2.0 THE PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF PROPOSED ACTION

2.1.1 Introduction

The WMWE Project is a proposed 360-MW electrical generating facility consisting of *up to* 240 wind turbines (assuming use of 1.5-MW generators). The annual energy output from this facility would be approximately 1,000,000 megawatt hours (MWh) annually. It should be emphasized that 240 wind turbines is the maximum number of wind turbines that could be installed in the project area, and it is likely that fewer would actually be constructed due to various technical (e.g., unfavorable geotechnical testing matters or broadcast signal interference) or environmental constraints (e.g., active raptor nests) that cannot be fully identified at this time. However, for the purpose of this analysis, it is assumed that all 240 wind turbines would be constructed. It is also possible that a slightly larger wind turbine by Teton (e.g., 2.0-3.0 MW) could be selected. The final turbine selection process would depend on numerous factors, such as availability and economics. However, a larger wind turbine would require a different layout, and fewer wind turbines would be installed because of the increased spacing requirements between individual wind turbines and turbine strings. Even though there would be fewer turbines with the larger capacity turbines, the overall dimensions of the wind turbine would be in the overall range of the wind turbine illustrated in Figure 2.1. As a result, the environmental analysis for the larger capacity turbine would be identical to the environmental analysis for the proposed 1.5-MW wind turbine except with larger capacity turbines there would be less disturbance.

While wind energy has traditionally been considered an unreliable power resource, advancement over the past 10 years have allowed power companies to now treat wind energy as a schedulable resource to assist in meeting power requirements. According to Teton, advancements in meteorology monitoring and modeling and computer tracking have allowed many wind resources to be scheduled on a monthly, weekly, and daily basis. Wind energy is also considered a clean renewable form of energy that uses a free type of fuel, produces no greenhouse gases or other pollutants from the generators, has limited environmental impacts compared to other forms of power production, obtains fewer tax subsidies compared with other forms of energy production, promotes stable and cost-efficient energy production, diversifies local economies, and provides jobs to the local economy (DOE 2008).

The project site is located on top of White Mountain, which is west-northwest of the city of Rock Springs, Sweetwater County, Wyoming, in portions of T19N-T20N, R105W-106W. The anticipated layout of the project is shown in Figure 2.2. The ROW application has been assigned an identification number of WYW167597 by the BLM. Sweetwater County has already issued a conditional use permit for 36 turbines on private land but not a construction permit although Teton is seeking to modify some locations. Any modification of locations would require a new conditional use permit. Table 2.1 provides the acres and percentage of landownership within the project area, and Table 2.2 presents the acres of potential disturbance for the entire project. Teton would obtain additional conditional use and construction permit(s) for the remaining turbines located on private lands from Sweetwater County prior to each phase of development of the Proposed Action. Table 2.3 presents the acres of potential disturbance on BLM-administered land under the Proposed Action.

The project would consist of up to 240 wind turbines. “Wind turbine” is the collective term for the equipment that captures the kinetic energy in the wind and converts it to electrical energy. The major components include the blades and hub (collectively called the rotor), the nacelle, and the tower. Inside the nacelle are the gearbox, generator, and various other components critical for operation of the wind turbine. Depending on the specific turbine manufacturer, the transformer would be located either in the nacelle or on the ground next to the tower. Figures 2.1 and 2.3 are general schematics of typical wind turbines.

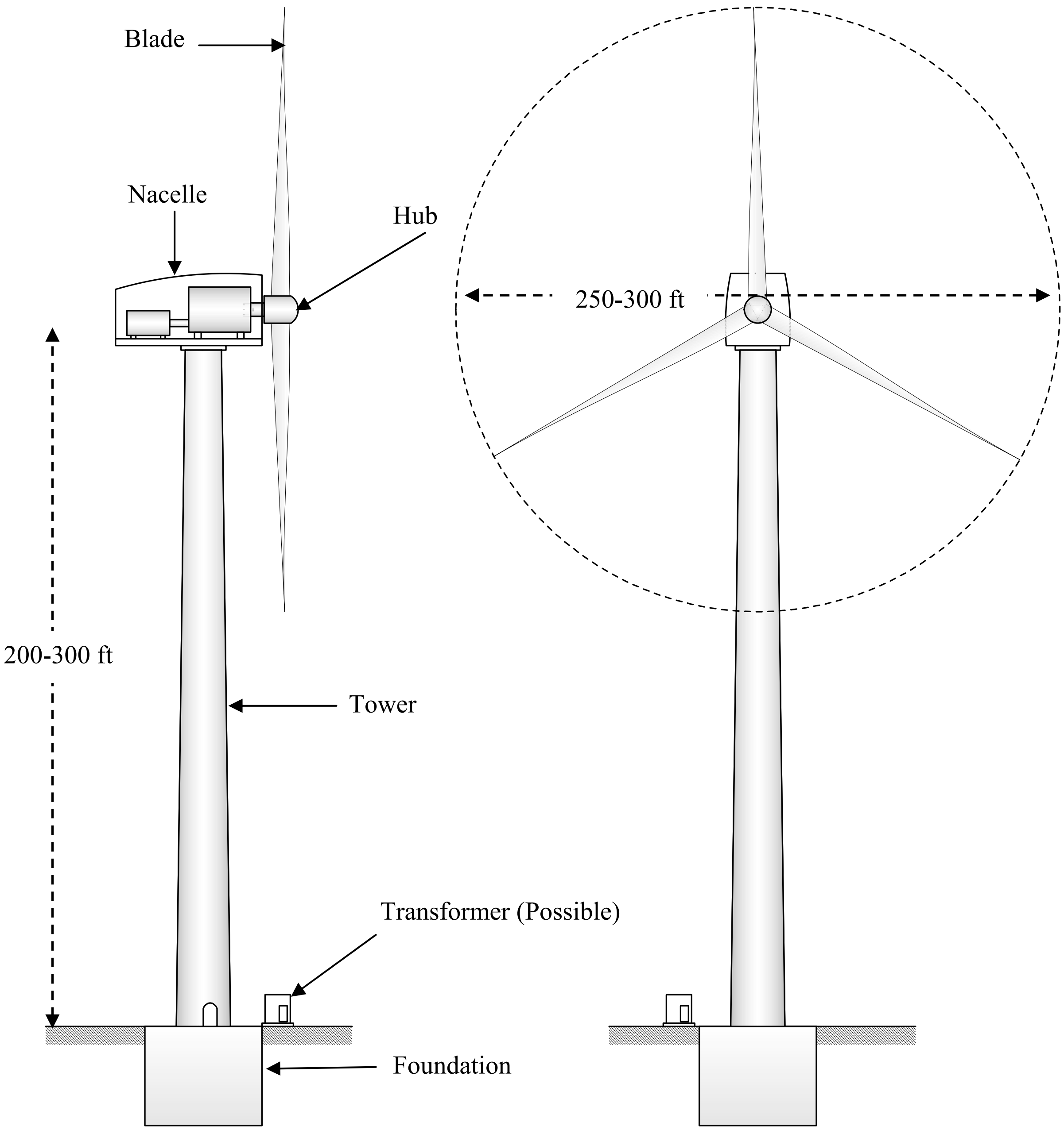

Figure 2.1 Typical Wind Turbine Components.

