES)	Review biological surveys conducted to date, review the results of the 2009-2011 surveys, and discuss the proposed survey protocol updates for the 2015 field season.
WGFD – Scott Gamo	6/15/2015	In person	Paul Martin (IMW) Andrew Newman (ICF) Kim Chapman (AES)	Review biological surveys conducted to date, review the 2010 survey results, and discuss the proposed survey protocol updates for the 2015 field season.
USFWS – Patricia Sweanor	9/9/ 2015 and 9/11/2015	E-mail, phone	Paul Martin (IMW) Genesis Mickel (AES) Kim Chapman (AES)	Discuss eagle and raptor activity survey plots for 2015 field survey effort.
Wyoming Industrial Siting Division (ISD) – Kimber Wichmann and Luke Esch	10/14/2015	In person	Paul Martin (IMW) Melanie Martin (ICF) Tanya Copeland (ICF)	Review the Project history, discuss resources surveys and agency coordination, provide an overview of the project status, and discuss the status of ISD rules and financial assurance and bonding.
Wyoming State Historic Preservation Office (SHPO) – Richard Currit	10/20/2015 and 12/1/2015	Phone	Ted Hoefer III (CRA)	Determine how SHPO would like to handle the Rock Creek to Fort Fetterman Trail through the Project Area in terms of direct and indirect impacts. These decisions are largely up to the ISC. SHPO would prefer for no direct impacts and would like a visual impact analysis.

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
ISD – Kimber Wichmann	10/27/2015	Phone	Melanie Martin (ICF)	Request additional permit example materials.
U.S. Army Corps of Engineers – Mike Happold	11/6/2015	Letter	Melanie Martin (ICF)	Request a preliminary jurisdictional review and determination of the proposed Project.
ISD – Kimber Wichmann and Luke Esch	11/12/2015	Phone	Paul Martin (IMW) Jenifer Scoggin (Holland and Hart) Melanie Martin (ICF)	Jurisdictional meeting.
Wyoming Department of Environmental Quality (WDEQ) – John Gorman	11/12/2015	Phone	Dan Nally (ICF)	Discuss the Wind Farm SWPPP. The contact provided an example wind project SWPPP.
Wyoming Department of Transportation (WYDOT) – Lorraine Lucero	11/20/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss traffic accident data for the Project Area.
WYDOT – Randy Griesbach	11/23/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss the traffic information system in the vicinity of the Project Area.
WGFD – Micah Morris	11/23/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss the recreational usage of roads in and around the Project Area.
District Traffic Technician	11/24/2015	Phone	Mike Gostovich (Independent Consultant)	Discuss the required radii on U.S. 30.
U.S. Army Corps of Engineers—Kevin Little	12/2/2015	Phone	Melanie Martin (ICF)	Follow-up on preliminary jurisdictional letter previously submitted.
ISD – Kimber Wichmann and Luke Esch	12/10/2015	In-person	Paul Martin (IMW) Melanie Martin (ICF) Tanya Copeland (ICF) Alex Uriarte (ICF)	Pre-filing meeting.
WGFD – Scott Gamo,	12/16/2015	Phone	Paul Martin (IMW)	Discuss project permitting and resource concerns.

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
USFWS – Patricia Sweanor	12/18/2015	Phone	Paul Martin (IMW) Ron Hankewich (Alterra) Mac Lowry (Alterra) Melanie Martin (ICF)	Discuss project permitting and resource concerns.
WGFD – Scott Gamo, Rick Huber	1/8/2016	Phone	Paul Martin (IMW) Ron Hankewich (Alterra) Mac Lowry (Alterra) Melanie Martin (ICF)	Discuss project permitting and resource concerns.
ISD – Kimber Wichmann, Andrew Kuhlmann, Luke Esch	3/11/2016	In-person	Paul Martin (IMW) Jenifer Scoggin (Holland and Hart) Melanie Martin (ICF) Tanya Copeland (ICF)	Pre-filing application discussion.
WGFD – Scott Gamo	4/18/2016		Paul Martin (IMW) Kim Chapman (AES) Genesis Mickel (AES)	Review 2015 survey results for birds, bats, and eagles.
ISD – Kimber Wichmann, Brian Lovett, Casey Robb	5/25/2017	In Person	Mac Lowry (Alterra) Paul Martin (IMW) Melanie Martin (ICF) Tanya Copeland (ICF) Jenifer Scoggin (Holland and Hart)	Project update related to change in ownership and discussion of timing for ISD Permit submittal.
WGFD – Linda Cope, Corey Class, Rick Huber, Lee Knox	5/26/2017	In Person	Mac Lowry (Alterra) Paul Martin (IMW) Melanie Martin (ICF) Tanya Copeland (ICF) Jenifer Scoggin (Holland and Hart) Kim Chapman (AES) Genesis Mickel (AES)	Project update related to change in ownership and discussion of WGFD letter dated May 22, 2017.
USFWS – Patricia Sweanor, Nathan Darnall	5/26/2017	In Person	Mac Lowry (Alterra) Paul Martin (IMW) Melanie Martin (ICF) Tanya Copeland (ICF) Kim Chapman (AES) Genesis Mickel (AES)	Discussed project update related to change in ownership, permitting schedule, and process for ECP/EA.

Agency Name and Representatives	Date	Contact Method	Project Representatives and Contractors in Attendance	Meeting Purpose and Comments
WGFD – Linda Cope, Corey Class, Rick Huber	6/12/2017	Phone	Mac Lowry (Alterra) Paul Martin (IMW) Tanya Copeland (ICF) Jenifer Scoggin (Holland and Hart) Kim Chapman (AES) Genesis Mickel (AES)	Discuss survey protocol for summer 2017 and WGFD comments on the Landowner Conservation Plan.

Alterra	Alterra Power Corporation	SHPO	State Historic Preservation Office
AES	Applied Ecological Services	SWPPP	Stormwater Pollution Prevention Plan
CRA	Cultural Resource Analysts, Inc.	U.S.	United States
ISD	Industrial Siting Division	USFWS	U.S. Fish and Wildlife Service
IMW	Intermountain Wind	WGFD	Wyoming Game and Fish Department

4.2.3 Community Outreach

Intermountain Wind has been working with local landowners in the vicinity of the project since its inception. In addition to the many meetings held with local landowners, Intermountain Wind undertook additional public outreach efforts to engage the broader community.

Public notification letters were sent to landowners within two miles of the Project Area and local government officials in the affected area on November 13, 2015. A notification to mineral owners was sent on December 21, 2015. Display ads were posted in the Laramie Boomerang on November 18, 2015 and December 23, 2015. Both the notification letters and the display ads provided a project description, information about the anticipated construction including schedule, workforce, and routes used to access the site, a summary of anticipated effects, and announced the public informational meeting (Appendix E).

A Public Informational Meeting was held on November 23, 2015 from 3:00 – 6:00 p.m. at the Rock River Town Hall in Rock River, WY. The intent of the meeting was to provide an informal discussion format that allowed the community to ask questions and get information about the project. Displays included a map of the proposed project, a summary of socioeconomic effects anticipated, and a visual simulation from the adjacent reservoir boat launch (Appendix G, Public Meeting Materials). The Informational Meeting was attended by nine visitors: six were local landowners, one was a city official, one was a county official, and one was an interested member of the public.

Intermountain Wind submitted an application for a Commercial WECS Permit to Albany County on March 7, 2016. The Albany County Planning and Zoning Commission held a public hearing for the WECS permit on Wednesday, May 11, 2016 at 7:00 p.m. in the Commissioners' Meeting Room of the Albany County Courthouse. The Albany County Board of County Commissioners held a public hearing on the WECS permit on Tuesday, May 24, 2016 at 9:30 a.m. in the Commissioners' Meeting Room of the Albany County Courthouse. Written notice of the public hearings for the WECS permit were sent by certified mail, return-receipt to the address of each landowner within five miles of the Project, as listed in the records of the Albany County Assessor.

4.2.4 Responses to Community Concerns

Both Intermountain Wind and the Albany County Planning Department received public comment letters on the Boswell Springs Wind project. Comment letters in support of the project cited the economic benefits of the project and support for renewable energy. Comment letters expressing opposition to the project cited impacts to scenic values, wildlife/birds, quality of life, and property values as cause for concern. Other letters identified a business interest related to the sale or lease of lands for project facilities or included inquiries related to the transmission line or the potential to erect turbines on privately held land near the project site. One letter provided a change of address to continue to receive project information, but offered no specific comments. One comment in support of the project was made at the Board of County Commissioners public hearing for the WECS Permit, citing the economic benefits that the project would provide.

Studies completed to assess whether wind projects affect property values nearby have found that the property-value effect of wind turbines is likely to be small, on average, if it is present at all (Lawrence Berkley National Laboratory 2013b). The Project complies with all wind project setbacks from the property boundary, residential structures, and subdivisions that are required for the Albany County WECS permit, which was granted on May 24, 2016. Intermountain Wind has engaged with those providing input, as needed, to address specific concerns raised.

Chapter 5
Socioeconomic Assessment

5.1 Area of Site Influence and Local Governments Primarily Affected

5.1.1 Area of Site Influence

Wyoming Industrial Development Information and Siting Rules and Regulations define the area of site influence as the "areas that may be affected environmentally, socially, or economically, in any significant degree, by the location of the industrial facility at the proposed site" (W.S. 35-12-102 (c)). This area was defined for the construction and operation and decommissioning of the Boswell Springs Project based on the location of the proposed project and ancillary facilities and on the potential locations of residence or of origin of the project related construction and operations workforce. These potential locations of residence for the project related workforce were determined based on commuting distance and commuting times between the project site and surrounding communities, current commuting patterns in the area, and on areas that may be reasonably expected to provide a considerable share of the workforce for the project.

Table 5-1 displays communities within a 60-mile (1 hour) commuting radius of the project site. Commuting workers coming from Laramie and communities from the south and west of the Project Area are likely to use State Highway 61 (Fetterman Road), from state route 30 north of Rock River, to access the site.

Table 5-1. Communities within 60 Mile and 1 hour Commuting Time to Project Site

Community	Distance to Project (miles)	Travel Time to Project
Albany County		
Rock River	18.5	17 minutes
Laramie	57.5	55 minutes
Carbon County		
Medicine Bow	36.6	37 minutes
Hanna	57	58 minutes
Elk Mountain	57.4	56 minutes

Source: Google Earth 2015.

Because temporary housing is expected to be available within 1-hour commuting distance to the project site, and because the project-related workforce would be expected to give preference to shorter commuting times, it is expected that most of the construction and operations workforce to reside in the communities shown in Table 5-2, particularly in Laramie. Table 5-2 shows the place of residence of workers whose primary job was in Rock River in 2013, the most recent year for which data are available.

Table 5-2. Places of Residence of Workers in Rock River, 2013

Residence	Count	Share
Laramie, WY	37	44.0%
Greeley, CO	3	3.6%
Casper, WY	3	3.6%
Cheyenne, WY	2	2.4%
South Greeley CDP, WY	2	2.4%
Rollingwood CDP, CA	1	1.2%
Breckenridge, CO	1	1.2%
Laporte CDP, CO	1	1.2%
Centennial CDP, WY	1	1.2%
Hartrandt CDP, WY	1	1.2%
Ranchettes CDP, WY	1	1.2%
Rawlins, WY	1	1.2%
Rock River, WY	1	1.2%
Rock Springs, WY	1	1.2%
Sheridan, WY	1	1.2%
Woods Landing-Jelm, WY	1	1.2%
All Other Locations	26	31.0%
Total	**84**	**100.0%**

Source: U.S. Census Bureau 2013.
% percent
CDP census designated place

Table 5-2 shows that some Rock River workers lived in places beyond commuting distance from Rock River. These were likely workers temporarily located in the town (e.g., workers residing in Greeley, Breckenridge, and Laporte, CO; Rollingwood, CA; Rock Springs and Sheridan, WY). Most workers resided in southern Albany County (Laramie, Centennial, South Greeley, and Woods Landing-Jelm). Some resided in the Casper area (Casper and Hartrandt), some in the Cheyenne area (Cheyenne, Ranchettes, WY). One worker resided in Rock River and one in Rawlins. Table 5-2 suggests that many workers in the Rock River area reside at considerable distance and may not commute on a daily basis to their areas of residence. Casper is approximately 2 hours from the Project Area, Cheyenne is approximately 1 hour and 45 minutes, and Rawlins is approximately 1 hour and 30 minutes.

Rawlins is a larger city than Medicine Bow, Hanna, and Elk Mountain, and some workers may choose to reside temporarily in Rawlins, despite the longer commute. However, because of the proximity of the project site to Laramie and the existence of considerable temporary and rental housing in that city, it is not anticipated that the number of workers that chose to live in Rawlins to be a substantial amount and it is not recommended to include Rawlins in the area of site influence.

5.1.1.1 Recommended Area of Site Influence

For the Boswell Springs Wind Project, the recommended area of site influence for this application includes those areas between the project site in Albany County and the communities of potential residence of project related workers or of origin of the project related workforce. These communities are Rock River, Laramie, Medicine Bow, Hanna, and Elk Mountain. Map 5-1 in Appendix A shows the recommended area of site influence.

5.1.2 Recommended Local Governments Primarily Affected by the Proposed Project

Wyoming industrial development information and siting rules and regulations define the area or local government primarily affected by the proposed industrial facility as "any defined geographical area in which the construction or operation of the industrial facility may significantly affect the environment, population, level of economic well-being, level of social services, or may threaten the health, safety or welfare of present or expected inhabitants" (W.S. 35-12-102 [b]) as well as counties, municipalities or school district within the defined geographical area.

Recommended Local Governments Primarily Affected

Based on the analysis above, Boswell Wind recommends that the local governments considered primarily affected by the proposed project be Albany County and the communities of Rock River and Laramie; and Carbon County and the communities of Medicine Bow, Hanna, and Elk Mountain.

Recommended Areas of Exclusion

Boswell Wind recommends that the neighboring County of Platte and the community of Wheatland as well as the neighboring County of Natrona and the community of Casper be excluded from local governments considered primarily affected by the proposed project. Bowell Wind also recommends that the community of Rawlins, in Carbon County, be excluded from the local governments considered primarily affected by the proposed project. Wheatland, Rawlins, and Casper are located beyond an acceptable 1 hour commuting time from the project site and Boswell Wind expects workers to give preference to residential areas closer to the site when choosing temporary accommodations. Casper, Wheatland, and Rawlins are not expected to be major sources of regional workers.

Boswell Wind also recommends the exclusion of other communities within the counties of Albany and Carbon since they are unlikely to receive any meaningful amounts of project-related workers or expenditures.

5.1.3 Study Area

The study area for the governmental, social and economic studies required for this application was identified in consultation with the ISD and includes both the recommended area of site influence and the recommended local governments primarily affected by the Project. In summary, these are the counties of Albany and Carbon and the communities of Rock River, Laramie, Medicine Bow, Hanna, and Elk Mountain.

5.2 Construction and Operations Workforce Estimates

5.2.1 Construction Workforce Estimates

Boswell Wind has estimated the direct construction and operations workforce requirements for the Boswell Springs Project based on the maximum number of WTGs proposed to be constructed and workforce estimates for comparable projects in the region. The total number of construction workers is anticipated to range from a peak of 236 workers during June through August 2020 to a low of 2 workers during December 2018 through April 2019. Table 5-3 below shows the number of workers, quarterly by construction phase, for the proposed construction schedule. Average construction employment over the 31-month construction period is projected at approximately 98 workers.

Table 5-3. Average Construction Workforce by Month

	2018								2019												2020										
Activity	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Alterra Construction Management	2	2	2	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	2	2	2	2	2	4	4	4	4	4	4	4	4
Contractor Supervision	8	8	8	8	8	8	8	-	-	-	-	-	8	8	8	6	6	-	-	-	-	-	-	6	12	12	12	12	12	12	-
Road Construction	35	35	35	35	35	35	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Geotechnical Investigation	-	-	-	-	12	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Foundation Construction	-	-	-	-	-	-	-	-	-	-	-	-	45	45	45	45	45	45	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric Collection Construction	-	-	-	-	-	-	-	-	-	-	-	-	75	75	75	75	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-
Offload Turbines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	40	40	40	10	-	-	-
Erect WTGs	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	25	65	65	65	65	65	65	-
Tower Wiring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	65	65	65	65	35	-
Install Substation	-	-	-	-	-	-	-	-	-	-	-	-	-	25	25	45	40	40	20	-	-	-	-	-	-	-	-	-	-	-	-
Install O&M Building	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	20	20	20	20	20	
Concrete Supply	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	30	-	-	-	-	-	-	-	-	-	-	-	-	-
Concrete Pumping	-	-	-	-	-	-	-	-	-	-	-	-	-	5	7	5	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Security	-	1	2	3	1	1	1	-	-	-	-	-	1	4	4	4	4	4	2	2	2	2	2	3	4	4	4	4	4	4	
Reclamation	-	6	6	8	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	25	
Site Medical Staff	-	2	2	2	2	2	-	-	-	-	-	-	2	3	3	3	3	3	-	-	-	-	-	3	3	3	3	3	3	3	
WTG Supplier Staff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	15	23	23	23	23	14	
Total	**45**	**54**	**55**	**58**	**72**	**72**	**48**	**2**	**2**	**2**	**2**	**2**	**135**	**199**	**201**	**217**	**212**	**199**	**24**	**4**	**4**	**4**	**4**	**76**	**218**	**236**	**236**	**236**	**226**	**182**	**4**

5.2.2 Local Hiring and Expected Use of Non-Local Specialized Skilled Workers

Development of the Project would entail a combination of tasks requiring a variety of skilled construction workers, including cement/concrete finishers, electricians, welders, turbine assembly technicians, heavy equipment operators, mechanics, and truck drivers. A substantial number of general laborers will also be required. The type and timing of the skills will vary during the course of the construction period. Table 5-4 displays estimates of local hires by occupation during peak employment for the Project. The estimates in this table form the basis of the in-migration so a conservative approach was used based on peak employment and fewer locally hired workers.

Table 5-4. Expected Local Hires by Occupation during Peak Employment

Occupations	Peak Employment	Locally Hired	Share Locally Hired
Project Managers	14	0	2%
Engineer	4	0	11%
Foreman	8	2	24%
QA/QC	12	0	0%
Administrative	2	2	100%
Safety/Site Security	5	1	22%
Iron/Steel Workers	9	0	0%
Cement Masons/ Concrete Finishers	5	0	0%
WTG Technician Assistants	19	2	12%
Turbine Technicians	4	1	24%
Electricians	28	2	6%
Lineman	2	0	0%
Rigger	4	1	0%
Plant Operator	2	0	0%
Equipment Operator	40	2	6%
Truck Driver	34	4	11%
Mechanic	4	0	2%
Laborer	40	2	4%
Total	236	19	8%

Source: Boswell Wind 2017.
% percent

Workers with some of the required construction skills are available within the existing labor forces of Albany County and Carbon County. At the same time, the erection, installation and commissioning of WTGs requires specialized skills and contractors that are less common among the local labor force. Boswell Wind will direct its EPC contractor(s) to hire qualified local workers and qualified and cost competitive local contractors. Boswell Wind estimated that approximately 8 percent of the force would be unemployed and available from within the study area during the month of peak employment. This includes any administrative, security staff and heavy equipment

mechanics, as well as some of the project managers and engineers, WTG technicians, truck drivers, concrete finishers, riggers, plant operators, and general laborers. This estimate was based on the occupational composition expected of the construction labor force, on peak employment estimates, and on the numbers of currently employed workers in the study area, by occupation, as reported by the Wyoming Department of Workforce Services (2016). The estimate also took into consideration current Bureau of Labor Statistics unemployment rates (BLS 2017a) as an indicator of labor force availability.

During non-peak employment months, the share of employees hired locally could be higher because the locally available workforce would likely be a greater share of project workforce needs. Boswell Wind has, therefore, established 20 percent minimum of the workforce over the course of construction as a local hiring goal. Local workers and subcontractors are anticipated to account for a higher ratio of workers associated with the construction of off-site access, on-site facility and access, and tower foundation preparation, with fewer employed for tower erection and commissioning.

The Project EPC contractor(s) and subcontractors will work with the local Wyoming Workforce Services offices to post job openings and hire qualified workers.

5.2.3 Estimated Construction Wages and Benefits

Based on Wyoming Department of Workforce Services estimates of mean wages by occupation (Wyoming Department of Workforce Services 2016a), Boswell Wind expects the average monthly wage to be approximately $3,605 ($43,265 annually), exclusive of benefits. Based on the Bureau of Labor Statistics National Compensation Survey, approximately 31.7 percent of total employee compensation corresponds to benefits, both in the construction industry nationally, as well as in the Mountain region private industry as a whole (BLS 2017b). The average monthly compensation for construction workers employed on the Project, including the 31.7 percent allowance for benefits, would be approximately $5,279 ($63,346 annually). The total payroll for the project is estimated to be $16 million over the 31-month construction period.[2]

EPC and subcontractor workers not already residing in Albany and Carbon county communities in the study area will receive lodging and food allowances. Based on data from the Wyoming Department of Workforce Services (2016a), Boswell Wind estimates this would be the case of up to 80 percent of the construction workforce. Based on this estimate and the duration of on-site activity for the various tasks, an estimated $7.5 million in such payments would be made during the construction phase of the project, nearly all of which will be spent on lodging, food, and miscellaneous services in the area of influence during the 31-month construction period.[3]

[2] Unless otherwise noted, all dollar values in the Socioeconomic Assessment section are expressed in 2016 dollars.
[3] Using GSA FY2016 per diem rates for Wyoming (GSA 2015).

5.2.4 Operations Workforce Estimates

Boswell Wind anticipates a total workforce of 15 workers during full-scale operations. Hiring of the operating workforce would begin as WTGs are commissioned in the latter stage of construction.

Based on Wyoming Department of Workforce Services (2016a) data, and a similar analysis as that done for the construction workforce (shown above), Boswell Wind estimates that up to three of the 15 operations workforce will be hired locally, depending on the extent to which potentially locally available wind turbine service technician assistants qualify for the positions offered (see the WTG Technician Assistants and Turbine Technicians rows in Table 5-4). An additional 12 workers (the remainder of the 15 total workers minus the 3 local hires) would move into communities in commuting distance from the project site.

5.2.5 Operations Workforce Salaries and Benefits

Based on the prevailing wages and salaries in the industry and the anticipated level of employment, the annual payroll for on-site workers during operations is estimated to be slightly over $1 million, including benefits.

5.3 Social and Economic Conditions: Inventory, Evaluation, and Impact Assessment

5.3.1 Land Use and Land Use Changes

Existing uses of private lands within the Project Area are primarily associated with livestock grazing. Except during temporary construction or major maintenance operations, the Project would not interfere with continued use of the Project Area for agricultural uses. Boswell Wind would provide timely notification and ongoing coordination with the private landowner regarding any Project activities that could affect their operations.

Construction traffic has the potential to affect grazing operations in open range areas along access routes to the Boswell Springs Project site. Effects could include damage to grazing improvements such as cattle guards and fences, livestock injury or mortality associated with vehicle/livestock collisions and reduced palatability of forage along roadways due to dust. Within the project boundary, the land on either side of Fetterman Road is privately owned and under lease agreement with Boswell Wind for such impacts. The EPC contractor will be required to manage dust on area roadways and control noxious weeds in and around disturbed areas, which should minimize effects on adjacent forage.

5.3.2 Area Economic Study

5.3.2.1 Impact Analysis Method

The primary drivers of potential socioeconomic effects associated with construction and operation of the proposed Boswell Springs Project would be the direct construction and operating employment, associated payroll, local expenditures with construction and operations materials and

services, and recurrent public sector revenues generated by the Project. These factors will support additional indirect and induced effects in the regional economy, through what is commonly referred to as the "multiplier effect."

Construction-related effects would be temporary, reflecting the duration of the construction schedule and of peak levels of employment. Long-term effects related to operations will be driven by the size of the direct work force and the continuing direct and indirect fiscal contributions of the Project. These effects are detailed in the sections below.

5.3.2.2 Regional Economic Analysis

Construction and operation of the Project would represent a new source of demand for local materials and labor. Labor directly employed during construction and operations of the Project represent new local employment and income. Supply linkages between different sectors of the economy allow some local businesses to meet some of the needs associated with the facilities, as well as the consumer needs associated with workers directly employed by the project and with workers employed by vendors in the supply chain. These supply linkages and local worker expenditures represent a secondary source of local employment and income. The various rounds of local expenditures and earnings followed by additional expenditures and earnings affect many sectors of the local economy and result in total generated employment and income that is a "multiple" of the original direct increase in demand for labor and materials. Public sector revenues are also affected with increased tax collections. Economists use mathematical analysis to capture and describe the supply and demand linkages between the economic sectors, which, given an estimate of the direct increase in demand, yield estimates of the total effects expressed in terms of jobs, income, and overall economic output. Additional analysis can yield estimates of the incremental public sector revenue generated.

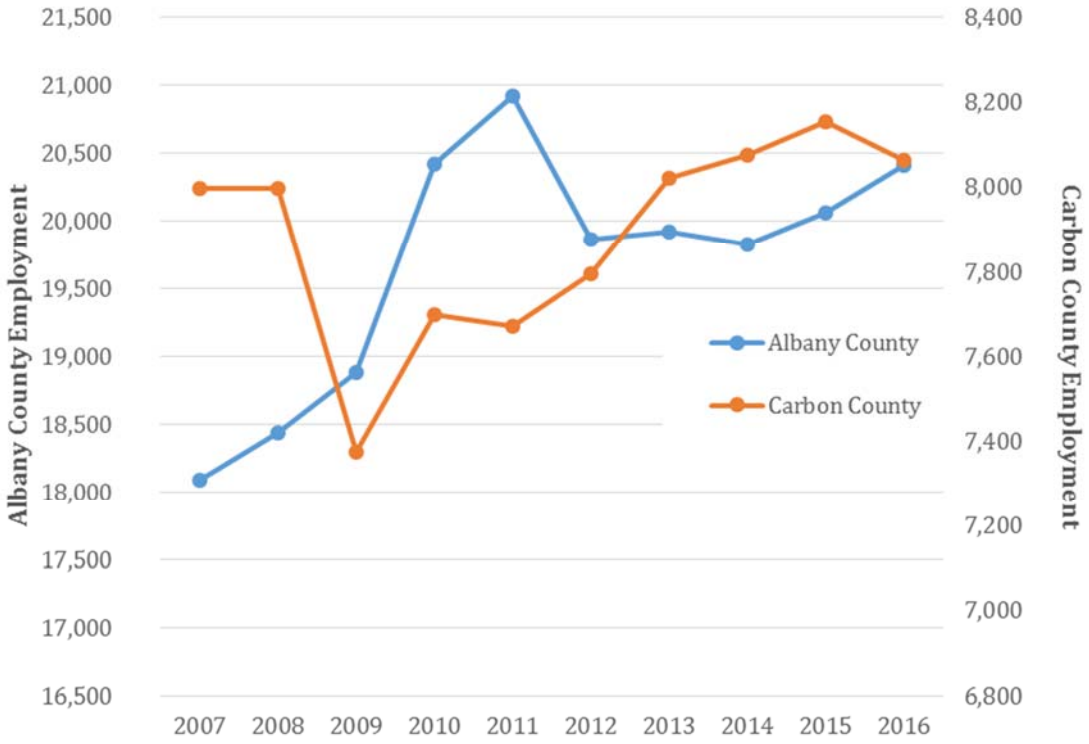
This assessment relies on the IMpact analysis for PLANning (IMPLAN) regional economic modeling software to estimate the total employment and income effects associated with the Project. The total employment impact, including the indirect and induced effects, may feed into the assessment of impacts on housing and public facilities and services, if additional workers are expected to move into the study area as a result of secondary employment effects. The IMPLAN modeling approach used and a summary table of the data set inputs are provided in Appendix H.1.

5.3.2.3 Existing Conditions

Employment and Unemployment

Employment in Albany County increased by approximately 13 percent between 2007 and 2016. Over the same time period, employment in Carbon County grew by 0.8 percent. The large decrease from 2008 to 2009 is believed to be a result of the financial crisis of 2007/2008. Figure 5-1 presents these growth trends.

Figure 5-1. Total Full and Part Time Employment in Albany and Carbon Counties

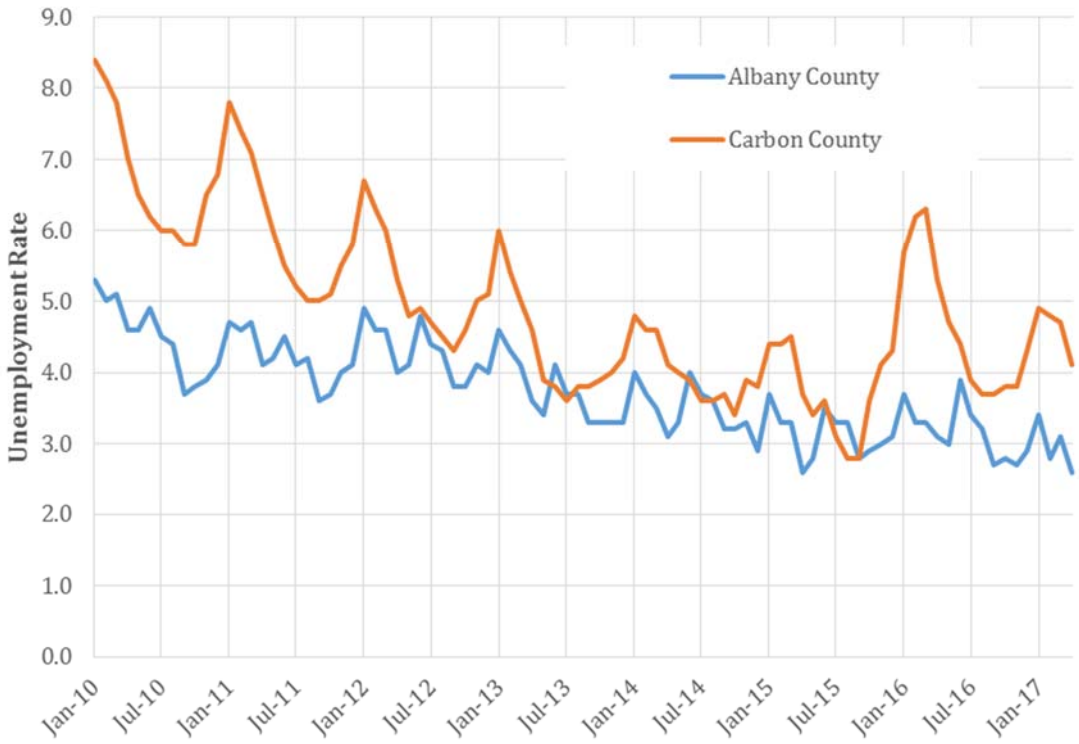


Source: BLS 2017c.

As of 2016, Albany County had an annual unemployment rate of 3.2 percent, while Carbon County had an unemployment rate of 4.6 percent. Between 2010 and April 2017, Albany County's monthly unemployment rate ranged from a low of 2.6 percent in April 2017 to a high of 5.3 percent in January of 2010. Monthly unemployment in Carbon County also peaked in January of 2010, reaching 8.4 percent (BLS 2017c).

Figure 5-2 shows monthly unemployment rates in the study area over January 2010 through April 2017. The figure illustrates how unemployment rates tend to peak in the early months of the year. These peaks are likely associated with decreases in economic activity and associated employment due to the winter weather.

Figure 5-2. Monthly Unemployment Rates



Source: BLS 2017c.

Table 5-5 summarizes the labor force in the study area. In 2016, approximately 71 percent of the total labor force in the two-county area was in Albany County, while the remaining 29 percent was in Carbon County.

Table 5-5. Labor Market Summary Table, 2010–2016

	2010	2011	2012	2013	2014	2015	2016
Albany County							
Labor Force	21,381	21,834	20,751	20,701	20,558	20,708	21,083
Employment	20,425	20,921	19,862	19,925	19,825	20,060	20,416
Unemployment	956	913	889	776	733	648	667
Unemployment Rate	4.5	4.2	4.3	3.7	3.6	3.1	3.2
Carbon County							
Labor Force	8,254	8,162	8,224	8,384	8,426	8,466	8,454
Employment	7,698	7,672	7,796	8,020	8,076	8,153	8,063
Unemployment	556	490	428	364	350	313	391
Unemployment Rate	6.7	6	5.2	4.3	4.2	3.7	4.6

Source: BLS 2017c.

Economic Base

Wyoming's economy is fundamentally natural resource-based, including cattle grazing and agriculture, mining, and outdoor tourism and recreation. In the counties of Albany and Carbon, agricultural employment is consistent with the state average. Private sector employment constitutes the major source of employment in both counties. Public sector employment is particularly important in Albany County, at least partially associated with the University of Wyoming located in Laramie. Construction jobs are on par with the state average of 7 percent in Carbon County and account for approximately 5 percent of jobs in Albany County. Employment in retail trade and arts, entertainment, and recreation are close to the state averages in both counties. Table 5-6 provides a comparison of employment characteristics for the counties and the state.

Table 5-6. Comparative Employment Characteristics for 2015: Statewide and Albany and Carbon Counties

	Albany County		Carbon County		Wyoming
	Total Full- and Part-time Employment	Percent of the Total	Total Full- and Part-time Employment	Percent of the Total	Percent of the Total
Farm	481	2%	478	5%	4%
Private	13,713	64%	6,626	71%	76%
Government	7,136	33%	2,236	24%	20%
Total	**21,330**	**100%**	**9,340**	**100%**	**100%**
In Selected Industrial Sectors					
Mining	46	0.2%	243	3%	9%
Construction	1,172	5%	687	7%	8%
Retail Trade	2,422	11%	1,004	11%	10%
Arts, Entertainment, and Recreation	435	2%	181	2%	2%

Source: WEAD 2017; BEA 2017c.
% percent

Table 5-7 shows that the largest employers in the study area are mostly public and private organizations in education, health care, energy, and retail.

Table 5-7. Major Employers, Albany and Carbon Counties

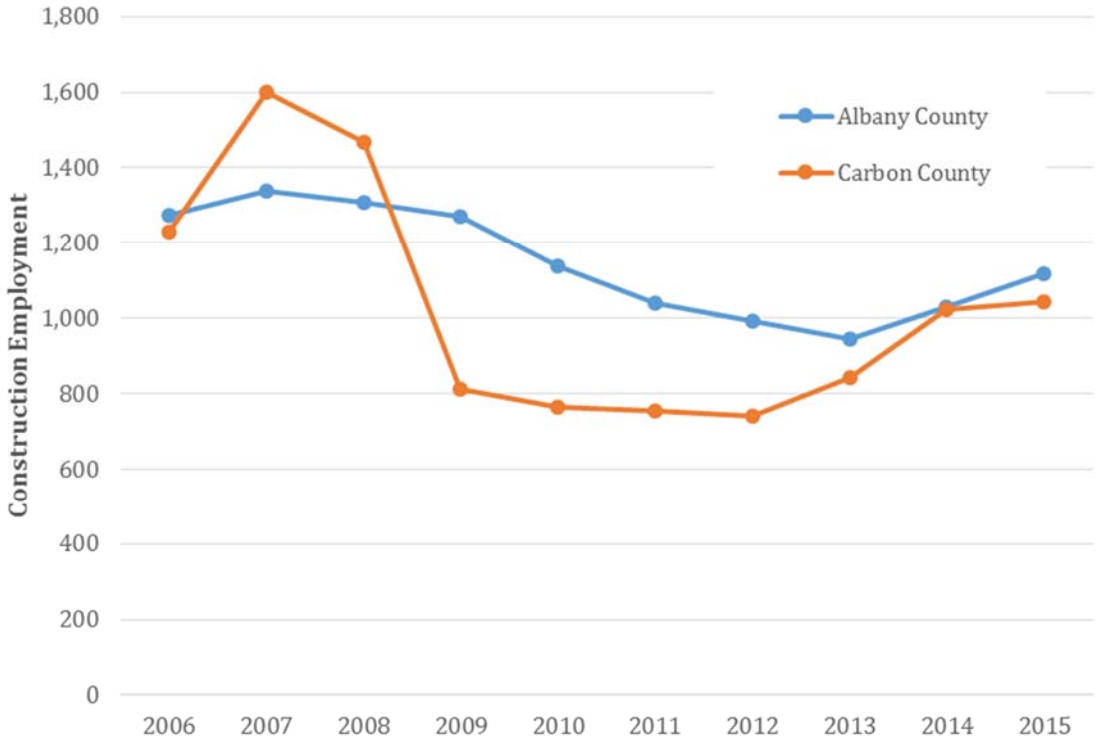
Enterprise (Ranked)	Estimated Number of Employees	Product or Service	County
University of Wyoming	2,800	Education	Albany
Sinclair Oil Refinery	500	Energy	Carbon
Behavioral Health Svc	412	Health Care	Albany
Trihydro Corp	411	Engineering Services	Albany
Walmart Supercenter	370	Retail	Albany
State Penitentiary	350	Government	Carbon
Medicine Bow National Forest	300	Government	Albany
Laramie City Hall	295	Government	Albany
Wyotech-Laramie	215	Education	Albany
Lending Tree	203	Financial Services	Albany

Source: Wyoming at Work 2015; InfoGroup.

Construction Labor

Employment in the construction industry experienced a small decrease between 2006 and 2015 in Albany County. In Carbon County, construction employment grew from 2006 to 2007 but experienced a decrease of almost 50 percent over a two-year period due to the financial crisis of 2007/2008. It has experienced an increase of approximately 200 jobs since that time. Figure 5-3 shows employment trends by county from 2006 to 2015.

Figure 5-3. Construction Employment Trends in Albany and Carbon Counties, 2006–2015



Source: WEAD 2017a.
Note: Data points for some years were interpolated because the data source omitted estimates to avoid disclosure of confidential information.

Personal Income

Table 5-8 shows personal income and personal income per capita in the study area in 2015 in 2016 dollar terms.

Table 5-8. Personal Income in the Study Area, 2015

	Albany	Carbon	Study Area
Personal Income ($ thousands)	$1,501,522	$784,702	$2,286,224
Personal Income per Capita	$39,560	$50,434	$44,997

Source: WEAD 2017c.

5.3.2.4 Future Economic Conditions

Employment projections released by the Wyoming Department of Workforce Services in 2016 projected the addition of 4,327 net new jobs between 2014 and 2024, which is a 13.0 percent increase. The net gains represent an average annual growth of 1.3 percent. The largest gains are projected to occur in health care and social assistance, while the largest losses are projected to occur in mining. Table 5-9 presents the long-term employment projects by industry.

Table 5-9. Long Term Employment Projections, By Industry, 2014–2024

Industry	2014 Employment	2024 Employment	Change 2014–2024	
			Absolute	Average Annual Change
Agriculture, Forestry, Fishing and Hunting	2,577	2,913	336	1.3%
Mining	27,291	21,160	-6,131	-2.2%
Utilities	2,490	2,719	229	0.9%
Construction	23,721	22,717	-1,004	-0.4%
Manufacturing	9,811	9,013	-798	-0.8%
Wholesale Trade	9,500	9,268	-232	-0.2%
Retail Trade	29,794	31,492	1,698	0.6%
Transportation and Warehousing	13,179	12,363	-816	-0.6%
Information	3,775	3,634	-141	-0.4%
Finance and Insurance	6,772	7,014	242	0.4%
Real Estate and Rental and Leasing	4,456	4,456	0	0.0%
Professional, Scientific, and Technical Services	9,513	9,296	-217	-0.2%
Management of Companies and Enterprises	1,011	1,003	-8	-0.1%
Administrative and Support and Waste Management and Remediation Services	7,898	7,655	-243	-0.3%
Educational Services	28,476	30,293	1,817	0.6%
Health Care and Social Assistance	31,499	37,464	5,965	1.9%
Arts, Entertainment, and Recreation	2,990	3,295	305	1.0%
Accommodation and Food Services	32,321	36,184	3,863	1.2%
Other Services (except Government)	7,832	7,275	-557	-0.7%
Government	32,056	32,075	19	0.0%
Total, All Industries	**286,962**	**291,289**	**4,327**	**0.2%**

Source: Wyoming Department of Workforce Services, 2016b

5.3.2.5 Project Impacts on Total Employment

In addition to the direct jobs associated with construction and operation of the Project, there would also be a number of associated indirect and induced jobs in the region. The IMPLAN System was used to estimate indirect and induced jobs. The approach adopted and the results obtained are details below.

Construction Impacts

To estimate the number of indirect and induced jobs resulting from construction of the Project, the following assumptions were used:

- Total construction costs were estimated at $495 million, in 2016 dollars.
- Turbines and their components would be purchased from outside the study area.
- Total direct labor compensation is estimated at $16 million over the 31-month construction period.
- It is anticipated that a total of $7.6 million would be spent in lodging and food/miscellaneous expenses ($4.8 million in lodging and $2.8 million in food/miscellaneous expenses).
- The remaining construction costs would include payments to the EPC contractor and purchases of constructional materials and services, some locally, some not.

Because Boswell Wind had developed estimates for direct labor expenditures, the estimates of secondary (indirect and induced) impacts was done through an "analysis by parts." In other words, the impacts of purchases of materials and services were modeled first. The direct and indirect impacts of these purchases are both indirect impacts of project construction. Then the induced impacts of direct labor expenditures were assessed and these impacts were added to the induced impacts of purchases of materials and services. The analysis was done using expenditures in 2013 dollars because the IMPLAN structural relationships are modeled for that year. The results were later transformed again into 2016 dollars using Wyoming cost of living inflation rates (WEAD 2017). The resulting estimates for the impacts in the study area are summarized below.

- A total of 402 secondary jobs (293 indirect, 109 induced) during the 31-month period of construction. IMPLAN defines jobs as either full-time or part-time over a 12-month period[4]. Under this definition, direct jobs during construction would be approximately 252 (3031 worker months ÷ 12 months). This corresponds to an employment multiplier of approximately 2.5 (or 1.5 secondary jobs per direct job generated).
- Indirect and induced labor income of approximately $17.5 million (including employee compensation and proprietor income).
- Main sectors of secondary employment include contracted construction work, hotels and motels, wholesale trade, truck transportation, and food and beverage sectors. To the extent that indirect and induced employment translates into new hires (as opposed to extended hours and increased productivity), and based on employment data incorporated in the IMPLAN model, Boswell Wind expects most of these secondary employment opportunities to be filled by the local workforce.

[4] This definition differs from Full-Time Equivalent jobs in that jobs may be part-time. Also note that jobs do not necessarily correspond to workers employed. One worker may have two part-time jobs throughout the year, or several workers working a few months a year can combine to form one job.

Operations Impacts

Similarly, secondary impacts during project operations were estimated. These estimates assumed the following:

- Total direct labor compensation would amount to slightly over $1million annually. This estimate was based on an operations workforce of 15 employees and Wyoming Department of Workforce Services estimates of mean wages by occupation (Wyoming Department of Workforce Services 2016a).
- Local maintenance expenditures of approximately $2.6 million per year, based on previous estimates of wind projects in Wyoming.

As in the case of estimates for construction, the impacts of maintenance expenditures were modeled first, then the induced impacts of direct labor expenditures were assessed and added to the induced impacts of maintenance expenditures. The analysis was done using expenditures in 2013 dollars and the results were later transformed into 2016 dollars using Wyoming cost of living inflation rates (WEAD 2017b). The resulting estimates for the impacts in the study area are summarized below.

- A total of up to 32 annual secondary jobs (23 indirect, 9 induced) over the lifetime of the project operations. Based on a direct employment of 15 full-time employees, this corresponds to an employment multiplier of approximately 3.1 (or 2.1 secondary jobs per direct job generated).
- Indirect and induced labor income of approximately $1.7 million (including employee compensation and proprietor income).
- Main sectors of secondary employment include restaurants, real estate, and health and family services. As in the case of secondary employment during construction, most of these secondary employment opportunities are expected to largely be filled by the local workforce, to the extent that new hires are required.

5.3.3 Population

5.3.3.1 Current Population and Trends

As of July of 2016—the most recent data available—the total population of both Albany and Carbon Counties was estimated to be 53,874. Approximately 71 percent of this population resided in Albany County. The largest community in the study area is Laramie (32,382); the second largest community is Hanna (812). Between 1990 and 2010, Albany County grew but at a rate below that of the overall population of the State of Wyoming, while Carbon County experienced a decrease in population. Between 2010 and 2016, the population of Albany County grew at a rate above that of the overall state, while the population of Carbon County decreased slightly (Table 5-10).

Table 5-10. Population Trends: 1990–2016

Area	1990	2000	2010	2016	Annual Percent Change 1990-2000	Annual Percent Change 2000-2010	Annual Percent Change 2010-2016
Wyoming	453,589	493,782	563,626	585,501	0.85%	1.33%	0.65%
Albany County	30,797	32,014	36,299	38,256	0.39%	1.26%	0.90%
Rock River	190	235	245	244	2.15%	0.42%	-0.07%
Laramie	26,687	27,432	30,816	32,382	0.28%	1.17%	0.85%
Carbon County	16,659	15,639	15,885	15,618	-0.63%	0.16%	-0.28%
Medicine Bow	389	274	284	270	-3.44%	0.36%	-0.82%
Hanna	1,076	873	841	812	-2.07%	-0.37%	-0.57%
Elk Mountain	186	192	191	196	0.32%	-0.05%	0.44%

Sources: WEAD 2017. Data for 1990, 2000 and 2010 are census population counts for the month of April. Data for 2016 are estimates for July.
% percent

5.3.3.2 Population Demographics

Table 5-11 below presents population demographics for the counties in the study area from the American Community Survey (ACS) 5-year estimates (2011–2015) published by the U.S. Census Bureau. Albany County had smaller proportions of residents younger than 18 years, seniors, and females relative to the overall State of Wyoming. Albany County had relatively larger fractions of African American and Asian residents compared to the overall state.

Carbon County had relatively larger proportions of residents younger than 18 years than the overall state but relatively smaller proportions of seniors and females. Carbon County also had relatively larger proportions of White and Hispanic/Latino residents.

Table 5-11. Population Demographics

	Albany County	Carbon County	Wyoming
Age and Sex			
Persons under 18 years	16.5	23.6	23.7
Persons 65 years and over	10.2	14.4	14.5
Female persons	47.7	45.9	49.0
Race and Hispanic Origin			
White alone	91.2	94.1	92.7
Black or African American	1.7	1.4	1.4
American Indian and Alaska Native	1.1	1.6	2.7
Asian	3.4	1.0	1.0
Native Hawaiian and Other Pacific Islander	0.1	0.1	0.1
Two or More Races	2.5	1.8	2.1
Hispanic or Latino	9.4	17.7	9.9

Source: WEAD 2017d.

5.3.3.3 Population Migration

Population migration is when people move from one location to another with the intention of relocating on a permanent basis. Year-to-year migration trends in the two-county area for the last ten years (2007–2016) are shown in Table 5-12.

Table 5-12. Year-to-Year Net Annual Migration, 2007–2016. Driver's License Exchanged or Surrendered

Net Change by Year	Albany County	Carbon County
2007	61	255
2008	261	303
2009	426	178
2010	450	224
2011	143	74
2012	-79	54
2013	237	99
2014	151	58
2015	135	126
2016 (first half)	60	64

Source: Wyoming Community Development Authority 2017.

Total net in-migration for the study area is positive, which means that more people are moving into the study area than out of it. Albany County experienced net out-migration in 2012 only. Although net in-migration decelerated in Carbon County following the 2008 economic recession, it remained positive throughout the time period.

5.3.3.4 Future Population

Population forecasts by WEAD anticipate continued population growth for the State of Wyoming and Albany County, but declines are projected in Carbon County's population between 2030 and 2040. Table 5-13 presents the WEAD forecasts for the study area.

Table 5-13. Population Forecasts for State, Counties, and Communities

Area	2010 Census	2016	2020 Forecast	2030 Forecast	2040 Forecast
Wyoming	563,626	585,501	615,810	661,950	699,430
Albany County*	36,299	38,256	39,190	41,190	42,450
Rock River	245	244	265	278	287
Laramie	30,816	32,382	33,270	34,968	36,038
Carbon County*	15,885	15,618	16,080	16,210	15,830
Medicine Bow	284	270	287	290	283
Hanna	841	812	851	858	838
Elk Mountain	191	196	193	195	190

Source: WEAD 2017b.
* County totals do not sum based on the presented community populations due to the exclusion of non-study area communities (e.g., Rawlins).

Albany County and its communities of Rock River and Laramie are expected to experience stable growth relative to their respective sizes. According to WEAD, over the 30-year forecast, Rock River is expected to gain 42 residents and Laramie is expected to gain 5,222 residents. If population growth proceeds as expected, Laramie will account for approximately 85 percent of the population growth in Albany County.

Carbon County is forecasted to experience a modest population increase of approximately 2 percent from 2010 to 2030 and then a 2.3 percent decline in population from 2030 to 2040.

5.3.3.5 Impacts on Population

Construction Impacts

Construction of the Project would result in temporary in-migration of non-local workers. Based on a local hiring target of 20 percent minimum, the total number of such workers would reach up to 189 during the peak months of construction in June through August of 2020. That number represents approximately 0.4 percent of the projected combined population of the two counties for 2016 and a fraction of the number of business travelers, temporary workers, and tourists typically staying at hotels/motels and other short-term lodging accommodations in the area. Although development of the project would support some indirect and induced jobs, no incremental population impact is anticipated in conjunction with those jobs. Rather, the secondary effects are likely to increase productivity, support existing jobs that are already in the local economy, or create opportunities of employment for the local population.

Operations Impacts

A total of 15 permanent jobs are anticipated during operations. Boswell Wind estimates that up to three of the 15 operations workforce will be hired locally, depending on the extent to which potentially locally available wind turbine service technician assistants qualify for the positions offered (see the WTG Technician Assistants and Turbine Technicians rows in Table 5-4). An additional 12 workers (the remainder of the 15 total workers minus the 3 local hires) would move into communities in commuting distance from the project site. Although operations and maintenance of the Boswell Springs Project would generate additional indirect and induced jobs in the local economy, these are likely to be spread across a number of sectors and be filled by increased productivity or by local workers. Assuming the 2009–2013 average Wyoming household size of 2.5, the Project's non-local operations workforce is anticipated to add less than 30 additional residents to the study area (resulting from 12 non-local hires with 2.5 persons per household). These residents would represent less than 0.1 percent of projected 2015 population.

5.3.4 Housing

The following housing analysis characterizes existing housing resources in the study area and assesses the ability of those existing resources to accommodate housing demand associated with a peak of 236 construction workers and 15 permanent operations workers.

5.3.4.1 Conventional Housing Stock

For the purposes of this assessment, "conventional housing" includes single-family attached and detached homes, duplexes, multi-family units (apartments, condominiums, and town houses) and mobile homes. The Wyoming Community Development Authority provides annual data on the total housing stock in Wyoming and the two-county area. Table 5-14 contains total housing stock data for this area for the last 10 years. Total housing units in Albany County has increased 14.7 percent from 2006-levels and in 2015 the housing stock is reported to be 18,777 units. In Carbon County, total housing units have only increased 1 percent from 2006-levels to 8,580 units in 2015 (Table 5-14).

Table 5-14. Total Growth in Albany and Carbon Counties Housing Stock: 2006–2015

Year	Albany County	Carbon County
2006	16,926	8,546
2007	17,221	8,596
2008	17,443	8,674
2009	17,577	8,708
2010	17,939	8,576
2011	18,078	8,566
2012	18,487	8,568
2013	18,630	8,569
2014	18,725	8,575
2015	18,777	8,580
Total Change (2005-2015)	**2,402**	**88**
Percent Change (2005-2015)	**14.7%**	**1.0%**

Source: Wyoming Community Development Authority 2017.

Single-family detached homes comprise the majority of housing stock in the three counties: approximately 51 percent in Albany County and 69 percent in Carbon County. Multi-family housing of three or more units represent about 31.5 percent of all units in Albany County and 8.0 percent of all units in Carbon County. Mobile homes represent about 8.2 percent of the Albany County housing stock and 18.3 percent of the Carbon County housing stock (See Table 5-15 below).

Table 5-15. Housing Stock by Type of Structure (2011–2015)

County	Total Housing Units	1-unit, Detached	1-unit, Attached	2 Units	3 or More Units	Mobile Home	Boat, RV, Van, etc.
Albany County	18,537	9,430	981	713	5,848	1,517	50
Carbon County	8,559	5,898	223	172	688	1,570	-

Source: U.S. Census Bureau 2017.
RV Recreational Vehicle

Table 5-16 indicates selected characteristics of the housing stock as reported by the U.S. Census Bureau's ACS 5-year (2011–2015) county and community profiles. The vacancy rate in Carbon County (28.6%) is almost twice as large as that of the State of Wyoming (14.9%) and Albany County (15.5%). The communities in Carbon County in the study area all have vacancy rates greater than 35 percent, with Elk Mountain having the greatest vacancy rate at 38.1 percent. The rental market in Albany County is more fluid than that of Carbon County, however, with a rental occupancy rate greater than 51 percent, which is in large part due to the renter occupancy rate in Laramie (58.2%). Conversely, Carbon County's housing stock is dominated by owner-occupants at 69 percent compared to Albany County at 48.5 percent.

Table 5-16. Selected Characteristics of Housing Stock

Area	Total Housing Units	Units Occupied	Owner Occupied (%)	Renter Occupied (%)	Units Vacant	Vacancy Rate (%)
Wyoming	266,630	226,865	69.1%	30.9%	39,765	14.9%
Albany County	18,537	15,662	48.5%	51.5%	2,875	15.5%
Rock River	124	100	78.0%	22.0%	24	19.4%
Laramie	14,787	13,179	41.8%	58.2%	1,608	10.9%
Carbon	8,559	6,108	69.0%	31.0%	2,451	28.6%
Elk Mountain	118	73	67.1%	32.9%	45	38.1%
Hanna	555	345	74.2%	25.8%	210	37.8%
Medicine Bow	169	107	78.5%	21.5%	62	36.7%
Total for Selected Communities in the Study Area	**15,753**	**13,804**	**67.9%**	**32.1%**	**1,949**	**12.4%**

Source: U.S. Census Bureau 2017.

Temporary Housing

"Temporary housing" includes hotel and motel rooms and cabins, as well as recreational vehicle (RV) park spaces or pads and campground spots. For non-local construction workers, such housing is often the most common option. Hotels, motels, campgrounds, and RV Parks in the study area were contacted to confirm the number of temporary housing units available at each establishment (refer to Appendix H.2 for a call log of establishments that were contacted). Additional information on campgrounds and RV parks in Carbon County was obtained from the Carbon County Economic Development Corporation. As shown in Table 5-17 there are 1,462 hotel/motel rooms and 258 spots and pads in campgrounds and RV parks in the communities in the study area.

Table 5-17. Temporary Lodging Units Selected Communities of the Study Area

	Hotels and Motels		Campgrounds and RV Parks	
Area	**Establishments**	**Rooms**	**Establishments**	**Spots/Pads**
Albany County				
Rock River	1	7	1	30
Laramie	23	1,383	1	118
Carbon County				
Medicine Bow	1	56	6	72
Hanna	0	0	1	30
Elk Mountain	2	16	1	8
Study Area Total	**27**	**1,462**	**10**	**258**

Source: Intermountain Wind 2015; Carbon County Economic Development Corporation 2015.
Note: excludes establishments with maximum stay of less than a month
RV Recreational Vehicle

5.3.4.2 Rental Housing Monthly Rent and Vacancy Rates

Rental Housing Costs

Table 5-18 presents second quarter 2016 rental rates—the most recent rates available at the time of this assessment—for houses, apartments, mobile homes and mobile home pads for Albany and Carbon counties and for the state as a whole. Albany County and Carbon County mobile home rates are both higher than the state average, while mobile home pads in both counties are relatively close to the average. Albany County apartments are lower than the state average, while Carbon County apartments are relatively more expensive. House rental rates in both counties are in line with the state average.

Table 5-18. Housing Rental Rates Wyoming and Selected Counties, Second Quarter 2016

	Houses	Apartments	Mobile Homes	Mobile Home Pads
Wyoming	$1,025	$723	$722	$324
Albany County	$1,026	$666	$777	$322
Carbon County	$1,014	$810	$941	$343

Source: WEAD 2017b.

Rental Housing Vacancies

The Wyoming Community Development Authority publishes semiannual reports that profile the demographics, economics, and housing conditions of Wyoming counties and the state itself. Table 5-19 displays recent rental vacancy rate trends for Albany and Carbon counties. Rental vacancy rates describe the share of housing units for rent that are not occupied. The trends show seasonal and annual fluctuations but also a substantial increase in vacancy rental rates in Carbon County in recent years.

Table 5-19. Rental Vacancy Rate Trends

Period	Albany County	Carbon County
June 2011	4.9%	7.2%
December 2011	2.2%	6.7%
June 2012	3.8%	5.0%
December 2012	4.2%	3.1%
June 2013	5.6%	6.4%
December 2013	6.5%	11.4%
June 2014	6.6%	6.5%
December 2014	7.4%	5.6%
June 2015	8.2%	3.8%
December 2015	6.6%	5.3%
June 2016	6.5%	14.1%
December 2016	7.5%	21.1%

Source: Wyoming Community Development Authority 2017.
% percent

5.3.4.3 Temporary Housing Availability and Rates

A total of 26 hotels and motels representing 1,455 rooms were identified in the communities in the study area. Proprietors or staff of these establishments contacted during development of this assessment, indicated that occupancy and vacancy rates were variable depending on the time of the year (contact logs are provided in Appendix H.2). Some establishments may close prior to the commencement of construction, while others may be opened or reopened in anticipation of increased temporary housing demand. However, the number of rooms identified for this assessment reflect a reasonable approximation of what would be available during the 2-year construction period commencing in 2017. Temporary housing occupancy and vacancy rates are typically seasonal, with higher occupancy and fewer vacancies during summer months. The Wyoming Lodging and Restaurant Association's Rocky Mountain Lodging Report for November of 2015, for example, shows that both occupancy and daily rates tend to peak in July. The average daily rate was $88.41 in July of 2015 (Wyoming Lodging and Restaurant Association 2015). The occupancy percentage through November of 2015 was 62.5 percent, while the average daily rate over the same time period was $125.54.

5.3.4.4 Impacts on Housing

Construction Impacts

The assessment of the effects of the Project construction workforce on housing is based on the anticipated peak workforce months, which is expected to occur in June through August 2020. All other months of both construction segments are anticipated to have smaller housing demand.

Peak workforce is estimated to be 236 workers. Approximately 20 percent of these workers are estimated to be hired locally. This percent of the workforce corresponds to 189 workers during the peak workforce month. With no shared occupancy rooms, a peak of 189 housing units would be required in June through August of 2020. Because of the short duration of the construction portion of each project, a considerable share of Project construction-related housing demand would likely be for hotel/motel and RV park units. However, construction management staff and employees hired for several months of continuous employment may seek to rent houses, mobile homes, or apartments. Demand for 189 short-term hotel/motel and RV park units would represent approximately 13 percent of the motel and hotel rooms within an hour commute of the project site, 11 percent of the total motel and hotel rooms, campground spots and RV park pads, and 9 percent of total accommodation units when available rental housing units are added. If construction workers share units, these percentages would be less. In other months of the construction period, the demand for temporary housing would also be less.

Based on the analysis above, Boswell Wind expects housing to be available within commuting distance of the site over the construction period. Because the Project's peak construction employment months coincide with the summer months of peak demand for temporary housing that are typical of the study area, the developer will reserve accommodations for workers during construction peak employment months in advance.

Operations Impacts

Demand for housing units for the 15 permanent operations workers would likely focus on permanent housing available for purchase or for rent and would begin in mid-2020 as the project

nears completion. Given the large housing base in the study area, the absorption of new demand for up to 15 housing units would have a negligible effect on housing conditions in the area.

5.3.5 Public Services

The effect of the Project on public facilities and services would result from the demand created by construction and operation workers moving within commuting distance of the project site. In the case of Albany County, demand associated with transportation, construction and operations activities on the project site and along access roads leading to the sites would also occur. For assessment purposes, the aforementioned demand is assessed for the anticipated peak month of construction and during operations.

The Project has set a local hiring target of 20 percent minimum to be sourced from Albany and Carbon counties. Communities within a one-hour commuting distance to the Project include Rock River and Laramie in Albany County, and Medicine Bow, Hanna, and Elk Mountain in Carbon County. The analysis below assumes that approximately 80 percent of the anticipated workforce would be sourced from outside these communities and require temporary housing within the communities in Albany and Carbon counties that are part of the study area.

For the purposes of assessing potential construction impacts, Boswell Wind assumed that construction workers would prefer lodging closest to the project site before occupying housing within a reasonable commuting distance. Using the vacant rental housing units and temporary lodging units shown in Table 5-17 as well as proximity to the project site and available community amenities, the estimated incoming construction workers during peak employment by community is shown in Table 5-20. This is a simplifying assumption to allow for analysis of potential impacts to public services in smaller communities.

Table 5-20. Estimated Incoming Construction Workers During Peak Employment by Community

Community	Vacant Rental Housing Units	Temporary Accommodations	Percent of Available Housing Proportioned to Incoming Workforce	Estimated Incoming Construction Workers During Peak Employment
Laramie	617	1,501	39%	73
Medicine Bow	8	132	26%	50
Rock River	0	37	20%	37
Hanna	26	30	8%	15
Elk Mountain	9	28	7%	14
Total	**660**	**1,728**	**100%**	**189**

Source: Intermountain Wind 2015; U.S. Census Bureau 2017.

5.3.5.1 Demand from Population Growth Unrelated to Project Construction and Operation

Table 5-21 displays 2017 population estimates and 2018, 2019, and 2020 population forecasts for the recommended study area. Most of the Boswell Springs Project construction is expected to occur from mid-2019 to mid-2020, and the first year of operations is expected to start in late-2020. As

shown in the table, all of the communities in the study are expected to increase in population over the construction time period.

Table 5-21. Forecast Population Growth between 2017 and 2020 for the Study Area

Local Government	2017	2018	2019	2020	Percent Change 2017-2020
Albany County*	38,650	39,060	39,460	39,820	3.0%
Laramie	32,812	33,160	33,500	33,805	3.0%
Rock River	261	264	266	269	3.0%
Carbon County*	15,970	16,060	16,140	16,210	1.5%
Elk Mountain	192	193	194	195	1.5%
Hanna	846	850	855	858	1.5%
Medicine Bow	286	287	289	290	1.5%

Source: WEAD 2017b.

* County totals do not sum based on the presented community populations due to the exclusion of non-study area communities (e.g., Rawlins).

Demand from Population Growth Related to Project Construction and Operations

Table 5-22 shows that, during peak construction, the project-related workforce would be expected to add to the estimated population growth of communities in the study area. This added growth would be expected to be greatest in Medicine Bow due to its proximity to the project site and availability of temporary housing. Population growth in Medicine Bow would temporarily increase from 1.4 percent between 2017 and 2020 to 18.9 percent during the same period, due to the temporary influx of construction workers.

Table 5-22. Boswell Springs Peak Construction Workforce Impact on Population by Community

Local Government	2017	2020	Percent Change 2017-2020	Boswell Springs Construction Related Population Increase	Percent Change 2017-2020 with Boswell Springs Construction
Laramie	32,812	33,805	3.0%	73	3.2%
Rock River	261	269	3.1%	37	17.2%
Elk Mountain	192	195	1.6%	14	8.9%
Hanna	846	858	1.4%	15	3.2%
Medicine Bow	286	290	1.4%	50	18.9%

Sources: WEAD 2017b; Boswell Wind 2017, from Tables 5.19 and 5.20.

During operations, the estimated operations workforce and their families would be expected to largely find permanent housing in Laramie, due to proximity to the site and availability of housing units for rent and for sale combined with community amenities (Table 5-16). But there may be some permanent workers choosing to live closer to the project site in either Rock River or Medicine Bow.

5.3.5.2 Administrative Facilities

Facilities required for the administrative functions of government include County courthouses and administrative buildings and city and town halls. Albany County administrative facilities are located in the Albany County Courthouse in Laramie. Carbon County administrative facilities are located in Rawlins. Laramie and Rawlins house their administrative facilities within city halls and other city administrative buildings within their respective cities and Rock River, Hanna, and Elk Mountain house their administrative facilities within their respective town halls.

Construction and Operations Impacts

The short-term and temporary construction workforce would represent up to 18.9 percent of the 2020 population of communities where they are expected to find temporary lodging (Medicine Bow). Because this increase would be temporary, Boswell Wind does not expect communities would need to add permanent staff or improve facilities to accommodate the short-term population increase. Therefore, long-term impacts on facilities required for the administrative functions of government would not be anticipated for any of the study area, even when added to population growth from other sources.

During operations, the incoming 12 permanent workers (the remainder of the 15 total workers minus the 3 local hires) and their family members (30 new residents in total) would be expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020 (see Table 5-20), Boswell Wind expects this increase would have no impact on the public administration of the community.

5.3.5.3 Wastewater and Water Distribution and Treatment Facilities

Water Treatment, Storage and Distribution

Table 5-23 shows current population served and capacity of municipal water systems in communities in the study area. Peak daily usage is typically considerably under system capacity in all cases where the information is available. This should also be the case of Medicine Bow: given that peak daily usage for communities in the study area is typically between 300 and 600 gallons, peak daily usage for Medicine Bow would be expected to be below 180,000 gallons.

Table 5-23. Affected Municipal Water System Capacities, Usage, and Available Capacity

Municipality	Population Served	Total System Capacity (gpd)	Treated Water Storage Capacity (gpd)	Peak Daily Usage
Rock River	245	720,000	500,000	120,000
Laramie	30,816	20,500,000	13,000,000	12,670,000
Elk Mountain	200	144,000	200,000	60,000
Hanna	841	2,000,000	1,000,000	515,000
Medicine Bow	300	309,600	1,500,000	Unknown

Source: Wyoming Water Development Commission 2013.

Wastewater Collection and Treatment

Counties are responsible for managing wastewater collection and treatment systems in all unincorporated areas within their jurisdictions. The only major city wastewater system in the study area is the Laramie Wastewater Treatment Facilities and Collection System. In the City of Laramie, there are approximately 140 miles of sewer main lines in the collection system and about 4.5 million gallons of wastewater per day are pumped through the wastewater treatment plant (City of Laramie 2015b).

Construction and Operations Impacts

The short-term and temporary construction workforce would represent up to 18.9 percent of the 2020 population of communities where they are expected to find temporary lodging (Medicine Bow). Because this increase would be temporary and because local water treatment systems currently function considerably under capacity, Boswell Wind expects this temporary increase in demand to be accommodated by the existing infrastructure and management. In addition, construction workers would reside primarily in temporary housing such as motels and RV parks and would not generate demand for new wastewater systems. During operations, of the 15 operations workers, the incoming of 12 permanent workers and their family members (30 new residents in total) would be expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020, Boswell Wind expects this increase would have no perceptible impact on the provision of water and wastewater treatment.

5.3.5.4 Solid Waste Collection and Disposal

In Albany County there is only one landfill which is the City of Laramie landfill located to the north of the city. The City of Laramie landfill is a Type I permitted landfill encompassing 250 acres and composed of unlined disposal trenches. This landfill serves the entire county; county residents can pay to bring their trash to the city landfill and the Town of Rock River transfers trash to this landfill. Non-city residents pay fees for disposal at the city landfill (Albany County 2014). The annual volume received at the landfill is approximately 72,000 cubic yards or 36,400 tons of solid waste. The landfill has a remaining life expectancy of 40 years at current disposal rates. In the last 10 years, environmental concerns have resulted in significant regulatory changes in the landfill industry. In 2014, the Laramie landfill upgrades were completed (City of Laramie 2015c). Boswell Wind has been in contact with the Laramie Solid Waste Division concerning landfill capacity, and capacity to receive solid waste from the Project was confirmed (Webb 2017).

Commercial waste collection is provided to 250 businesses and multi-unit residential facilities within the City of Laramie. One collection truck operates six days per week allowing collections of one to six times per week. This operation competes with private collection companies and accounts for about 16 percent of the $1,204,349 annual waste collection budget (City of Laramie 2015c).

There are several solid waste districts within Carbon County. There is also a landfill located northeast of the Town of Hanna, owned by the High Country Joint Powers Board, consisting of two members each from Hanna, Elk Mountain, and Medicine Bow (Town of Hanna 2015).

Construction Impacts

Construction and operations workers would generate municipal solid waste in communities where they live while working on the project and additional solid waste would be generated at the

construction site. The increased demand for solid waste collection and treatment is expected to be proportional to the increase in population. Albany County residents generate approximately 5.3 pounds of municipal solid waste per person per day.[5] Boswell Wind has estimated that 189 construction workers would temporarily relocate to communities within commuting distance of the project site during the peak of construction. Based on average rates of solid waste disposal in Albany County, the temporary construction workforce could contribute up to 0.5 tons per day to the municipal solid waste landfill. Actual contributions would likely be much lower due to the fact that the temporary construction workforce is not likely to dispose of yard waste and other durable and non-durable wastes that permanent residents may dispose of. In addition, the peak workforce would not be sustained for the duration of the construction period.

Typical wind projects in Wyoming have been estimated to generate approximately 26 cubic yards of construction waste per WTG, leading to an estimate of 4,420 cubic yards of construction waste for the Boswell Springs Project. Construction wastes include packaging and erosion control materials (e.g. straw bales, silt fencing), wood pallets, and scrap steel among other materials.

The EPC contractor will be expected to prepare a construction solid waste management plan prior to the initiation of construction. To the extent possible, packaging materials and other construction wastes will be separated and recycled. Costs of the hauling and disposal would be borne by the construction contractor. The landfill has a remaining life expectancy of 40 years at current disposal rates and the temporary increase in municipal solid waste that would be generated by the Boswell Springs Project will not exceed the landfill capacity.

Operations Impacts

During operations, of the anticipated 15 workers, the incoming 12 permanent workers and their family members (30 new residents in total) are expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020, Boswell Wind expects this increase would have no perceptible impact on the provision of solid waste collection and treatment services.

5.3.5.5 Law Enforcement Services

Law enforcement services within the recommend Area of Site Influence are provided by Albany and Carbon County Sheriff's Departments as well as the Laramie and Hanna Police Departments. Table 5-24 displays 2015 staffing for county and municipal law enforcement agencies within the study area. Assuming staffing remains the same, the current ratio of law enforcement personnel to population in the two-county area would be approximately one law enforcement employee per every 350 people. Refer to Chapter 7 for some additional information on law enforcement and emergency services in Albany County.

[5] Based on an annual volume of 36,400 tons of solid waste received at the municipal landfill in Albany County and a 2014 population of 37,811 in Albany County.

Table 5-24. Law Enforcement Personnel and Crimes per 1,000 Population, 2015

County/Agency	Employees			Crime Rates per 1,000 Inhabitants
	Total	Officers	Civilian	
Albany County Total	**46**	**42**	**4**	**27.1**
Laramie	75	49	26	17.6
Carbon County Total	**29**	**18**	**11**	**45.3**
Hanna	2	2	0	0.0

Source: FBI 2015

Construction and Operations Impacts

The influx of 189 construction workers to Albany and Carbon counties during the months of peak construction would temporarily increase the population in Albany and Carbon counties from the estimated 56,030 for 2020 to 56,219. To maintain the current ratio of law enforcement personnel to population, one more law enforcement staff would be needed. Because this increase in population would be temporary, Boswell Wind does not expect local organizations to feel the need to hire additional permanent personnel.

During operations, of the 15 operations workers, the incoming 12 permanent workers and their family members (30 new residents in total) are expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020, Boswell Wind expects this increase would have no perceptible impact law enforcement services.

5.3.5.6 Fire Protection and Emergency Response Services

As with law enforcement, certain fire protection and emergency response agencies would potentially provide fire suppression and accident response services at the Project site, in communities where employees of the Project live, and along transportation routes that would provide access for materials, equipment, and supplies and workforce commuting.

The Albany County Emergency Management Agency and the Carbon County Emergency Management Coordinator coordinate emergency response, disaster planning, and Homeland Security activities in Albany and Carbon counties.

Table 5-25 below displays the fire suppression agencies within the Project's study area along with the information about agency staffing.

Table 5-25. Fire Protection Agencies within Albany and Carbon Counties

	Number of Fire Fighters			EMS Services		
	Number of Stations	Full-Time Paid (Part-Time Paid)	Volunteer	EMS Services	Basic EMTs	Advanced EMTs
Albany County						
Albany County Firefighters 1 (Albany County Volunteer Fire Department)	1	(1)	1	No	-	-
Albany County Firefighters 2 (Big Laramie Valley Volunteer Fire Department)	4	-	39	Yes	6	-
Albany County Firefighters 3 (Centennial Valley Volunteer Fire Department)	2	-	23	Yes	6	1
Albany County Firefighters 4 (Garrett Fire Zone)	1	-	7	No	-	-
Albany County Firefighters 5 (Laramie Peak Fire Zone)	2	-	29	No	-	-
Albany County Firefighters 6 (Little Laramie Fire Department)	-		16	Yes	9	0
Albany County Firefighters 7 (Rock River Volunteer Fire Department)	1	-	12	No	-	-
Laramie Fire Department	3	1 (48)	-	Yes	6	36
Sybille Fire Zone	1	-	26	No	-	-
Vedauwoo Fire Department	1	-	7	No	-	-
Albany County Total	**16**	**1 (49)**	**160**	**-**	**27**	**37**
Carbon County						
Baggs Volunteer Fire Department	1	-	8	No	-	-
Carbon County Fire Department	1	-	27	Yes	4	-
Carbon County Fire Department - Hanna Division	1	-	11	No	-	-
Elk Mountain Volunteer Fire Department	1	-	12	No	-	-
Encampment/Riverside Volunteer Fire Department	1	-	18	No	-	-
Medicine Bow Volunteer Fire Department	1	-	8	Yes	1	1
Ryan Park Fire Department	1	-	15	Yes	10 EMR	-
Saratoga Volunteer Fire Department	1	-	32	No	-	-
Carbon County Total	**8**		**131**	**-**	**5 (+10 EMR)**	**1**
Two County Total	**24**	**1 (49)**	**291**	**-**	**32 (+10 EMR)**	**38**

Source: Wyoming State Fire Marshal 2015.
EMR Emergency medical responder
EMS Emergency management services
EMT Emergency medical technician

Albany County

The Albany County Rural Fire District #1 includes the City of Laramie, the southern half of Albany County outside the city of Laramie, and the town of Rock River. Albany County has seven County firefighting departments located throughout the county which include: Albany County Volunteer Fire Department in Laramie; Big Laramie Valley Volunteer Fire Department in Laramie; Centennial Valley Volunteer Fire Department in Centennial; Garret Fire Zone in Garrett; Laramie Peak Fire Zone in Laramie; Little Laramie Fire Department in Laramie; and Rock River Volunteer Fire Department in Rock River. Additionally within Albany County are the Laramie Fire Department, Sybille Fire Zone, and Vedauwoo Fire Department (Wyoming State Fire Marshal 2015).