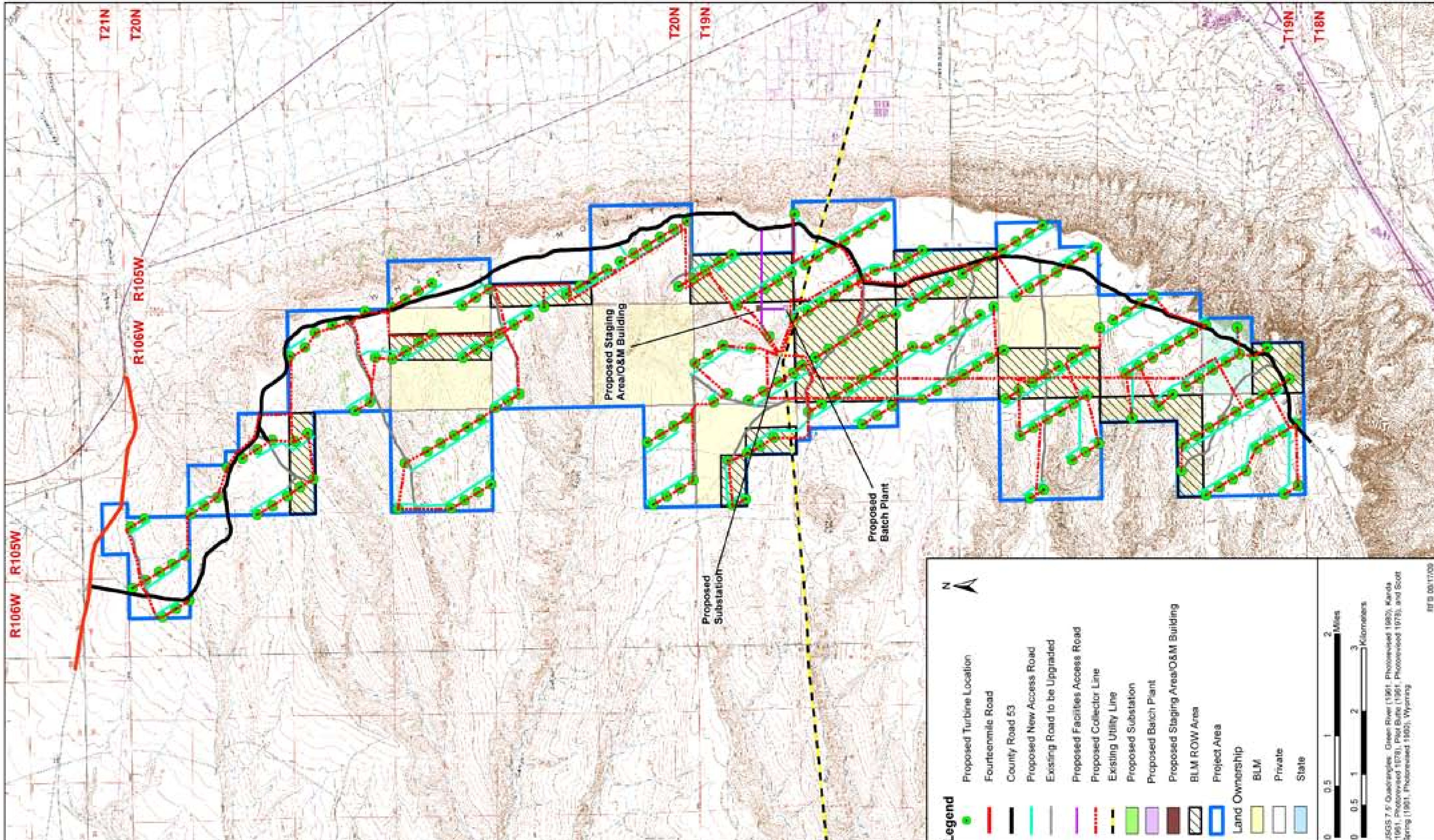

Figure 2.2 Layout of the White Mountain Wind Energy Project.

Table 2.1 Landownership Within the WMWE Project Area.

Landowner	Acres	Percentage
Bureau of Land Management	4,398[1]	33.4
State of Wyoming	240	1.8
Private landowner	8,527	64.8
Total	13,165	100.0

1 BLM development ROW is 2,640 acres.

Table 2.2 Estimated Acres of Surface Disturbance Within the WMWE Project Area (Proposed Action).

	Proposed Action	
Disturbance Type	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	317.5	152.8
Staging area and O&M building	2.0	0.8
Substation and transmission line	11.0	0.3
Turbine pads[2]	176.3	35.3
Collector line trenches[3]	356.8	0.0
Concrete batch plant	2.0	0.0
Total	865.6	189.2

1 Initial disturbance: 48.5 mi x 54 ft = 317.5 acres; life-of-project disturbance: 48.5 mi x 26 ft = 152.8 acres.

2 Initial disturbance: 160 ft x 200 ft x 240 turbines = 176.3 acres; life-of-project disturbance: 80 ft x 80 ft x 240 turbines = 35.3 acres.

3 Initial disturbance: 64.0 mi x 46 ft = 356.8 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbances would be reclaimed immediately.

Table 2.3 Estimated Acres of Surface Disturbance on BLM-administered Land Within the WMWE Project Area.

	Disturbance on BLM-administered Lands	
	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	78.5	37.8
Staging area and O&M building	0.0	0.0
Substation and transmission line	0.0	0.0
Turbine pads[2]	51.4	10.3
Collector line trenches[3]	106.5	0.0
Concrete batch plant	0.0	0.0
Total	236.4	48.1

[1] Initial disturbance: 12.0 mi x 54 ft = 78.5 acres; life-of-project disturbance: 12.0 mi x 26 ft = 37.8 acres.
[2] Initial disturbance: 160 ft x 200 ft x 70 turbines = 51.4 acres; life-of-project disturbance: 80 ft x 80 ft x 70 turbines = 10.3 acres.
[3] Initial disturbance: 19.1 mi x 46 ft = 106.5 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbances would be reclaimed immediately.

During the design phase of this project, Teton undertook numerous studies and evaluations to assist in the siting of the project components to minimize potential impacts to the environment and existing man-made facilities in the general project area. Some of these studies and evaluations include a communication interference study and an obstruction evaluation and airport airspace analysis. Results of these studies and evaluations have been considered. In cases where turbines conflict with broadcast signals, with other existing facilities (transmission power lines), with unfavorable geotechnical testing results, or with other resource issues (active raptor nest), those turbines would either be moved or eliminated.

The wind turbines that would be used in the WMWE Project would be placed in locations that would provide the best balance of energy capture, safe construction, and minimum impacts to the environment. The environmental impacts of the project would be closely monitored during the construction, O&M, and decommissioning of the project. The environmental impacts, mitigation measures, and monitoring activities are presented in the Plan of Development (POD) (TRC Environmental Corporation [TRC] 2009a).

Wind turbines operate autonomously with computer control based on wind speed and direction data. When the anemometer on a wind turbine senses winds within the operational range of the turbine and power sensors find the electrical grid available to accept power, the wind turbine turns itself on and begins to generate power. It continues to generate electricity until the wind speed is above or below the turbine operational range, the grid is no longer available, or the turbine detects a fault with one of its components. If a fault occurs, the turbine shuts itself down and, depending on the nature of the fault, either waits for the condition to clear itself or signals for maintenance.