County-wide, there are 16 fire stations with the following employees: one full-time paid employee; 49 part-time paid employees; 160 volunteer fire fighters; 27 basic emergency medical technicians (EMT); 37 advanced EMTs; and seven paramedics (not featured in the above table). The closest fire department to the project site is Albany County Firefighters 7 (Rock River Volunteer Fire Department), which has 12 volunteer fire fighters and one fire station (Wyoming State Fire Marshal 2015).

The Laramie Fire Department is the largest fire department within Albany County and responds to all emergencies within the Laramie City limits. They also respond to fire calls within the Rural Fire District #1, which encompasses the majority of Albany County. Additionally, the ambulances respond to calls throughout Albany County (approximately 4,200 square miles). The Laramie Fire Department employs one full-time fire fighter, 48 part-time fire fighters, and 6 paramedics, and covers a population of 31,816 (City of Laramie 2015a; Wyoming State Fire Marshal 2015). The Fire Department maintains a fleet of seven firefighting units to suppress fires in Laramie. They also maintain command vehicles and a hazardous materials response trailer. The department responds to fires in Albany County through an agreement with the Rural Fire District #1.

Apparatus, Units & Personnel

The Laramie Fire Department is a fully paid department and provides 24-hour emergency response services 365 days per year, including holidays. There are three shifts that work 24 hours on-duty and 48 hours off-duty, with one shift commander, two company officers, three equipment operators, and seven firefighters per shift. Additionally, there are also six administrative staff members, including the chief, one division chief / fire marshal, one company officer of fire prevention, one administrative assistant, one emergency medical services secretary, and one emergency management secretary.

In all, the Laramie Fire Department consists of one command unit, two wildland units, five ambulances, four Class A pumpers, and one 95-foot aerial platform truck.

The Laramie Fire Department provides emergency medical services for Albany County through an agreement with Ivinson Memorial Hospital. All Laramie Fire Department personnel are certified emergency medical technicians. Personnel who are regularly assigned to a rotation on the ambulance also hold certifications in advanced cardiac life support and pediatric advanced life support. The Fire Department maintains five ambulances to provide emergency management services (EMS) to Laramie and Albany County. They also provide transport to other health care facilities within approximately 250 miles (City of Laramie 2015a).

Carbon County

Carbon County is not part of a Fire Protection District (along with five other Wyoming counties). Fire protection services in Carbon County include the following organizations: Baggs Volunteer Fire Department in Afton; Carbon County Fire Department; Carbon County Fire Department – Hanna Division in Hanna; Elk Mountain Volunteer Fire Department; Encampment/Riverside Volunteer Fire Department; Medicine Bow Volunteer Fire Department; Ryan Park Volunteer Fire Department in Saratoga; and Saratoga Volunteer Fire Department. The included area of Carbon County has 8 fire stations with the following personnel: 131 volunteer firefighters; 5 basic EMTs; 10 emergency medical responders (EMR); and one advanced EMT. Also within the County is the Sinclair Refinery Volunteer Emergency Response Team located in Sinclair. This private organization has two stations and an unknown number of employees (Wyoming State Fire Marshal 2015).

Construction and Operations Impacts

The influx of 189 construction workers to Albany and Carbon counties during the month of peak construction would temporarily increase the population Albany and Carbon counties from the estimated 56,030 for 2020 to 56,219. There are currently approximately 170 residents per volunteer firefighter in the two county area of Albany and Carbon, and 897 residents per full-time or part-time paid firefighter. To maintain the current ratio of law enforcement personnel to population, one more volunteer firefighter would be needed, and less than 0.5 full-time or part-time paid firefighter. Because this increase in population would be temporary, Boswell Wind does not expect local organizations to hire additional permanent personnel.

During operations, of the anticipated 15 workers, the incoming 12 permanent workers and their family members (30 new residents in total) are expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020, this increase would have no perceptible impact on fire protection and emergency response services.

5.3.5.7 Health and Hospital Care Facilities and Services

Ivinson Memorial Hospital, in Laramie, is the only major hospital located within the included study area. Local clinics and medical facilities are also present within commuting distance of the site.

Ivinson Memorial Hospital

Ivinson Memorial Hospital is an affiliate of the University of Colorado Health and is located in Laramie. This medium sized hospital offers comprehensive services and has 99 patient beds. Survey data for the latest year available shows that 12,149 patients visited the hospital's emergency room. The hospital had a total of 2,263 admissions. Its physicians performed 592 inpatient and 2,624 outpatient surgeries (U.S. News and World Report 2015; Ivinson Memorial Hospital 2015).

Local Medical Facilities

Energy Basin Clinic is located in Hanna and is open from 8:00 a.m.-5:00 p.m. on Tuesdays and 8:00 a.m.–12:00 p.m. on Thursdays. A physician's assistant is available to attend to family practice and urgent care needs and the doctor sees patient at the clinic monthly (Town of Hanna 2015). Albany County also has a public health clinic located in Laramie that is open Monday through Friday. Albany County Public Health Clinic offers maternal, child and family health programs, communicable

diseases programs, adult health services, emergency preparedness services, and testing services (Albany County Public Health 2015).

Construction and Operations Impacts

The influx of 189 construction workers to Albany and Carbon counties during the month of peak construction would temporarily increase the population of Albany and Carbon counties from the estimated 56,030 for 2020 to 56,219. Given the number of patients seen by nearby hospitals in the past year, Boswell Wind expects these hospitals to be able to accommodate needs from the influx of 189 construction workers during the months of peak employment. Furthermore, this influx would be temporary. During operations, the incoming 12 permanent workers and their family members (30 new residents in total) are expected to be concentrated in Laramie. Because this would be less than 0.1 percent of the forecast population for Laramie in 2020, Boswell Wind expects this increase would have no perceptible impact on health services.

5.3.5.8 Human Services

The Wyoming Department of Family Services offers human services in four program areas: Public Assistance (nutrition support and home heating help), Child Support Enforcement, Juvenile Services, and Protective Services (Wyoming Department of Family Services 2015). Because construction workers are expected to move without their families and because operations workers moving into the study area are estimated to be up to 30 new residents (12 relocated permanent workers and their families assuming 2.5 persons per household), impacts on human services are not expected.

5.3.5.9 Community and Urban Outdoor Recreation

Each of the communities likely to host a substantial proportion of non-local construction workforces offers community and outdoor recreation resources. Regional outdoor recreational resources are addressed in Section 6.13 *(Recreation)* of this application.

5.3.5.10 Educational Facilities

There are two public school districts serving the site area of interest: Albany County School District #1 (ACSD#1) includes all of Albany County and Carbon County School District #2 (CCSD#2) includes the western part of Carbon County and the towns of Elk Mountain, Hanna, Medicine Bow, and Saratoga. The Project is located in ACSD#1.

Table 5-26 presents school enrollment by grade range for Albany County in 2015. In 2015, Albany County had a total enrolled student population of 3,943 across 19 schools. The largest cohort of students is the Pre-K–5th grade cohort at 2,024 students, followed by the 9–12th grade cohort at 1,052 students.

The largest school in Albany County was Laramie Junior High School, which had a total student population of 879. The second largest school was Laramie High School with 672 students.

Table 5-26. School Enrollment by Grade Range, Albany County

	Grade Range			
School	**Pre-K-5**	**6-8**	**9-12**	**Total**
Beitel	272	-	-	**272**
Centennial	9	2	-	**11**
Harmony	24	1	-	**25**
Indian Paintbrush	315	43	-	**358**
Lab School Elementary	129	32	-	**161**
Laramie Montessori	74	2	-	**76**
Linford	379	52	-	**431**
Notch Peak	1	-	-	**1**
Rock River Elementary	27	3	-	**30**
Slade	319	-	-	**319**
Spring Creek	321	-	-	**321**
Valley View	9	-	-	**9**
Lab School Middle School	-	55	24	**79**
Laramie Junior High	-	623	256	**879**
Rock River Junior High	-	20	-	**20**
Laramie High School	-	-	672	**672**
Rock River High School	-	-	37	**37**
Whiting High School	-	-	58	**58**
Snowy Range Academy	145	34	5	**184**
Total	**2,024**	**867**	**1,052**	**3,943**

Table 5-27 presents school enrollment by grade range for Carbon County in 2015. In 2015, Carbon County had a total enrolled student population of 198 across 4 schools. Similar to Albany County, the largest cohort of students is the Pre-K–5th grade cohort at 93 students, followed by the 9–12th grade cohort at 60 students.

The largest school in Albany County was EHEM High School, which had a total student population of 89. The second largest school was Hanna Elementary with 72 students.

Table 5-27. School Enrollment by Grade Range, Carbon County

	Grade Range			
School	**Pre-K-5**	**6-8**	**9-12**	**Total**
Elk Mountain	14	-	-	**14**
Medicine Bow	20	3	-	**23**
Hanna Elementary	59	13	-	**72**
EHEM High School	-	29	60	**89**
Total	**93**	**45**	**60**	**198**

During operations, the incoming 12 non-local workers (the remainder of the 15 total workers minus the 3 local hires) and their family members amounts to approximately 30 new residents in total (resulting from 12 non-local hires with 2.5 persons per household). These workers and their family members are expected to be concentrated in Laramie. This increase would have no impact on the public school operations of the community.

5.3.6 Transition from Construction to Operations

The anticipated construction workforce for the project would reach a peak of 236 workers, but would be considerably lower during most of the construction period. The estimates of on-site workforce exceed 200 for eight months of the construction period and more than 100 workers for an additional four months. Most non-local workers would likely be housed in temporary housing accommodations such as motels and RV parks. New housing would not be required to accommodate either the construction or the operations workforces. Local governments would not be required to add staff or services or expand facilities or otherwise change their service levels to accommodate either the construction or operations workforces for the project. Therefore, no problems associated with the transition from a temporary workforce to the relatively small operating workforce would be anticipated.

5.3.7 Cumulative Workforce Estimates

Large-scale construction projects that may overlap with the Project in time and geographic region, would generate cumulative impacts in the study area. In particular, they would compete for local construction labor force, incoming workers, and housing. Additionally, the cumulative numbers of incoming workers could generate higher peaks in demand for local public services or extend those peaks over a longer period of time.

To identify large-scale construction projects with overlapping schedules in the study area, planning departments in Albany and Carbon counties as well as communities within those counties were contacted. Additional information regarding project construction schedules and workforce estimates was obtained through project websites. These are shown in Table 5-28. Several of these projects are in the various permitting stages and pending approvals before construction. Therefore, there is no clear indication as to whether construction would overlap with the proposed Project. However, it was assumed that the publicly available construction schedules are accurate for the purposes of the analysis.

Table 5-28. Other Construction Projects Potentially Overlapping with the Boswell Springs Wind Project

Project	County	Period of Construction	Description
Gateway West Transmission	Carbon, Natrona	2019-2024	1,000 miles of high-voltage transmission lines in WY and ID which will cross Carbon and Natrona counties. Includes substations in Carbon county, north of Medicine Bow. The Proposed Action would involve three separate Engineering, Procurement, and Construction (EPC) Areas, which would include a total peak construction workforce of 1,207. The EPC 1 area includes Carbon and Albany counties and would have a peak workforce of 362 in the second year of construction, once initiated.
Gateway South Transmission	Carbon	2020-2024	400 miles of high-voltage transmission lines from the planned Aeolus substation in Carbon County to Mona, UT. Spread 1, which includes Wyoming and Colorado, would have a peak construction workforce of 263.
Transwest Express Transmission	Carbon	2018-2020	High-voltage transmission system spanning 730 miles originating southwest of Rawlins in Carbon County. Direct employment associated with construction would have a temporary peak workforce of 230.
Chokecherry and Sierra Madre Wind Energy Project	Carbon	2016-2023+	1,000 wind turbine project, located south of Rawlins in Carbon County which includes a haul road, rail facility, and quarry in addition to the wind turbines. Construction has begun on the support facilities. The project has obtained approvals to construct the first 500 wind turbines in January 2017 and approvals remain for the remaining 500 turbines. The project would be constructed over a period of eight years. Temporary on-site accommodations would house 30-60% of the workforce during peak construction.
Atlantic Rim Natural Gas Field Development	Carbon	2007–2027+	Development of up to 2,000 new wells in southwestern Carbon County over 30-50 years. Estimated Proposed Action-related employment between 2017-2018 (year 10-11 of the project), is 700-800. Subsequent APDs are being processed, including the Doty Mountain Plan D consisting of nine coal bed natural gas wells.

Project	County	Period of Construction	Description
Continental Divide-Creston Natural Gas Development	Carbon	2016-2031+	Development of up to 8,950 wells in Carbon and Sweetwater counties. Over a typical eight-week period, the average onsite employment would average approximately 881 jobs and workers are expected to reside in in Rawlins, Rock Springs, Wamsutter, and Baggs.
Desolation Flats Natural Gas Treatment Plant Expansion	Carbon	2004-2024	Development of up to 385 wells in Carbon and Sweetwater counties. Estimated Proposed Action-related employment during drilling and completion of 125.

Sources: Personal Communication with Albany County; Personal Communication with Carbon County; Personal Communication with City of Rock River 2015; Personal Communication with Natrona County; Project websites: http://www.gatewaywestproject.com/, http://www.pacificorp.com/tran/tp/eg/gs.html, http://www.transwestexpress.net/about/timeline.shtml; BLM 2015a; Storrow 2015; BLM 2014a; BLM 2014b; BLM 2013; BLM 2012a; BLM 2012b; BLM 2006; BLM 2004.

There are several new transmission projects that originate near the Boswell Springs Wind Project. If the Gateway West and Gateway South Transmission Projects construction activities overlap with the planned Boswell Springs project construction, the estimated workforce for these projects would be distributed across the Wyoming segment, but is not expected to significantly add to the construction base near the Boswell Springs Project Area. In the case of a potential overlap in construction for these projects, the most likely effect would be that a greater portion of the Boswell construction workforce may have to find housing in Laramie, as nearby RV spaces and motel rooms may be occupied in Rock River, Medicine Bow, Hanna, and Elk Mountain. The main project that could have generated important cumulative demands with Boswell Springs was the DKRW coal to liquids plant proposed just south of Medicine Bow, which was suspended as of June 2016. The other large-scale construction projects identified in Table 5-27 are all located in Carbon County and would likely draw on housing stock in Rawlins, which is outside the socioeconomic area of influence for the Boswell Springs project. Therefore, while there is a potential for more construction activity during 2018-2019, local communities near the Boswell Springs Project should be able to support the activities and cumulative workforce effects to the socioeconomic study area are not anticipated.

5.3.8 Fiscal Analysis

5.3.8.1 Ad Valorem Taxes

Ad valorem taxes (property taxes) are derived from assessments on real and personal property. Property taxes are important sources of revenue for local governments and school districts. The state of Wyoming does not impose property taxes, but the counties do. The Project is located in tax district 0100 in Albany County. Public entities with ad valorem taxing authority in tax district 0100 include the county and municipalities, and tax levies include special county district levies for weed and pest, fire, hospital, water and sewer and conservation. The combined overlapping tax levies in tax district 0100 is 65 mills, the majority of which support public education (WDOR 2016).

Property taxes levied on individual properties reflect the taxable value assessed on the property and the tax rates assessed by local entities with taxing jurisdiction in which the property is located. Property is assessed at a fractional basis of fair market or productivity value. Wind energy facilities are industrial property and are assessed at 11.5 percent of the base value.

Over the past decade, total assessed valuation increased almost 32 percent in Albany County. This compares with a decrease in property valuations of approximately 3 percent in the State of Wyoming as a whole. Assessed values in Carbon County have fluctuated throughout the past decade and remain currently below the assessed values of 2007 (Table 5-29).

Table 5-29. Total Assessed Valuation, 2007 to 2016

Year	Albany County	Carbon County	Wyoming
2007	$300,978,646	$891,998,340	$21,491,267,438
2008	$330,654,074	$896,215,989	$21,889,331,198
2009	$349,028,839	$1,223,230,319	$29,219,533,181
2010	$352,642,957	$764,194,959	$21,316,477,631
2011	$362,958,600	$915,134,660	$24,339,700,232
2012	$365,130,140	$877,327,227	$25,242,644,578
2013	$373,430,338	$746,614,775	$22,797,094,335
2014	$382,474,421	$760,910,660	$24,164,467,525
2015	$389,156,728	$834,521,908	$26,057,281,969
2016	$398,334,017	$591,549,575	$20,932,788,556

Source: WDOR 2017.

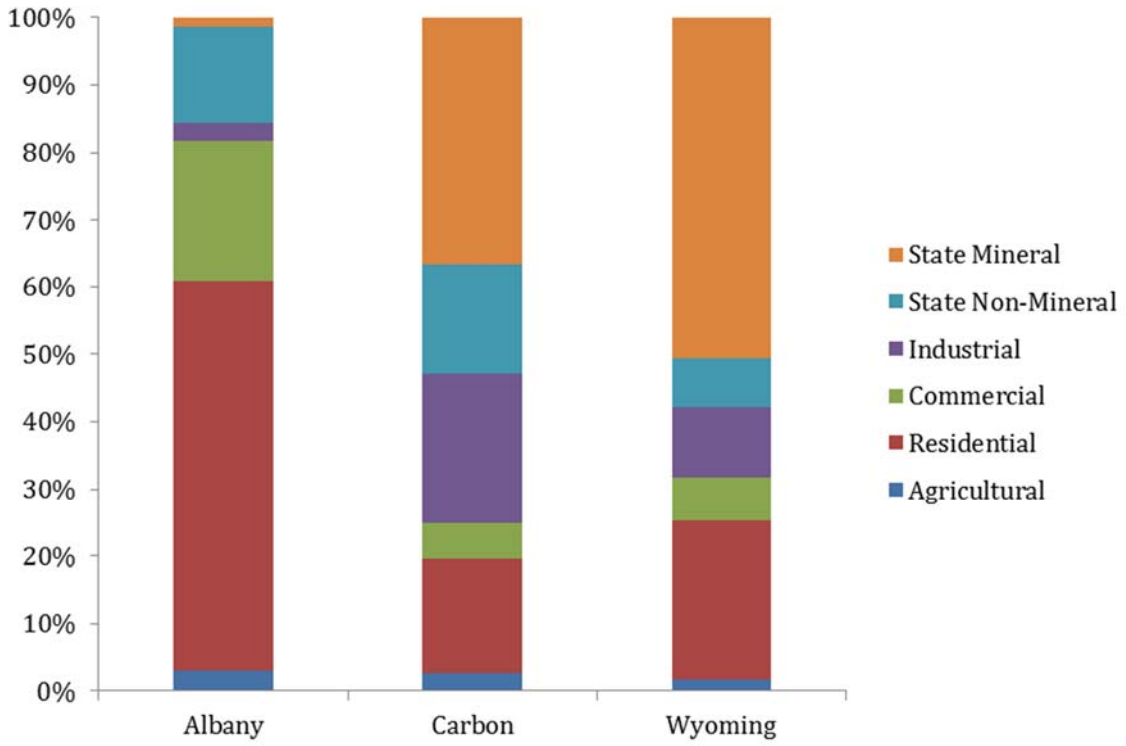
Residential property is the largest contributor to assessed valuation in Albany County (Table 5-30), accounting for approximately 58 percent of total valuation. In contrast, assessments on minerals are almost 37 percent of total valuation in Carbon County.

Table 5-30. Assessed Valuation by Type of Property and County (2016)

	Albany	Carbon	Wyoming
Locally Assessed Valuations			
Agricultural	$11,702,273	$15,975,669	$345,379,388
Residential	$230,374,447	$100,139,766	$4,937,530,338
Commercial	$83,089,444	$31,125,657	$1,372,642,956
Industrial	$10,692,066	$132,310,808	$2,182,071,481
State Assessed Valuations			
Non-Mineral	$57,303,828	$95,247,619	$1,519,845,495
Mineral	$5,171,959	$217,450,807	$10,575,318,899

Source: WDOR 2016.

Figure 5-4. Composition of Total Assessed Valuation in the Study Area and Statewide, 2016



Source: WDOR 2016.

Construction and Operations Impacts

Ad valorem/property taxes would accrue to Albany County and those other taxing entities in which the project is located. For ad valorem tax purposes, the Project would be initially assessed at 11.5 percent of improved value. After the facilities go into production, assessments consider replacement cost, capitalized value of income, and the prices of comparable sales. Project development costs are estimated at approximately $495 million. The total includes the costs of the WTGs, other equipment and materials, construction and erection labor and management services, off-site access improvement costs, sales and use taxes. Boswell Wind used assessment values per MW and per turbine that were publicly available for other Wyoming wind projects to estimate the assessed value for the Project. Assessed values per MW were in the range of $130,000/MW to $180,000/MW. The assessed value of the Project is estimated to be in the range of $51 million to $70 million. Total projected ad valorem taxes to be paid in 2019 is estimated to be between $3.3 million and $4.6 million.

5.3.8.2 Sales, Use, and Lodging Tax

Sales and use taxes are important revenue sources for the state and for local governments. The state levies a 4 percent sales and 4 percent use tax, the latter imposed on purchases made outside of the state for use in Wyoming. Revenues generated by these taxes are allocated to the state's general fund (69 percent) with the remainder (less a 1 percent administrative fee) distributed to local governments. Local governments have an option to impose sales, use, and lodging taxes. Local sales and use taxes can be levied for both general and specific purposes, the former benefiting the general fund, the latter

a defined purpose. In addition, local governments can impose a lodging tax. As shown in Table 5-31, both counties impose a 1 percent general purpose option tax and an additional 1 percent specific purpose option. Albany County imposes a 4 percent lodging tax, while Carbon County imposes a 2 percent lodging tax. Sales and lodging taxes only apply to rentals of less than 30 days.

Table 5-31. Sales, Use and Lodging Tax Rates for 2017

	State Sales and Use Tax Rate	General Purpose County Option	Specific Purpose County Option	Lodging Tax Rate
Albany County	4%	1%	1%	4%
Carbon County	4%	1%	1%	2%

Source: WDOR 2017a.
% percent

Sales and use tax collections in the study area, along with statewide collections, for fiscal years 2011 through 2016 are presented in Table 5-32 below. Between 2011 and 2016, the State of Wyoming experienced an overall increase in nominal sales and use tax collections of approximately 2.8 percent. The increase in Albany County during the same time period was approximately 19.9 percent, while Carbon County experienced a decrease of 1.8 percent. As Table 5.32 demonstrates, sales and use tax receipts fluctuate over time, reflecting differences in the level of construction and energy development activity.

Table 5-32. Sales and Use Tax Collections, Fiscal Years 2011-2016

Year	Albany County	Carbon County	Wyoming Total
2011	$27,841,048	$25,448,874	$864,756,484
2012	$30,667,619	$28,366,087	$988,667,615
2013	$30,089,800	$27,038,251	$946,086,467
2014	$31,619,074	$28,791,291	$1,077,505,057
2015	$33,758,897	$28,956,230	$1,142,761,983
2016	$33,376,193	$24,999,288	$888,981,759

Source: WDOR 2017b.

Lodging taxes apply to the costs of stays less than 30 days in length at hotels, motels, RV parks and private campgrounds. Lodging tax collections for the past five years are shown in Table 5-33 below.

Table 5-33. Lodging Tax Collections, Fiscal Year 2012-2016

	FY12	FY13	FY14	FY15	FY16
Albany County	$697,239	$709,837	$736,841	$867,646	$853,433
Carbon County	$421,478	$466,337	$514,559	$511,833	$605,432

Source: WDOR 2017b.

Construction Impacts

Of the estimated $495 million Boswell Springs cost of construction, only direct labor compensation would not be subject to either sales or use tax. Direct labor compensation is estimated to be approximately $16.2 million. As described above, the total sales and use tax rate in Albany County is 6 percent—4 percent for the state, and 2 percent local. Based on these estimates for direct construction expenditures and on the above tax rates, sales and use taxes collected over the period of construction would be estimated to be approximately $28.8 million, with $19.2 million collected by the state and $9.6 million collected locally. Most of these tax collections would occur in 2020.

In addition to sales tax, construction workers residing in temporary lodging would be subject to a 4 percent tax rate in Albany County and a 2 percent tax rate in Carbon County. Up to 80 percent of the construction workforce is expected to currently reside beyond commuting distance and require temporary housing. Lodging tax collections also depend on the share of workers residing temporarily in Albany County (who pay a 4 percent lodging tax rate) and those residing temporarily in Carbon County (who pay a 2 percent lodging tax rate).

It is unknown where non-local workers will choose to reside temporarily. Various scenarios were considered regarding the variables above. If 75 percent of the workforce requiring temporary lodging selects accommodations in Albany County with the remaining 25 percent selecting accommodations in Carbon County, lodging tax collection estimates would total approximately $168,000 in 2020. If the workforce is distributed similar to the population growth projections presented in Table 5-22 (i.e., 90 percent in Albany County; 10 percent in Carbon County), estimated lodging tax collections would total approximately $182,000.

Operation Impacts

During operations, based on estimates of other projects in Wyoming, Boswell Wind estimated annual expenditures with materials and maintenance services to be approximately $9 million. Most of the materials are expected to come from out-of-state, which subjects them to use taxes, while services would likely be provided locally and is subject to sales tax. Based on this estimate and the current sales and use tax rates in Albany County, annual sales and use tax collections is expected to be $550,000, with $370,000 collected by the state and $180,000 collected locally. Only incidental lodging tax collections associated with project operations is expected.

5.3.8.3 Wind Production Taxes

Since 2010, Wyoming has charged a wind energy production tax on operating wind energy projects. The tax is $1.00 per MW-hour of electricity produced annually by a commercial wind project. There is a three-year exemption from the date of initial production. Table 5-34 shows wind energy tax collections for the last four years. Local governments receive 60 percent of these tax collections.

Table 5-34. Wind Generation Tax, Fiscal Years 2013-2016

	FY13	FY14	FY15	FY16
General Fund Distribution	$1,050,611	$1,501,764	$1,772,147	$1,501,880
Local Government Distribution	$1,575,916	$2,252,646	$2,658,221	$2,252,819
Total	**$2,626,527**	**$3,754,410**	**$4,430,368**	**$3,754,699**

Source: WDOR 2017b

After three years, operation of the Boswell Springs Project would generate wind energy tax collections. Under the current plan of development, initial commercial production would begin in 2020. Given the three-year exemption, full-scale taxable production would begin in 2023. Projected annual energy production is a function of generating capacity, efficiency and actual wind conditions. Given wind conditions in the Project Area, Boswell Wind expects an overall capacity factor considerably higher than the current national average for wind energy projects. However, if the current national average capacity factor of 34 percent is used (EIA 2015), the Project would generate approximately 1,164,554 Megawatt-hours/year (MWh) of energy. Annual wind energy production taxes associated with that production would be approximately $1.1 million. Forty percent (40 percent) of the revenues generated by this tax would accrue to the state's general fund, with 60 percent to be distributed among counties where generating facilities are located. Wind production taxes would continue over the life of the project, fluctuating on a year-to-year basis in response to the amount of power produced.

5.3.8.4 Industrial Siting Impact Assistance Funds

Counties that have a major construction project of $170.3 million or larger may receive extra revenue in direct proportion to increases in their tax collections to help with the impacts caused by the Project. These funds are not additional tax collections, but rather transfers from the State General Fund to the applicable county treasurers. The total distribution of impact assistance funds over time reflects the number and cost of projects constructed that are subject to ISC permitting.

Estimated Impact Assistance Funds Available for Distribution

Construction of the Project may result in the availability of impact assistance funds to primarily affected units of local government. Section 12(b) of the Industrial Development Information and Siting Rules and Regulations provides that the ISC may establish an amount and schedule for distribution of impact assistance funds, not to exceed 2.76 percent of the total estimated material costs of the facility, for unmitigated impacts to affected counties, cities, and towns. Material costs are understood as the costs of materials, supplies and equipment. It is estimated that, of the $495 million cost of construction for the Project, approximately $449 million would be considered material costs, excluding labor, EPC contractor and engineering services and including $377 million estimated expenditures with turbine components purchased out-of-state. The estimated impact assistance payments to the affected local governments would be approximately $12.4 million.

Mitigated and Unmitigated Project Impacts

During development of this application, local governments were contacted to obtain input on anticipated impacts of the Project on local jurisdictions. Written responses were received from Rock River, Medicine Bow, the city of Laramie, and Albany County and are included as Appendix H.3. Telephone calls were made to representatives of Hanna and Elk Mountain in which anticipated impacts resulting from the Project were also considered and discussed (Intermountain Wind 2016). Per communication with local government representatives, unmitigated impacts of the Project on affected counties, cities, and towns may include:

- Increased demand for municipal water, wastewater, sewer, and solid waste facilities;
- Increased demand for local government services, fire and emergency response, law enforcement, and associated equipment needed for increased community support services;

- Increased use of local roads by the construction workforce leading to increases in road maintenance or road improvements.

While impacts of hauling heavy loads for turbine delivery to the project site would be mitigated through a Road Use and Road Damage Agreement with Albany County, additional wear caused by use of local roads by construction vehicles or personal vehicles belonging to the construction workforce may not be fully mitigated.

There is adequate housing in the project vicinity to accommodate the construction workforce and the influx of construction workers would be temporary, so no impacts related to housing shortages are anticipated. Temporary construction workers tend not to be accompanied by their families, thus impacts to the capacity of local educational facilities are not anticipated.

Recommended Impact Assistance Distributions

Of the estimated $12.4 million available for impact assistance payments, it is recommended that approximately $7.9 million be distributed to the local towns and communities primarily affected by the Project. The two communities closest to the project site, Rock River and Medicine Bow, may experience the heaviest burden due primarily to increased use of roadways for transportation of construction workers to the site and delivery of materials for construction of the Project. Additionally, these communities' emergency response teams have little in the way equipment. These communities also anticipate supplying water for Project needs, which may require some upgrades to the local water facilities. Accordingly, approximately $3.4 million in funds is recommended for Rock River and approximately $3 million in funds is recommended for Medicine Bow. These funds can be used to purchase even basic fire and rescue equipment such as emergency radios, jaws of life and other rescue equipment. Money may also be required for first responder training and the purchase of personal protective equipment and other life-saving devices. Impact assistance funds could also be used for road repairs and upgrades to local water facilities and infrastructure.

Two smaller communities in Carbon County, the Towns of Elk Mountain and Hanna, are located within commuting distance to the Project and are situated along a route between I-80 and the Project site that could be used for construction deliveries. Additionally, housing needs for the temporary construction workers will likely be absorbed by the City of Laramie. An estimated $1.5 million in impact mitigation funds are recommended for the towns of Elk Mountain, Hanna, and City of Laramie to cover miscellaneous increases in community operating expenses resulting from the Project, local emergency response equipment, specialized training, miscellaneous road repairs required by additional use, and miscellaneous government staff and service costs that these communities may experience during Project construction.

The remaining amount of unallocated impact assistance funds ($4.5 million) is recommended to be proportioned among Albany County ($2.5 million) and Carbon County ($2 million). As the Project host, it is anticipated that Albany County will experience the greatest impacts due to construction traffic and the influx of the temporary workforce population. Funds should be allocated to Albany County in order to cover the corresponding miscellaneous increases in county operating expenses resulting from the Project. Based on communications with Albany County, impact assistance funds may be used for new service positions or to support existing service positions. For example, funding may be needed to hire additional law enforcement or to cover overtime for sheriff's deputies. Funds may also be used to offset the costs of additional required services such as inspections and other demands placed on the county fire warden. Further, funds may be required to offset impacts to

infrastructure such as repairs related to additional county road use not covered by the county road maintenance agreement or impacts to the county landfill not covered by user fees. While similar impacts to county road maintenance and additional demands on county services may also be felt by nearby Carbon County, the impacts to Albany County as the Project host are anticipated to be much greater, which warrants the allocation of more funds to Albany County than Carbon County.

Table 5-35 summarizes the recommended distribution of impact assistance to affected communities. Notably, these recommendations are not intended to commit the counties and local communities to spend impact assistance funds for the needs identified above, but are rather intended to proportionately distribute the anticipated impact assistance funds to the areas most affected by the Project. It is expected that most of the impacts to government services described above will largely occur during the construction phase of the Project with the influx of the temporary workforce. See Table 5-3 for an estimated schedule of the construction workforce by month. Because the total number of long-term employees associated with the Project will be approximately 15 workers, most of the impacts to roads and government services associated with the Project are expected to subside once construction is complete. However, there may be ongoing occasional needs for emergency services during the operations phase of the Project as related to fire and rescue.

Table 5-35. Summary of Impact Assistance Recommendations

Geography	Amount	Percent of Allocation
Albany County*	$2,500,000	20.2%
Town of Rock River	$3,400,000	27.4%
City of Laramie	$1,000,000	8.1%
Carbon County*	$2,000,000	16.1%
Town of Medicine Bow	$3,000,000	24.2%
Town of Elk Mountain	$250,000	2.0%
Town of Hanna	$250,000	2.0%
Total	**$12,400,000**	**100%**

* County totals do not include the impact funds identified for cities within the counties.

5.3.9 Summary

Based on the above analysis, Boswell Wind expects the proposed Project to generate tax revenues during construction for the State of Wyoming and for the two counties in the study area. Estimates are summarized in Table 5-36. During operations, Boswell Wind expects the proposed Project to generate tax revenues for the State of Wyoming and for Albany County. Estimates are summarized in Table 5-37.

The project is estimated to generate $12.4 million in impact assistance funds. Table 5-35 provides recommendations of distribution for these funds among the local governments directly and indirectly affected by the Project, including: Albany and Carbon Counties; the Towns of Rock River, Medicine Bow, Elk Mountain, and Hanna; and the City of Laramie.

Table 5-36. Estimated Tax Revenues and Potential Mitigation Costs, Construction Period

	State of Wyoming	Albany County	Carbon County
Estimated Tax Revenues			
Ad Valorem Tax Revenues	-	$3.3 million to $4.6 million	-
Sales and Use Tax Revenues	$19.2 million	$9.6 million	-
Lodging Tax Revenues	-	$168,000 to $182,000	

Table 5-37. Estimated Tax Revenues and Potential Mitigation Costs, Operations Period

	State of Wyoming	Albany County
Estimated Tax Revenues		
Ad Valorem Tax Revenues (first year of operations)	-	$3.3 million to $4.6 million
Sales and Use Tax Revenues	$370,000	$180,000
Lodging Tax Revenues	-	(incidental)
Wind Generation Tax (starting fourth year of operations)	$1,164,554	(60% of total state revenues distributed to counties where wind is produced)

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Chapter 6
Evaluation of Environmental Impacts

6.1 Physical, Chemical, Biological, and Radiological Discharges

There are no anticipated physical, biological, or radiological discharges associated with construction or operation of the Project that would result in damage to the environment or impact construction and operational employees' health and wealth. Chapter 7 and Appendix O describes emergency services located within the area, proposed waste disposal methods, and potential occupational hazards.

Western Environmental Services and Testing, Inc. conducted a Phase 1 Environmental Review on the Boswell Springs Project Area in 2007. The review concluded that the property appeared to be in very good environmental condition and did not have any recommendations for mitigation (Western Environmental Services and Testing 2007).

6.2 Air Quality

6.2.1 Regulatory Jurisdiction

Project-related effects on project related construction and operations emissions must be considered in the permit application process. Federal and Wyoming State regulations are listed below:

- The Clean Air Act of 1963 (42 United States Code [U.S.C.] § 7401) as amended in 1970, 1977, and 1990, requires Project Area to develop and enforce regulations to protect the public from air pollutants and their health impacts. The National Ambient Air Quality Standards (NAAQS) of the Clean Air Act specifies the maximum acceptable ambient concentrations for six criteria air pollutants: Carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), Ozone (O_3), particulate matter size 10 (PM_{10}) and particulate matter size 2.5 ($PM_{2.5}$), and Sulfur dioxide (SO_2) (shown in Table 6-1).
- The WDEQ - Air Quality Division (AQD) implements adopted air quality standards and regulations**.** Air emissions associated with construction and operations of the Project are subject to the Wyoming Air Quality Standards and Regulations (WAQSR) promulgated under the *Wyoming Environmental Quality Act* (W.S. § 35-11-101 *et seq.*) under Chapter 6 which establishes permitting requirements for all sources being constructed or operating.

Table 6-1. National Ambient Air Quality Standards

Pollutant	Federal Standard Type	Averaging Period	Standard Value
Carbon monoxide (CO)	Primary	1-hour average	35 ppm (40 mg/m^3)
	Primary	8-hour average	9 ppm (10 mg/m^3)
Lead (Pb)	Primary and Secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen dioxide (NO_2)	Primary	1-hour average	100 ppb (188 µg/m^3)
	Primary and Secondary	Annual average	53 ppb (100 µg/m^3)
Ozone (O_3)	Primary and Secondary	8-hour average	0.075 ppm
Particulate matter (PM_{10})	Primary and Secondary	24-hour average	150 µg/m^3
Particulate matter ($PM_{2.5}$)	Primary and Secondary	24-hour average	35 µg/m^3
	Primary	Annual average	12 µg/m^3
	Secondary	Annual average	15 µg/m^3
Sulfur dioxide (SO_2)	Primary	1-hour average	0.075 ppm (196 µg/m^3)
	Secondary	3-hour average	0.5 ppm (1300 µg/m^3)

Source: 40 CFR Part 50.

CFR Code of Federal Regulations
mg/m^3 milligrams per cubic meter
ppb parts per billion
ppm parts per million
µg/m^3 micrograms per cubic meter

6.2.2 Area of Site Influence

Emissions associated with construction and operation of the proposed Project would be from fugitive dust and limited particulates, as well as emissions from construction equipment and transport of construction materials.

The recommended area of site influence for the Project's effects on air quality is the Project Area boundary (Map 5-1 in Appendix A) and its immediate surroundings because impacts would primarily be associated with the proposed access roads and Fetterman Road. Fetterman Road is a gravel roadway, and the proposed access roads would be gravel roadways as well. The Project Area is in attainment for all criteria pollutants. The closest nonattainment area is located in Routt County, Colorado for PM_{10} (EPA 2015c).

The closest WDEQ monitoring locations are in Sinclair, WY (AQS: 56-077-1000), and Cheyenne, WY (AQS: 56-021-0100). These monitors collect real time data for 1-hour ozone, 8-hour average ozone, 1-hour NO_2, 24-hour average PM_{10}, 24-hour average $PM_{2.5}$, and 1 hour wind speeds (WDEQ 2015).

6.2.3 Construction Emission Sources and Impacts

Particulate Matter – Particulate matter emissions are measured in three main size categories: total suspended particulate (TSP), 10 micrometers (PM_{10}), and 2.5 micrometers ($PM_{2.5}$). Smaller particles are likely responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract. $PM_{2.5}$ is the main cause of reduced visibility and cause the air to appear hazy

when levels are elevated. Project-related emissions would be associated with dust from cement on-site mixing as well as smaller emissions from aggregate, sand dust, and metal emissions.

Fugitive Dust – Fugitive dust is a type of particulate matter consisting of very small solid and liquid particles which become suspended in the air by the wind and human activities. Fugitive dust emissions are not emitted from a stack, vent, or other specific point that controls the discharge. Fugitive particulate matter would result from excavation, earthmoving, vehicle and equipment travel over unpaved roads and surfaces, and erosion of exposed earth or materials surfaces by the wind. For example, windblown dust is fugitive particulate matter. All fugitive dust emissions are regulated by the NAAQS for particulate matter. The NAAQS for PM_{10} is 150 µg/m^3 averaged over 24 hours. The NAAQS for $PM_{2.5}$ is 35 µg/m^3 averaged over 24 hours or 12 µg/m^3 averaged over 1 year.

Exhaust – Exhaust emissions would result from construction equipment, trucks, and workers' personal vehicles. Typical construction equipment includes excavators, dozers, loaders, dump trucks, and scrapers. Construction emissions would be temporary and only where construction is occurring at any given time or along roads traveled by construction vehicles.

Blasting – Blasting emissions would potentially result as part of building the turbine foundations depending on the type of soil encountered. If blasting was necessary, emissions generated could include CO, CO_2, NO_x, SO_2, and ammonia. However, the exact level of emissions would depend on the type of explosive being used and the type of material being blasted (MSHA 2014).

6.2.3.1 Construction Impacts

Particulate Matter and Fugitive Dust – Fugitive dust will be generated directly from construction activities. Construction activities that have been identified as having potential for generating fugitive dust are:

- Vehicle and motorized equipment movement on paved and unpaved access roads,
- Vegetation clearing, grubbing, and grading,
- Trenching and backfilling,
- Material loading, hauling, and unloading,
- Use of material storage piles,
- Excavation for turbine foundations,
- Use of parking, staging and storage areas.

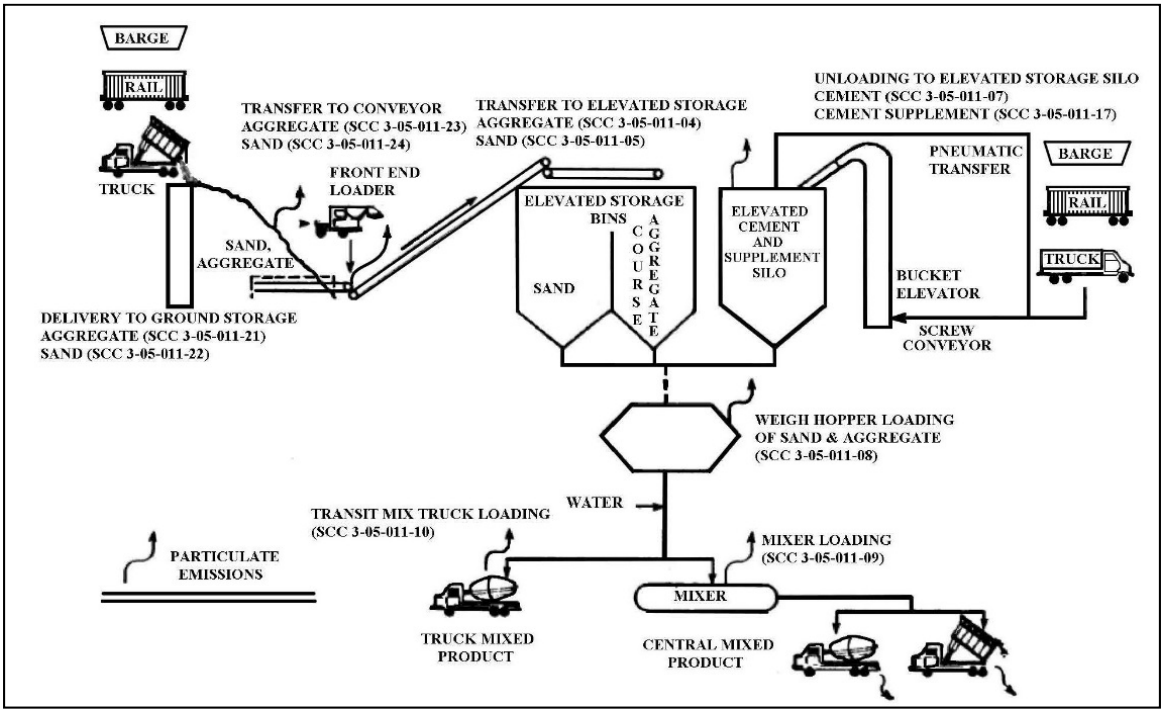
Particulate emission factors for concrete batching are detailed in Table 6-2 and Figure 6-1 and are expressed in pounds of pollutant per cubic yard of concrete. Particulate emissions associated with the mixing and transport of concrete are typically minor. Construction of the Project would result in minimal impacts to air quality from fugitive dust and particulates. Consequently, it would not represent a substantial impairment of health, safety, or welfare of the present or expected inhabitants of the Project Area or the regional airshed. Water trucks will be the primary means of dust abatement during all phases of construction. Water trucks will be used as appropriate during construction activities to wet the surface of access roads and potential work area sources of fugitive particulate matter. These measures are expected to reduce dust during construction to levels that have no significant impact on air quality, vegetation, or wildlife species (see Chapter 7).

Table 6-2. Estimated Emissions per cubic Yard of Truck-Mix Concrete

Component	Total Particulate Matter (PM_{10}) (lb/yd^3)	Fine Particulate Matter ($PM_{2.5}$) (lb/yd^3)
Aggregate Delivery to Storage Area	0.00289	0.00280
Sand Delivery to Ground Storage	0.00050	0.00048
Aggregate Transfer to Conveyer Belt	0.00289	0.00280
Sand Transfer to Conveyer	0.00050	0.00048
Aggregate Transfer to Elevated Storage	0.00289	0.00280
Sand Transfer to Elevated Storage	0.00050	0.00048
Cement Delivery to Silo	0.00002	0.00002
Cement Supplement Delivery to Silo	0.00001	0.00001
Weight Hopper Loading	0.00107	0.00104
Mixer Truck Loading	0.16130	0.15646
Total Dust Emissions per Yard of Concrete	0.17258	0.16740
Total Dust Emission for Project Concrete (56,000 yd^3)	**9,664.43**	**9,374.50**

Source: EPA 2006.
lb/yd^3 pound per cubic yard
$PM_{2.5}$ particulate matter size 2.5 micrometers
PM_{10} particulate matter size 10 micrometers

Figure 6-1. Typical Concrete Batching Process



Source: EPA 2006.

Exhaust – The effects of construction emissions on ambient air quality would vary with time due to the construction schedule, the mobility of the emission sources, the types of equipment in use, and local meteorology. As an example, typical construction related emissions from two loaders operating 12-hour days, 287 days per year (6 days per week) would equal approximately less than 1 ton of CO, SO_2, PM_{10}, and $PM_{2.5}$ in a year and less than 3 tons per year of NO_X emissions. Therefore, construction-related activities are not anticipated to lead to pollutant concentrations that would violate the NAAQS.

Blasting – The potential effects of construction related blasting emissions on ambient air quality would vary depending on the type of explosive device used and the material being blasted. If blasting were to occur, emissions would be minor and temporary due to the limited to the footprint of the proposed turbine (approximately 1.6 acres of disturbance per turbine).

6.2.4 Operation Emissions Sources and Impacts

The sources of pollutants during the operation of the Project would be fugitive dust emission resulting from operation and maintenance vehicles using unpaved, gravel access roads, use of maintenance equipment, watering roadways to reduce fugitive dust emissions, and workforce travel. These emissions would be minor compared with the level of activity that would be required to exceed NAAQS emissions thresholds. Thus, these emissions have not been quantified. No air emissions will be generated from operation of the WTGs nor the collector and interconnection substation.

Any fugitive dust generated from operation of workforce vehicles traveling within the Project Area would be minimal and variable based on work schedules. The minor emissions would be mitigated with watering of the access roadways as necessary to reduce excess amounts of fugitive dust (see Chapter 7). Any related emissions would not represent a substantial impairment of health, safety, or welfare of the present or future inhabitants in the Project Area or the area of site influence.

6.3 Noise

Noise is generally defined as an annoyance to humans and wildlife. Existing sources of noise within two miles of the study area include: traffic on County Road 61, U.S. 30, and Fetterman Road; ranching activities; and overhead aircraft.

6.3.1 Regulatory Jurisdiction

Project-related effects on ambient noise must be considered in the permit application process. As of this time, no numeric noise standards have been created at the state level. Federal and Albany County regulations are listed below:

- The Noise Control Act of 1972 protects the health and welfare of U.S. citizens from the growing risk of noise pollution, primarily from transportation vehicles, machinery, and other commerce products. Amended the Federal Aviation Act to involve the U.S. EPA in airport noise regulation. Increased coordination between federal researchers and noise control activities; established noise emission standards; and presented noise emission and reduction information to the public (EPA 2014).

- The Federal Transit Administration Transit Noise and Vibration Impact Assessment provides procedures and guidance for analyzing the level of noise and vibration, assessing the resulting impacts, and determining possible mitigation for most federally funded transit projects (Federal Transit Administration 2006).
- The Occupational Safety and Health Administration (OSHA), Occupational Noise Exposure Hearing Conservation Amendment (29 Code of Federal Regulations [CFR] Part 1910.95) sets duration limits for workers exposed to certain levels of sound. Mitigation measures are required when the permissible noise exposure limits are exceeded. Employers must take preventative measures such as hearing conservation programs, monitoring, or employee notification when an 8-hour time-weighted average of 85 dBA (referred to as the action level) occurs.
- Section 8 of the Albany County Wind Energy Siting Regulations states that noise associated with WECS operation shall not exceed 55 dBA as measured at any point along the common property lines between a non-participating property and a participating property. Subsection a states that this level may be exceeded during short-term events such as utility outages, severe weather events, and construction or maintenance operations. Subsection b states that this standard shall not apply along any portion of the common property line where the participating property abuts state or federal property. Subsection c states that noise levels may exceed the 55 dBA limit along common property lines if written permission, as recorded with the Albany County Clerk, is granted by the affected adjacent non-participating property owners.

6.3.2 Area of Site Influence

The area of site influence for noise consists of the proposed turbine arrays and a 2-mile radius surrounding the Project Area that could be subject to increased noise levels.

6.3.3 Characteristics of Sound

Sound can be measured through a variety of methods which are dependent on the objectives of the study, source of the noise, and the receiver. Table 6-3 provides definitions of terms commonly used to describe sound levels and measurements.

Table 6-3. Definition of Acoustical Terms

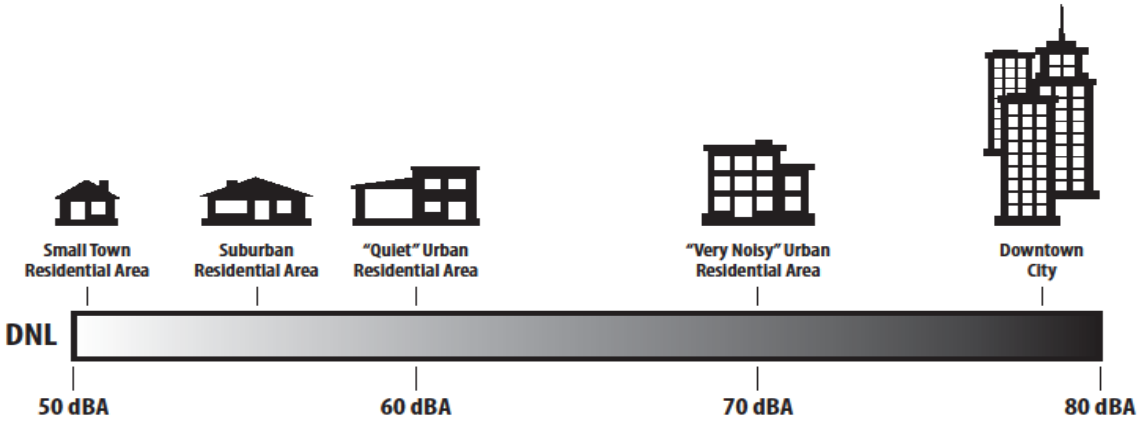
Term	Definition
Ambient noise level	Sum of all noise (from human and naturally occurring sources) at a specific location over a specific period.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals (µPa).
A-weighted sound pressure level (dBA)	Adjustable measure of noise level that approximates the frequency response of the human ear.
Day-night average noise level (DNL)	Energy average of A-weighted decibels sound level over a 24-hour period; includes a 10-decibel adjustment factor for noise between 10 p.m. and 7 a.m. to account for greater sensitivity to noise during the night.
Hertz (Hz)	A unit of measurement of frequency; the number of cycles per second of a periodic waveform.

Term	Definition
Infrasound	According to the International Electrotechnical Commission's (IEC's) IEC 1994, infrasound is: Acoustic oscillations whose frequency is below the low-frequency limit of audible sound (about 16 Hz). However this definition is incomplete as infrasound at high enough levels is audible at frequencies below 16 Hz.
L_{max}	Maximum sound level during a measurement period or a noise event.
Low-frequency Sound	Sound in the frequency range that overlaps the higher infrasound frequencies and the lower audible frequencies, and is typically considered as 10 Hz to 200 Hz, but is not closely defined.

Source: Colby et al. 2009.

Figure 6-2 shows the relative day-night average noise level (DNL) sound levels of common sounds measured in the environment.

Figure 6-2. Typical Day-Night Average Noise Levels



Source: U.S. Environmental Protection Agency 1974.

6.3.4 Construction Impacts

Noise from construction equipment is shown in Table 6-4. Specific information about types, quantities, and operating schedules of the Project construction equipment is not available at this time; therefore, data from the U.S. Environmental Protection Agency (EPA) has been used to show the total composite noise level at a reference distance of 50 feet, based on the pieces of equipment operating for each construction phase and the typical usage factor for each piece (EPA 2006). The U.S. EPA did not consider the attenuation related to the presence of structures, trees or vegetation, ground effects, and terrain.

Table 6-4. Composite Construction Site Noise Level

Construction Phase	Composite Equipment Noise Level at 50 ft. (dBA)	Composite Equipment Noise Level at 1,500 ft. (dBA)
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

Source: EPA 1971.
dBA A-weighted decibels
ft. feet

The Project's major construction activities would be temporary (approximately 24 months) and would generally be limited to daytime hours. The distance from the project boundary to the nearest residence is approximately two miles (10,062 feet). Therefore, based upon the information provided in the tables referenced above, sound levels resulting from construction of the Project will not adversely affect the environment nor the health and safety of area residents, nor would construction violate Albany County noise regulations.

Blasting would result in a one-time high instantaneous noise level increase. If blasting were to occur during construction, ground vibrations can be reduced by restricting the timing of blasting, changing the direction of blasting zone, blast mats, avoiding blasting during severe weather conditions, and integrating delays into the detonation sequence (New Zealand Transport Agency 2014). Impacts related to this Project are expected to be minor and temporary due to the limited area of blasting (approximately 1.6 acres per turbine) and the distance of the closest residence from the turbines (approximately 2.5 miles).

6.3.5 Operation Impacts

Noise associated with wind turbines is generated from either a mechanical or aerodynamic (infrasound) mechanism. Mechanical sound originates from the gearbox and control mechanisms and is reduced by standard noise control techniques. Infrasound generated by the proposed Project wind turbines is expected to be 50 to 70 dBA in the immediate vicinity of the turbines, which would not be capable of projecting out to the closest residence located over 2.5 miles away from the closest turbine (Colby et al 2009). This is due to local factors such as the topography of the area, average temperature, and wind speed which would dilute the level of sound emitted from the turbine the further it has to travel to reach a receptor. The anticipated noise levels decreases with increasing distance from the project. Such levels would likely be unnoticeable at these residences and would not violate Section 8 of Albany County regulations. Under calmer turbine wind conditions, the turbines emit less noise and the expected levels would be less than those described above or depicted on the map. Under higher wind conditions, much of the sound emitted by the turbines would be drowned out by the noise created by the wind itself.

A study conducted on wind turbine sound and health effects concluded that impacts to workers on wind turbines would be negligible because the levels considered sufficiently high to cause hearing loss are higher than one could experience in the vicinity of wind turbines. For example, prolonged, unprotected high exposure to noise at levels greater than 90 dBA is a risk for hearing loss in

occupational settings such that OSHA established this level for hearing protection. Sound levels from wind turbines would be less than 90 dBA. A conservative estimate for wind turbine noise affecting members of the operation and maintenance workforce would be 50 dBA at a distance of 1,500 feet (Colby et al 2009). Any Project related sound level emissions would not represent a substantial impairment of health, safety, or welfare of the present or future inhabitants in the Project Area or the area of site influence.

6.4 Geology and Soils

This section describes aspects of the geologic setting, geologic hazards and soil characteristics, and faults and seismicity that could affect or be affected by the Project. Refer to Chapter 7 for mitigation measures that would be applied to avoid or minimize potential impacts related to geology and soils.

6.4.1 Regulatory Jurisdiction

Regulatory jurisdiction over geology and soils is indirect and relates primarily to the potential effects of Project-related soil erosion on water quality (as described in Section 6.6 *(Surface and Groundwater Resources)* or public health and safety concerns related to engineering constraints or geologic hazards (discussed herein). Regulatory jurisdiction over fossils is limited to public lands and is therefore not applicable to this Project.

6.4.2 Area of Site Influence

The area of site influence for geology and soils is the Project Area because all potential impacts to these resources are anticipated to result from Project-related surface disturbances. Seismic hazards are assessed on a regional scale due to the ability of seismic waves to propagate over long distances.

6.4.3 Geologic Setting

The Project Area lies near the eastern edge of the Wyoming Basin physiographic region, where it abuts the Southern Rocky Mountains physiographic region. Within the Wyoming Basin, the Project Area is situated in the northern Laramie Basin, which formed during the crustal deformation of the Laramide orogeny from the Late Cretaceous to the Middle Paleocene. The Project Area is bordered by the Shirley Mountains to the northwest, the Shirley Basin to the north, and the Laramie Mountains to the northeast.

6.4.3.1 Bedrock Geology

Bedrock geology of the Project Area was determined using the U.S. Geologic Survey (USGS) 1:500,000-scale *Geologic Map of Wyoming* (Love and Christiansen 1985) and is depicted in relation to proposed Project facilities on Map 6-1 in Appendix A. The Project Area contains seven mapped bedrock units (not including Quaternary surficial units) ranging in age from Early Mississippian (approximately 350 million years ago) to Late Cretaceous (approximately 70 million years ago). The north-central and northeast section of the Project Area contains the oldest, most weathered bedrock (i.e., Madison Limestone and Goose Egg Formation), which has been uplifted toward the Laramie Mountains and outcrops at the surface in some areas. Bedrock units in other portions of the Project Area are typically covered by soils and surficial deposits.

Table 6-5 lists the six mapped bedrock units in the Project Area from youngest to oldest. Most of the proposed turbine foundations would be constructed atop the Chugwater Group or Formation and Cloverly, Morrison, and Sundance Formations, which are the most prevalent bedrock units within the Project Area. Some turbine foundations may also be constructed atop the Niobrara Formation.

Table 6-5. Bedrock Units in the Area of Site Influence

Bedrock Unit	Map Symbol	Age	Description
Niobrara Formation	Kn	Late Cretaceous	Light-colored limestone and gray to yellow speckled limy shale.
Frontier Formation	Kf	Late Cretaceous	Gray sandstone and sandy shale.
Mowry and Thermopolis Shales	Kmr	Early Cretaceous	Silvery-gray hard siliceous shale containing abundant fish scales and bentonite beds (Mowry Shale) and black soft fissile shale with Muddy Sandstone Member at top (Thermopolis Shale).
Cloverly, Morrison, and Sundance Formations	KJs	Middle Jurassic to Early Cretaceous	Rusty sandstone at top, underlain by brightly variegated bentonitic claystone; chert-pebble conglomerate locally at base (Cloverly Formation); dully variegated claystone, nodular limestone, and gray silty sandstone (Morrison Formation); and greenish-gray glauconitic sandstone and shale, underlain by red and gray nonglauconitic sandstone and shale (Sundance Formation).
Chugwater Group or Formation	Trc	Early Triassic	Red shale and siltstone containing thin gypsum partings near base; includes members of the following units: Popo Agie Formation (red shale and red, yellow, and purple siltstone; lenses of lime-pellet conglomerate), Crow Mountain Sandstone (red and gray, thick bedded), Alcova Limestone, and Red Peak Formation (red siltstone and shale).
Goose Egg Formation	TrPg	Early Triassic and Permian	Red sandstone and siltstone, white gypsum, halite, and purple to white dolomite and limestone.
Madison Limestone	PIPM	Mississippian	Lower unit of gray to dark-gray argillaceous to shaly or silty, in places cherty, thin- to medium-bedded limestone (Lodgepole Limestone) and a middle unit of generally thick- to massive-bedded fossiliferous to oolitic carbonate rock (Mission Canyon Limestone).

Source: Love and Christiansen 1985.

6.4.3.2 Surficial Geology

Surficial geology of the Project Area was determined using the Wyoming State Geological Survey (WSGS) 1:100,000-scale *Preliminary Surficial Geologic Map of the Rock River 30' X 60' Quadrangle* (Halberg and Case 2005). The Project Area contains 16 mapped surficial units (not including soils). These surficial units have been grouped into nine categories for ease of interpretability, which are depicted in relation to proposed Project facilities on Map 6-2 in Appendix A. Surficial deposits in the northeastern portion of the Project Area consist primarily of bedrock and residuum (symbols 1402, 1501, and 1503 on Map 6-2 in Appendix A). Residuum consists of residual material left in place from the weathering of consolidated bedrock. Flowing water and other weathering processes have deposited slopewash (symbols 1101, and 1102) and alluvium (symbol 101) in drainage channels that flow southwest over gently sloping terrain. Slopewash consists of clay to cobble-sized material moved downslope through overland flow; alluvium refers to materials deposited on land by streams. Eolian deposits, which consist of sandy material accumulated in dunes or loess through wind action, cover much of the Project Area outside of drainage channels. Playa (symbol 1001) and bench (symbol 401) deposits are also present, but have no or minimal overlap with proposed Project facilities.

6.4.3.3 Paleontology

The Bureau of Land Management (BLM) has developed a Potential Fossil Yield Classification (PFYC) system to assess the potential for the occurrence of significant paleontological resources by bedrock geologic units (BLM 2007). Although PFYC is primarily used to assess public lands, it provides a useful index to assess the likelihood that bedrock units on private lands in the Project Area contain fossils. Map 6-3 in Appendix A depicts the PFYC of bedrock units in the Project Area in relation to proposed Project facilities.

Under the PFYC system, the BLM classifies the Goose Egg Formation as Class 2, indicating "sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils." The Chugwater Group or Formation; Frontier Formation; and the Mowry and Thermopolis Shales are classified as PYFC Class 3, indicating the presence of "fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential." PYFC Class 3 formations may be exposed or shallowly-buried in the north-central portion of the Project Area. The Cloverly, Morrison, and Sundance Formations are classified as PFYC Class 4, which indicates variable, but generally high occurrence of vertebrate fossils or scientifically significant invertebrate or plant fossils that could be adversely affected by surface-disturbing activities." PYFC Class 4 formations in the Project Area are typically flat-lying and covered by surficial geologic deposits and soils.

6.4.3.4 Soils

Surficial soils in the Project Area were identified using the National Resource Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database (NRCS 2015). Map 6-4 in Appendix A depicts soil map units within the Project Area in relation to proposed Project facilities. The Project Area contains soil with predominantly sandy loam, fine sandy loam, or loam textures that are well-drained and located on slopes between 0 and 8 percent. Slopes as steep as 70 percent may be present in localized areas along drainage systems or rock outcrops; however, no facilities are proposed for construction on steep slopes.

The most prevalent soils within the Project Area include Anchutz sandy loam, 1 to 8 percent slopes (symbol 110 on Map 6-4 in Appendix A); Wycolo-Alcova complex, 3 to 10 percent slopes (symbol 241); Joemre fine sandy loam, 3 to 6 percent slopes (symbol 174); Rohonda-Tieside complex, 3 to 10 percent slopes (symbol 222); Alcova, calcareous subsoil-Rock River complex, 0 to 8 percent slopes (symbol 104); and Alcova, shallow substratum-Lupinto-Dahlquist complex, 0 to 8 percent slopes (symbol 103). No soils within the Project Area meet state or federal criteria as prime farmland soils. Section 6.4.4 *(Geologic Hazards and Soil Characteristics)* further describes physical properties of soils relevant to the proposed Project.

6.4.4 Geologic Hazards and Soil Characteristics

This section describes how geologic hazards and soil resources could affect or be affected by the Project. Table 6-6 identifies select physical properties of soils within the proposed Project footprint (i.e., the soils that are most likely to be disturbed during construction) that may increase their susceptibility to erosion or may require additional site preparation or design considerations to overcome limitations for development.

Table 6-6. Select Physical Properties of Surficial Soils in Areas of Proposed Project-related Surface Disturbance

Soil Series	Map Symbol	Texture	Slopes (%)	Soil Erodibility Factor (Kw)[a]	Wind Erodibility Group[b]	Shrink/ Swell Potential
Anchutz sandy loam	110	sandy loam	1 to 8	0.2	3	moderate
Alcova, shallow substratum-Lupinto-Dahlquist	103	loam	0 to 8	0.05	6	moderate
Wycolo-Alcova complex	241	fine sandy loam	3 to 10	n/a	3	moderate
Joemre fine sandy loam	174	fine sandy loam	3 to 6	0.28	3	low
Alcova, calcareous subsoil-Rock River complex	104	sandy loam	0 to 8	0.05	3	moderate
Rohonda-Tieside complex	222	fine sandy loam	3 to 10	n/a	3	low
Rock River sandy loam	216	sandy loam	2 to 6	0.24	3	moderate
Alcova-Borollic Camborthids complex	102	sandy loam	0 to 8	0.1	3	moderate

Source: NRCS 2015.

[a] Values of the soil erodibility factor (K) range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Values shown in the table reflect KW, which measures the erodibility of the whole soil.

[b] A wind erodibility group consists of soils that have similar susceptibility to wind erosion when under cultivation. The soils assigned to Group 1 are the most susceptible to wind erosion, and those assigned to Group 8 are least susceptible.

Kw soil erodibility factor, whole soil

6.4.4.1 Soil Erosion

The soil erodibility factor (K_W) quantifies the susceptibility of a soil (include rock fragments) to erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. In general, soils with high silt content exhibit the least cohesion and are the most susceptible to erosion. As shown in Table 6-6, the erodibility factor ranges from 0.05 to 0.28 for major soil types within the proposed Project footprint, indicating low to moderate erosion potential (NRCS 2015). Soils with moderate to high erosion potential are present within limited areas of the proposed Project footprint, including Luhon loam, 1 to 5 percent slopes (erodibility factor of 0.43; symbol 184 on Map 6-4 in Appendix A), Forelle-Diamondville association, 3 to 15 percent slopes (erodibility factor of 0.37; symbol 165), and the Stunner-Borollic Camborthids complex, 2 to 5 percent slopes (erodibility factor of 0.37; symbol 229). Localized areas with high erosion potential may also exist in within soil map units with generally low to moderate erosion potential due to site-specific variations in soil characteristics and slope.

The wind erodibility group represents the susceptibility of a soil to erosion by wind. The soils assigned to Group 1 are the most susceptible to wind erosion, and those assigned to Group 8 are least susceptible. As shown in Table 6-6, the major soils types within the proposed Project footprint range are assigned to Group 3 or Group 6, which indicates moderate to low susceptibility wind erosion, respectively. No soils in the Project Area are classified as having high susceptibility to wind erosion.

6.4.4.2 Soil Shrink/Swell Potential

A soil's tendency to shrink or swell in response to changes in moisture content varies based on its chemical composition. Soils with high clay content are especially prone to large changes in volume. Structures or roads built on shrinking or swelling soils could be damaged by changes in soil volume. Linear extensibility is a quantitative coefficient used to measure a soil's change in volume as its moisture content is decreased from a moist state to a dry state. Shrink-swell potential is considered low if the soil has a linear extensibility of less than 3 percent; moderate if it is 3 to 6 percent; high if it is 6 to 9 percent; and very high if it is greater than 9 percent.

Major soil types within the proposed Project footprint have linear extensibility coefficients between 1.5 and 4.5 percent, indicating low to moderate shrink/swell potential (NRCS 2015). No soils with high shrink/swell potential are located within the proposed Project footprint.

6.4.4.3 Soil Collapse Potential

Certain soils, particularly those composed primarily of sand or silty loess, have the potential for collapse and settlement when wetted or loaded by foundations or structures. Collapse potential is most generally most reliably assessed through soil compaction tests. Loose to very loose sandy soils that are susceptible to collapse may be present within portions of the Project Area and would be identified and characterized during the final design geotechnical investigation.

6.4.4.4 Soil Corrosion Potential

The rate at which a given soil will corrode concrete or steel is related to a range of physical and chemical properties, including sulfate and chloride content, clay percentage and type, soil resistivity,

moisture content, and pH. Most soils in the Project Area exhibit low to moderate potential to corrode concrete and moderate to high potential to corrode steel (NRCS 2015). Soils with high potential to corrode both concrete and steel that present in the wind turbine development areas include Alogia loam, 0 to 3 percent slopes (symbol 108 on Map 6-4 in Appendix A) and Luvar-Stylite-Diamonkit complex, 1 to 8 percent slopes (symbol 185).

6.4.4.5 Soil Limitations for Road Building

The NRCS classifies soils in the Project Area are rated as "somewhat limited" to "very limited" for the development of local roads (NRCS 2015). A rating of "somewhat limited" indicates that the soil has characteristics that are moderately favorable for road building and that limitation can generally be overcome or minimized by incorporating specific measures into planning, design, or construction. Fair performance and moderate maintenance can be expected. A rating of "very limited" indicates that the soil has one or more features that are unfavorable for the specified use. These limitations can generally be overcome through extensive planning and design and costly installation procedures. Poor performance and high maintenance can be expected. Soils present in the Project Area received these ratings based primarily on slope grade, frost action, depth to bedrock, dust generation potential, and the amount of large stones present.

6.4.4.6 Landslides

A review of maps published by the WSGS did not identify any landslides within the Project Area (Larsen and Wittke 2013; Halberg and Case 2005). Localized areas, particularly in steep-sided gullies, may be subject to surficial slumping and streambank failures during large runoff events.

6.4.4.7 Mining

No mining activities, past or present, were identified within the Project Area based on a review of USGS 7.5 minute topographic quadrangles (USGS 2015a-d) and various sources of aerial imagery. As discussed in Section 2.6, a report detailing mineral ownership compiled by K2 Land and Minerals Company LLC for the Project Area indicates a total of ten owners of oil, gas, and minerals as well as bentonite. These minerals owners were notified via letters and posting in the local newspaper regarding the intent to develop the Project. Additional information on these notifications is provided in Section 4.2.3 and Appendix E.

6.4.4.8 Oil and Gas

The records of the Wyoming Oil and Gas Conservation Commission (WOGCC) indicate the presence of a single plugged and abandoned oil well in Section 12 of Township 22 North, Range 76 West (WOGCC 2015). The well was drilled in 1957 and no production was reported. As discussed in Section 2.6, a report detailing mineral ownership compiled by K2 Land and Minerals Company LLC for the Project Area indicates a total of ten owners of oil, gas, and minerals as well as bentonite. These minerals owners were notified via letters and posting in the local newspaper regarding the intent to develop the Project. Additional information on these notifications is provided in Section 4.2.3 and Appendix E.

6.4.5 Faults and Seismicity

This section discusses the extent to which seismic hazards could affect the Project based on historical seismicity, deterministic analysis of active faults, probabilistic seismic hazard analysis, and floating or random earthquakes analysis.

6.4.5.1 Seismicity

The *Basic Seismological Characterization for Albany County, Wyoming* identifies 30 earthquakes with magnitudes 3.0 or greater that occurred in Albany County between 1882 and 2002 (Case et al. 2002). Earthquakes with estimated Modified Mercalli Intensity scales up to intensity VII have occurred during this time period, but only minor damage has been reported. No earthquakes with magnitudes 3.0 or greater have been recorded in Albany County since 2000 (USGS 2015e; Northern California Earthquake Data Center 2015). The nearest mapped earthquake epicenters are located approximately 20 miles north of the Project Area in the Laramie Mountains and are associated with a series of earthquakes up to intensity VI that occurred in northern Albany County between 1983 and 1986.

The USGS *2014 Wyoming Seismic Hazard Map* indicates that locations within the Project Area could experience peak accelerations from 16 to 18 percent gravity at an estimated 2,500-year recurrence interval (2 percent probability of exceedance in 50 years). This would be equivalent to an intensity VI to VII earthquake. An intensity VI earthquake is generally felt by all and can move heavy furniture but causes slight damage. An intensity VII earthquake results in negligible damage to buildings of good design and construction. Localized ground accelerations could be greater in areas with loose, unstable, or unconsolidated soils.

Additional earthquake potential exists from random, or floating, earthquakes, which may occur in areas where active faults are buried and have no surface expression. The floating earthquake analysis for the region estimates that the largest floating earthquake would have a magnitude between 6.00 and 6.50 (Geomatrix 1988). A floating earthquake of this magnitude, placed 10 miles from any structure, would generate peak horizontal acceleration of approximately 15 percent gravity at the site.

6.4.5.2 Faults

The USGS Quaternary Fault and Fold Database shows one suspected active fault, the South Granite Mountains fault system, approximately 45 miles to the northwest of the Project Area boundary (USGS 2006). This fault is classified as a Class B fault—a fault for which Quaternary deformation is suspected, but for which insufficient evidence has been gathered to support this determination. The *Geologic Map of Wyoming* depicts other inactive faults within 10 miles of the Project Area boundary (Love and Christiansen 1985); however, no surface fault ruptures exist within the Project Area.

6.4.6 Construction Impacts

As mentioned previously, regulatory jurisdiction over geology and soils is indirect and relates primarily to the potential effects of Project-related soil erosion on water quality or public health and safety concerns related to engineering constraints or geologic hazards. These impacts are described in the sections that follow. Chapter 7 identifies additional controls, mitigation, and monitoring measures that would be implemented to reduce impacts to geology and soils.

Soil Erosion

The construction of proposed Project facilities would result in the disturbance and excavation of soils, which could increase their susceptibility to erosion and result in the mixing of soil horizons and soil compaction. Proposed access roads, turbine foundations, and substation would account for the majority of Project-related soil disturbances. The maximum depth of soil excavation would be approximately 8 feet at each turbine foundation. Most soils within the proposed Project footprint have low to moderate erosion potential based on a review of NRCS soil data; however, soils with high erosion potential may exist in localized areas (see Section 6.4.4.1 *[Soil Erosion]*). Best management practices (BMPs) put in place during construction, including the design or siting of facilities to avoid or mitigate impacts to soils susceptible to erosion, and the installation and maintenance of permanent erosion control devices, such as culverts, ditches, and slope stabilization measures, would ensure that Project construction activities would result in minimal soil erosion. Standard dust control practices would be applied to minimize fugitive dust generation and attendant wind erosion from roadways and other non-vegetated surfaces during construction.