Wind turbines are connected through an underground electrical collection system to a central substation, where the power is raised to the voltage of the electrical grid (Figure 2.4). The turbines and towers sit atop large concrete and steel foundations. Access roads interlink each turbine site (Figure 2.5). A permanent O&M building and substation, as well as a temporary construction trailer pad, material storage area, and batch plant site, would be built on land owned by the RSGA within the central portion of the project

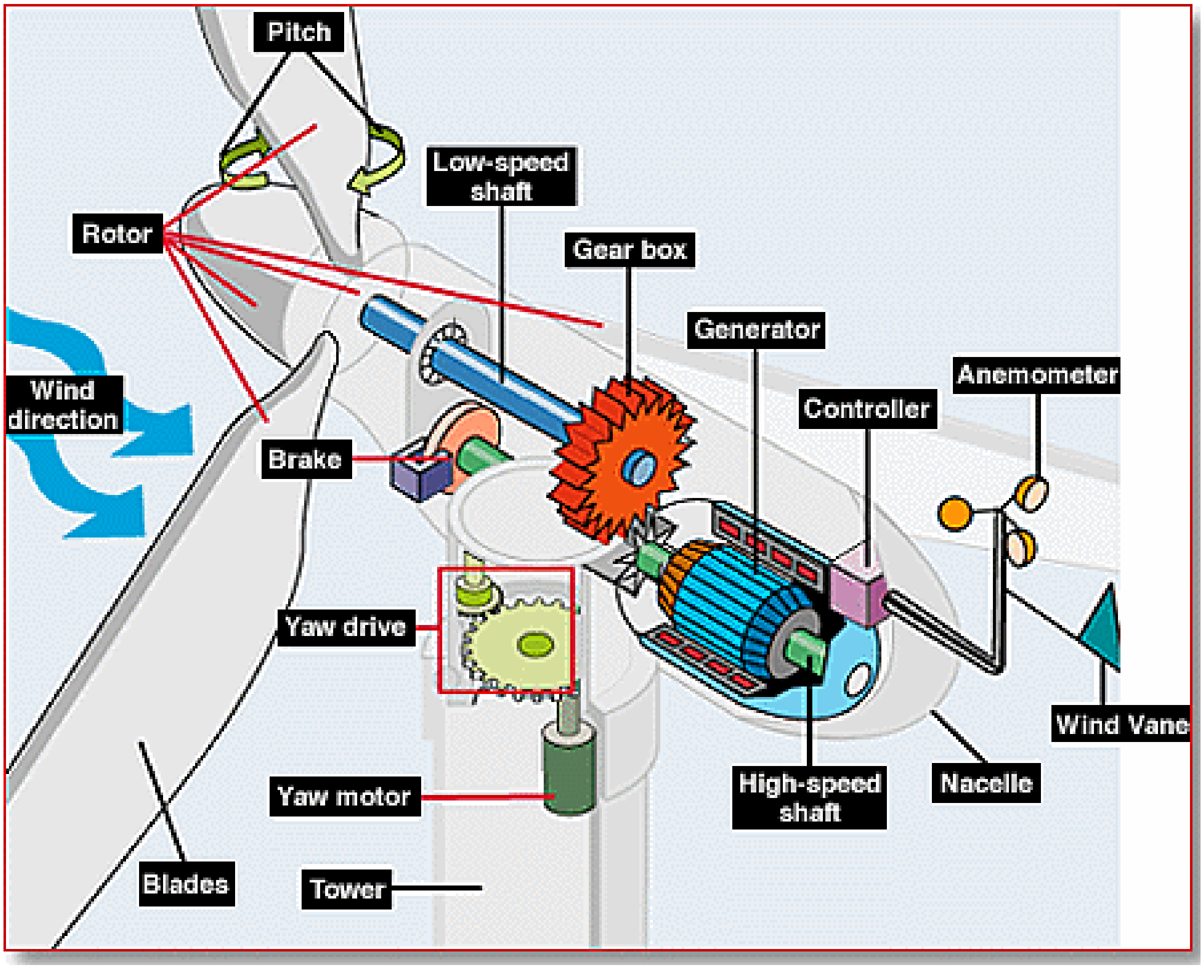

Figure 2.3 General Wind Turbine Nacelle Components (Adapted from DOE [2004]).

area (Section 1, T19N, R106W) near the existing 230-kV line. If required, other temporary work areas related to this project (such as the crane assembly area) would be located on previously disturbed land within the ROW grant area or on privately owned lands.

2.1.2 Health, Safety, and Environmental Commitment and Policy

Teton and its employees, partners, and contractors are concerned with health, safety, and the environment. They would develop and implement a Health, Safety, and Environment (HSE) Plan for each phase of this project.

To avoid, reduce, or mitigate potential environmental impacts associated with construction of the WMWE Project, Teton has evaluated potential environmental consequences of this project and developed specific design features that would be implemented during each phase of the project.

2.1.3 Adaptive Management Strategy

Adaptive management is a core environmental management principle of this project. It has guided planning for the design, development, management, and operation of the WMWE Project. It is intended to improve decisions