As indicated in Table 3-2, Boswell Wind would be required to prepare a SWPPP and associated Notice of Intent (NOI) for the Project, in accordance with the WYPDES General Stormwater Construction Permit. Adherence to the provisions of the General Stormwater Construction Permit would ensure that Project construction practices incorporate BMPs designed to minimize soil loss and degradation and achieve reclamation standards. In addition, the SWPPP would identify the types and locations of Project-specific erosion controls that would be installed during construction and should include additional provisions for soils with high erosion potential (see Section 7 *(Controls, Environmental Protection Measures, and Monitoring)* for additional mitigation measures that would be implemented to limit soil erosion).

The construction of turbines and other Project facilities may require disturbance or excavation of surficial deposits and bedrock in certain locations, dependent upon the conditions present at each site. These activities may result in minor physical alterations or relocation of geologic materials and strata, but would otherwise have no notable effects. Boswell Wind does not anticipate that Project construction would require blasting, but would comply with all applicable regulations should the need arise.

Geologic units in the Project Area with highest potential to contain significant fossils (PFYC Class 4) are typically covered by soils and surficial deposits and are unlikely to be affected by Project construction. Geologic units with variable or unknown potential to contain significant fossils (PFYC Class 3) are generally closer to the surface and could be affected by Project construction; however, there are no mechanisms in place to regulate activities that may affect fossils private lands. On public lands, pre-construction surveys are typically required for exposed bedrock classified as PYFC Class 4 and may be required for Class 3 formations for exposures or settings that have high potential to contain vertebrate fossils.

Engineering Constraints and Geologic Hazards

All proposed turbine foundations and the substation would be constructed on flat or gently sloping terrain in upland areas underlain predominately by bedrock or surficial deposits consisting primarily of residuum or eolian deposits. Access roads have been sited to avoid traversing unfavorable soils wherever possible. Some proposed access roads and buried collection lines would cross areas of slopewash and alluvium that are subject to periodic flooding and may require deeper

foundations. The proposed turbines, maintenance building, and substation would be supported on properly designed and engineered foundations. Specific foundations designs would be determined during the final design geotechnical investigation based on site-specific soil characteristics. The subsurface conditions at every turbine site can have variable soil properties that influence the engineering design and construction. A detailed geotechnical investigation and testing program would be conducted to evaluate the engineering properties of the soils and measure groundwater levels at each proposed Project structure. The geotechnical investigation would consist of a combination of soil borings, rock coring, geophysical investigations, and test pits. Shallow sampling (upper 5 feet of soil) is typically targeted for access roads, crane walk paths, crane pad design, and collector cable design. Deeper sampling (up to 50 feet) would be used to evaluate foundation conditions for each turbine location. Samples collected during the investigation would be tested for engineering properties including compressive strength, Atterberg limits, grain size, and moisture content. Geotechnical analyses would be used to calculate bearing capacity of the soils and bedrock and conduct stability analysis of the turbines.

Soil improvements or over-excavation may be required for certain soils, particularly those within the proposed Project footprint that the NRCS identifies as having high susceptibility to erosion (see Section 6.4.4.1 *[Soil Erosion]*), high corrosion potential (see Section 6.6.4.4 *[Soil Corrosion Potential]*), or major limitations for road building (see Section 6.4.4.5 *[Soil Limitations for Road Building]*). Construction on these soils, or other areas that are determined to have engineering constraints during the final design geotechnical investigation, may require additional design measures to mitigate erosional hazards. Additional soil-related factors that would be investigated in detail during the final design geotechnical investigation include:

- Soil strength and other properties that affect roadway design and performance and ability to accommodate anticipated traffic loads
- Suitability of native soils and bedrock materials as structural fill for crane pads and the need for soil improvements
- Slope stability at turbine locations and other Project facilities (e.g., potential for rapid erosion, bank failures, or channel migrations)

Historic seismicity records and probabilistic hazard analyses suggest that seismic activity in the vicinity of the Project Area is infrequent and unlikely to damage properly designed structures. For new construction, the facilities and turbine foundations would be assigned a seismic site class based on soil properties and would be designed for the maximum considered earthquake (MCE), according to the International Building Code (IBC). These seismic design considerations would be fully addressed during the final design geotechnical investigation.

Localized geologic or soil characteristics may impact the design or siting of certain Project facilities; however, these impacts would be investigated and mitigated appropriately during final design geotechnical analysis. No impacts associated with geologic hazards such as earthquakes or landslides that would substantially impair the health, safety, or welfare of inhabitants or expected inhabitants are anticipated to occur as a result of Project construction. No landslides, mines, or active oil and gas wells were identified in the Project Area and, therefore, would not affect or be affected by the Project.

6.4.7 Operation Impacts

Continued maintenance of permanent erosion control BMPs and culverts installed during or post-construction would ensure ongoing operational activities would result in minimal soil erosion. Standard dust control practices would be used to minimize fugitive dust generation and attendant wind erosion from roadways and other non-vegetated surfaces during operations. Impacts to geology and soils during the operational phase of the Project would be negligible.

6.5 Water Supply: Yield and Analysis

This section identifies anticipated water sources and estimates the quantity of water to be used for Project construction and ongoing operations.

6.5.1 Regulatory Jurisdiction

If an applicant for an Industrial Siting Permit plans to construct a facility that will use more than 800 acre-feet (260.7 million gallons) of water per year, the applicant must submit a water supply and water yield analysis to the Wyoming State Engineer's Office (WSEO). The State Engineer would then review the analysis and "render a preliminary opinion as to the quantity of water available for the proposed facility." This preliminary opinion would be made available for public comment, and the State Engineer would consider submitted comments in preparing a final opinion. The State Engineer's final opinion is binding on the Industrial Siting Council (W.S. §35-12-108).

In Wyoming, water may be appropriated from an existing right holder, such as a municipal water source, in accordance with a Temporary Water Use Agreement between the water user and water right holder (W.S. 41-3-110). This contract must identify the source of the water, the amount of the appropriation, and the proposed temporary use, and is subject to approval by the WSEO. The duration of the temporary water use may not exceed two years, at which point a new agreement is required.

Development of new water supply wells requires an applicant to obtain an approved Permit to Appropriate Ground Water from the WSEO prior to the commencement of any drilling or completion activities (W.S. 41-3-930). The applicant must identify the location and beneficial use of the proposed appropriation. After the well is completed, the applicant must submit a statement of completion and description of the well, as well as provide proof of the appropriation and beneficial use.

In 1997, Colorado, Wyoming, Nebraska, and the Department of Interior partnered together to develop a shared approach to managing the Platte River. The result was the Platte River Recovery Implementation Program. The primary objectives of the program are to increase stream flows in the central Platte River during certain time periods through retiming and water conservation/supply projects; enhancing, restoring and protecting habitats for target bird species; and accommodating certain new water-related activities. Under the program, new water-related activities in the Platte River basin of Wyoming that have a federal nexus (e.g., a Section 404 permit), may require coverage under Section 7 of the Endangered Species Act (ESA). Activities likely to require coverage are new or expanded wells, reservoirs, or diversions whose water supply is solely derived from sources that are considered "hydrologically connected" to the Platte River and that meet or exceed the *de minimus* threshold of 0.1 acre-foot per year of depletions in flow to the nearest surface water

tributary to the Platte River system. These activities require the applicant to conduct a depletions analysis and seek streamlined ESA consultation through the Platte River Recovery Implementation Program or conduct independent Section 7 consultation with the USFWS.

6.5.2 Area of Site Influence

The area of site influence for water used for construction and operation of the Project is the North Platte River Basin, which is the major hydrologic basin from which water would be appropriated for use.

6.5.3 Construction Water Use

Water used during Project construction would be obtained from the Rock River municipal water supply, an existing senior water right holder, in accordance with a WSEO Temporary Water Use Agreement. Additional water may be obtained from the town of Medicine Bow municipal water supply if needed. This water would be transported to the Project Area by truck and put to immediate use or placed in a temporary water storage tank.

The primary use of water during construction would be for compaction and dust control on Project access roads. Based on reasonable assumptions for construction water uses using a conceptual layout of 170 turbines, an estimated 4,609,222 gallons of water would be applied for compaction and dust control of new access roads during the first year of construction with 13,827,665 gallons of water during the second year of construction. The actual amount of water applied to roads during construction would vary based on temperatures, humidity, wind speeds, and precipitation amounts.

In addition to the water used on Project access roads, the construction of each turbine foundation would require approximately 14,000 gallons of water per 400-cubic yard concrete foundation based on a conceptual layout of 170 turbines.

Table 6-7 shows that an estimated 65 acre-feet (21,056,912 gallons) would be required for Project construction activities, including 14 acre-feet (4,609,222 gallons) during the first year of construction, 50 acre-feet (16,312,735 gallons) during the second year of construction, and < 1 acre-foot (134,955 gallons) during the third year of construction. Based on the estimated construction water balance calculations, the Project would not exceed the 800 acre-foot per year threshold; therefore, the Project would not require a WSEO water supply yield analysis or opinion.

Table 6-7. Estimated Construction Water Use

Use	Construction Year 1	Construction Year 2	Construction Year 3	Total Construction Water Use
Concrete Mixing[a]	0 gallons	2,485,070 gallons	134,955 gallons	2,620,025 gallons
Access road compaction[b]	2,845,920 gallons	8,537,760 gallons	0 gallons	11,383,680 gallons
Access road dust control[c]	1,763,302 gallons	5,289,905 gallons	0 gallons	7,053,207 gallons
Total	**4,609,222 gallons (14 acre-feet)**	**16,312,735 gallons (50 acre-feet)**	**134,955 gallons (<1 acre-foot)**	**21,056,912 gallons (65 acre-feet)**

[a] Assumes 35 gallons of water per cubic yard of concrete, including up to 170 turbine foundations (400-cubic yard of concrete per each foundation) and 74,858 cubic yards of concrete associated with the substation, transformers, maintenance facility, and batch plant.

[b] Assumes an application rate of 232,320 gallons of water per mile over 12 miles of new access roads during construction year 1 and 37 miles during construction year 2.

[c] Assumes an application rate of 143,943 gallons of water per mile over 12 miles of new access roads during construction year 1 and 37 miles during construction year 2.

6.5.4 Operations

Daily water use would decrease substantially once the Project is operational. Boswell Wind would construct a new residential-type water supply well in the Project Area to support Project operations in accordance with a WSEO Permit to Appropriate Ground Water. Water usage is anticipated to be limited to the maintenance building for restrooms, sinks, hand washing stations, showers, internal/external hose, and dishwasher. Based on reasonable assumptions for water use and an estimated operations staff of 15 full-time employees, operational water use associated with the maintenance building would be approximately 435,445 gallons per year, or approximately 1 acre-foot (Table 6-8).

Table 6-8. Estimated Operations Water Use

Use	Frequency (occurrences per day)	Consumption per Use (gallons per occurrence)	Total Consumption (gallons per day)
Bathroom sinks	56	2	112
Toilet	56	2	112
Shower	14	17	238
Kitchen Sink	42	3	126
Dishwasher	0.5	10	5
Internal/external hose	30	15	450
Maintenance area sinks	30	5	150
Daily Usage	**-**	**-**	**1,193**
Annual Usage	**-**	**-**	**435,445**

According to WSEO "Green Area" maps, the proposed maintenance building location is in an area generally considered as "not hydrologically connected" to the Platte River (WSEO 2006). Therefore, development of a new water supply well at this facility is unlikely to require coverage under the

Platte River Recovery Implementation Program, which would be confirmed through the WSEO's review of Boswell Wind's Application for Permit to Appropriate Ground Water.

6.6 Surface and Groundwater Resources

This section describes potential impacts to surface and groundwater resources from the Project, which could result from instream construction and culvert installations, stormwater discharges and flooding, and inadvertent spills of fuels or hazardous materials. Refer to Section 6.5 *(Water Supply: Yield and Analysis)* for a discussion of the estimated amounts of water that would be used during Project construction and operations. Section 6.7 *(Wetlands and Waters of the U.S.)* specifically considers impacts to wetlands and waters of the U.S. Refer to Chapter 7 for mitigation measures that would be applied to avoid or minimize potential impacts to surface and groundwater resources.

6.6.1 Regulatory Jurisdiction

Potential impacts to water quality associated with construction and operation of the proposed Project are regulated under sections 401 and 402 of the Federal Water Pollution Control Act (now commonly referred to as the Clean Water Act) of 1972. In Wyoming, the WDEQ has been delegated jurisdiction over water quality by the EPA. Accordingly, the WDEQ Water Quality Rules and Regulations and the Wyoming Environmental Quality Act (W.S. § 35-11-102) provide primary jurisdiction over surface and groundwater quality in the state.

6.6.2 Area of Site Influence

The area of site influence for surface water resources includes the full extent of the sixth-level subwatersheds (12-digit Hydrologic Unit Code [HUC-12]) that intersect the Project Area. The area of site influence for groundwater resources includes the major hydrologic units identified in the vicinity of the Project Area. These areas encompass the hydrologically-connected surface and subsurface drainage basins in which Project-related impacts may be reasonably expected to occur.

6.6.3 Surface Water

The area of site influence is located within the North Platte River basin and contains five HUC-12 subwatersheds: Post Lake, Rock Creek Lakes, Sevenmile Creek, Soda Lakes, and Taylor Ditch-Rock Creek (NRCS et al. 2015). Watershed boundaries and surface water are depicted in relation to the proposed Project facilities on Map 6-5 in Appendix A. Most streams and overland flow in this area drain in a southwesterly direction to Rock Creek, which is located southwest of the Project Area and is a tributary to the Medicine Bow River, which flows to the North Platte River. The Soda Lakes subwatershed, which includes the northwest corner of the Project Area, is classified as a closed basin, meaning that no outlet is present, and all drainage is internal to the hydrologic unit.

Most natural streams and ponds within this area contain water only intermittently, as supplied by spring snowmelt, surface runoff from precipitation events, or groundwater. Spring Creek and Sevenmile Creek, which flow intermittently, are the only named drainages within the Project Area. Wheatland Reservoir #3 (commonly referred to as Post Lake) is the largest waterbody in this area, encompassing approximately 3,800 acres southwest of the Project Area boundary. Several small

lakes/ponds, irrigation ditches, stock water impoundments, and springs are also present in the area of site influence.

In its Wildlife Protection Recommendations for Wind Energy Development in Wyoming (Recommendations), the WGFD recommends that wind development proponents assess the potential for sediment impacts to aquatic habitats (WGFD 2010a). The recommended assessment method is the Watershed Assessment of River Stability and Sediment Supply (WARSSS) approach (Rosgen 2009). WARSSS is a three-phase methodology that identifies the processes responsible for significant changes in erosion, sedimentation, and related stream channel instability. The first phase of WARSSS is known as a reconnaissance-level assessment (RLA).

The RLA conducted for the Project determined that most sediments contributed by the generally low levels of soil disturbance and erosion occurring in the Project Area are trapped and filtered by six bermed impoundments (three along Sevenmile Creek and three along Spring Creek) before continuing downstream (AES 2016). The impoundments were originally constructed to provide water for cattle and have been present for decades. The construction of these impoundments and subsequent creek bed pooling and channel overflow were likely historic sources of erosion and sedimentation, but have largely stabilized in the decades since their construction. A copy of the RLA is provided in Appendix I *(Reconnaissance Level Assessment)*.

The Federal Emergency Management Agency (FEMA) National Flood Hazard Layer identifies several 100-year floodplains (1 percent annual chance of flooding) within the area of site influence (FEMA 2015). As shown on Map 6-6 in Appendix A, these floodplains occur primarily along Sevenmile Creek and Spring Creek or in the vicinity of intermittent ponds scattered throughout this area. Proposed access roads and buried collection lines would cross the 100-year floodplains in several locations.

Based on a review of the WDEQ's Section 303(d) list of impaired waters, there are no waterbodies listed as impaired in the area of site influence (EPA 2015b).

6.6.3.1 Construction Impacts

Potential impacts to surface waters from Project construction activities include direct disturbance in intermittent drainages, increased sediment contributions to streams during heavy runoff or flood events, and inadvertent releases of fuels or hazardous materials. With implementation of the measures described below and in Chapter 7, Project construction would not result in substantial impacts to the environment nor the social and economic condition of current or expected inhabitants in the area of site influence.

Instream Construction and Culvert Installation

The construction or improvement of access roads and buried collection lines would result in the direct disturbance of soils within intermittent stream beds in the Project Area, including Sevenmile Creek and Spring Creek. Boswell Wind's proposed improvements to existing roads at crossings of Sevenmile Creek and Spring Creek (up to four locations), include widening, stabilization, and culvert installation to facilitate the passage of heavy equipment and crane walks. These improvements could result in new sources of erosion and sedimentation. However, Boswell Wind's implementation of WGFD Recommendations to prevent erosion and sedimentation of streams, the Project-specific SWPPP, Section 404 permitting requirements, and the mitigation measures listed in Chapter 7 would minimize new erosion and sedimentation and provide an opportunity for repair

and restoration of any erosional areas already present. In addition, Boswell Wind anticipates that instream construction activities can be completed during low-flow periods and when the potential for large runoff events is low, which would minimize the potential for these impacts to occur. Any work within jurisdictional wetlands and other waters of the U.S. would be conducted in accordance with Sections 404 and 401 permits of the Clean Water Act (CWA), as described in Section 6.7 *(Wetlands and Waters of the U.S.)*.

The RLA for the Project determined that only the southwestern corner of the Project Area, downstream of the six impoundments within the Project Area, could be a source of sedimentation into Rock River; however, because no facilities are proposed in this area, the Project would not increase sediment contributions to Rock River. Based on these findings, the RLA concluded that future wind development will have "little to no effect" on water quality or erosion and no areas, subwatersheds, or streams in the Project Area require further evaluation at the second level of the WARSSS methodology —the Rapid Resource Inventory for Sediment and Stability Consequence (RRISSC)assessment (AES 2016). A copy of the RLA is provided in Appendix I *(Reconnaissance Level Assessment)*.

Stormwater Discharges and Flooding

A SWPPP would be developed for the Project to identify specific erosion measures and BMPs to reduce or attenuate stormwater discharges in accordance with the requirements of the WYPDES Large Construction General Permit. Potential erosion control measures may include the use of sediment barriers, ditches, culverts, and temporary seedings. Implementation of the SWPPP would reduce or eliminate the potential for increased sediment loading to nearby streams due to vegetation removal and soil disturbance associated with Project construction activities.

Certain Project facilities may be at risk for inundation during a 100-year storm events (Map 6-6 in Appendix A). Flood hazard potential would be assessed in detail for any facilities located within 100-year floodplains during final design geotechnical investigation and mitigating design features would be incorporated as needed.

Inadvertent Spills of Fuels or Hazardous Materials

To prevent the release of petroleum products, fuel storage areas would be managed and controlled in accordance with federal Project Area standards and state regulations. Implementation of BMPs such as proper labeling and storage, secondary containment, and inspection, as required by the WYPDES General Stormwater Construction Permit, would reduce the potential for accidental release of hazardous materials to water resources. Boswell Wind would also develop and implement a Project Spill Prevention, Control, and Countermeasure Plan (SPCC) during construction to minimize the risk of inadvertent releases and would outline specific steps to contain and remediate spills, should they occur.

6.6.3.2 Operations Impacts

Boswell Wind would operate the proposed Project in accordance with all issued conditions of approval from the WDEQ, WGFD, and all relevant local, state, and federal permits. The stabilization and reclamation of areas disturbed during construction that are no longer needed for long-term operations (e.g., buried pipeline corridors, construction staging and laydown areas) and ongoing inspection and maintenance of culverts and permanent erosion control devices would minimize the

potential for erosion and sedimentation during operations. Therefore, Project operation would not result in substantive impacts to surface water resources that would impair the health, safety, or welfare of current or expected inhabitants.

6.6.4 Groundwater

The North Platte River Basin contains a wide variety of geologic formations and structural elements. Mapped hydrogeologic units in the Project Area include quaternary unconsolidated-deposit aquifers, the Casper-Madison aquifer, the Niobrara confining unit, and the Goose Egg confining unit (Bartos et al 2013a). The characteristics of these aquifers and confining units are summarized below, based on information contained in the *Available Groundwater Determination Technical Memorandum* of the Platte River Basin Water Plan Update (Bartos et al. 2013b).

Quaternary unconsolidated-deposit aquifers, consisting primarily of alluvium, are the source of most shallow wells in the Platte River Basin. Well yields vary considerably by location and depth, but water obtained from these aquifers is typically suitable for domestic, livestock, and agricultural use.

The Frontier aquifer ranges in thickness from ranges from 500 to 1,230 feet and consists of dark-gray shale with beds of sandstone near the formation top. Development of the aquifer in the vicinity of the area of site influence has been limited due to its typically high salinity and the availability of shallower sources of groundwater. The Frontier aquifer is typically overlain by the shales of the Niobrara Formation, which act as a confining unit.

The Goose Egg Formation generally serves as a confining unit, but may contain locally permeable sandstones that function like an aquifer. Water supply wells drilled in the Goose Egg Formation are primarily used for stock water purposes because of their generally low yield and poor groundwater quality.

The Madison aquifer, which consists of limestone with intervening beds or lenses of sand and chert, is thought to be hydraulically connected to the overlying Casper aquifer in the vicinity of the Project Area. The Casper aquifer consists of thick sandstones interbedded with thin marine carbonates. Neither formation has been extensively developed, but may exhibit favorable characteristics for domestic and livestock use or petroleum extraction in localized areas.

6.6.4.1 Construction Impacts

During the construction phase, Project water supply needs would be met by purchasing water through a WSEO Temporary Water Use Agreement with an existing senior water rights holder. Portable toilets and sinks would be provided for onsite sewage handling during construction and would be pumped and cleaned weekly by a contracted waste company. No other wastewater would be generated during construction. Any solid wastes generated by Project construction would be promptly removed from the Project Area and disposed of by licensed waste haulers in licensed and approved facilities according to local regulations and procedures, eliminating the potential for leachate from improperly stored or stockpiled solid waste to contaminate groundwater.

The Project SWPPP and SPCC plan would ensure that fuels and hazardous materials are stored in a location and manner that minimizes the potential for inadvertent spills that could contaminate groundwater.

6.6.4.2 Operations Impacts

During construction, a well would be drilled to supply water to the maintenance building to serve ongoing Project needs. Boswell Wind would obtain a WSEO Permit to Appropriate Ground Water prior to drilling the well. As previously discussed, most of the operational water usage would be associated with potable water needs for the 15 operations staff. Water used at the maintenance building would be treated and discharged to an onsite septic system. Boswell Wind would obtain a wastewater permit from Albany County prior to septic system installation and would comply with any issued conditions to protect groundwater.

Ongoing operations would require the use of oils and lubricants in various quantities to maintain the turbines. As during construction, potential risks to groundwater would be mitigated through adherence to the Project SWPPP and SPCC plan. The quantities of other chemicals used during operations are considered *de minimus* and therefore pose negligible risk of contamination.

6.7 Wetlands and Waters of the U.S.

This section identifies potential impacts to a specific subset of surface water resources, wetlands, and waters of the U.S. that are subject to specific regulatory and permitting requirements under the CWA.

6.7.1 Regulatory Jurisdiction

The U.S. Army Corps of Engineers (USACE) and the EPA share jurisdiction over wetlands and other waters of the U.S. under the CWA. The objective of the CWA is to maintain and restore the chemical, physical, and biological integrity of the waters of the U.S. Section 404 of the Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits authorizing discharge of dredged or fill material into the waters of the U.S., including wetlands. Based on preliminary communications with the USACE, impacts to wetlands or water of the U.S. from the proposed Project would likely be authorized through nationwide permit (NWP) 12 (utility lines) and NWP 14 (linear transportation projects) (Little 2015).

6.7.2 Area of Site Influence

The area of site influence for wetlands and waters of the U.S. includes the full extent of the five HUC-12 subwatersheds that intersect the Project Area. These areas encompass the hydrologically-connected drainage basins in which Project-related impacts may be reasonably expected to occur.

6.7.3 Wetlands

Wetlands are defined by the USACE as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (40 CFR 230.3[t]). Wetlands are considered a special type of waters of the U.S. (see Section 6.7.4 *[Waters of the U.S.]*, below).

Preliminary information on wetlands and other waters of the U.S. located in the vicinity of the Project has been obtained from the National Wetlands Inventory (NWI) (USFWS 2015a) and the National Hydrologic Dataset (NHD) (USGS 2015f). The area of site influence contains three mapped wetland types (excluding rivers and lakes): freshwater emergent wetland (2,217 acres), freshwater forested/shrub wetland (56 acres), and freshwater pond (78 acres). Map 6-7 in Appendix A depicts the locations of mapped wetlands in relation to proposed Project facilities. Freshwater emergent wetlands consist of marshes and wet meadows dominated by herbaceous grass-like plants include grasses, sedges, and rushes. These wetlands occur throughout the area of site influence in narrow bands in and along intermittent streams or in isolated pockets in and around ponds and lakes. The largest freshwater emergent wetlands in the area of site influence occur along the shoreline of Post Lake, southeast of the Project Area boundary.

Freshwater forested/shrub wetlands are confined to the meanders and oxbow lakes of Rock Creek, which is located southwest of the Project Area boundary. Freshwater ponds occur primarily in association with small stock water impoundments along streams in the Project Area or in conjunction with wetlands along the banks of Rock Creek.

6.7.4 Waters of the U.S.

Waters of the U.S., or jurisdictional waters, are defined by the USACE as "all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide. These include both interstate waters including wetlands and intrastate waters such as lakes, rivers, streams mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce" (33 CFR 328.3). Perennial and many intermittent tributaries to traditionally navigable waters like the North Platte River are considered jurisdictional. Ephemeral streams that do not flow for an entire season and are without a defined bed and bank are generally considered to not be jurisdictional.

6.7.5 Construction Impacts

Based on preliminary site designs, turbine locations, the substation, and the maintenance building have been sited primarily in upland areas to avoid impacts to wetland resources. Prior to final project design, Boswell Wind or their designee would conduct a reconnaissance-level wetlands survey within the proposed Project footprint. This survey would include the investigation of any wetlands mapped in the NWI database that are located in the vicinity of access roads and turbine foundations, as well as the proposed crossing of a spring-fed impoundment classified as freshwater emergent wetland in the NWI database by a proposed access road and buried collection line (Section 33 of Township 23 North, Range 75 West). If practicable, crossing of or encroachment of surveyed wetland areas would be avoided in the final Project design. Should road crossings or collector line crossings prove necessary, Boswell Wind or their designee would conduct a formal wetlands delineation and apply for a permit with the USACE for coverage under Section 404 of the CWA.

If wetland surveys determine that Project construction could result in the cumulative loss or destruction of more than one acre of naturally occurring or man-made isolated wetlands, Boswell Wind would also apply for coverage under the WDEQ General Permit for Wetland Mitigation. Coverage under this permit requires a Mitigation Plan to offset the loss of wetland functions and values such that Project activities result in no net loss of wetlands.

Several existing field roads in the Project Area that cross intermittent streams that may be considered waters of the U.S., which are regulated under the jurisdiction of the USACE. In order to identify Project permitting requirements, Boswell Wind has requested a preliminary jurisdictional determination from the USACE identifying which surface waters in the Project Area are considered waters of the U.S. and would require permitting under Section 404 of the CWA. Boswell Wind proposes to upgrade crossings that are in poor condition prior to the construction of the Project to ensure that construction activities do not increase erosion and sedimentation in these waterways. The improvement of road crossing through intermittent streams in the Project Area (including Sevenmile and Spring Creeks) would likely require authorization under NWPs 12 and 14 (Little 2015). Appropriate permits and wetland survey/delineation requirements will be determined through continued correspondence with the USACE. In accordance with Section 404 requirements, Boswell Wind would incorporate into the final site plan and implement appropriate measures to avoid or minimize the discharge of dredged and fill materials into waters of the U.S. when installing and maintaining culverts, which could have long-term beneficial impacts on water quality.

Pending further investigation of site-specific areas of concern during final Project design, Project activities would be unlikely to adversely affect wetlands and waters of the U.S and would not pose a threat of serious injury to the environment nor to the social and economic condition of current or expected inhabitants in the affected area.

6.7.6 Operation Impacts

The cessation of construction activities and reclamation of any disturbances within wetlands or waters of the U.S., in accordance with Section 404 permitting requirements, would prevent long-term impacts on wetlands and waters of the U.S. Therefore, operation and maintenance of the proposed Project would have no effect on wetlands and other waters of the U.S.

6.8 Vegetation, Special Status Plants, and Rare Plant Communities

6.8.1 Regulatory Jurisdiction

The USFWS has jurisdiction over plant species listed as threatened or endangered under Section 9 of the ESA (16 U.S.C. 1536), which provides for the protection of listed species. Federally listed plants that occur on non-federal lands are protected only if there is a state law that prohibits the taking of listed plants or if their taking involves any violation of state criminal trespass law. The State of Wyoming does not have a law prohibiting the take of plants, and the Project does not involve federal lands; as a result, there is very limited federal or state regulatory jurisdiction over federally listed plants in the study area.

No federally listed plants are believed to occur in the study area. One federally listed threatened plant species, the Ute Ladies'-tresses orchid (*Spiranthes diluvialis*) occurs in moist drainages persisting through summer months generally under 7,000 feet. While there are approximately 254 acres of identified wetland habitat that could be suitable for Ute Ladies'-tresses orchid (USFWS 2012), the Project Area elevation is higher than elevations reported for this species in Wyoming, and it is unlikely that Ute-Ladies'-tresses orchid will occur in the Project Area (Heidel 2007).

The State of Wyoming tracks "Species of Special Concern," a list of species which is maintained by the Wyoming Natural Diversity Database (WYNDD) that are rare, endemic, disjunct, threatened, or otherwise biologically sensitive. Slender-leaved buckwheat and pale blue-eye grass have the potential to occur in the study area. This status does not confer any special protection to plants and no surveys for these species were required within the study area.

The *Wyoming Weed and Pest Control Act of 1973* and the *Federal Noxious Weed Act of 1974* establish state and federal jurisdiction over the designation and management of noxious weeds. In Wyoming, there are 26 species of plants considered noxious weeds, three plants including plains larkspur (*Delphinium geyeri*), locoweed (*Oxytropis* spp.), and cheatgrass (*Bromus tectorum*) have the potential to occur in Albany County (WDA 2015a; WDA 2015b).

6.8.2 Area of Site Influence

The study area for vegetation, special status plants, and federally listed plants, and plant communities consists of the Project Area. The area of influence would be the project footprint (less than four percent of the Project Area), which includes areas that will be disturbed to construct WTGs, the substation, access roads, and buried collection lines.

6.8.3 Existing Vegetation

Vegetation cover in the study area is typical of the Laramie Basin and Foothill Shrublands and Low Mountains ecoregions (Chapman et al. 2004), dominated by, sagebrush steppe and mixed-grass prairie. The Foothill Shrubland is characterized by montane shrubland consisting of mountain big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* spp.), bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) at lower elevations and by Rocky Mountain juniper (*Juniperus scopulorum*) and ponderosa pine (*Pinus ponderosa*) at higher elevations. Utah juniper (*Juniperus osteosperma*) and mountain mahogany (*Cercocarpus ledifolius*) woodlands occur on rock outcrops. The Laramie Basin is dominated by blue grama (*Bouteloua gracilis*), Indian ricegrass (*Achnatherum hymenoides*), western wheatgrass (*Pascopyrum smithii*), rabbitbrush, fringed sage (*Artemisia frigida*), and a variety of other forb and shrub species.

The two vegetation ecoregions in the study area as described by Chapman et al. (2004) are further divided into 22 dominant vegetative functional groups using LANDFIRE, a raster Geographic Information System (GIS) database of vegetation types and other spatial data layers covering the nation (LANDFIRE 2012) which was used to map these vegetation types within the Project Area. LANDFIRE provides greater resolution of dominant vegetation cover and was used as the primary land cover, while ecoregions were identified to provide general descriptions of associated vegetation communities.

The dominant vegetation classification is Intermountain Basins Big Sagebrush Shrubland, which comprises approximately 14,960 acres (69 percent) of the Project Area. Intermountain Basins Big Sagebrush Steppe, Mountain Big Sagebrush Shrubland Alliance, and Intermountain Basins Semi-Desert Shrub-Steppe comprise approximately 3,075 acres (14 percent), 1,098 acres (5 percent) and 1,094 acres (5 percent) of the Project Area, respectively. Other vegetation classifications identified by LANDFIRE comprise less than 2 percent of the Project Area individually (Table 6-9) (Map 6-8 in Appendix A).

Table 6-9. Vegetation Coverage in the Project Area

Landcover Group Name	Landcover Class Name	Acres in Project Area	Percent of Project Area
Human-Dominated Land Covers			
Developed Roads	Developed Roads	61	<1%
Developed Upland Herbaceous	Western Cool Temperate Developed Ruderal Grassland	1	<1%
	Western Cool Temperate Urban Herbaceous	11	<1%
Developed Upland Shrubland	Western Cool Temperate Developed Ruderal Shrubland	<1	<1%
	Western Cool Temperate Urban Shrubland	40	<1%
Agricultural Pasture and Hayland	Western Cool Temperate Pasture and Hayland	<1	<1%
Native Land Covers			
Aspen Forest, Woodland, and Parkland	Rocky Mountain Aspen Forest and Woodland	4	<1%
Barren	Barren	6	<1%
Big Sagebrush Shrubland and Steppe	Mountain Big Sagebrush Shrubland Alliance	1,098	5%
	Intermountain Basins Big Sagebrush Shrubland	14,960	69%
	Intermountain Basins Big Sagebrush Steppe	3,075	14%
	Intermountain Basins Montane Sagebrush Steppe	2.0	<1%
Deciduous Shrubland	Rocky Mountain Gambel Oak-Mixed Montane Shrubland	<1	<1%
	Rocky Mountain Lower Montane Foothill Shrubland	296	1%
Depressional Wetland	Western Great Plains Depressional Wetland Systems	24	<1%
Desert Scrub	Intermountain Basins Semi-Desert Shrub-Steppe	1,094	5%
Grassland	Intermountain Basins Semi-Desert Grassland	108	<1%
	Northern Rocky Mountain Lower Montane Foothill Valley Grassland	51	<1%
Greasewood Shrubland	Intermountain Basins Greasewood Flat	5	<1%
Limber Pine Woodland	Rocky Mountain Foothill Limber Pine Juniper Woodland	55	<1%
Low Sagebrush Shrubland and Steppe	Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	192	<1%
Mixedgrass Prairie	Northwestern Great Plains Mixedgrass Prairie	6	<1%

Landcover Group Name	Landcover Class Name	Acres in Project Area	Percent of Project Area
Open Water	Open Water	27	<1%
Salt Desert Scrub	Intermountain Basins Mat Saltbush Shrubland	143	<1%
Sparse Vegetation	Intermountain Basins Sparsely Vegetated Systems	9	<1%
	Rocky Mountain Alpine/Montane Sparsely Vegetated Systems	1	<1%
Western Herbaceous Wetland	Rocky Mountain Wetland Herbaceous	14	<1%
Western Riparian Woodland and Shrubland	Rocky Mountain Montane Riparian Forest and Woodland	11	<1%
	Rocky Mountain Subalpine/Upper Montane Riparian Shrubland	99	<1%
	Western Great Plains Floodplain Forest and Woodland	173	<1%
	Western Great Plains Floodplain Herbaceous	14	<1%
Nonnative Land Covers			
Introduced Annual and Biennial Forbland	Introduced Upland Vegetation Annual and Biennial Forbland	11	<1%
Introduced Perennial Grassland and Forbland	Introduced Upland Vegetation Perennial Grassland and Forbland	3	<1%

Source: LANDFIRE 2012.

There are two State of Wyoming designated "Species of Special Concern" that may occur within the Project Area: slender-leaved buckwheat (*Eriogonum exilifolium*) and pale blue-eye grass (*Sisyrinchium pallidum*). Slender-leaved buckwheat is a regional endemic of south-central Wyoming (Albany and Carbon counties). It occurs on semi-bare sandy-clay flats, shaley-gypsum ridges, red clay hills, and limestone outcrops in cushion plant and bunchgrass habitats between 6,900 and 8,600 feet (Fertig 2000). Pale blue-eye grass is a regional endemic of southeastern Wyoming (Albany, Carbon, and Sweetwater counties) and occurs on wet meadows, stream banks, roadside ditches, and irrigated hay meadows where standing water is available during the early growing season between 6,500 and 7,900 feet (Heidel 2008). There are no documented occurrences of these plant species in the Project Area and surveys are not required.

6.8.4 Construction Impacts

Based on a conceptual layout of up to 170 turbines, construction of the Project would result in approximately 872 acres of short-term surface disturbance (approximately 4 percent of the Project Area) to vegetation communities identified in the Project Area. Following construction, temporary use areas would be reclaimed and reseeded, and long-term impacts would be reduced to approximately 148 acres (less than 1 percent of the Project Area). The majority of construction impacts are expected to occur in the Intermountain Basins Big Sagebrush Shrubland. Estimated acreages of temporary and permanent disturbance by vegetation type are summarized below in

Table 6-10. Construction of the proposed Project would not pose a threat of serious injury to federally listed plants or vegetation populations in the Project Area.