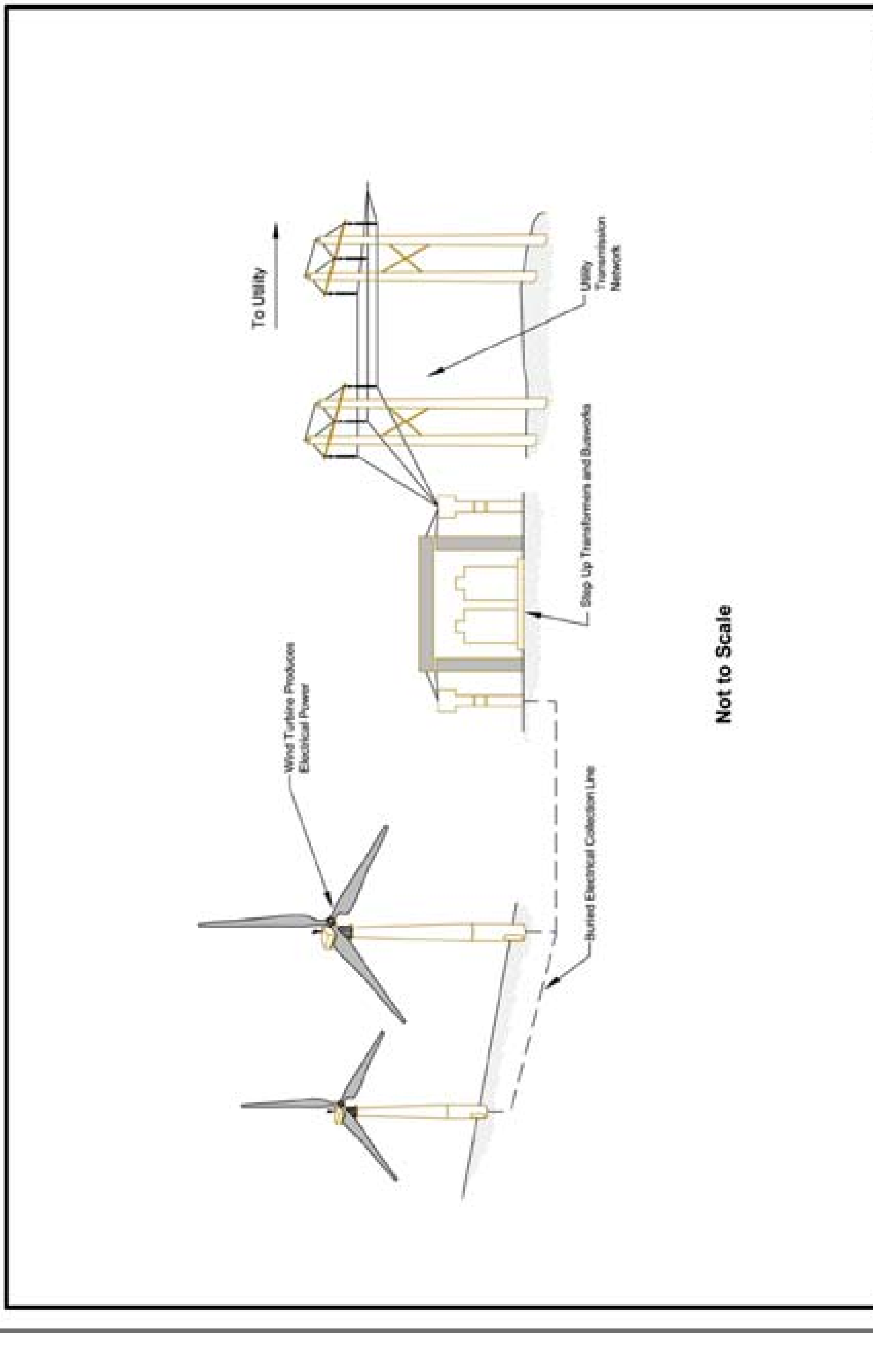

Figure 2.4 Typical Electrical System Components.

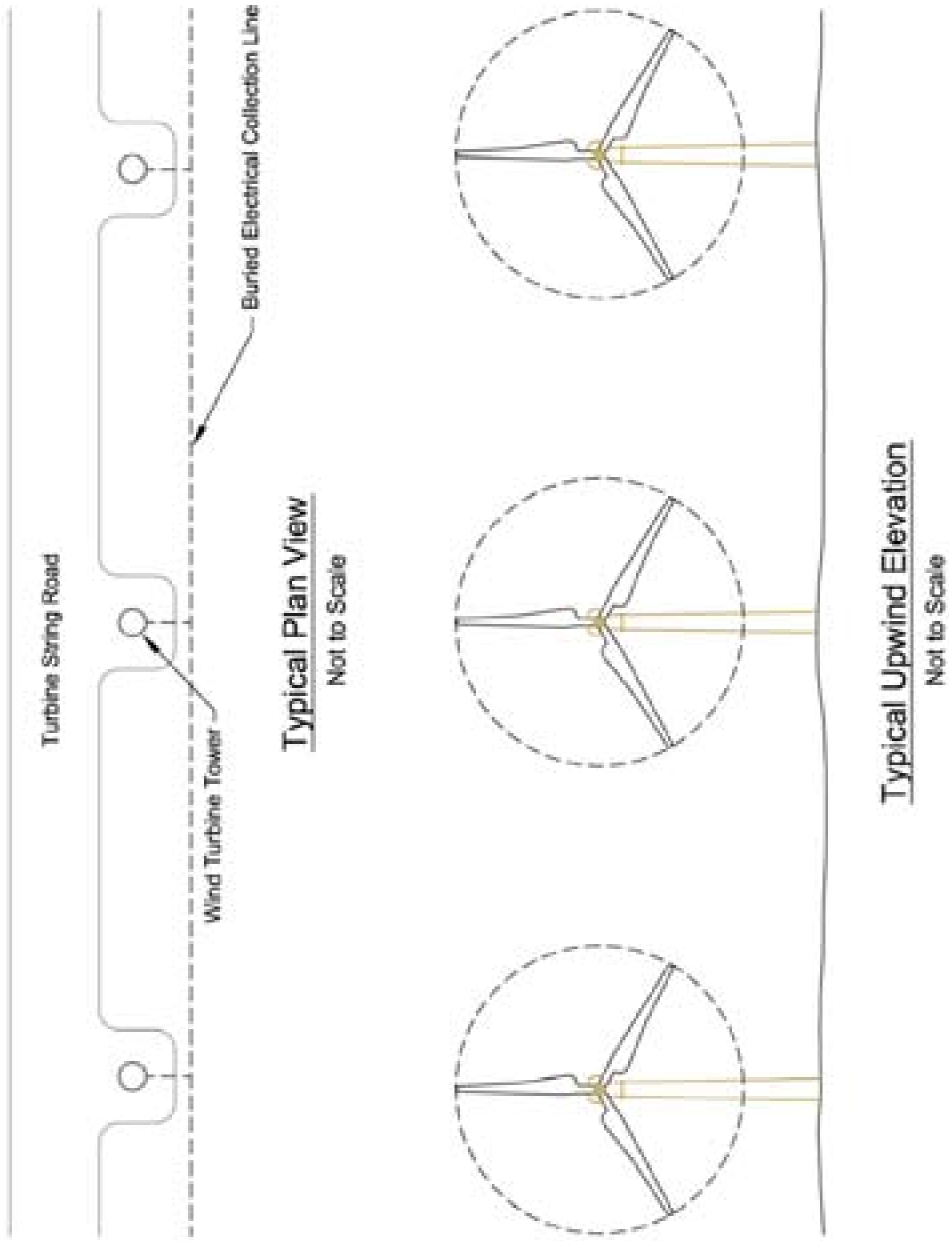

Figure 2.5 Typical Turbine String Road and Electrical Collection System Layout.

regarding the planning, design, development, management, and operation of large engineering projects in relationship to their setting.

Adaptive management is based on the premise that ecosystems are complex and inherently unpredictable over time. It approaches the uncertainties of ecosystem responses by evaluating and optimizing management actions using a systematic method from which "learning over time" is a critical tool. For the WMWE Project, learning and adapting are based on a rigorous process of long-term monitoring and incorporation of best available science to determine impacts to the environment.

2.1.4 Communication Plan

For the portion of the project located on BLM-administered land, the BLM would play an active role during the development and construction of the WMWE Project. The State of Wyoming, Sweetwater County, and private landowners would play a similar role for the portion of the project affecting state and private lands. Teton would coordinate the project design using the adaptive management approach endorsed by the BLM and other affected land interests. BLM representatives, as well as appropriate state and Sweetwater County agencies and private landowners, would be consulted at critical development stages of the project, including transportation, construction, commissioning, reclamation, and decommissioning.

Teton expects that the BLM Authorized Officer, or assigned staff, and/or officials from Sweetwater County would be present at the project site during construction as appropriate and would observe construction activities to confirm these activities with this plan. The Teton construction project manager would communicate directly with the BLM Authorized Officer and officials from Sweetwater County on-site to keep the BLM and county apprised of the construction progress and the results of environmental mitigation measures and monitoring efforts. This collaboration would continue as necessary to explore and evaluate alternative mitigation measures. Any deviations from the POD requested by Teton would be reviewed by the BLM Authorized Officer and Sweetwater County, and written approval would be obtained before such changes are made.

The BLM and Sweetwater County would also receive monthly reports during the construction, operation, and decommissioning of the project that contain the anticipated upcoming activities and results of recent environmental monitoring. These reports are intended to maintain constant communication and keep the BLM and Sweetwater County informed on mitigation results.

Teton would maintain open communications with the landowners, livestock operators, and state and local governments, including agencies of the State of Wyoming, Sweetwater County, and the cities of Rock Springs and Green River. Informational updates would be provided to these local governments regarding activities that could impact their jurisdictions, including schedules for construction and truck traffic. If necessary, meetings or other mechanisms for coordination would be used to discuss relevant issues, project status, scheduling, or other concerns.