Table 6-10. Vegetation Coverage in the Project Area

Land Cover Class Name	Initial Disturbance	Long-Term Disturbance
Human-Dominated Land Covers		
Developed Roads	<1	0.1
Western Cool Temperate Urban Herbaceous	<1	<0.1
Western Cool Temperate Urban Shrubland	<1	0.1
Native Land Cover		
Mountain Big Sagebrush Shrubland Alliance	49	9
Intermountain Basins Big Sagebrush Shrubland	620	107
Intermountain Basins Big Sagebrush Steppe	107	18
Intermountain Basins Montane Sagebrush Steppe	<1	<0.1
Rocky Mountain Lower Montane Foothill Shrubland	10	2
Western Great Plains Depressional Wetland Systems	<1	<0.1
Intermountain Basins Semi-Desert Shrub-Steppe	73	10
Intermountain Basins Semi-Desert Grassland	2	0.3
Northern Rocky Mountain Lower Montane Foothill Valley Grassland	3	0.2
Intermountain Basins Greasewood Flat	0.1	<0.1
Rocky Mountain Foothill Limber Pine Juniper Woodland	<1	0.2
Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	<1	0.1
Northwestern Great Plains Mixedgrass Prairie	<1	0
Open Water	<1	0
Intermountain Basins Mat Saltbush Shrubland	<1	0.1
Rocky Mountain Wetland Herbaceous	<1	<0.1
Rocky Mountain Subalpine/Upper Montane Riparian Shrubland	<1	0.1
Western Great Plains Floodplain Forest and Woodland	2	0.4
Western Great Plains Floodplain Herbaceous	0.1	<0.1

Source: LANDFIRE 2012.

6.8.5 Operations Impacts

Because O&M would occur on areas previously disturbed during construction, there would be no additional impacts to vegetation during operation and maintenance of the proposed facilities.

6.9 Terrestrial Wildlife

6.9.1 Regulatory Jurisdiction

Jurisdiction over terrestrial wildlife is shared by the WGFD and the USFWS. The WGFD has primary jurisdiction over big game (e.g., elk, mule deer, pronghorn), small game, and nongame species that are not migratory. Congress created the State Wildlife Grants Program in 2000 to address at-risk wildlife species to avoid the need for listing under the ESA. In order for Wyoming to receive federal funding through the State Wildlife Grants Program, WGFD completed a State Wildlife Action Plan (WGFD 2010b) according to the elements required by Congress, including identifying Species of Greatest Conservation Need (SGCN) and reviewing the State Wildlife Action Plan every five years. The WGFD bases the SGCN designation on population numbers, habitat threats, or lack of population data within the State of Wyoming, to identify species whose conservation status warrants increased considerations for conservation, land use, and development planning (WGFD 2010b).

The USFWS has primary jurisdiction over federally listed threatened and endangered species under the ESA, migratory birds under the *Migratory Bird Treaty Act* (MBTA), and eagles under the *Bald and Golden Eagle Protection Act* (BGEPA). The ESA protects threatened and endangered wildlife species by prohibiting take, which is defined as "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. § 1532(19)). There are no federally listed species known to occur in the study area.

The USFWS also oversees the enforcement and compliance with the provisions of the MBTA and the BGEPA. The MBTA, enacted in 1918, protects migratory birds, and their nests, eggs, young, and parts from possession, sale, purchase, barter, transport, import, and export, and take. For purposes of the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect"(50 CFR § 10.12). The BGEPA provides additional protection to bald and golden eagles. It prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 U.S.C. § 668(a)). "Take" under this statute is defined as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb"(50 CFR § 22.3). "Disturb," in turn, is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 Federal Register [FR] 31132). If a proposed project or action would occur in areas where nesting, feeding, or roosting eagles occur, then project proponents may need to take additional conservation measures to achieve compliance with the BGEPA.

6.9.2 Area of Site Influence

The study area for general wildlife and special status wildlife species is the Project Area (Map 6-9 in Appendix A). The study area for raptors and eagles is the Project Area plus a 2-mile buffer to account for potential impacts to raptors that nest adjacent to, but may fly through, the Project Area (Map 6-10 in Appendix A). The study area for Greater Sage-grouse extends to 11 miles beyond the Project Area (Map 6-11 in Appendix A). The area of site influence for small, less-mobile species such as amphibians, reptiles, and small mammals is likely limited to portions of the individual project

sites in which those species occur. In contrast, the area of site influence for larger migratory species such as big game and birds could encompass the entire study area and even extend beyond the analysis area boundary if project development causes wildlife to be displaced to adjacent lands during construction and/or operation.

The following threatened and endangered species have the potential to occur within the Project Area based on information from the USFWS (USFWS 2015b):

1. Least tern (*Sterna antillarum*), endangered;
2. Piping plover (*Charadrius melodus*) threatened;
3. Whooping crane (*Grus americana*), endangered;
4. Pallid sturgeon (*Scaphirhynchus albus*) endangered;
5. Black-footed ferret (*Mustela nigripes*) endangered and experimental population, non-essential;
6. Preble's meadow jumping mouse (*Zapus hudsonius preblei*), threatened.

Of these species, only the black-footed ferret is discussed below because of the potential for the Project to have impacts to the species or its habitat. There are approximately nine acres of Preble's meadow jumping mouse habitat in the Project Area. However, since there is no disturbance proposed in or adjacent to this habitat, this species is not discussed further in this application. The Project Area does not provide suitable habitat for the other four species (USFWS 2015b), nor are there project-related water depletions that would affect these Platte River species downstream.

6.9.3 Existing Wildlife

A variety of wildlife species occur or have the potential to occur within the analysis area.

The following wildlife reports were prepared for the Project Area to assess existing wildlife in the vicinity of the Boswell Springs project:

- Boswell Springs Wind Farm Incidental Observations (February 1, 2017)
- Boswell Springs Wind Farm Raptor Nest and Passerine Bird Surveys Results (August 13, 2015)
- Boswell Springs Wind Farm Ground Raptor Nest Surveys (June 14, 2015)
- Boswell Springs Wind Farm Sage Grouse Lek Surveys (May 7, 2015)
- Preliminary Boswell Bat Acoustic Monitoring Report – DRAFT (January 8, 2015)
- Observations of Golden Eagle and Ferruginous Hawk at the Boswell Springs Wind Farm (AES 08-0853) during 2011 (January 4, 2012)
- Observations of Golden Eagle and Ferruginous Hawk at the Boswell Springs Wind Farm (AES 08-0853) during 2011 (November 3, 2011)
- Assessment of Wind Energy and Wildlife Interactions at Boswell Springs Wind Farm (March 15, 2011)
- Addendum to Assessment of Wind Energy and Wildlife Interactions at Boswell Springs Wind Farm (January 14, 2011)

- Assessment of Wind Energy and Wildlife Interactions at Boswell Springs Wind Farm (August 17, 2010)
- Boswell Springs Wind Energy Project – 2009 Progress Report (December 15, 2009)
- Site Review for Boswell Springs Wind Farm (April 31, 2009)

The wildlife information provided throughout this section includes the baseline survey efforts described above and included in Appendix J, as well as information from the following sources:

- WGFD Job Completion and Annual Harvest Reports, containing harvest and population information on game animals
- Wyoming Interagency Spatial Database and Online Management (WISDOM) online application, containing information on species occurrence, range, distribution, federal and state agency status, and crucial habitat designations (WISDOM 2015).

The following subsections summarize results from these wildlife survey efforts completed to date and the supplemental information described above. For detailed information on survey protocols, timing, results, and the scientific names of observed species, please refer to Appendix J. Refer to Appendix K (*Landowner Conservation Plan*) for descriptions of post-construction reporting.

6.9.3.1 Big Game

Pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) occur in the Project Area on a yearlong basis. The entire Project Area is considered yearlong range for pronghorn. WGFD-designated crucial winter range for pronghorn is located approximately one mile southwest of the Project Area. There are 238 acres (1 percent) of mule deer yearlong habitat in the Project Area, and spring/summer/fall range habitat is northeast of the Project Area (Map 6-12 in Appendix A). There are no migration corridors in the Project Area.

6.9.3.2 Small Game

Greater Sage-Grouse

There are no State of Wyoming designated Greater sage grouse core areas within the Project Area; however, there are 117,050 acres of core area in the 11-mile study area. The Natrona Core Area is to the north of the Project Area, and the North Laramie Core Area is to the southwest (Map 6-11 in Appendix A). There are general habitat outside of core areas on approximately 21,596 acres of the Project Area and 403,792 acres in the study area (WGFD 2015a) (Map 6-11 in Appendix A).

Initial surveys for sage-grouse leks were conducted on April 11, April 16, and May 7, 2009 and no signs of sage-grouse were observed at the historical lek locations (AES 2010). Subsequent sage-grouse surveys were conducted in April 22, April 29, and May 6, 2015. No sage-grouse were observed during the three surveys. While suitable habitat is present, particularly in the northwest corner of the site, no sage-grouse were observed on the site or within two miles (Table 6-11) (RWNRC 2015b).

Table 6-11. Historical Sage-Grouse Leks Located On or Near the Project Area

Lek Name	Zone & Easting	Northing	Distance from Site	2014 WGFD Status
Fetterman 21	13T 439100mE	4636200mN	0.78 miles southeast	Unoccupied
Fetterman 22	13T 437101mE	4639491mN	On site	Unoccupied
Cordingly	13T 426000mE	4641800mN	On site	Not listed
Rock Creek Bend	13T 426700mE	4632000mN	3.5 miles south	Unoccupied

Source: RWNRC 2015b.
WGFD Wyoming Game and Fish Department

There are no occupied leks within the Project Area; there is one unoccupied lek and one undetermined lek. An undetermined lek is one that has not been documented as active in the last 10 years, but survey information is insufficient to designate the lek as unoccupied. Thirty leks are present within 11 miles of the Project Area. Fourteen of those leks are designated as occupied, 13 are unoccupied, and three are undetermined (WGFD 2015a) (Map 6-11 in Appendix A).

6.9.3.3 Non-Game

Raptors

Raptor nest surveys were conducted on June 12, 2015 (RWNRC 2015a). Three active raptor nests including one golden eagle (*Aquila chrysaetos*) nest, one ferruginous hawk (*Buteo regalis*) nest, and one red-tailed hawk (*Buteo jamaicensis*) nest were observed within the Project Area, and one active raptor nest (ferruginous hawk) was observed just outside the Project Area boundary at the northwest corner (Map 6-10 in Appendix A). Within two miles of the Project Area there are an additional three active raptor nests: a ferruginous hawk nest to the northwest of the Project Area, and a bald eagle (*Haliaeetus leucocephalus*) and golden eagle nest to the southwest of the Project Area (Map 6-10 in Appendix A).

The entire Project Area is designated as suitable bald eagle habitat. Raptor activity surveys were conducted in late April through August 2011 (AES 2011a) and two years of pre-construction eagle point count surveys are ongoing. Golden eagles were observed from three observations points, and the majority of observations occurred off-site near the Wheatland Reservoir No. 3. Golden eagles were most active in the southwest corner of the Project Area, likely because this is the location of the only active golden eagle nest in the Project Area. Eagles flying near the reservoir were observed flying over the southern portion of the site on two occasions. Observations of eagle activity at the northwest corner of the Project Area were rare. Ferruginous hawks were also observed from the same observation points as golden eagles and the greatest activity was observed off-site near an active nest just outside of the Project Area in the northwest corner and in the northeast corner of the Project Area near another active ferruginous hawk nest.

An aerial survey of raptor nests was conducted on April 26, 2010 and where possible, nests were field verified from the ground. This survey identified two confirmed occupied nests; one ferruginous hawk nest, and one red-tailed hawk or golden eagle nest, as well as two possible nests; one a ferruginous hawk nest and the other was unknown. Two additional unoccupied golden eagle nest sites were identified in 2011 within the Project Area.

Other Migratory Birds

Approximately 42 different species of birds were observed in the Project Area during spring and fall passerine migration and breeding bird surveys. The most commonly observed species documented during the surveys were horned lark (*Eremophila alpestris*), mallard (*Anas platyrhynchos*), McCown's longspur (*Rhynchophanes mccownii*), and blue-winged teal (*Anas discors*).

Sensitive species are similar to the species of concern as defined by the USFWS Interim Voluntary Guidelines (USFWS 2010), however, the AES 2010 analysis defines sensitive species to emphasize the conservation significance of a species. Of the 42 bird species, 18 (43 percent) were classified as sensitive species under the AES 2010 definition (Table 6-12). Bird species were identified as sensitive if they met the following conditions:

- Endangered, threatened, candidate or special concern on federal lists;
- Wyoming Species of Greatest Conservation Need (SGCN);
- Birds of Conservation Concern for Region 10, Northern Rockies;
- Critically endangered, endangered, vulnerable, near threatened in International Union for Conservation of Nature (IUCN) Red Book;
- Known from literature to require large habitat blocks (area-sensitive species);
- Significantly declining in USGS Breeding Bird Survey (BBS) data (Pardieck et al 2015); or
- Demonstrated to be significantly adversely affected by wind energy development.

No federally listed bird species occur or have the potential to occur within the study area.

Table 6-12. Sensitive Avian Species Observed in the Study Area during Migratory Bird Point-Count Surveys

Common Name	Scientific Name	Per-point abundance
McCown's longspur[a]	*Calcarius mccownii*	0.68
Blue-winged teal	*Anas discors*	0.50
Northern shoveler	*Anas clypeata*	0.33
Vesper sparrow	*Pooecetes gramineaus*	0.22
Black tern[a]	*Childonias niger*	0.20
American avocet	*Recurvirostra americana*	0.18
Golden eagle	*Aquila chrysaetos*	0.16
Ferruginous hawk[a]	*Buteo regalis*	0.10
Northern harrier	*Circus cyaneus*	0.09
Brewer's sparrow[a]	*Spizella breweri*	0.09
Sage sparrow[a]	*Amphispiza belli*	0.05
Say's phoebe	*Sayornis saya*	0.03
Barn swallow	*Hirundo rustica*	0.03
Lark bunting[a]	*Calamospiza melanocorys*	0.02
Redhead[a]	*Aythya Americana*	0.02
Bald eagle	*Haliaeetus leucocephalus*	0.01
Burrowing owl[a]	*Athene cunicularia*	0.01
Loggerhead shrike	*Lanius ludovicianus*	<0.01

Common Name	Scientific Name	Per-point abundance

Source: AES 2010.

[a] Wyoming Species of Greatest Conservation Need (SGCN)

There are historic records of mountain plover (*Charadrius montanus*) in the Project Area along Fetterman Road (WISDOM 2015). The mountain plover inhabits low, open habitats that have been disturbed by prairie dogs, heavy grazing, or fire (WGFD 2010b). There have been several documented incidental sightings of mountain plover inside and near the Project Area in 2009 and 2016 (AES 2009, RWNRC 2017). A mountain plover was observed in the southwest corner of the Project Area, which was identified as having low prairie dog density (Map 6-9 in Appendix A). There were four incidental observations of mountain plover during 2016 surveys between April 23 and June 10, 2016 in the western and southern portions of the Project Area (RWNRC 2017). Long-billed curlews (*Numenius americanus*) were also observed (or potential evidence observed) incidentally during surveys in the early April migration period in 2016.

Bats

Passive acoustic (Anabat) monitoring for bats in the Project Area at seven different monitoring locations between 6:00 p.m. to 6:00 a.m. between May 25, 2010 and October 19, 2010 and between August 28 and October 21, 2015 (Table 6-13). Anabat is a bat detection system that uses a broadband microphone and data storage unit to detect and record ultrasonic sounds including bat echolocation. Bat species produce different echolocation calls based on a variety of ecological and species-specific factors. The sounds recorded by the Anabat can be used to facilitate species identification in the field. The Anabat was mounted on a 3-meter portable tripod per WGFD guidelines and was moved every three weeks to one of the other seven monitoring locations when data cards were exchanged.

Table 6-13. Bat Monitoring Location Descriptions in the Project Area

Site Number	2010 Surveys		2015 Surveys		Habitat Description
	Start Date	End Date	Start Date	End Date	
1	5/25/2010	6/16/2010	8/28/2015	10/23/2015	Playa pond on grassland
2	6/16/2010	7/09/2010	8/28/2015	10/23/2015	Small reservoir
3	7/10/2010	7/29/2010	9/13/2015	9/24/2015	Sagebrush/grasslands
4	7/29/2010	8/18/2010	8/28/2015	10/22/2015	Wetland with creek
5	8/18/2010	9/08/2010	9/25/2015	10/8/2015	Grassland with rock outcroppings
6	9/08/2010	9/29/2010	8/28/2015	9/12/2015	Grassland
7	9/29/2010	10/19/2010	10/10/2015	10/21/2015	Reservoir and wetland area/grasslands

Source: AES 2011b, AES 2015.

Bat activity was highly variable over the survey periods. In general, bat activity peaked from mid-June through mid-July for the 2010 surveys, and from late August to early September for the 2015 surveys. During this time, activity increased as the mean daily temperatures increased. In 2010, recorded calls were absent from mid-July to early August when the sampling equipment was in sagebrush habitat with no water resources to attract foraging bats. A small peak of activity occurred in mid-August as migrating forest bats joined resident bats. Bat activity was absent in September, likely due to the poor quality of grassland habitat for bat foraging. Late in the survey season the daily mean temperature dropped below 50°F, and low temperatures reduced insect populations; subsequently, there were no recorded bats despite one recording in a wetland/reservoir habitat.

During 2015 surveys, similar to the 2010 surveys, bat activity levels were lower in grassland habitat with the exception of Site 6 located just west of Fetterman Road which detected a higher than expected number of calls for grassland habitat. The greatest bat activity occurred at a reservoir along the main stem of a creek in the eastern part of the site.

The most frequently recorded species were the *Myotis* species including western small-footed myotis and the fringed myotis, hoary bat, and silver-haired bat (Table 6-14).

Small Mammals

A variety of small mammals, including mice, voles, and other burrowing mammals such as ground squirrels and prairie dogs, are known to occur in the Project Area. Surveys for white-tailed prairie dog are the only systematic surveys that were conducted for small mammal species in the Project Area. White-tailed prairie dogs were located in grasslands throughout the Project Area. White-tailed prairie dog density was mapped using aerial photography and locations were divided into high, medium, and low-to-no density areas. Mapping was verified by ground surveys during June, 2010. Field verification of the mapping exercise showed the maps to be generally accurate (Map 6-9 in Appendix A). Surveys conducted in areas with high density prairie dog burrows had a mean count of 17.4 burrows per transect. Those mapped as medium density had a mean count of 8 burrows per transect, and those mapped as low-to-none had a mean count of 3.5 burrows per transect (AES 2010).

Reptiles and Amphibians

Incidental observations of reptile and amphibian species were completed during all surveys from spring 2009 through fall 2016 and were augmented by deliberate searches in summer 2010. Boreal chorus frogs (*Pseudacris maculata*) were observed seven times and tiger salamanders (*Ambystoma tigrinum*) were observed twice during these surveys. These species were predominantly observed along Spring Creek (Map 6-9 in Appendix A). Additional reptile and amphibian species that have the potential to occur in the Project Area include the greater short-horned lizard (*Phrynosoma hernandesi*), smooth greensnake (*Opheodrys vernalis*), plains spadefoot (*Spea bombifrons*), wood frog (*Lithobates sylvaticus*), northern leopard frog (*Lithobates pipiens*), and eastern clade western toad (*Anxyrus boreas*) (WISDOM 2015).

Table 6-14. Bat Species Detected at the Project Area

Common Name	Scientific Name	Feeding Habitat	Roosting Habitat	Percent of All Calls		Detection Period During Survey
				2010 Surveys	2015 Surveys	
Big brown bat[a]	*Eptesicus fuscus*	Meadows, over water, among trees, backyards	Buildings or trees	6	4	5/25/2010 – 6/30/2010; 8/28/2015 – 10/23/2015
Eastern red bat[a]	*Lasiurus borealis*	Among trees, clearings, and over water	Trees	1	N/A	7/30/2010 – 8/14/2010
Western red bat	*Lasiurus blossevillii*	Among trees, shrubs, and over water	Trees	N/A	2	8/28/2015 – 10/23/2015
Little brown myotis[a]	*Myotis species*	Over water, near trees, over pastures, or streets near roosts	Buildings, dead trees, mines, caves	Unidentifiable	17	5/25/2010 – 8/27/2010; 8/28/2015 – 10/23/2015
Western small-footed myotis[a]					3	
Fringed myotis[a]					< 1	
Long-legged myotis[a]					5	
Pallid bat[b]	*Antrozous pallidus*	Ground	Trees, rock crevices, mines, caves	<1		6/27/2010
Hoary bat	*Lasiurus cinereus*	Clearings, fields, and over streams	Trees	11	20	5/25/2010 – 7/3/2010; 8/28/2015 – 10/23/2015
Silver-haired bat	*Lasionycteris noctivagans*	Woodland ponds and streams	Trees	N/A	43	8/28/2015 – 10/23/2015
California myotis	*Myotis californicus*	Deserts, forests	Caves, mines, rock crevices, trees, buildings	N/A	1	8/28/2015 – 10/23/2015
Long-eared myotis	*Myotis evotis*	Forests	Trees	N/A	< 1	8/28/2015 – 10/23/2015
Unknown				N/A	7	8/28/2015 – 10/23/2015

Source: AES 2011b, AES 2015.

[a] Species of Greatest Conservation Need (SGCN) Tier II

[b] SGCN Tier III

6.9.3.4 Threatened and Endangered Species

Black-footed ferrets in the vicinity are non-essential, experimental populations. There are approximately 11,402 acres (53 percent of the Project Area) of black-footed ferret habitat in the Project Area (Map 6-9 in Appendix A), and there are unconfirmed records of the federally endangered black-footed ferret within five miles of the Project Area (WISDOM 2015). The ferret preys almost exclusively on prairie dogs, and there are white-tailed prairie dogs present throughout the Project Area. The Shirley Basin Black-footed Ferret Recovery Area boundary is located approximately three miles west of the site; however, the release site is significantly to the northwest of the Project Area. In early 2004, the USFWS issued a block clearance eliminating the need for ferret surveys in all black-tailed and most white-tailed prairie dog colonies throughout Wyoming. The clearance was based on the lack of ferret observations since 1985, when the last wild ferret was believed to have been documented in the state, and the resulting belief that such habitats were unlikely to support black-footed ferrets in the state (80 FR 19263). Fresh diggings, identified as those potentially made by black-footed ferrets were observed on December 8, 2016. The diggings were located near two primary burrow entrances that were interconnected underground with four smaller burrows (RWNRC 2017). However, there is no evidence confirming the actual existence of ferrets within the Project Area.

6.9.4 Construction Impacts

6.9.4.1 Big Game

The Project Area includes yearlong range for pronghorn and mule deer, which indicates that these species make general use of the suitable habitat on a year-round basis. Based on a conceptual layout of up to 170 turbines, construction of the project would result in an estimated 872 acres of short-term surface disturbance (approximately 4 percent of the Project Area), which would be reclaimed to an estimated 148 acres of long-term disturbance (less than 1 percent of the Project Area). Removal of vegetation could potentially eliminate some forage for big game species, resulting in indirect adverse impacts and increased competition for remaining suitable forage in the Project Area. There would also be an increased potential for vehicular collisions during the construction phase of the project which could result in mortality and injury to big game species. Blasting associated with the project could also result in functional habitat loss due to big game avoidance of the Project Area.

There are no migration corridors located within the Project Area; therefore, construction activities will not have adverse impacts on big game migration. Big game species that utilize the Project Area are likely to avoid areas with high construction activity. Adverse impacts to big game species would include reduction or degradation of available forage and increased potential for wildlife-vehicle collisions.

6.9.4.2 Small Game

Greater Sage-Grouse

Based on a conceptual layout of up to 170 turbines, construction of the project would result in an estimated 872 acres of short-term surface disturbance (approximately 4 percent of the Project Area), which would be reclaimed to an estimated 148 acres of long-term disturbance (less than 1

percent of the Project Area). Construction would result in up to 872 acres of temporary disturbance and up to 148 acres of permanent disturbance in big sagebrush steppe vegetation, which could affect Greater Sage-grouse utilizing the Project Area. Potential construction-related impacts are unlikely to adversely affect nesting sage-grouse because there are no occupied sage-grouse leks in the Project Area. There is one undetermined nest located on the northwestern edge of the Project Area and there is one unoccupied lek located towards the central east portion of the Project Area (Map 6-11 in Appendix A). In addition, the Project Area is not within State of Wyoming designated Greater sage-grouse core areas.

While there is no designated habitat or seasonal range for sage-grouse in the Project Area, there are 19,135 acres (89 percent of the Project Area) of big sagebrush shrubland steppe, which indicates there is suitable habitat for sage-grouse, which could be utilized for foraging and/or brood-rearing. Temporary surface disturbance would result in decreased quantity and quality of suitable habitat, increased habitat fragmentation, increased disruption of life-history requirements from lighting, vibration, noise, dust, and/or human presence, and overall diminished health in sage-grouse individuals and local populations as a result of reduced foraging and insect prey opportunities until interim reclamation was deemed successful. Successful reclamation and establishment of pre-disturbance ecological function could take between 20 and 50 years post reclamation efforts due to the challenges of establishing mature sagebrush-steppe vegetation communities with both vertical and horizontal structural diversity required by sage-grouse (Hild et al. 2009).

Disturbance associated with construction activities taking place during the summer and fall will likely cause any sage-grouse that could use the Project Area to avoid areas while they are under construction, displacing individual birds and broods to other suitable habitats in the area. Blasting associated with the project could also result in functional habitat loss due to sage-grouse avoidance of the Project Area. Disruption could result in brooding female avoidance of areas with visible infrastructure and reduction in female nest initiation rates closer to wind turbine development.

6.9.4.3 Non-Game

Raptors

The closest active raptor nest to a portion of the Project Area is approximately 2,773 feet (0.5 mile) away from proposed surface disturbance, which is consistent with general guidance on raptor nest buffers. See Table 6-15 for a list of all raptor and eagle nests and distances to disturbance. Three active raptor nests were observed in the Project Area in June 2015.

Blasting associated with the project could also result in functional habitat loss due to raptor avoidance of the Project Area. Although construction will result in some habitat loss and construction activity including noise and human presence may cause raptors to avoid hunting in the immediate vicinity of the project components while they are actively under construction, these disturbances are not anticipated to pose a threat of serious injury to populations of migrating or resident raptors in the area.

Table 6-15. Raptor Nest and Distance to Disturbance

Eagle/Raptor	Nest Status	Distance to Disturbance (feet)
Bald Eagle	Active	6,850
Ferruginous Hawk	Active	4,980
	Active	5,051
	Inactive	298
Golden Eagle	Active	6,288
Red-tailed Hawk	Active	2,733
Unknown	Inactive	6,473
	Inactive	2,247
	Inactive	2,324

Other Migratory Birds

Based on a conceptual layout of up to 170 turbines, construction would result in approximately 872 acres of short-term surface disturbance which would be unavailable to migratory bird species until interim reclamation takes place, at which point up to 148 acres of potential habitat would remain unavailable in the long-term.

Disturbance due to increased vehicle and heavy equipment traffic, human activity, degradation of available forage and prey species, and increased potential for vehicle collisions will likely result in displacement of migratory birds and will further preclude most migratory birds from nesting and foraging in the immediate vicinity of the construction zones. This temporary displacement of migratory birds from the construction zones is not expected to cause substantial adverse impacts to these species due to the availability of suitable habitat outside of the Project Area.

Vegetation along access roads, turbine foundations, the maintenance building site, and temporary parking and laydown areas will be cleared outside of the avian breeding season (June 1-July 31), which will minimize direct impacts to migratory birds in the Project Area.

Bats

The WTGs, substation, access roads, collection lines, and maintenance building would not be located in areas suitable for bat foraging, such as woodlands or riparian areas, and only comprise approximately 4 acres, which is a negligible amount of the Project Area. In addition, construction activities will take place during the day when bats are not active; therefore, construction is unlikely to have adverse impacts on bats.

Small Mammals

Small mammals, particularly less mobile species including mice, voles, and other burrowing mammals such as ground squirrels and prairie dogs may be impacted by construction activities, which could fragment habitat, limit dispersal, and increase potential for vehicle collisions and mortality. High density prairie dog areas may experience the greatest impact from construction activities while the low-to-no density areas will receive the least impact.

6.9.4.4 Reptiles and Amphibians

Construction could impact reptiles and amphibians during surface disturbance activities such as vegetation removal, topsoil clearing, and excavation for WTGs. Additional risks to these species include direct mortality from accidental crushing and limited loss of habitat due to construction activities. Riparian areas which are suitable habitats for the two species that have been observed in the Project Area, boreal chorus frog and tiger salamander, will largely be avoided by construction with the exception of one access road, which will cross Spring Creek. Boswell Wind will ensure that stream crossings are adequate to support heavy equipment so there is little potential for erosion which could contribute to sediment in these waters.

6.9.4.5 Threatened and Endangered Species

It is determined that wild, free-ranging endangered black-footed ferrets would not likely be impacted by this project because ferret populations are no longer present outside of the reintroduced population ferrets. Anticipated adverse impacts resulting from construction of the project are unlikely, as there is no confirmed evidence of black-footed ferrets in the Project Area. Boswell Wind intends to conduct additional survey to better assess presence or absence of this species in the area to validate these assumptions.

6.9.5 Operations Impacts

6.9.5.1 Big Game

Project operations are unlikely to affect big game use of the Project Area. Following construction, initial surface disturbance will be reclaimed and revegetated and would potentially provide forage once again for these species. Based on a conceptual layout of up to 170 turbines, an estimated 148 acres of the Project Area will be unavailable to big game until final decommissioning and reclamation of the project. This disturbance represents a very small portion (<1 percent) of the entire Project Area; therefore, impacts on big game are likely to be negligible. It is expected that there will be limited human activity in the Project Area during operation. O&M activities will result in only sporadic worker trucks and maintenance equipment on the site, which is unlikely to result in additional big game vehicle collisions on main access routes beyond current levels. The design height of the turbines is tall enough that these structures will not deter big game species movement through the Project Area. Big game species could be displaced from the Project Area due to human activity during construction; however, should this occur it is not likely to have a substantial long-term effects on local populations of big game species that will likely return to the area post-construction.

6.9.5.2 Small Game

Greater Sage-Grouse

There is limited information about how wind energy development affects Greater Sage-grouse. While Greater Sage-grouse are not known to be displaced by wind turbines, their avoidance of other areas disturbed by humans suggest that they may respond negatively to wind energy development. There may be an increased risk of Greater Sage-grouse nest or brood failure closer to wind turbines

(LeBeau et al. 2014). The new facilities may provide additional roosting and hunting locations for raptors and ravens, which may increase predation on Greater-Sage-grouse in the area.

Direct mortality resulting from a turbine blade strike is unlikely because Greater Sage-grouse rarely fly as high as the turbine blades. Impacts are more likely to be caused by habitat alteration and human presence, which will be minimized after construction.

6.9.5.3 Non-Game

Raptors

Potential direct impacts on raptors include fatalities due to collisions with turbines and guy wires to the extent that migrating or resident raptors fly through the Project Area at an elevation above ground comparable to the rotor-swept zone. The new facilities may provide additional perching and roosting sites for raptors, but this equipment could also pose additional electrocution risks. In applicable areas, utility connections and powerline structures will be constructed to meet or exceed the raptor safe design standards described in the Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006).

During 2011 surveys, golden eagle activity was greatest in the vicinity of the active nest documented southwest of the Project Area, and ferruginous hawk activity was greatest around an active nest in the northeast portion of the Project Area. Eagle and hawk activity was rare to non-existent over the remainder of the site (AES 2011a). Despite the absence of much raptor activity other than at the southwest and northeast corners of the Project Area, raptors have the potential to be directly affected by project operations and these species could be struck and injured or killed by spinning turbine blades, particularly during hunting.

Raptor use areas and movement patterns have been considered and influenced the turbine array in attempt to reduce the potential for conflicts during operations. These measures had included arranging turbines in a north-south orientation with a half-mile spread between turbine strings to allow for north-south raptor migration. The project layout also allowed for an approximately one-mile, east-west corridor along the riparian area to allow for unimpeded raptor use and east-west migration. Also, USFWS recommended that raptor nest buffers be applied to the project layout to avoid turbine placement near nests in the northeast and southwest portions of the project. These layout changes were implemented at the recommendations of the USFWS and WGFD in response to the first year of biological field data collection.

A detailed analysis of potential for eagle mortality will be completed as part of the Eagle Conservation Plan, which will require a calculated level of mitigation to be determined in consultation with WGFD and USFWS as a result of the risk this project poses to the eagle population. In addition, Boswell Wind intends to develop a bird and bat conservation strategy for this Project, in order to reduce potential impacts from operations on non-eagle raptor species.

Other Migratory Birds

Migratory birds are more common in the Project Area than raptors. Songbird mortality is likely to peak during the spring and fall migratory seasons. The majority of North America's songbirds migrate at altitudes well above the rotor-swept zones of the WTGs when the weather is suitable. Unfavorable weather poses a greater risk of migratory bird collisions with WTGs and met towers if birds are required to fly at lower altitudes due to low cloud cover or fog conditions (NWCC 2010).

Collision risk and the risk of displacement from habitat alteration would affect sensitive bird species more than other native bird species because such species are already experiencing issues which make them a focus of conservation. The number of bird fatalities at wind energy facilities is lower than a variety of other human-caused sources of bird mortality such as vehicle, building, window, and communication tower collisions, and pesticides, and feral and domestic cats (Erickson et al. 2005). Operation of the proposed project is unlikely to have a substantial effect on populations of migratory birds in the region. Boswell Wind intends to develop a bird and bat conservation strategy for this Project in order to reduce potential impacts from operations on migratory bird species.

Bats

Bats are most common in the Project Area during the late summer and early fall, which is the period when bats are most likely to be affected by operating WTGs. Approximately 21 species of bats have been recorded as collision fatalities at wind-energy facilities, with the majority of fatalities reported are from three migratory tree-roosting species: 1) hoary bat; 2) eastern-red bat; and 3) silver-haired bat (AWWI 2015), all species which are known to occur in Wyoming near the Boswell Springs Project Area. These three species constitute approximately 80 percent of the reported fatalities for all North American regions combined. Studies from other wind-energy facilities in Wyoming indicate these species have experienced a high level of impact at other wind farms (Johnson 2005). Some bat species may be attracted to wind turbines due to sounds produced by turbines, a concentration of insects near turbines, and bat mating behavior (AWWI 2015).

Of these three species, the hoary bat and eastern red bat were identified during acoustical monitoring of the Project Area; however, these species collectively comprised approximately 12 percent of all calls collected. The Project Area is largely non-forested; therefore, bat mortality rates are expected to be relatively low. Boswell Wind intends to develop a bird and bat conservation strategy for this Project in order to reduce potential impacts from operations on bat species.

Small Mammals

O&M activities will result in only sporadic worker trucks and maintenance equipment on the site, which is unlikely to result in mortality of small mammals beyond current levels. The new facilities may provide additional roosting and hunting locations for predators such as raptors and ravens, which may increase predation of small mammals in the area.

Operation of the proposed project is unlikely to have an adverse effect on populations of small mammals within the Project Area. Prairie dogs will likely habituate to the presence of wind turbines over time, but a small percentage of available habitats may be lost to turbine pads and roads.

Reptiles and Amphibians

O&M activities will result in only sporadic worker trucks and maintenance equipment on the site, which is unlikely to result in mortality of reptiles and amphibians beyond current levels. Operation of the proposed project is unlikely to have any adverse effect on populations of reptiles and amphibians within the Project Area.

6.9.5.4 Threatened and Endangered Species

It is determined that wild, free-ranging endangered black-footed ferrets would not be affected by this project because ferret populations are no longer present outside of the reintroduced population

and there is no confirmed evidence of the ferret in the Project Area. Anticipated adverse impacts resulting from operations of the project are unlikely. Boswell Wind intends to conduct additional survey to better assess presence or absence of this species in the area.

6.10 Fisheries

6.10.1 Regulatory Jurisdiction

The WGFD has primary jurisdiction over sport fisheries in the State of Wyoming. The USFWS has regulatory jurisdiction over threatened and endangered fish species; however, there are no known federally listed fish species in the Project Area or surrounding region.

6.10.2 Area of Site Influence

The area of site influence includes the five HUC-12 subwatersheds which intersect the Project Area (Map 6-5 in Appendix A). These include Post Lake, Rock Creek Lakes, Sevenmile Creek, Soda Lakes, and Taylor Ditch-Rock Creek (USGS 2015g).

6.10.3 Existing Fisheries

Most natural streams and ponds within the study area contain water only intermittently, as supplied by spring snowmelt, surface runoff from precipitation events, or groundwater, and as a result likely do not support fisheries. There are no designated blue or red ribbon streams or crucial stream corridors within the Project Area.

There are approximately 209 acres (<1.0 percent of the Project Area) of freshwater emergent wetland, 22 acres of freshwater pond (0.1 percent of the Project Area, and 24 acres (0.1 percent of the Project Area) of "other" wetlands (USFWS 2012). Rainbow trout may occur in the ponds located within the Project Area (WISDOM 2015). Wheatland Reservoir #3, also referred to as Post Lake, supports brown trout, cutthroat trout, rainbow trout, and walleye is outside the Project Area.

6.10.4 Construction Impacts

While there is limited wetlands habitat in the Project Area (one percent of the Project Area), construction activities have the potential to impact aquatic habitats and fisheries due to hazardous material spills, soil erosion, and sedimentation. Based on a conceptual layout of 170 turbines, construction of the project would result in an estimated 1.8 acres of short-term surface disturbance, which would be reclaimed to an estimated 0.3 acres of long-term disturbance on wetland habitat.