Teton would request that each government entity appoint a contact person to whom project updates would be sent. These government agencies would be given as much advanced notice as possible for major project activities, as well as any changes to these schedules.

2.1.5 Project Schedule

The WMWE Project (up to 240 turbines) would be constructed in four phases over a 3- to 4-year period. The proposed schedule for each construction phase is discussed in detail in Section 2.2.3.10. Teton expects that all construction operations would occur during daylight hours, 5 days a week. Once in operation, Teton expects that each phase of the project would have an approximate 20-year life of operation (24-year total). It is possible that Teton would evaluate repowering the project as the life of the project comes to an end as opposed to decommissioning the project. However, repowering is not considered part of the current project and would be discussed with the BLM, landowners, and state and local agencies in the future. Teton expects decommissioning to also be completed in phases and over a 3- to 4-year period. Revegetation operations would be completed as soon as practical following equipment removal.

2.2 CONSTRUCTION OF FACILITIES

The actions necessary to construct the WMWE Project are summarized below and include development of a HSE Plan, civil construction activities, project construction activities, general construction activities, structural construction activities, wind turbine tower erection, reclamation plan, potential environmental impacts, and mitigation and monitoring activities. Where helpful, photographs of similar activities from the construction of other wind energy projects have been added for illustration purposes. A list of typical construction equipment used to build a wind energy facility is presented in Table 2.4. Teton would provide licensed certifications for all appropriate project elements in accordance with federal, state, and county regulations.

2.2.1 Health, Safety, and Environmental Plan

The WMWE Project HSE Plan as outlined in the POD addresses HSE risks and requirements during the construction stage of the project. As the project moves into the operational stage, the components of the HSE Plan would be modified to adapt to O&M activities. Teton could coordinate the HSE Plan and modifications with all appropriate federal, state, and county agencies.

Components of the management system that would be addressed in the HSE Plan include, but are not limited to, risk management analysis, emergency response, HSE planning and procedures, implementation, monitoring and reporting results, setting performance targets, incident classification, investigation and reporting results, audits and inspections, as built certification, and HSE management review.

Minimum contractor HSE requirements would be included in the HSE Plan. These requirements include personal protective equipment, housekeeping, maintaining a safe workplace, fire prevention, safe work practices, etc. Contractors are expected to comply with these requirements at a minimum, and contractor safety plans would be reviewed for compliance.

Development of the HSE Plan is a collaborative effort between Teton and the contractors. Contractor BMPs would be reviewed and incorporated into the HSE Plan as appropriate.

Also included in the HSE Plan is a risk register, which identifies potential hazards and the risks associated with them. Contractors are expected to address these risks and develop mitigation plans for incorporation into the register. The risk register is a document that would be used and updated on a continuous basis to identify and mitigate risks as they surface. It is conceivable that mitigation plans as developed may not prove to be sufficient as anticipated. In this case, the HSE Plan would be adjusted to provide a suitable solution to project risks.

Observation of HSE performance is key to avoiding incidents. Project personnel would be expected to regularly observe work practices and to provide positive reinforcement and guidance to fellow employees. Work practices that may be considered to place employees or the environment at risk would be identified, evaluated, and modified as necessary to eliminate or substantially reduce the risk.

2.2.2 Civil Construction Activities

2.2.2.1 Surveying and Staking

Construction surveying and staking are the first construction activities associated with the project. Field crews would use survey equipment and known reference points to locate points in the field that correspond to critical project design locations. When a critical point is found, it is marked with a survey stake (a wooden stake with a colored plastic flag that is driven into the ground 1 to 2 ft). The project site is accessed by a pickup truck or similar vehicle. Teams of two or more surveyors would walk across the site to perform surveying and staking.

Table 2.4 List of Typical Equipment Used for Construction of Wind Energy Facilities.

Equipment	Use
Tracked-bulldozer	Road and pad construction
Grader	Road and pad construction
Water trucks	Compaction, erosion, and dust control
Roller/compactor	Road and pad construction
Backhoe	Digging foundations and trenches for utilities
Trenching machine	Digging trenches for underground utilities
Truck- or track-mounted drill rig	Drilling geotechnical sample holes
Concrete trucks and pumps	Pouring tower and other structure foundations
Cranes	Tower and turbine erection
Dump trucks	Hauling road and pad material
Flatbed trucks	Hauling towers and other equipment
Pickup trucks	General use and hauling small equipment
Small hydraulic cranes and forklifts	Loading and unloading equipment
Fuel truck	Fueling of mobile equipment
Rough terrain forklifts	Lifting equipment

2.2.2.2 Geotechnical Sampling

The primary objective of the geotechnical sampling is to investigate the strength characteristics of the bedrock and to determine dynamic properties for the turbine foundation design. The investigation would consist of coring specific locations along the turbine alignment. Coring would be completed using moderate-sized geotechnical drilling equipment mounted to either a truck or tracked vehicle (Figures 2.6 and 2.7). The coring process would obtain samples of rock that would be logged. Core samples would be sent to a geotechnical laboratory for strength testing. Since the coring process leaves holes at the test site approximately 3 inches in diameter and up to 40 ft deep, each hole would be backfilled in accordance with applicable requirements. Test pits dug with a backhoe or similar equipment may also be utilized to evaluate whether the bedrock can be excavated.

Additional geotechnical investigations include several seismic refraction survey lines. The seismic refraction lines would be used to determine dynamic soil properties of the underlying bedrock and would also be used to confirm bedrock strength. The seismic refraction lines would be completed using an extremely low-energy source (a sledgehammer and plate). The seismic analysis would also include multichannel surface-wave analysis, which utilizes background vibrations such as vehicles to generate seismic noise.

2.2.2.3 Rock Removal

Bedrock at the site is generally composed of sandstone material, which does not require blasting to remove. Excavation would be completed using conventional earth-moving equipment and sound engineering practices. Methods and techniques would be utilized to

Figure 2.6 Typical Coring Truck and Support Vehicle.

Figure 2.7 Typical Coring Tracked Vehicle.

minimize overbreak beyond the limits indicated on the drawings and to preserve the rock beyond these limits in the soundest possible condition.

2.2.2.4 Topsoil Salvage Operations

Prior to the construction of any project-related equipment, structures, or facilities, all available vegetation and all available topsoil would be salvaged, based on an on-site evaluation, used for reclamation in other areas (live haul), if possible, and if not, then stockpiled for future reclamation operations. If less than 6 inches of topsoil are available, topsoil along with an appropriate quantity of other suitable subsoil (with BLM or landowner/county approval) would be salvaged so that a minimum of 6 inches of plant growth material would be available for use during revegetation operations. Topsoil and suitable subsoil would be stockpiled separately, and appropriate signs would be installed on each topsoil or subsoil pile. Care would be taken to avoid mixing topsoil and subsoil. Where possible, topsoil would be live-hauled to minimize topsoil stockpiling and encourage improved vegetation.

Topsoil salvage operations would apply to all construction activities except for the construction of any required overhead transmission power lines. Topsoil salvage operations are not required for the construction of overhead power lines because these activities would result in minimal disturbance from wheeled vehicles driving over the vegetation and soil. In addition, natural revegetation would occur more rapidly if the vegetation and soil is left in place.