The construction of access roads and buried collection lines would result in the direct disturbance of soils within intermittent stream beds in the Project Area. Boswell Wind anticipates that instream activities can be completed during no- or low-flow periods and when the potential for large runoff events is low, which would minimize the potential for these impacts to occur which would subsequently limit the potential for sedimentation to affect fisheries or aquatic habitats. Boswell Wind would install or replace culverts at several locations where proposed access roads cross intermittent streams to improve flow and reduce the potential for stream bed and bank erosion.

Properly installed and maintained culverts could have long-term beneficial impact on surface waters downstream and on any fish species present.

Boswell Wind would develop a SWPPP to identify specific erosion measures and BMPs to reduce or attenuate stormwater discharges in accordance with the requirements of the WYPDES Large Construction General Permit. Potential erosion control measures may include the use of sediment barriers, ditches, culverts, and temporary seedings. Implementation of the SWPPP will ensure that soil erosion on disturbed sites such as WTG locations, crane pads, and temporary laydown areas is confined to those areas and does not result in sediment reaching perennial and intermittent streams or ephemeral washes.

Subwatersheds and associated aquatic habitats and fisheries that occur within the Project Area will be further protected by WARSSS as recommended by the WGFD. For more information about WARSSS see Section 6.6.3 *(Surface Water)*.

Implementation of BMPs such as proper labeling and storage, secondary containment, and inspection, as required by the WYPDES General Stormwater Construction Permit and the SPCC would reduce the potential for accidental release of hazardous materials to water resources and the potential that aquatic habitats and/or fisheries would be adversely affected by spills.

6.10.5 Operations Impacts

Operation of the project will have no effect on fisheries within the area of site influence.

6.11 Scenic Resources

6.11.1 Regulatory Framework

Albany County is the approving jurisdiction of the area, through its approved Comprehensive Plan (Albany County 2014). The county does not have specific laws, ordinances, regulations or standards related to scenery or visual quality, beyond statements of intent about vistas and open spaces and regulations about lighting. The following is from the current Albany County regulations about lighting, unshielded lighting, and shielded lighting: “The purpose of the rules is to reduce light trespass, glare, and light pollution, to reduce energy costs, promote public safety and preserve the county's pristine night sky” (Albany County 2015).

6.11.2 Area of Site Influence

The Boswell Springs Project Area includes expansive views and is contained within private lands in Albany County, WY. Affected visual resources are situated within the vicinity of the Boswell Springs Project Area. The area of site influence (also called analysis area) is the ranch plus the 30-mile viewshed; this distance is associated with proposed wind turbine lights at the assumed height of the nacelle – 80- to 86-meters surrounding the Project Area. Visual resources consist of the topography, soils, vegetation, bodies of water (lakes, streams, and rivers), and human-made structures that are noticeable on the landscape. These elements of the landscape can be described in the context of visual resources based on their forms, lines, colors, and textures or patterns. The Project viewshed (Map 6-13 in Appendix A) is the area from which potential wind turbine lights would be noticeable

to the casual viewer. Two public roads, Fetterman Road and Palmer Canyon Road are located inside the Project Area. Three KOPs, in the immediate foreground (Section 6.11.3.3, *(View Distances)* of the Project Area, are identified as the viewpoints for conducting the characteristic landscape, visual simulations, and impacts analyses. The KOP locations are as follows: KOP-1 is associated with viewers at the Wheatland Reservoir No. 3 main parking area, restroom and boat landing; KOP-2 is at a residential intersection on Fetterman Road; and KOP-3 is associated with viewers traveling from the north on Fetterman Road at an activity area associated with cattle-gathering corrals (Map 6-13 in Appendix A). Refer to Appendix L (*Visual Simulations*) for further information about visual simulations that were created for the Project Area.

6.11.3 Visual Conditions On-site and the Surrounding Area

The Project is located in a remote region that has ranching and recreational activity. There is limited residential development. The characteristic landscape of the Project Area is contained within flat to gently rolling and dissected landforms of the Interior Plains physiographic province (Fenneman 1931). Visual resources within the analysis area are influenced by topographic, vegetative, geologic, hydrologic, and land use characteristics. The topography of the Project Area is predominantly flat or gently rolling with dry or ephemeral drainages. The Project Area has a dry, arid climate; vegetation across the Project Area is predominantly grassland with infrequent wetlands. Please refer to Section 6.8 (*Vegetation, Special Status Plants, and Rare Plant Communities)* of this document for detailed information on vegetation types and characteristics in the Project Area. The forms, lines, colors, and textures are mostly consistent with the natural grasslands scenery of the landscape, but are contrasted with the few scattered residences, existing roads and fences, and the sparsely distributed range improvements and unimproved roads associated with livestock grazing and range management.

Further analysis and documentation of the Project Area's visual resources was conducted to determine the visual values. The typical components of visual resources include: scenic quality, viewer sensitivity/concern, visibility, view distances, and existing scenic integrity.

6.11.3.1 Scenic Quality

The scenic quality evaluation for the Project Area is rated using key factors typical for landscapes similar to the Project Area: landforms, vegetation, water, color, influence of adjacent scenery, and cultural modifications (BLM 1986b). The possible classifications in this physiographic province are Distinctive, Common, and Disturbed. Due to the flat to gently rolling topography, limited surface water, homogenous color of the grasslands, homogenous adjacent scenery, and limited cultural modifications, the scenic quality of the Project Area is determined to be in the Common classification.

6.11.3.2 Sensitive Viewers

The viewer sensitivity/concern analysis indicates the landscape's relative value to residents and visitors. Lands are typically assigned high, medium, or low sensitivity levels based on consideration of the following factors: types of users, amount of use, public interest, adjacent land uses, and special areas. Two public access roads Fetterman Road and Palmer Canyon Road go through the Project Area. Wheatland Reservoir No. 3 is situated at the eastern edge of the Project Area. Three homesteads are located in the immediate foreground of the Project Area. Recreational activities, including driving, fishing, hunting, photography, and picnicking are associated with the roads,

reservoir, open grasslands, and nearby foothills. There are several existing, lit wind facilities to the west and southwest of the Project Area that are visible from the KOPs and associated public and private use areas.

6.11.3.3 View Distances

Distance classifications are typically delineated based on relative visibility from travel routes, use areas, or vantage points, where nearer viewing situations are considered more influential to viewers than are more distant viewing situations. Based on the visual characteristics of project facilities and the Project Area landscape, view distances include:

- Immediate Foreground Distance: This is an area that can be seen within a distance of 0.5 mile from sensitive viewer locations. Approximately 5 percent of the Project Area landscape is visible in the immediate foreground from Fetterman Road, Palmer Canyon Road, or Wheatland Reservoir No. 3.
- Foreground Distance: This is an area that can be seen from a distance of up to two miles from sensitive viewer locations. Approximately 15 percent of the Project Area landscape is visible in the foreground from Fetterman Road, Palmer Canyon Road, or Wheatland Reservoir No. 3.
- Middleground Distance: This is an area that can be seen from a distance of up to four miles from sensitive viewer locations. Approximately 25 percent of the Project Area landscape is visible in the middleground from Fetterman Road, Palmer Canyon Road, or Wheatland Reservoir No. 3.
- Background Distance: This is an area that can be seen from a distance of up to 30 miles (based on visibility of night lighting) from sensitive viewer locations. Approximately 45 percent of the Project Area landscape is visible in the background from Fetterman Road, Palmer Canyon Road, or Wheatland Reservoir No. 3.
- Seldom Seen Area: These are areas that are not visible from sensitive viewer locations and areas beyond 30 miles from project facilities. Approximately 10 percent of the existing Project Area landscape is seldom seen from sensitive viewer locations.

6.11.3.4 Existing Scenic Integrity

Scenic integrity classifications indicate the degree of intactness of the natural landscape. Scenic integrity is expressed as high, moderate, or low, with high representing those places of intact natural landscape and no surface-disturbing activities. The Project Area consists of approximately 85 percent high scenic integrity, 12 percent moderate scenic integrity, and 3 percent low existing scenic integrity.

6.11.4 Construction Impacts

The analysis area for the Project is the Project Area plus the 30-mile background distance landscape surrounding the Project Area (Map 6-13 in Appendix A). Potential visual impacts associated with the Project were estimated for impacts to landscape scenery and impacts to viewers. These were determined by comparing the characteristics and extents of the structures and vegetation of the proposed project facilities with the visual resources components of scenic quality, viewer sensitivity, view distances, and scenic integrity. The process involves comparing the visual character of the proposed facilities and project-related activities with the existing landscape character during active construction, operation, and maintenance, and after reclamation is completed. The process utilized

existing photographs and visual simulations for the three KOPs (Appendix L) as well as the roads, residences, and recreation land uses as the viewpoints for conducting the impact analyses.

Primary issues related to visual resources include estimated direct and indirect impacts associated with the degradation of views from immediate foreground KOPs associated with Fetterman Road, Palmer Canyon Road, and Wheatland Reservoir No. 3, and other sensitive views in the vicinity of the Project Area, including towns of Arlington, Bosler, Medicine Bow, and Rock River, and multiple ranch residences and recreation locations located throughout the 30-mile view area. Linear viewpoints that would be influenced in the 30-mile viewshed include U.S. Highway 287, Interstate 80, Highways 13, 34, and 487, Fetterman Road, Palmer Canyon Road, and multiple local improved and unimproved roads and trails.

The development of the Project would likely result in visual contrast with the predominantly natural character of the existing landscape. The primary change in visual effects would be the addition of wind turbines, substation, O&M building, roads, fugitive dust and earthwork. The Project also would extend visual effects through the increased human use of this landscape, and increased human activity in the area.

Prior to completion of reclamation, the facilities may exhibit form and color contrast, especially bright, clear light conditions. Line contrasts are generated to a large extent by the shapes of the structures and roadways. Moderate texture contrasts will likely be created between the bare surfaces and the vegetation textures and patterns in the natural landscape. The Project would expand the visual effects in the views of the existing facilities and adjacent undeveloped areas. The visual impact effects to landforms and vegetation gradually would become less noticeable as reclamation is completed.

6.11.5 Operations Impacts

The proposed facilities would have visual characteristics during operations that would be similar to existing wind energy facilities in the region, notably strongly vertical and elevated geometric structure forms, lines, colors, and textures and exposed earth surfaces. As a result, the Project would have similar, but expanded, visual effects to those already occurring from the existing facilities, including moderate to strong form and color contrasts, moderate line contrast, and weak to moderate to strong texture contrasts between the structural surfaces and the surrounding grasslands and background foothills.

The proposed night-sky lights of the Project Area are within the viewshed of residences in the towns of Arlington, Bosler, Medicine Bow, and Rock River, and multiple ranch residences throughout the 30-mile view area. Linear viewpoints include U.S. Highway 287, Interstate 80, Highways 13, 34, and 487, and Fetterman Road, Palmer Canyon Road, and multiple local improved and unimproved roads and trails. Night sky/night lighting of the operations (turbines, production areas, machinery, vehicles, light towers, the substation, and roadway intersections) would impact the characteristic night landscape.

There would be an increase in the existing conditions in sky glow in the view from all locations in the viewshed, including the three KOPs. Greater sky glow impacts would be apparent during non-moonlit nights, from reflections on clouds, and during the clearest and darkest nights. Areas of night-time activity, such as star gazing, camping, hiking, dispersed recreation, and driving would receive higher noticeable changes to the characteristic night sky. Structures and disturbed

vegetation nearest the light sources would be reflected by operations lighting and would have increased visibility to viewers in the surrounding landscape out to and in some topographically-elevated situations, beyond the background distance zone.

Based on the Common scenic quality classification, scenic integrity of the landscape, viewer sensitivity, view distances, and the presence of existing wind facilities in the background views, it is estimated that impacts to scenery and people would be consistent with other existing wind energy projects in the overall viewshed and characteristic landscape.

6.12 Cultural Resources

This section describes cultural resources in the Project Area that could be affected by the Project. Refer to Chapter 7 for mitigation measures that would be applied to avoid or minimize potential impacts to cultural resources.

6.12.1 Regulatory Jurisdiction

The National Historic Preservation Act (NHPA) is the principal federal law guiding the treatment of archaeological resources in actions authorized, funded, or carried out by federal agencies or located on federal lands. Section 106 (16 U.S.C. 470f) of the NHPA requires federal agencies, prior to taking action to implement an undertaking, to take into account the effects of their undertaking on historic properties included in, or eligible for inclusion in, the NRHP. The criteria used to evaluate the NRHP eligibility of historic properties are contained in 36 CFR 60.4. Given that there are no federal lands or permits required for construction of the proposed Project, the NHPA does not apply. Similarly, there are no Wyoming state laws specific to the protection of cultural resources on private lands. The Industrial Siting Act (W.S. 35-12-109(a)(xiii)(C)) requires that Section 109 permit applications evaluate potential impacts to archaeological and historic resources.

6.12.2 Area of Site Influence

The area of site influence for cultural resources is limited to the footprint of the proposed facilities and temporary (construction-related) use areas as well as a 100 foot buffer. CRA conducted a Class III cultural resources pedestrian survey for the Project in the fall of 2015 around proposed construction and operations locations, which was based on a preliminary project design. Refer to Appendix M for a detailed description of the cultural resources survey area.

6.12.3 Cultural Resources in the Project Sites

A total of approximately 1,493 acres within the Project Area have been inventoried as a result of the Class III inventory performed by CRA in 2015 and one previous cultural inventory known to have occurred in the Project Area in 1998. The previous inventory identified three cultural resources within the Project Area, one prehistoric site, and two historic road segments. One of these historic road segments, the Rock Creek to Fort Fetterman Road (48AB356), runs from south to north through the central portion of the Project Area and is eligible for inclusion in the NRHP.

Two prehistoric sites, seven isolated resources, and one new segment of the Rock Creek to Fort Fetterman Road (48AB356 Segment 18) were newly recorded by CRA in the 2015 survey area.

Neither of these sites is recommended as eligible for the NRHP. Refer to Appendix M for a detailed report describing the cultural history, results of the Class I archival literature review, Class III inventory methods, and findings. The SHPO will receive the Class III report concurrent with the ISD permit application submittal. Note that due to concerns about damage to cultural resources, information relating to specific locations of sites and artifacts has been removed or redacted from the copy of the report included in this application (Appendix M).

6.12.4 Construction Impacts

Though a segment of the NRHP-eligible Rock Creek to Fort Fetterman Road runs through the Project Area, the Project has been designed to avoid direct impacts to this trail (Map 6-14 in Appendix A). All Project features have been designed in the preliminary site plan to avoid direct impacts to all of the identified cultural resources within the Project Area. Final site design will be in accordance with consideration for identified cultural resources, avoidance of impacts, and a 100-foot buffer. The final site design may include additional areas not previously surveyed for cultural resources; those areas may require a cultural resource field survey prior to construction.

The project has the potential to provide a visual impact to cultural resource sites, including the NRHP-eligible Rock Creek to Fort Fetterman Road segments that run through the Project Area. Historic properties are coded by distance zone and Visual Contrast Rating to assess the potential impact of a project. Distance zones are defined by BLM Manual H-8410 (BLM 1986a) and BLM Manual 8431 (BLM 1986b) discusses determining Visual Contrast Rating to assess the impact to the setting from a proposed undertaking. Based on the distance of the project to the Rock Creek to Fort Fetterman Road segments in the Project Area, the project has the potential for visual impacts (BLM 1986a, BLM 1986b).

6.12.5 Operations Impacts

The primary impact to cultural resources is to historic viewsheds from the presence of the turbines, as discussed under the construction impacts in Section 6.12.4 as well as in Section 6.11 *Scenic Resources*. There will not be any additional effects on cultural resources from the Project's operational activities, as operational use would be limited to areas disturbed during construction.

6.13 Recreational Resources

This section examines community recreational facilities, urban outdoor recreational opportunities, and outdoor resource-oriented recreational opportunities that may be affected by the Project.

6.13.1 Area of Site Influence

The area of site influence for recreational resources includes all lands within 10 miles of the Project Area boundary, which encompasses most areas that could experience Project-related impacts to recreational facilities, viewsheds, and access routes.

6.13.2 Recreational Facilities and Outdoor Recreational Opportunities

Post Lake (also known as Wheatland Reservoir No. 3) is an approximately 3,800-acre reservoir located just southeast of the Project Area that provides public access for fishing, hunting, camping, and boating. The lake is jointly owned and managed by the BLM, WGFD, and private landowners. Amenities include a boat ramp, two comfort stations, and two parking areas. Fetterman Road (County Road 61) serves as the primary public access route to Post Lake from Rock River, the nearest town. Fetterman Road would also serve as the primary access route for Project-related vehicle trips.

The town of Rock River has a small public park named Holiday Park. The park's amenities include a playground, two picnic pavilions, a gazebo, a basketball court, a volleyball court, two parking lots, and a portable toilet. No other developed recreational facilities or public parks were identified in the area of site influence.

This area includes portions of four WGFD Hunter Management Areas (HMAs): Como Bluffs, Medicine Bow River, Moriah Ranch, and Pinto Creek (WGFD 2015b). HMAs are parcels of land in which the WGFD facilitates management of hunters for access to hunt. The area may refer solely to private lands or a combination of private, state trust land, and federal land within ranch boundaries. All hunters who wish to hunt these access areas must obtain a printed permission slip. None of the WGFD HMAs occurring within the area of site influence overlap the Project Area.

One historic trail, the Rock Creek-Fort Fetterman Stage Road passes through the northwestern portion of the Project Area. There are no developed trails or facilities along the portion of the historic road, making recreational use of this trail segment unlikely.

Map 6-16 in Appendix A depicts the location of Post Lake, WGFD HMAs, and the Rock Creek-Fort Fetterman Stage Road in relation to proposed Project facilities.

6.13.3 Construction Impacts

Potential impacts of Project construction to community and outdoor recreation resources within the area of site influence include the use of community parks and recreation facilities by construction workers, the effects of construction activities on outdoor recreation resources and access, and alterations to the outdoor recreation setting.

The short-term construction workforce averaging 126 workers during the construction period would likely have little effect on Post Lake and Holiday Park. The distribution of the non-local workforce in nearby communities would be a fraction of the current and anticipated regional population. Consequently, the effects from the use of recreational facilities and outdoor recreation areas by construction workers would be negligible. Similarly, the use by construction workers of the extensive outdoor recreation resources available within the region would have negligible effects on those resources.

Recreation travelers may encounter temporary delays, construction activities, and equipment travelling to Post Lake or the Moriah Ranch or Pinto Creek HMAs on the segment of Fetterman Road between State Highway 287 and Old Fort Fetterman Road. Boswell Wind would install appropriate signage to alert recreation visitors to the potential for increased construction traffic on this route.

6.13.4 Operations Impacts

The operational workforce of 15 people would have little effect on recreational facilities and recreation areas in the ASI. Except during brief periods of major maintenance activities, private recreational use of the Project Area would continue at the discretion of the landowner. Impacts on public outdoor recreation from Project facilities would be limited to the change in viewshed from some recreation sites, as discussed in Section 6.11. Recreationists traveling past the Project Area on Fetterman Road and other surrounding roads would view the turbines and associated facilities. The effects of this change may depend in large part on the visitor's personal, subjective attitudes and opinions about wind energy.

6.14 Land Use

This section presents information regarding existing and future land uses, zoning, and adopted land use plans and regulations applicable to the Project.

6.14.1 Regulatory Jurisdiction

Albany County has regulatory jurisdiction over land use in the Project Area through the Albany County Comprehensive Plan (2014), Planning and Zoning Commission, and Board of County Commissioners. The County assumes specific jurisdiction over wind energy projects through its Wind Energy Siting Regulations (Section 8 of the Albany County Zoning Resolution).

6.14.2 Area of Site Influence

The area of site influence for land use consists of the Project Area and the county roads that would be used to access the site. The Project Area comprises approximately 21,596 acres in Albany County, located entirely on private lands. No federal or state lands would be used for any Project-related infrastructure.

6.14.3 Consistency with Albany County Land Use Plan

According to the Existing Land Use Map contained in the Albany County Comprehensive Plan (Albany County 2014), all lands within the Project Area are categorized as Agricultural. The Plan defines the Agricultural land use designation as "land for commercial farming and ranching operations…that allows for active production and management of livestock, production and storage of commercial and grain crops, and related functions."

The Albany County Wind Energy Siting Regulations require all facilities with an aggregate generating capacity greater than 25 kW to apply for a Wind Energy Conversion System (WECS) Use Permit. The application process involves the review and recommendation of the Planning and Zoning Commission and the approval of the Board of County Commissioners, as well as community input during a defined and requisite public hearing and comment period. The WECS permit applicants must certify that the Project would comply with all applicable state and county zoning and land use regulations. Boswell Wind must also submit a waste management plan and a reclamation/decommissioning plan with the WECS permit application to ensure future compliance with the land use designation.

6.14.4 Construction Impacts

Existing uses of private lands within the Project Area are primarily associated with livestock grazing. Except during temporary construction or major maintenance operations, the Project would not interfere with continued use of the Project Area for agricultural uses. Boswell Wind would provide timely notification and ongoing coordination with the private landowner regarding any Project activities that could affect their operations, in accordance with the lease agreement between them.

No information is readily available on the frequency and level of use of the Project Area for livestock grazing. In general, project construction activities could impact livestock grazing by removing limited amounts of forage during construction, increasing the risk of vehicular collisions with livestock due to increased traffic and new roads, or exposing livestock to construction zone hazards (e.g., open pipeline trenches). Other potential impacts on livestock grazing could result from Project-related activities that generate fugitive dust, which can affect forage quality, or increase the establishment and spread of invasive species and noxious weeds that are unpalatable or poisonous to livestock. To minimize or avoid these impacts, Boswell Wind would maintain close coordination with the landowner throughout Project construction and would promptly reclaim all disturbed areas in accordance with the Project-specific reclamation plan.

By ensuring that the Project would be consistent with all relevant land use plans, policies, and regulations through the WECS permitting process, and maintaining close coordination with the landowner to avoid or resolve any conflicts with livestock grazing or other existing land uses, construction of the proposed Project would be compatible with existing and future surrounding land uses in the Project Area.

6.14.5 Operation Impacts

The operation of wind turbines is compatible with grazing and farming activities. Cattle, sheep, and other domestic animals routinely graze underneath operating wind turbines at projects across the U.S. and around the world, and ranchers regularly farm around wind turbines. Operation of a wind energy facility is compatible with existing and future surrounding land uses in the Project Area.

6.15 Transportation

This section describes the location and status of the primary and secondary routes that would be used to access the Project Area. This section also provides projected traffic information and the potential impacts to roadways and intersections from implementation of the Project. Refer to Appendix N, *Traffic Study* for further information about traffic in the Project Area.

6.15.1 Transportation Facilities/Routes

The Project would use existing and proposed roads to accommodate project activity. The following section describes the existing roads that are expected to be used by project-related traffic to access the Project Area. The WTG vendor will decide if rail transport of project components is a viable option. As such, rail transport is discussed under project transport alternatives. Proposed access roads in the Project Area would be used only for construction, operations, and maintenance purposes.

6.15.1.1 Key Transport Route Roadways

Various federal, state, and county roadways are likely to be impacted by traffic generated by this project. The following paragraphs identify the roadways that are most likely to be impacted by site-generated traffic (Map 6-15 in Appendix A).

Interstate 80

I-80 extends east to west across southern Wyoming and travels through Laramie and Rawlins. Its functional highway classification is a rural principal arterial interstate. There are two interchanges to connect I-80 with U.S. 30 and U.S. 287, which provide access to Fetterman Road, the primary roadway to and from the Project site. I-80 is a four-lane, divided, paved highway with 12-foot travel lanes and eight to ten foot outside shoulders with two to four foot median shoulders. Current WYDOT projects along the Interstate include concrete slab repairs, installing cable median barriers, drainage repairs, reconstruction, and dowel bar retrofit and structure rehabilitation.

U.S. 30 and U.S. 287

U.S. 30 is an east-west route that extends from Cheyenne through Laramie, Rawlins, and ultimately to the Utah border. U.S. 287 is a north-south route beginning at the Colorado border, running north to Laramie, west Rawlins, and then north to Lander. While both are separate routes, they overlap and operate as a single roadway between Laramie and Rawlins. The U.S. 30/U.S. 287 roadway is functionally classified as a minor arterial between Laramie and Walcott junction. The road section is an asphalt paved highway. It is primarily a two-lane road with a short section of divided four-lane road. The driving lanes are 12 feet wide with five-foot shoulders. U.S. 287 will provide an alternate route for supplies coming from northern Colorado. U.S. 30/U.S. 287 will be a primary route for delivery of construction supplies to the construction site and construction delivery could come from Rawlins and points westward as well as from the north. Wyoming Highway 13 would be used as the primary connecting route between I-80 and U.S. 30/U.S. 287 for oversized loads, in order to minimize the transportation of oversized loads through Laramie.

WY 487 and WY 34

WY 487 and WY 34 are paved two-lane roadways that are functionally classified as minor arterials. They extend north to south (WY 487) and east to west (WY 34) providing access to various rural areas surrounding the Project site. WYDOT currently has construction projects scheduled for preliminary engineering for pavement overlay and restoration and rehabilitation along certain sections of WY 487. Timing of this activity would be determined based a cooperative agreement between Boswell Wind, Albany County, and WYDOT.

Fetterman Road

Fetterman Road (County Road 61) is a-single-lane, unpaved county road that extends east and then north from the U.S. 30 providing access to various rural areas surrounding the Project site. The roadway varies in width from 16 to 20 feet wide at its widest point with little to no shoulder. Fetterman Road will be the primary route used for project-related traffic.

6.15.1.2 Key Transport Route Intersections

Several intersections will also be affected as a result of Project-related traffic. The following paragraphs discuss the location and key features of each intersection.

U.S. 30/U.S. 287-Fetterman Road

The intersection of U.S. 30/U.S. 287 with Fetterman Road is located approximately three miles north of Rock River. This junction is a T intersection with the through route, U.S. 30/U.S. 287 running north and south, and Fetterman Road, the stem of the T, running east and west. Fetterman Road is controlled with a STOP sign. There is adequate sight distance in all directions.

Fetterman Road-Palmer Canyon Road

The intersection of Fetterman Road and Palmer Canyon is a three-way junction, commonly known as a "Y" intersection, which is located approximately 15 miles west of U.S. 30/U.S. 287 on the Fetterman Road. Intersection sight distance from the minor approach is adequate in both directions for a typical passenger vehicle or moderate-sized truck. The storage capacity for the intersection, meaning the amount of cars that can be queued to pass through an intersection, is adequate in all directions for a typical passenger vehicle or moderate-sized truck. Construction vehicles will not use Palmer Canyon Road to access the project site.

6.15.1.3 Project Transport Alternatives

Boswell Wind anticipates that the majority of the Project's components will be trucked to the project site and that Albany County will be the primary point of delivery for these components. However, the turbine supplier will make a determination of the feasibility of rail based upon the availability of trailers and rail cars.

The primary route for Project-related traffic would be Fetterman Road (County Road 61) extending west and southeast from the U.S. 30 Interchange, providing access to various rural areas surrounding the Project site. Other transportation routes could include Interstate 25 providing access to WY 487 and WY 24.

A secondary transport option utilizing the Union Pacific railroad would depend upon the decision made by the supplier of construction materials or wind turbines and not Boswell Wind. Union Pacific operates 834 miles of track running east to west along the I-80 corridor in Wyoming and is often referred to as the Central Corridor or Service Unit #14. Materials transported via rail would then be offloaded at the nearest siding or transport facility which would depend on the location from which the materials are being transferred. There is a transload site located in South Laramie, WY operated and owned by Union Pacific which could provide highway access to I-80 and U.S. 287.

6.15.2 Existing Conditions

Albany County has 311.1 highway miles with over 1 million daily vehicle miles traveled with approximately 35 percent from truck traffic. The majority of the highway vehicle miles traveled are

along rural state highways including interstates, other principal arterials, minor arterials, major collector, minor collector, and local roadways.[6]

6.15.2.1 Traffic Volumes

Prior to evaluating changes in traffic associated with Project implementation, it was necessary to observe current traffic conditions and establish a baseline for traffic demand at key locations in the study area. Table 6-16 shows turning movement counts that were performed at the following key study area intersections and roadways (Map 6-15 in Appendix A) in November of 2015.

Table 6-16. 24-hour Traffic Count Data Collection

Date	Intersection of Fetterman Rd and U.S. 30 Site #1	Y Junction of Palmer Canyon Rd and Fetterman Rd - West Site #2	Y Junction of Palmer Canyon Rd and Fetterman Rd - North Site #3	Y Junction of Palmer Canyon Rd and Fetterman Rd - East Site #4
November 7th, 2015	159	138	45	94
November 8th, 2015	141	135	40	91
November 9th, 2015	138	116	27	78
November 10th, 2015	85	70	12	65
November 11th, 2015	3	5	1	3
November 12th, 2015	82	72	46	31
November 13th, 2015	45	49	39	24

Source: Gostovich, Mike 2015.

None of the intersections or roadways in the area of site influence currently experience a particularly high traffic demand. The Fetterman Road-Palmer Canyon Road intersection had very low daily traffic demands when observed for the purposes of this study.

Table 6-17 shows annual average daily traffic (AADT) count data for several locations along I-80, U.S. 30, U.S. 287, WY 487, and WY 34 (WYDOT 2014).

[6] Arterial Road = Functionally classified highway that is characterized by a high degree of continuity and a capacity to quickly move relatively large volumes of traffic but often provide limited access to abutting properties. The arterial system typically provides for high travel speeds and the longest trip movements.
Collector Road = Connects local roads to arterial roads.
Local roads = Provide land access.

Table 6-17. 2014 WYDOT Traffic Count Data

Site #	Location	Milepost	AADT	Functional Roadway Classification	County
23	I-80 West of Rawlins	208.65	12,238	Rural (R.) Principal Arterial - Interstate	Carbon
26	I-80 East of Little America	71.6	12,717	R. Principal Arterial - Interstate	Carbon
106	I-80 West of Laramie	299.3	10,690	R. Principal Arterial - Interstate	Albany
178	U.S. 30 East of Sage Junction	30.3	1,504	R. Principal Arterial - Other	Lincoln
114SE	WY 487 Southeast of WY 220	72.71	661	R. Minor Arterial - Other	Natrona
117	U.S. 287 North of Spruce St	0.2	4,950	Urban (U.) Principal Arterial - Other	Carbon
145N	U.S. 30/287 North of WY 34	310.85	918	R. Minor Arterial - Other	Albany
145E	WY 34 East of U.S. 30/287	0	581	R. Minor Arterial - Other	Albany
145S	U.S. 30/287 South of WY 34	310.85	1,315	R. Minor Arterial - Other	Albany

Source: WYDOT 2014.
AADT annual average daily traffic
WYDOT Wyoming Department of Transportation

6.15.2.2 Intersection and Roadway Capacity

Intersection and roadway capacity are often measured by how efficiently they can accommodate existing traffic. This is measured through LOS designations provided by the Highway Capacity Manual from the Transportation Research Board (TRB 2000). LOS is evaluated using letter designations from A to F, with A being the most favorable operating condition representing free flowing unobstructed movement of traffic and F being the worst representing significant delay to vehicles. LOS C is generally considered to be the minimum threshold for acceptable peak hour (typically 8-10:00 a.m. and 4-6:00 p.m.) traffic operations.

For this study, existing conditions capacity was evaluated at several sites; all of the sites in the area of influence were found to operate at an LOS of A, which is an indication of smooth and efficient traffic operations (Table 6-18). No significant queues were projected through the capacity calculations. Given the low level of existing traffic demand for the analyzed intersections, these results were anticipated.

Table 6-18. Existing Volume LOS Determinations

Time of Day/Day of Week	U.S. 30	Fetterman Rd	Fetterman Rd and Palmer Canyon Rd Junction
Direction	SB Lt Lane	WB Lt & Rt Lane	NB, SB, WB, EB Lt, Thru, Rt
AM Weekday	A	A	A
PM Weekday	A	A	A
AM Weekend	A	A	A
PM Weekend	A	A	A

EB	Eastbound	Rt	right turn lane
LOS	level of service	SB	Southbound
Lt	left turn lane	WB	Westbound
NB	Northbound		

6.15.3 Projected Traffic Generation

6.15.3.1 Component Transport and Construction Traffic

As described in Chapter 2 of this Application, between 110 and 170 WTGs will be constructed in the project site. It is estimated that each WTG installation will generate approximately 60-65 concrete and other materials truck trips, approximately 20 truck trips with crane components, as many as 2 assist cranes, 7-8 heavy haul trucks with turbine components, and 2-5 extended reach forklifts for a maximum total of approximately 100 materials and component trucks per WTG.

The construction materials and wind turbines are expected to be shipped from the following destinations:

- The road and foundation materials will be sourced in Wyoming as close to the project site as possible.
- The turbine nacelles and generators will come from Florida.
- The towers will likely be coming from Texas and the blades from South Dakota.
- The turbine components will be delivered either by rail to Cheyenne and then put on trucks or just trucked from their origin to the project site.

The turbine vendor will make a determination of whether they will use rail or not within a couple months of delivery based upon the availability of trailers and rail cars.

Although each of the above vehicles and components will initially need to be delivered to the Project Site, the majority of impacting traffic will actually be generated once construction and assembly are initiated at the site. The Project would generate approximately 15,680 round trips related to turbine component and construction materials transport vehicles only.

In addition to the construction truck traffic described above, various ancillary trips related to fuel, mechanics, vendors and maintenance items are also expected. These trips are likely to originate in Albany and Carbon Counties. As such, they would impact traffic operations for streets and intersections evaluated in this analysis. For the purposes of this study, it was estimated that a

maximum of approximately 20 one-way trips per day could be expected to account for this maintenance-based traffic.

6.15.3.2 Commuter Traffic during Construction

Based on the socioeconomic analysis conducted for this Application (see Chapter 5), it is expected that approximately 74 percent of the construction work force will be workers brought in from other areas, and 26 percent will comprise locals already living in the immediate area (Albany and Carbon counties). Over 74 percent of the workforce would be expected to be sourced from outside the communities in commuting distance and require temporary housing.

Construction is scheduled to begin November 2017 and continue through October 2019. The overall monthly workforce during construction is expected to vary with a peak workforce of 236 employees. Assuming a carpool rate of 1.5 persons/vehicle and only one trip in and one trip out per commuter vehicle, this would result in a commuter traffic generation of 314 round trips per day (157 in/157 out). Of those 157 vehicles, 80 percent (125 vehicles) will come and go in the morning and afternoon peak hours (8-10:00 a.m. and 4-6:00 p.m.). During the peak hours, 90 percent of the volume will be to and from the south. Commuter traffic is expected to account for nearly two-thirds of the daily project-generated trips.

6.15.3.3 Trip Routing

For component delivery purposes, Boswell Wind has indicated that the majority of component transport vehicles will likely originate from areas south of the project site and that they would primarily use I-80 to access the Project Area. Some traffic could be re-routed via Interstate 25 (I-25 route through Casper) and approach the Project Area from the west, eastbound on I-25. It is not anticipated that any of the roadways associated with the I-80 route would require improvement or modification in order to safely and efficiently accommodate traffic generated by the Project. The primary access to the project site will be from Fetterman Road, regardless of an eastbound or westbound approach to the Rock River area. Fetterman Road will be reconstructed to a width of 26 feet to accommodate turbine delivery and construction. In terms of everyday Project-generated traffic, it is expected that commuter and ancillary support vehicular trips will be routed to the project site via Fetterman Road.

6.15.3.4 Traffic Impacts

The Project will generate a substantial amount of traffic during construction. The traffic loadings will consist of construction materials and component transport vehicles, as well as commuter transport vehicles and ancillary support service vehicles.

An evaluation of existing conditions showed that the roadways and intersections encompassed by the alternative routes currently experience a minimal level of traffic demand and thus, the LOS and reserve capacity for those facilities are excellent. Given that existing traffic demands are relatively light in most areas, it is not expected that highway or intersection LOS will degrade such that traffic control or lane expansion improvements would be necessary for any of the associated roads or highways. The following paragraphs discuss specific elements related to expected traffic operations impacts.

6.15.3.5 Traffic Volumes

Based on the current proposed construction schedule, it is expected that the early months of the construction period will consist of road construction with the majority of work being constructed from June 2018 to September 2019. As such, the analysis of future traffic impacts focuses on that time period of construction as a worst-case scenario. In order to project traffic volumes for the peak construction scenario, it was necessary to calculate daily vehicular demands for component transport, construction activity and workforce commuter traffic. It was also necessary to determine how the project-generated traffic would be distributed among the potential access routes. This projection of construction traffic demand and distribution was calculated based primarily on information provided by Boswell Wind in regard to workforce scheduling and expected materials transport routing. Although the overall number of construction and commuter trips generated by this project (approximately 16,160 trips) seems high, that volume would be spread out over 24 months of work. Also considering that many of the materials production-related trips will be generated on-site, the net overall daily and peak hour traffic demand impacts for key study area intersections is relatively minor. Table 6-19 below illustrates the expected levels of average daily traffic during the peak construction period for the wind energy facility.