2.2.2.5 Site Grading

There are three phases associated with the grading activities for the project. The first phase (road grading) is the construction of the roadways associated with the project. The roads would be constructed based on the lines and grades indicated on the detailed design drawings. At the same time the roads are being constructed, or very shortly after they are completed, the second phase (rough grading) associated with the turbine sites, substation, and O&M building would begin. Once the turbine sites, substation, and O&M building are completed, the third phase (final grading) activities would be completed with these facilities.

All surface areas disturbed by construction activities would be graded. The grading would be finished to the contours and elevations indicated on the drawings or match contours and elevations of the original undisturbed ground surface. The final grading would provide a smooth uniform surface and minimize the impact to existing water runoff patterns.

The overall goal of the detail design associated with grading activities is to achieve a cut and fill balance. Such a balance ensures that a minimum of material is required to be transported on or off the site. Any required material or excess material would be obtained or disposed of at a properly permitted facility.

2.2.2.6 Road Base Construction

The road base (aggregate) would be placed on graded turbine access roads and turbine areas in 6- to 12-inch (maximum) deep compacted layers. The depth of a compacted layer would be based on the compaction standard required in the engineering drawings. Geotextile may be required for separation between the road subgrade and the aggregate, except where otherwise specifically noted.

Aggregate materials would be made from crushing the excavated rock from the foundation holes to the extent possible. Any additional aggregate materials would be from private sources located off-site. Since the access roads would need to be built before any foundations are excavated, initial quantities of aggregate would need to be imported from an off-site commercial source.

2.2.2.7 Excavation

Excavation involves the removal of earth and rock to allow for the construction of roads and foundations. Excavation for structures would be completed to the designated lines and elevations indicated on the detail design drawings. Machine excavation would be controlled to prevent undercutting the subgrade elevations indicated on the drawings.

Excavated materials that meet the specified requirements may be used for the fills, embankments, and backfills. Vertical faces of excavations would not be undercut to provide for extended footings.

Excavated materials would be either crushed for road aggregate or placed back into the center of the foundation hole, although most rock material would be used as road aggregate. The road material would be crushed at the location where it was excavated. Crushing operations would be conducted using small portable rock crushing equipment with manufacturer provided or approved dust control equipment. Remaining excess excavated materials, if any, would be used on-site for road maintenance and would not be hauled off-site unless absolutely required and approved by the BLM Authorized Officer.

2.2.2.8 Compaction

During construction of roads and foundation structures, it is critical that the earth under them is solid. To achieve this, the earth is compacted. Compaction associated with the WMWE Project would meet the following standards.

- For roads, the requirements outlined in the BLM Road Standards (Manual Section 9113) would be adhered to. The manual indicates that the top 12 inches of subgrades of all roads that are to be surfaced would be compacted to 95% of the maximum density as determined by AASHTO T-99.
- Rock fill would be compacted in 8-inch uncompacted thickness to 70% relative density as determined by American Society for Testing and Materials (ASTM) D4253 and D4254. Compaction would be performed with vibrating mechanical compactors.

2.2.2.9 Erosion Control

A Storm Water Pollution Prevention Plan (SWPPP), which includes erosion control measures, would be prepared and implemented for the project area. The SWPPP would be based on the 1992 Environmental Protection Agency (EPA) document entitled *Storm Water Management for Construction Activities-Developing Pollution Prevention Plans and Best Management Practices* (EPA 1992). The SWPPP would be developed with the civil design of the project. Teton would continue to implement the SWPPP and county drainage and road maintenance agreement and would monitor the project area for erosion or soil instability and take appropriate action should problems become evident.

Teton would not conduct any construction, O&M, or decommissioning activities when soils in the work area are too wet to adequately support construction equipment. If construction equipment creates ruts greater than 4 inches deep, support would be deemed inadequate and activities would be discontinued until soil conditions improve or appropriate remediation action is taken to ensure operations could continue without deep rutting.

2.2.3 Project Construction Plan

This section contains a general description of the construction steps for each phase of the major components of the project as outlined in the associated POD. This plan discusses the general activities and design approaches as currently understood and anticipated. Teton would remain in contact with the BLM as the project designs are finalized and specifics on construction are available.

In general, the design approach for the WMWE Project would have two primary objectives. The first is the concept of minimizing the overall environmental impact of the project while maintaining cost effectiveness and safety standards. This would include minimizing the amount of cut and fill required for the roads and foundations and using as much excavated soil and rock as possible on project roads.

The second design objective is the concept of "adaptive management," in which the project design would be done to complement the natural characteristics of the site. Adaptive management would also be employed during construction by allowing for some specifics to be modified, adapting to actual site conditions (subsequent to BLM approval).

In accordance with the approved engineering grading and drainage plans, prior to the start of construction, Teton would review and document the general condition of the site, including soil characteristics, the type and levels of vegetation, and areas of disturbance. When construction is completed, Teton would complete revegetation and reclamation operations to return the areas not needed during operations to near preconstruction condition as detailed in Section 2.4.8. This includes returning land contour and drainage, replacement and preparation of topsoil, seeding, and weed control as necessary in order to restore the area to conditions similar to those that existed prior to construction.

Teton understands that portions of the land in the WMWE Project area are public lands managed by the federal and state government, and as such, the public has a right to expect access to the area. Public access would only be temporarily limited during construction of the WMWE Project to those specific areas where construction activities could cause public safety concerns. These activities include, but may not be limited to, wind turbine erection, foundation excavation, electrical collection system trenching, and substation construction. Once these specific activities are completed, full public access would resume to its current state.

2.2.3.1 Roads and Turbine Pads

In order for equipment and personnel to reach the wind turbine locations, existing roads would be used whenever possible; although, some existing two-track roads would need to be upgraded and new roads would need to be constructed. The existing County Road 53 and Fourteenmile Road from Highway 191 to the top of the WMWE Project area are sufficient to allow for truck traffic during the project construction. Additionally, access roads running adjacent to each turbine site and the project substation, O&M and wareyard, batch plant would be required. All access roads would be designed, engineered, and constructed in accordance with BLM and county standards and would be located to minimize disturbance, to avoid sensitive resources (e.g., raptor nests, cultural resource sites, etc.), and to maximize transportation efficiency during construction and O&M activities. An example of a constructed access road at the Bridger Butte Wind Energy Project in southwest Wyoming is shown in Figure 2.8. During the life of the project, Teton would be responsible for maintenance on all project roads, including specific portions of County Road 53 and Fourteenmile Road located within the project area and those portions of Fourteenmile Road that are used to access the project area. These activities would be conducted in accordance with a Road and Maintenance Agreement between Teton and Sweetwater County.

Many of the trucks used to haul wind turbine components to the site would be extra-long (for blade transport) and heavy-load (for wind turbine nacelles). Figure 2.2 notes the access roadways, but the exact locations may vary slightly. However, the access roadways would be generally along each of the turbine strings.

The tentative location of each wind turbine site is illustrated on Figure 2.2. Construction zones would be built around each wind turbine site. Typical construction areas for each turbine would be approximately 160 x 200 ft (0.73 acre) in size with a life-of-project disturbance area of 80 x 80 ft (Figure 2.9). The area around each site would need to be clear of obstacles and level enough to allow for the wind turbine components to be delivered and for a crane to be set-up. Designers would work to minimize the amount of work area required at each site, and, where possible, only a minimal amount of vegetation would be removed to allow for component delivery. It is likely that, at most sites, the location for the crane would require the same amount of earthwork as the roads (described below), although these pads can then be removed and the site restored to a natural state once construction is complete.

Figure 2.8 Constructed Turbine Access Road.

To the greatest extent possible, the area of construction and operation of the project (often referred to as the project footprint) would be consolidated for efficient land use in order to minimize disturbance to the existing ecosystem.

When practical, existing roads would be improved rather than constructing new ones. It is not anticipated that County Road 53 would require any widening to allow equipment access. However, if necessary, Teton would work with Sweetwater County Road and Bridge Department and the Wyoming Department of Transportation to obtain the necessary approvals to improve this road and/or the turnoff from U.S. Highway 191. The cut and fill required for the access road would be balanced to minimize the amount of materials that would need to be brought onto or removed from the site.

The design of access and turbine string roads would utilize the flow of the natural contours; however, in order to maintain safety during construction and maintenance activities, the following design criteria would also be implemented:

- Sweetwater County or BLM design standards such as Manual 9113 (BLM 1985) or the design standards suitable for wind energy development approved by the BLM (indicated below);
- maximum access road slope of 10%;
- maximum road slope between turbines (turbine string road) between 7 and 10%;
- access roads would generally have a maximum width of 26 ft;
- turbine string roads would have a maximum width of 54 ft (required for crane movement on-site) or 26 ft with an extra track about 28 ft off the road for crane movement (refer to Figure 2.9);
- minimum turn radius (inside radius of road way) of 115 ft (based on transporting three turbine blades at a time) wherever possible or 76 ft (based on transporting one turbine blade at a time) where necessary;

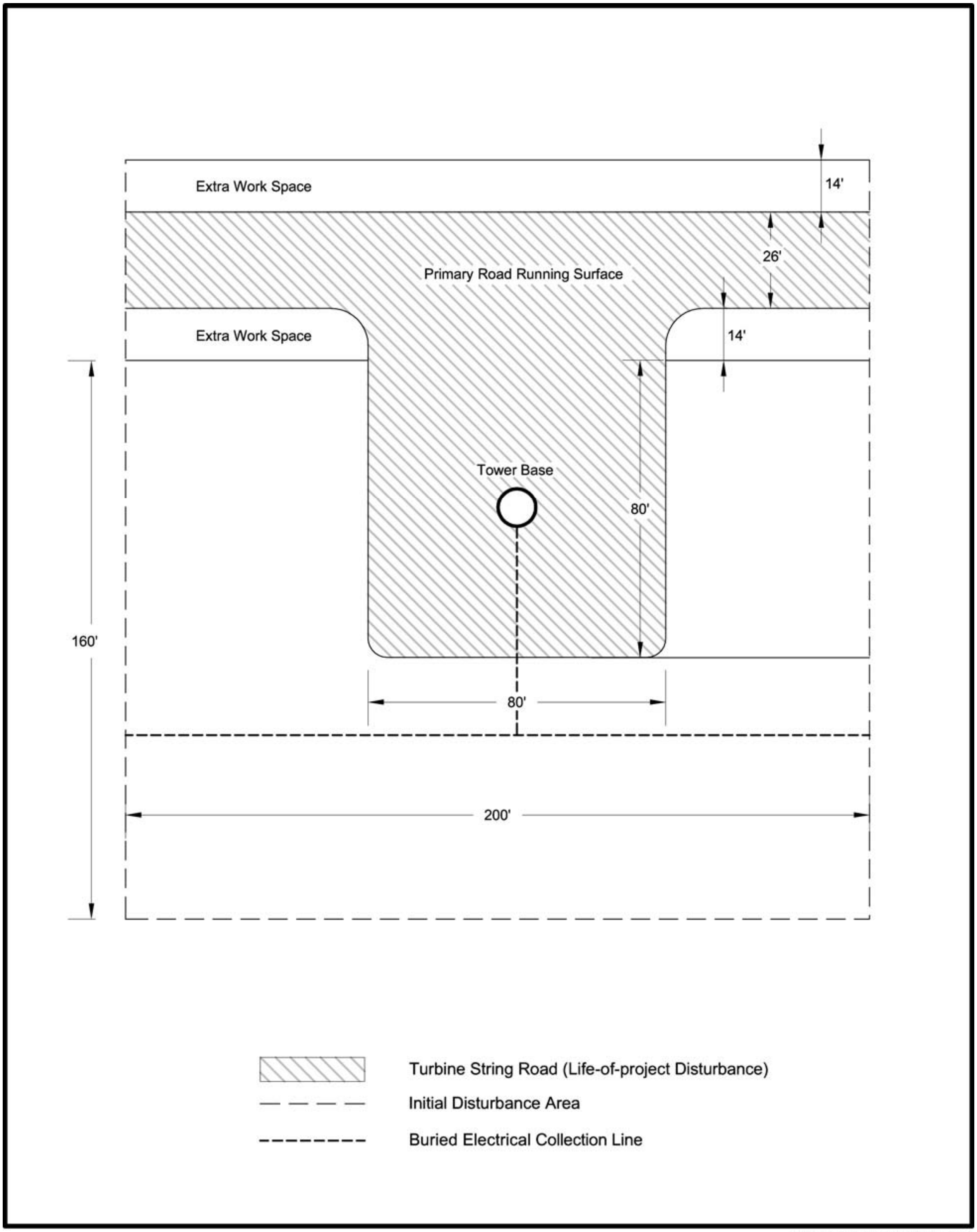

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Figure 2.9 Typical Road and Turbine Construction Layout.

- road surfaces would be that of an all weather gravel road;
- design speed of 15 miles per hour (mph) maximum on the turbine string road and 25 mph on the site access road; and
- where necessary, culverts and road crossings of stream or wash crossings would be designed, installed, maintained, and monitored so as to accommodate and safely pass the 10-year storm event; and
- culverts installed where roadways exceed 5% slope would receive additional monitoring to ensure that they continue to function properly.

The access and turbine string roads would generally be constructed in the following sequence:

- stake centerline of access and turbine string roads;
- install temporary stabilization features such as silt fences, straw bales, and other controls at the limits of construction;
- clear and grub area associated with the access and turbine string road;
- separate and stockpile topsoil for later use;
- grade roads to slopes/design indicated on construction drawings;
- compact subgrade;
- install aggregate all weather road surface;
- install final stabilization/revegetation on disturbed areas associated with the roadway corridor; and
- remove temporary stabilization measures once final stabilization measures are established.

Once construction of the roads and turbine pads is complete, reclamation would be performed around the areas disturbed by the civil construction operations. Cut materials used during the road construction would be used to return contours to near preconstruction conditions. Any remaining cut materials would be distributed in previously disturbed areas in a manner that would not increase dust and erosion or change drainage conditions. Any exposed areas that are not covered by road materials would be revegetated using a seed mixture specified by the BLM or the landowner. Control of invasive nonnative species would continue on-site during the revegetation process and during the life of the project. Sterile nonnative plant species could be used in certain areas.

2.2.3.2 Electrical Collection System

Each wind turbine in the WMWE Project would be connected to an underground electrical cable to allow the generated energy to be sent to the project substation. These cables could be direct-buried (rather than placed in conduit) using cable specifically designed for this application. The voltage of this system would be 34.5 kV, but could potentially be from 12 kV to 46 kV.

If possible, the cables would be buried directly into the soil and materials found on-site. However, if those native materials are found to provide insufficient thermal conductivity (i.e., allow heat to dissipate from the cables), Teton may need to bring in engineered backfill, which would be a soil of a type sufficient to radiate the heat from the cables. The engineered backfill would only be used in the trenches with the cables and only to an amount sufficient to radiate the heat from the cables. The remaining depths of the cable trenches would be filled with native material.