Table 6-19. Projected Daily Traffic Volumes

Roadway	AADT[a]	Construction Daily Traffic plus AADT[b,c]	% Increase[d]
I-80 West of Laramie	10,690	11,278	5.5%
U.S. 30 East of Sage Junction	1,504	2,092	39.1%
WY 487 Southeast of WY 220	661	1,249	88.9%
U.S. 287 North of Spruce St	4,950	5,538	11.9%
U.S. 30/287 North of WY 34	918	1,506	64.0%
WY 34 East of U.S. 30/287	581	1,169	101.1%
U.S. 30/287 South of WY 34	1,315	1,903	44.7%
Fetterman Road	93	681	629.8%

[a] AADT is based on 2014 WY DOT data or an average of Site #1's 2015 Fieldwork traffic counts.

[b] Assumes an average of 28 construction vehicle trips (15,680 total construction trips/19 months construction/30 days per month).

[c] Assumes an average of 280 workers per day during construction with 1 worker per vehicle = 560 workforce one-way trips.

[d] Is not a weighted average by roadway. This presents a worst case scenario with all vehicles traveling on each roadway each day.

% percent
AADT Annual average daily traffic

Table 6-19 shows that expected increases in average daily traffic along key project access routes could range from 6 percent to 630 percent during the peak construction. However, it should be noted that the greatest overall impact in terms of vehicular traffic will likely occur along the segments of Fetterman Road that will need to be reconstructed by Boswell Wind in order to accommodate transport vehicles. At this time, no specific information is available relative to sequencing and operations for the off-site road improvement portions of the project.

As such, the annual average daily traffic (AADT) projections in Table 6-19 account for all workforce commuter traffic for this project (including roadway improvement crews), as well as WTG materials and component delivery, and ancillary support vehicle trips. Table 6-19 does not account for all of the traffic that may be associated with the proposed off-site road improvements, such as the necessary reconstruction of portions of Fetterman Road.

6.15.3.6 Intersection and Roadway Capacity

Capacity for the peak construction scenario was calculated for the traffic count sites using site-generated traffic demand increases. Based on this scenario, all of the intersection approaches were found to operate at an LOS B or better during both peak periods. No significant queues were projected through the capacity calculations (Appendix N). No deficiencies requiring mitigation were identified relative to intersection capacity (see Section 7.1.6.4 *[Traffic Management]* for traffic control measures). However, it should be noted that the capacity calculation results likely do not fully account for how slow moving and bulky some of the transport vehicles will be as they traverse these intersections. As such, additional, albeit temporary, delays may be experienced by ancillary vehicles as oversized trucks navigate through intersections. Additional capacity impacts are likely to arise temporarily if any reconstruction is necessary for any of the intersections.

6.15.3.7 Operations and Maintenance Related Traffic

Traffic levels associated with operation and maintenance activities will be low in volume resulting in up to fifteen vehicles per day (in and out) as well as travel throughout the Project Area along access roads. The actual timing of these vehicles on area roadways will vary based on Project needs, work schedules, and time of year. Potential fugitive dust emissions will be mitigated with water suppression techniques, as needed.

6.15.3.8 Safety

The primary safety concern is related to potential conflicts between oversized transport vehicles and the normal everyday traffic stream during the construction period. Some sections of the access route roadways are narrow, with travel lanes on Wyoming state highways at 12 feet wide and 16- to 20-foot width travel lanes on county roads with minimal shoulders. Escorts would be provided for all oversized vehicles through these sections using flag cars and proper signage, lighting, or other means to warn approaching and following vehicles. Oversized vehicles also typically have very slow acceleration rates, particularly from a stopped position. Intersection approaches along each of the transport routes provide adequate sight distance therefore there are no anticipated issues with the expected reduced startup and acceleration time for heavy vehicles. Roadway conditions during winter conditions can be slippery especially on gravel roads, which is possible to occur outside of the designated winter months (January to March). I-80 is often closed during periods of heavy snowfall during the winter, limiting travel options for construction materials.

6.15.3.9 Geometrics

The most significant traffic impacts are likely related to roadway geometrics and structural integrity of roads, culverts, cattle guards, etc. Fetterman Road will likely require modification involving widening of the roadway and replacing 24-foot wide cattle guards with 30-foot wide cattle guards. American Association of State Highway and Transportation Officials (AASHTO) and the Albany County road standards recommend a 32-foot running surface to accommodate the temporary traffic

condition during construction. Boswell Wind has proposed to reconstruct Fetterman Road to a width of 26 feet, with designation of a reduced speed limit (40 mph) during the construction phase to reduce the safety hazards associated with the geometric conditions of the roadway. The 26-foot reconstructed width would be consistent with AASHTO guidelines for the post-construction traffic volumes and speed limit. WYDOT has indicated that it will require Boswell Wind to enter into a road damage agreement(s) to account for any damage incurred by State roadway facilities. Albany County will require a similar agreement(s) prior to granting access and/or approval of reconstruction of their facilities. All necessary roadway improvements should be designed based on AASHTO, WYDOT, Albany County, and other applicable standards.

6.15.4 Conclusion

In accordance with County Road Use Agreements and State Road Damage Agreements, intended to be in place prior to construction, impacts to area roads will be avoided and minimized by road improvements completed prior to construction, road maintenance activities during construction, and, where necessary, road repairs following construction. Though impacts to traffic during construction may result in occasional inconvenience to area residents, such impacts are not anticipated to substantially impair the health, safety, or welfare of current and expected inhabitants in the area of site influence. Operation of the proposed Project will result in negligible impacts to roads and an incremental increase in light vehicle traffic on Fetterman Road.

Chapter 7
Controls, Environmental Protection Measures, and Monitoring

7.1 Controls

7.1.1 Avoidance

Boswell Wind incorporated the following avoidance areas for turbine placement into the conceptual site plan for the Boswell Springs Project to reduce impacts to communities and natural resources:

- Turbines are set back at least 0.25 mile or 5.5 times the tower height, whichever is greater, from a residential dwelling or occupied structure.
- Turbines are set back a distance of at least 1.10 times the tower height from third-party transmission lines and communication towers.
- Turbines are set back a distance of at least 1.10 times the tower height from adjacent property lines.
- Turbines are set back a distance of 0.5 mile or 5.5 times the tower height, whichever is greater, from any platted subdivision.
- Turbines are set back a distance of 1.0 mile from any incorporated municipality.
- Turbines are set back at least 0.25 mile from the right-of-way for Interstate 80, Highway 34, 130 and 230, and U.S. Highway 287/30.
- Turbines are set back a distance of at least 1.10 times the tower height from public roads and railroads.
- Turbines are set back at least 0.25 mile from State Parks and wildlife refuges.
- Turbines will not be constructed within the alignment of Fort Fetterman Road, which is a historic road.
- Turbines will not be constructed within 1.0 mile of an active ferruginous hawk, golden eagle, or bald eagle nest, or within 0.5 mile of an active Swainson's hawk nest.
- Turbines are set back 450 meters from Wheatland Reservoir No.3.
- Turbines are set back 100 meters from riparian corridors and wetlands larger than 5 acres.

Health and Safety Measures

Boswell Wind, including its Contractor(s) and O&M staff, is committed to a safe and healthy workplace that promotes a zero-accident culture. Boswell Wind is committed to continuous improvements to identify and control risks so that company safety metrics and performance meets

the goal of zero incidents. To meet this commitment, the Project's health and safety policies will require the following:

- Operate in compliance with or exceed all health and safety government laws, regulations, ordinance, standards, and permit requirements.
- Ensure all employees are involved in health and safety programs with appropriate training and communication to work responsibly, make decisions to carry out their duties, and be accountable for the results.
- Provide a health and safety plan and structure that ensures health and safety management with risks, impacts, and legal requirements controlled through appropriate actions and governance.
- Ensure that health and safety programs are set and communicated to all employees and that performance is monitored to promote continuous improvement.
- Work to proactively prevent incidents, accidents, and environmental damage before these occur through sustainable actions and process improvements at the Project site.
- Enable real-time communication on site through the installation and use of a two-way radio system that will be employed throughout construction and during operations of the facility.

7.1.2 Worker, Environmental, and Facility Controls

There are no health and safety standards specific to the siting or operation of wind energy facilities, but safety standards relevant to construction can be applied. In addition, in an effort to prevent injury and damage to the environment and public and private property, conditions or actions that may put workers, the environment, or the facility at risk have been identified. Boswell Wind has taken measures to avoid these conditions and actions and minimize the potential for an incident to occur. Should an incident occur, it would be timely and effectively addressed. Preliminary site planning has considered measures to protect both workers and the general public during construction and operation of the facility, such as fencing and signage.

7.1.2.1 Emergency and Law Enforcement Services

To ensure the safety and health of all employees Boswell Wind is committed to working with the local emergency, fire, and law enforcement agencies. Emergency service providers in Albany County include the Wyoming Regional Emergency Response Team, Albany County Police and Fire Departments, Albany County Hospital and other emergency response providers such as the Wyoming Highway Patrol and BLM Rangers. Boswell Wind will provide emergency service providers an updated Emergency Response Plan and updated site plan for the Project prior to commencement of construction. A final site plan representing as-built development will also be provided post-construction, if the final site plan deviates from the pre-construction site plan. For additional information on emergency response teams in the Project vicinity, site and activity risks, on-site emergency response requirements, and response plans, see Appendix O, *Emergency Response Plan*.

7.1.2.2 Occupational Hazards

As with any construction project, construction and operations workers are subject to risk of injury or fatality from physical hazards. Such hazards can be minimized when workers adhere to safety

standards as set by the U.S. Department of Labor's OSHA. Occupational health and safety are regulated at the federal level through the OSHA (29 U.S. Code [USC] 651 *et seq*.). Wyoming has additional statutes and regulations that build on the federal law including the Wyoming Safety Act. The State of Wyoming cannot enact standards more strict than those regulations set forth by OSHA under Federal regulations; however, they can adopt standards for industries not covered by OSHA (OSHA 2014b).

Some of the occupational hazards associated with wind energy projects are similar to those of the heavy construction and electric power industries, while others are unique to wind energy projects such as rotating/spinning equipment. In particular, the hazards of installing and repairing WTGs can be similar to those of buildings, bridges, telephone poles, and other tall structures. The WTG manufacturer will provide an O&M manual and hands-on training sessions that will include system safe operating limits and descriptions, startup and shutdown procedures, alarm response actions, and an emergency procedures plan. On-site training is also available upon request through the State of Wyoming through a free on-site consultation program.

Boswell Wind and its contractors will comply with all applicable federal, state, and local safety, health, and environmental laws, ordinances, regulations, and standards.

Cellphone service in the Project Area may be unreliable or limited to specific local carriers. Thus, Contractor(s) crews may need to carry or have ready access to satellite phones or have access to a landline phone to ensure that emergency calls (i.e., 911) or other critical calls can be made from the project site in case of emergency. Crews and individuals not carrying satellite phones will have two-way radio contact with those that do.

7.1.2.3 Public Safety/Security

Throughout the Project site appropriate signage will be placed in high visibility areas to warn employees and visitors of all potential hazards. Locations will include access roads, entrances, roadway intersections, excavation sites, maintenance buildings, and trenches. Signs will include emergency contact information and direction for emergency aid workers to help in locating specific turbines and facilities. Additional safety measures would include fencing surrounding excavated foundation holes, electrical collection trenches, unfinished turbine bases, excavations, and other hazards. Temporary fencing would typically consist of high-visibility plastic mesh. Security guards, cameras, and/or additional fencing could be used as necessary to protect public health and safety as well as Project facilities. Inspections would be conducted by the Wyoming OSHA department for compliances with federal and state OSHA requirements.

7.1.2.4 Traffic Management

Construction

The potential for any traffic issues will be highest during construction of the Project when worker traffic is at its peak and deliveries of materials and equipment which is expected to occur between June 2018 and September 2019. Detailed traffic information is included in Section 6.15 *(Transportation)* that includes information regarding roadway characteristics and expected traffic volumes within the Project Area.

Boswell Wind will consult with the Town of Rock River, City of Laramie, Albany County, the local WYDOT District and others, as appropriate, to ensure the execution of a well-coordinated transportation plan that will minimize risks and inconvenience to the public. The plan will be focused on traffic and circulation on Fetterman Road, U.S. 30, and the main intersection between Fetterman Road and Palmer Canyon Road where the highest concentration of Project-related traffic would be (see Section 6.15 *[Transportation]*). The plan will be finalized with WYDOT once final turbine component routing has been established in consultation with the Project's turbine vendor. Prior to construction, Boswell Wind will execute a Road Improvement Agreement and Road Damage and Maintenance Agreement with Albany County, and a Road Damage Agreement with WYDOT, to ensure that roads used during the construction phase of the Project are properly improved, maintained, and repaired prior to, during, and after construction.

Operations

During operations, the Project will run continuously (24 hours per day, 7 days per week) using an automated system. Boswell Wind will employ up to 15 full-time employees, with an incremental daily increase in traffic to and from the sites as necessary.

7.1.2.5 Lightning

Eastern Wyoming is not a highly lightning-prone area. Nevertheless, the potential for lightning strikes has been considered in the design of the proposed Project and its structures. Because the turbines will be the highest structures in the surrounding area, the probability of lightning striking them, should there be an electrical storm in the immediate area, may be higher. Mitigation measures to avoid serious injury or potential structural damage during a lightning strike include:

1. WTGs and the substation will be equipped with lightning-protection systems.
2. Grounding equipment shall be installed for WTG foundations, substation, and met towers.

Grounding equipment may consist of a copper cable grounding mat cast in place when the base is constructed for turbines and a grounding grid laid below grade in trenches around the substation. Grounding equipment would be installed during construction where the grounding crew follows behind the tower assembly and erection crew installing grounding rods. Crews would then measure the ground resistance and continue to add additional grounding rods until an appropriate ground resistance is obtained.

7.1.2.6 Aviation Lighting

According to standards set by the U.S. Department of Transportation, FAA, not all wind turbine units within the Project site need to be lighted. The turbines located along the periphery of the installation are required to be lighted; however, lighting of interior wind turbines is of lesser importance. The lights can be either flashing red (L-864) or white (L-865) and nighttime wind turbine obstruction lighting would be consistent with the preferred FAA L-864 red flashing lights. All lights are required to flash or pulse simultaneously or in a synchronized fashion. Prior to construction, Boswell Wind will determine the number and location of WTGs with lights and the lighting pattern of the WTGs in coordination with FAA prior to construction.

7.1.2.7 Shadow Flicker

Shadow flicker is a visual phenomenon common to WTGs that can be easily mitigated. It is created by the rotation of the wind turbine blades which results in alternating patterns of shadow and light. This can be seen as a nuisance to people and wildlife. Shadow flicker is not present on cloudy days, during fog events, and when the turbines are not rotating (Massachusetts Clean Energy Center 2013). Potential receptors such as residences or sensitive wildlife habitats (e.g., sage-grouse leks) that are more than a few hundred yards away from a turbine only experience shadow flicker for short periods in the morning or evening or during the winter when the sun tracks low in the southern sky. See Section 6.9 *(Terrestrial Wildlife)* for potential wildlife impacts. There are no residences in close enough proximity to the Project to be adversely affected by shadow flicker; the nearest residence is approximately two miles from a wind turbine.

7.1.2.8 Turbine Certification

In the U.S., there are four regional testing locations, two blade testing locations, one drivetrain testing facility, and one turbine interaction testing facility. These facilities are used to research, test, and certify wind turbine components to validate the components design, performance, and adherence to safety standards. A joint testing program has been established between the Massachusetts Clean Energy Center and the National Renewable Energy Laboratory to test wind turbine blades to meet International Electrotechnical Commission (IEC) standards. The establishment of the Small Wind Certification Council provides accredited third-party certification for small scale wind turbine development (DOE 2014).

European manufacturers also have their own rigid standards verifying their design criteria, operational characteristics, supervision of construction, transportation, erection, commissioning, testing, and servicing with two testing laboratories located in Denmark.

Boswell Wind will rely on independent agencies used by the turbine vendor to certify that the design and construction of a given turbine/tower assembly conform to international and U.S. accepted standards in terms of design, construction materials and methods, performance, and safety including potential mechanical failures. This type of certification is generalized and provided at the manufacturers' expense.

7.1.2.9 Turbine Control

Turbines can be controlled through electrical and mechanical systems from the control panel or a computer. SCADA systems can be used to send signal over communication channels to remotely located equipment. Equipment can be fully controlled using the tower-top control panel. Service switches are located at the tower top to prevent employees at the bottom of the tower from operating certain turbine systems while employees are in the nacelle. Override (i.e., stop) buttons are located in the tower base and in the nacelle to stop the turbine in the event of an emergency.

Wind turbine braking systems are important systems in order to keep the turbines operating efficiently and safely. Typical brake systems hold the blade pitch steady and keep the nacelle pointed in the right direction. Brakes can also steady turbines during heavy storms minimizing the potential risk of structural damage. Braking systems include rotor brakes which can be placed between a gearbox and generator and a disc brake can be used with a large friction lining area which

requires high-braking torque. Pitch drive brakes are electrically released, relatively small, and require less torque than rotor brakes (WindPower 2012).

7.1.2.10 Construction Waste Management

Waste management control procedures will be implemented as previously set forth during the construction phases of the Project.

Solid Waste Management

The generation of solid waste during the construction phases will be handled by a solid waste hauling and management firm contracted by Boswell Wind or their Contractor(s). Boswell Wind or its Contractor will solicit bids from waste management companies in the area. There are four roll-off companies near the Boswell Springs site: Waste Connections, Waste Management, Rock River Disposal, and Dumpster Source. The contracted waste hauler will remove the portable dumpsters depending on the construction activities. Exact timing of waste removal and size of the portable dumpster will be determined based on the construction activities being conducted on site. There are no plans to store or treat solid waste at the Project site.

Fuel and Oil Storage

Designated collection points would be used for disposal of oil used during construction. It is expected that the collection points will consist of 55-gallon drums placed on secondary containment pallets in temporary structures during construction and in permanent structures during operations. The exact number of 55-gallon drums that would be utilized during construction is unknown; however, it is not expected to be more than five drums. The Contractor(s) and Boswell Wind will comply with the applicable sections of the Federal Standards for the Management of Used Oil (40 CFR Part 279). Boswell Wind will contract with appropriate and reputable companies to remove used oil from the site for disposal at properly licensed facilities.

Aboveground fuel storage tanks (diesel and/or gasoline) will be used by the Contractor(s) to facilitate all on-site equipment refueling, including workforce vehicles and heavy construction equipment. The Project will not utilize underground tanks during construction or operation. Storage tanks will be maintained in accordance with all federal, state, and local rules and regulations.

Hazardous Wastes

It is anticipated that minimal or no hazardous wastes will be generated during construction of the Project and that the Project will qualify for Conditionally Exempt Generator Status under the Resource Conservation and Recovery Act (RCRA). Conditionally Exempt Generators have to produce 100 kilograms or less of hazardous waste per month or 1 kilogram or less per month of acutely hazardous waste (EPA 2015a). Potential generation of hazardous wastes could include lubricants, hydraulic and insulating fluids, and glycol-based coolants. Compressed gas cylinders for welding and cutting such as oxygen and acetylene and modest amounts of cleaning solvents, paints, and corrosion-control coatings could also be present. The quantities of such wastes are expected to be well below regulatory thresholds for being considered a Conditionally Exempt Small-Quantity Generator under the RCRA.

Any such wastes that are generated will be properly characterized and managed by the Contractor(s) and Boswell Wind using established SPCC protocols. The Project will not include any on site treatment, storage, or disposal that would require obtaining hazardous waste permits during the construction period. In addition, any wastes generated from a release will be properly characterized and managed by the Contractor(s) and by Boswell Wind.

Construction equipment and workforce vehicles will be maintained at all times to minimize leaks. Any necessary maintenance will be performed off-site at an appropriate facility. An environmentally friendly detergent will be used to remove wind carried particulate matter from internal and external turbine mechanisms.

Spill Management

The Contractor(s) will develop and implement a SPCC Plan in accordance with federal standards for oil pollution prevention (40 CFR Part 112) and Solid Waste Rules and Regulations. During the unlikely event of a spill during construction the treatment/disposal facility currently permitted by the WDEQ Solid and Hazardous Waste Division will be contracted to clean, dispose, and manage any contaminated soils. Any spills will be reported in accordance with applicable regulations.

7.1.2.11 Operations Waste Management

Project operations will require appropriate waste management procedures to be implemented throughout the Project site.

Fuel Storage

The Project will include at least one maintenance building which will store all hazardous and non-hazardous materials used in the operation and maintenance of the facility. All spent materials will be temporarily held in the maintenance building prior to delivery to a certified recycling center. Hazardous and non-hazardous materials will be stored in approved containers located above ground varying based on the substance. It is not anticipated that a fuel storage tank will be required on site during operations. Every three years, larger amounts of used oil would be temporarily stored on site for scheduled wind turbine oil changes.

Hazardous Waste

The handling of all hazardous waste materials will be done in accordance with all federal, state, and local government regulations and guidelines. No extremely hazardous materials, as defined by 40 CFR 355, are anticipated to be produced, used, transported, or disposed of as a result of Project related operations.

Hazardous waste generation is anticipated to be minimal and will be well below the regulatory thresholds for small-quantity or large-quantity program requirements. Any waste generated would be handled to ensure the health and safety of the environment and people within the area and in compliance with federal, state, and local rules and regulations. As part of the waste management bid Boswell Wind will also contract services for oil waste disposal from the site.

Below is a list of potential hazardous materials that could be used during operation and maintenance of the wind turbines:

- Simple Green (cleaner and degreaser)
- Oil-Flo (Cleaner and degreaser)
- Mobil SHC 632 (Gear Oil)
- Mobilux EP1 (grease)
- Mobil SHC 524 (hydraulic fluid)
- Shell DIALA (R) A oil (mineral oil used as transformer coolant)
- Ethylene glycol (standard commercial antifreeze used in radiators)

None of the above listed products contains any compounds listed as "extremely hazardous" by the EPA. All of these products would be used in small quantities and any potential spill would be contained to the wind turbine spill trap. Lubricating oils will be checked quarterly and filled and changed as needed. Transformers will also be inspected regularly. Spent oils will be recycled with a certified waste contractor. The oil change will be performed up-tower where any accidental spills will be contained by the nacelle.

It is anticipated that all towers and ancillary equipment will arrive on site already painted and will rarely need to be repainted during the life of the equipment. Should any repainting be needed, it will be performed by qualified, licensed contractors.

There has been no identified need for the use of chemical control procedures during the construction phase to minimize the potential for introduction or spread of noxious weeds. If this is determined to no longer be accurate, Boswell Wind will consult with the Albany County Weed and Pest Control District on which herbicides may be used. Herbicides would then be applied either by the landowner or by a licensed professional who will select the appropriate herbicides and apply them in accordance with EPA requirements.

Spill Management

BMPs will be used for any potential accidental releases of hazardous materials including using proper containment based on the substance during use and transport. Hazardous materials could include lubricating oils which would be used within the WTGs themselves to allow any potential spill to be contained. Other associated materials such as oil waste and rags would be collected and sealed in drums for removal by a licensed contractor.

In the unlikely event of a spill or release of hazardous or non-hazardous materials, the area will be cleaned and the contaminated soil or other materials will be disposed of and treated according to applicable federal, state, and local environmental laws and regulations. Spill kits will be located throughout the project site and utilized to respond to such an event if any were to occur. Employees required to handle hazardous materials would be adequately trained in spill response as well as informed of the location of all safety equipment.

7.2 Environmental Protection Measures

7.2.1 Air Quality

7.2.1.1 Construction – Methods for Control

Fugitive Dust - Sources of fugitive dust during construction include access road construction; improvements to area roadways; clearing and grading of the temporary staging areas, parking areas, concrete batch plant, substation, crane pads; and excavation of the underground collection and communication system and turbine foundations. Fugitive dust suppression controls shall be implemented such as spraying water on haul roads or other dusty areas as necessary. Graveling permanent roadways and imposing appropriate speed limits on the Project's roads will minimize sources of fugitive dust during construction.

Particulate Matter - The concrete batch plant would be able to meet the required WDEQ air quality permit standards through existing design features for a permitted source (Chapter 6, Section 2 of the WDEQ's Standards and Regulations). The on-site contractor and holder of the issued air quality permit will be responsible for ensuring that the batch plant is operated in accordance with the issued permit conditions. Therefore, the resulting construction emissions will not result in a significant detriment to or significant impairment of the environment or the social and economic condition of present or future inhabitants in the area of site influence.

7.2.1.2 Operations – Methods for Control

Emissions related to O&M activities would be limited to workforce vehicle travel because no air emissions will be generated from the operation of the WTGs or substation. Potential vehicle emissions can be minimized by ensuring proper vehicle maintenance and following roadway speed limits and proper driving techniques. In cooperation with Albany County, the Contractor(s) will implement speed limits to ensure that any fugitive dust generated by O&M vehicles traveling on access roads and county roads would be minor and variable depending on employee schedules. Therefore, these activities would not result in any substantial impairment to the health, safety, or welfare of the present or expected inhabitants in the area of site influence.

7.2.2 Noise

The following mitigation measures will be implemented to reduce noise and the potential for annoyance from the Project's construction-related activities (even though no impacts to residents are anticipated):

- Construction and hauling equipment will be maintained adequately and equipped with appropriate mufflers.
- Noisy construction activities that might result in legitimate complaints, such as blasting (if required), will be limited to daylight hours.

7.2.3 Soils and Geologic Hazards

Project construction will be carried out in accordance with all erosion control and reporting measures prescribed in the WYPDES Large Construction General Permit for stormwater discharges

and the Project-specific SWPPP. Other relevant mitigation measures are discussed in Section 7.2.4 (*Surface Water and Groundwater)*.

Strategies for avoiding and minimizing potential impacts to soils and geologic hazards, which will be investigated during the final geotechnical investigation and incorporated into final site plans, may include, but are not limited to, the following:

- Monitor of site-specific erosion control measures (e.g., berms, ditches, sediment barriers) during and after construction to determine their effectiveness in minimizing impacts to soils. Inspect erosion control measures periodically and after precipitation events, repairing and replacing non-functioning measures as necessary.
- Following the completion of construction activities, regrade and revegetate all work areas, except areas occupied by permanent access roads and structures, so that all surfaces drain naturally, blend with the natural terrain, and are left in condition that will facilitate the growth of natural revegetation, provide for proper drainage, and prevent erosion. Refer to Appendix D for details on reclamation and seed mixes.
- Manage construction zones such that disturbed areas are well-defined, limited in extent, and regularly inspected by appropriately trained staff and construction managers.
- Minimize fugitive dust generation by using a combination of commonly employed management practices for various construction-related dust sources. These may include covering the ground with fabric or other materials, applying water or dust suppressants (chemical flocculating agents), limiting the extent and duration of surface disturbance, and reducing vehicle speeds.
- Identify and avoid areas where grading may create unstable slopes that could exceed the soil strength limits, as prescribed by the final road design and turbine layout engineering design. Ensure that temporary excavations greater than 4 feet deep (e.g., turbine foundations and collection line trenches) are sloped or stabilized with trench boxes, in accordance with OSHA and other standards.
- Implement appropriate mitigation for rapid erosion and gullying, such as installing erosion protection structures (e.g., rip-rap and gabions) in areas identified to be potentially subject to rapid erosion, placing properly-sized and located culverts at drainage crossings, and avoiding placement of structures or roads in areas that are susceptible to rapid erosion or gullying.
- Ensure that seismic design issues are fully addressed during final design site characterization. Determine the seismic site class for each facility location according to the IBC for the final geotechnical report. Design facilities and turbine foundations for the MCE based on a 2,500 year return period, as indicated on IBC seismic hazard maps.
- Evaluate soils at each turbine/crane pad location for high shrink/swell potential and incorporate appropriate mitigation measures into the final design geotechnical report. Mitigation measures may include, but are not limited to, over-excavating below the bottom of the foundations and replacing with structural fill, ensuring proper drainage during construction, and also using spread footings with impermeable backfill to prevent future water introduction and associated soil swelling.
- Evaluate soils at each turbine/crane pad location for high collapsing or settling potential and incorporate appropriate mitigation measures into the final design geotechnical report.

Mitigation measures may include, but are not limited to, excavating the soils and replacing with structural fill, or constructing foundations deeper, more stable soils or bedrock.

- Evaluate soils at each turbine location for high corrosion potential and incorporate appropriate mitigation measures into the final design geotechnical report. Mitigation measures may include, but are not limited to, using proper sulfate-resistant cement for foundations and installing cathodic protection for buried pipes and conduits.
- Design access roads based on soil properties and the requirements of the AASHTO for design of aggregate surfaced roadways. Determine roadway thickness based on the strength of the underlying soils, traffic duration, and traffic frequency and incorporate appropriate mitigation measures into the final design geotechnical report.

7.2.4 Surface Water and Groundwater

State and federal laws and regulations require that a SWPPP be prepared for construction projects that result in the cumulative disturbance of more than five acres. The SWPPP prepared for the proposed Project will focus on sedimentation and erosion controls during construction and will set forth a schedule for regular inspections of appropriate controls at the construction site.

Strategies for avoiding and minimizing potential impacts to surface and groundwater resources, which will be investigated during the final geotechnical investigation and incorporated into final site plans, may include, but are not limited to, the following:

- Do not locate Project parking, laydown areas, or concrete batch plant within 500 feet of wetlands or waters of the U.S., as identified through wetland surveys/delineations, as applicable, and correspondence with the USACE. Avoid locating turbine foundations, access roads, and other Project facilities in these areas. If avoidance is not feasible, any discharges of dredge or fill material into wetlands or waters of the U.S. must be authorized by the USACE.
- Perform construction activities using methods that prevent entrance or accidental spillage of solid matter, contaminated debris, and other objectionable pollutants and wastes into flowing streams, intermittent drainages, ponds, and underground water sources. Such pollutants include, but are not limited to, refuse, garbage, concrete (including cement and other associated chemical admixtures), sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, tailings from aggregate processing, mineral salts, and thermal pollutants. Specific prevention protocols and procedures will be detailed in the Project SWPPP and SPCC Plan.
- Excavate borrow pits so that water will not collect and stand therein. Before being abandoned, stabilize the sides of the borrow pits and waste piles such that slope intersections are shaped to carry the natural contour of adjacent, undisturbed terrain across the borrow or pile area.
- If significant quantities of groundwater are encountered during excavation of trenches (as defined in Section 7.13 of the WYPDES Large Construction General Permit), turbine foundations, or other Project facilities, do not dewater without prior approval by the WDEQ, SEO and the landowner.
- Do not stockpile or deposit excavated material or other construction materials near or on stream banks, pond shorelines, or other water course perimeters where they could be washed away by high water or storm runoff or can, in any way, encroach upon the actual water source.

7.2.5 Jurisdictional Wetlands and Other Waters of the U.S.

Project facilities will be micro-sited during the final design phase to avoid and minimize potential impacts to jurisdictional wetlands and other waters of the U.S as well as isolated wetlands greater than one acre. For unavoidable impacts, such as improvements to existing road crossings and creation of new road crossings of potentially jurisdictional waters (including intermittent stream channels that the USACE determines to be waters of the U.S.), if wetland surveys determine that Project construction could result in the cumulative loss or destruction of more than one acre of naturally occurring or man-made isolated wetlands, Boswell Wind would also apply for coverage under the WDEQ General Permit for Wetland Mitigation. Coverage under this permit requires a Mitigation Plan to offset the loss of wetland functions and values such that Project activities result in no net loss of wetlands.

Boswell Wind will obtain all applicable state and federal permits (including those identified above and in Table 3-2). This will ensure that the Project is constructed in compliance with all applicable state and federal laws and regulations pertaining to the placement of dredged or fill materials in jurisdictional waters or isolated wetlands. Compliance with state and federal statutes require avoidance and minimization of impacts and may require compensatory mitigation for unavoidable impacts. The design of new and improved stream crossings and any required mitigation will be detailed during the appropriate permit process(es) prior to initiating construction.

7.2.6 Vegetation and Topsoil

Boswell Wind and its contractors will implement measures to preserve the natural landscape and will conduct surface-disturbing and associated construction activities in a way that prevents or limits unnecessary damage to, or destruction of, natural vegetation. The WDEQ Land Quality Division practices for topsoil handling and revegetation recommend preserving the integrity of the topsoil by minimizing the mixing of the productive topsoil with less-productive subsoil during construction activities such as grading, trenching, and backfilling. These measures would minimize the risk of soil contamination and help ensure that revegetation is successful. These measures will be implemented during construction of the Project.

In temporary use areas, such as parking and equipment laydown areas, the contactors will incorporate methods to preserve topsoil by stockpiling it in piles or rows along the edge of the disturbed area. Topsoil and subsoil piles will be separate. Contractors will regrade and redistribute the stockpiled topsoil across temporary use areas in the Project Area following completion of construction. These measures will facilitate reclamation and revegetation efforts by preserving the native seed bank.

Contractors will grade all surfaces (except permanent access roads) so that they drain naturally, blend with the natural topography, and are in a condition to facilitate natural revegetation, provide proper drainage, and prevent erosion following completion of construction activities at all work areas.

The following measures are recommended for all areas of temporary surface disturbance in the Project Area:

1. Preliminary seed mixes specific to the existing Ecological Site Descriptions and associated vegetation communities are provided in Appendix D. Contractors will use these seed mixes to

effectively revegetate all temporarily disturbed areas within the Project Area and the respective landowners will have the final authority over the selected seed mixture.

2. Contractors will implement standard commercial practices appropriate for the soil and vegetation being restored via seeding and mulching. Initial and final seeding will be conducted during the appropriate seasons allowing for beneficial moisture regimes, typically in the fall or early spring.
3. Disturbed and unvegetated ground may require chemical or mechanical weed control efforts in May or June before weeds have an opportunity to become established.
4. In accordance with specified BMPs, contractors will implement erosion control measures after seeding which may include certified weed-free straw bales, filter bags, compost blankets, or other geotextiles, sediment fences, silt curtains, sediment traps, or other similar devices or impervious materials. Erosion control measures will be implemented and monitored until soils are stabilized by growing vegetation or from planting and/or re-seeding.

7.2.7 Noxious and Invasive Weeds

Surface-disturbing activities increase the potential for infestation by invasive species and noxious weeds. These risks can best be managed or avoided by timely revegetation. All temporary use areas will be regraded and reseeded in accordance with the measures described above in Section 7.2.6 (*Vegetation and Topsoil*).

Project staff will monitor the Project Area for undesirable plants and will control these plants using mechanical or chemical methods to reduce the introduction and spread of noxious weeds or other invasive plants as determined by the Wyoming Weed and Pest Council and Albany County's Weed and Pest Control Division. Impacts to native vegetation communities will be limited through the use of BMPs.

7.2.8 Wildlife Resources

Terrestrial wildlife survey protocols, data analysis, and reporting will be determined in consultation with WGFD and USFWS as described in Section 6.9 *(Terrestrial Wildlife)*. Wildlife data has been collected and analyzed to inform the development of the Project (Appendix J) such that impacts to sage-grouse leks, high raptor use areas, bats, other migratory bird species, and other sensitive wildlife species are avoided or minimized.

7.2.9 Cultural Resources

The following measures will be used to avoid adverse impacts to cultural resources during construction:

- The historic Fort Fetterman Road will not be used for vehicular travel and crossings will be limited to disturbed areas at existing road crossings. No other NRHP-eligible sites have been identified in the Project Area.
- Construction crews shall participate in environmental compliance training, including the necessity of avoiding cultural resource sites, to further increase awareness of cultural sites and to prevent accidental damage to known and undiscovered cultural resources.

- Should any previously unknown sites or artifacts be encountered during road clearing and excavation activities, all such activities will be immediately suspended at that location and the discovery left intact until such a time the landowner is notified and appropriate measures are taken to ensure compliance with landowner desires or state laws and regulations, as appropriate.
- Should any human remains be discovered, all land altering activities at that location will be immediately suspended and the Albany County Coroner will be immediately notified.
- If during micro-siting and final site design proposed facilities are required to be located outside of the area inventoried for cultural resources, additional archaeological field surveys will be completed to ensure avoidance of sites considered unevaluated or eligible for listing on the NRHP.

7.2.10 Land Use and Recreation

Boswell Wind will implement the following mitigation measures to reduce land use and recreation impacts from Project construction and operations.

- Limit movement of crews, vehicles, and equipment to existing county road rights-of-way and approved access roads to ensure that property damage and disruption or normal land use and recreational activities is minimized.
- At the earliest opportunity, level, fill, grade, or otherwise eliminate all construction ruts that are hazardous to agricultural or ranching operations and/or movement of vehicles and equipment. Restore damaged ditches, tile drains, culverts, terraces, local roads, and other similar land use features to their original condition as soon as practicable.
- Install appropriate signage to alert recreation visitors to the potential for increased construction traffic on the segment of Fetterman Road between State Highway 287 and Old Fort Fetterman Road during construction.

7.3 Monitoring Programs

Post-construction monitoring requirements and protocols will be developed through a project-specific bird and bat conservation strategy (BBCS) and eagle conservation plan (ECP) in coordination with the USFWS as part of an eagle take permit application for the Project.

In addition, contractors will conduct a pre-construction onsite visit and yearly post-construction onsite visits with WGFD and WDEQ personnel to ensure that the redesigned culverts and culverts are functioning properly and the BMPs outlined in the SWPPP are working as intended. If any problems are observed, the agencies will provide recommendations to fix the problems and may recommend that additional monitoring be conducted if problems are not addressed in a timely manner.

Chapter 8
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