In almost all areas, the cable would be run directly between the turbines. The cable would not be run in the center of the road to avoid unnecessary stress due to vehicle traffic, as well as the potential for cable damage during road maintenance. For areas near the substation where several runs of cable would all be in the same area, Teton may use both sides of the road for the cable trenches, where practical. Cables would be installed in a manner similar to that described below and then recontoured to a state similar to preconstruction and revegetated with BLM-approved seed.

2.2.3.3 Wind Turbine Foundations

The wind turbine base foundation anchors the wind turbine structure (consisting of the tower, hub, blades, and nacelle) securely to the ground. For most projects, the construction of the wind turbine foundation constitutes the largest volume impact of earth excavation, although some foundation designs allow for much of the excavated material to be backfilled in and around the foundation itself.

Two foundation designs are typically used for wind turbine installations in the U.S. The specific one for the project would be determined by the soil and geotechnical conditions and wind turbine requirements. The first foundation type is a “mat” foundation and is shown in Figure 2.10. The second foundation type is a “pier” foundation and is shown in Figure 2.11. Mat foundations are wide and shallow, and pier foundations are narrow and deep. There can be variations of these foundations. The exact foundation type depends on completion and results of the geotechnical investigation. Under known conditions, most foundations would be pier design.

At the top of both foundation types is the turbine base. The base consists of a metal ring and series of anchor bolt connections to mate the foundation to the bottom of the wind turbine tower. The turbine base is cast into the concrete reinforced structure that makes up the remainder of the foundation. The casting and the subsequent backfilling of the foundation are typically done prior to the delivery of the wind turbine tower to allow the lowest sections of the wind turbine tower to be placed upon delivery.

The BLM has indicated that all excavated materials from their lands should be used within the boundaries of their land. If Teton determines that some native materials would need to be removed from BLM-administered land, Teton would obtain approval from the BLM before undertaking any such activities.

Teton would perform an extensive geotechnical investigation prior to construction to determine the soil conditions at each site. While very unlikely, it is possible that when the foundation site is excavated, the soil conditions could be very different from expected and not conducive to wind turbine installation. In that case, the excavated soils would be placed back into the hole and compacted to a level as close to pre-excavation as possible. The surface of the site would be recontoured, retopsoiled, and revegetated using BLM-approved seed.

2.2.3.4 Wind Turbine Installation

The wind turbines themselves are the primary generation equipment in the project. Their installation requires specialized equipment and crews and careful planning. Once construction has fully begun, components would be delivered directly to their installation locations as they arrive at the project. Lower tower sections would be placed immediately on foundations, while the remaining components would be placed around the site in planned staging arrangements. Crane crews would erect the turbines soon after all components arrive to minimize the amount of time the equipment is on the ground. The only exception may be if components begin to arrive in the spring before the site is available for construction (e.g., snow on-site). In such an instance, some components may be temporarily stored near the O&M facility site until full project site access is available. Figure 2.12 provides an example of a wind turbine and crane.

2.2.3.5 Meteorological Tower Installation

Two temporary meteorological (met) towers have already been installed within the project area, Additional met towers may be installed later (for control means) prior to the construction of each phase of development. If additional met towers are required, Teton would obtain all required federal, state, and county permits before the structure would be installed. The permanent met towers would be self-supporting and unguyed to minimize impacts to avian species. These towers would be located within the specific phase of development, but specific location cannot be determined at this time. However, these towers would be located next to existing access roads and would result in minimal disturbance (less than 0.25 acre of disturbance) and would likely remain in place throughout the life of the project and would be removed during the decommissioning phase of the project.

Figure 2.10 Typical Mat Foundation Installation (During Construction).

Figure 2.11 Typical Pier Foundation Installation (Post-construction).

Figure 2.12 Typical Wind Turbine and Crane.

2.2.3.6 Substation

Teton is currently negotiating a power purchase agreement and interconnection grant for this project. These agreements would be in place prior to construction of the project.

The energy generated by the wind turbines would be delivered to the substation via the underground collection system. The location of the substation is illustrated on Figure 2.2. At the substation, voltage of the energy would be increased from the collection system level of 34.5 kV to the transmission line voltage of 230 kV. Also, capacitor banks and other equipment would be installed at the substation to provide the voltage support necessary to meet the interconnection requirements for the project. A small control building would be installed within the substation for electrical metering equipment and the supervisory control and data acquisition (SCADA) system for control of the wind turbines.

2.2.3.7 Overhead Collection Lines

The substation of the WMWE Project would be interconnected directly with the existing PacifiCorp 230-kV transmission line, and no overhead transmission lines would be required (refer to Figure 2.1).

However, in a few select locations where buried cable power collector lines cannot be installed due to topography or rock conditions, short segments of low-voltage overhead power line could be installed. These low-voltage power lines (less than 46 kV) would consist of a single pole configuration with an overhead line to allow power generated at the wind turbines to be transmitted to the substation where the voltage would be stepped up and fed into the existing PacifiCorp transmission line.

The overhead lines would follow the general route of the buried collector lines, and the collector lines would return to a buried or underground configuration where it is technically feasible to do so. No additional roads would be required because the power lines would generally follow the planned access roads and construction crews would drive cross-country during construction of the power line, thereby minimizing surface disturbance. The only disturbance associated with the power lines would be as a result of the drilling of the holes for each individual power pole (less than 4 ft^2), and the amount of disturbance for the overhead power line would be far less than the comparable distance of buried collector line. The exact location of where these short segments of overhead power lines would be installed cannot be determined at this time. However, based on a preliminary evaluation of the project area, Teton believes that only approximately 2.0 mi of overhead power lines of the planned 64.0 mi of buried collector line may be needed.

The power lines would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards. The power lines would also be designed in accordance with *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee 2006).

2.2.3.8 Operations and Maintenance Site

The WMWE Project would require an O&M building for use during the life of the project. This site would include a building to house storage for small parts, offices for the project staff, computers and control equipment for the wind turbines, and shop facilities. This building would be pre-engineered, assembled, and finished on-site. The building would meet Sweetwater County Building Code Requirements. It would be located on private land in the south-central portion of the project area. The location of the O&M building is shown on Figure 2.2. A picture of the O&M building from the Colorado Green project near Lamar, Colorado, is shown in Figure 2.13. To minimize visual impacts, the O&M building would be painted a shale green color. The O&M building would utilize a septic system for waste water disposal. In addition, Teton would use motion detectors on exterior lighting at the O&M building and would not use high intensity (e.g., sodium vapor) lights.

2.2.3.9 Construction Schedule and Workforce Requirements

The exact schedule of construction would depend on the approval date for the project; weather; delivery schedules for the turbines, steel, concrete, and electrical components; and seasonal restrictions during which construction must be delayed for wildlife protection. The project would be developed in phases. In general, a typical schedule for one construction phase (e.g., 60 turbines) of the wind energy project is shown in Table 2.5. Typical construction operations would occur during daylight hours 5 days per week. It is anticipated that approximately 187 full- and part-time employees would be required during the construction phase.

2.2.4 General Construction Activities

2.2.4.1 Housekeeping

Good housekeeping is important for all construction sites, and wind energy projects are no different. Good housekeeping can drastically reduce the incidents of injuries on-site, as well as minimize the environmental impact. At the end of each work shift, debris would be removed from turbine sites and disposed of in a county-approved landfill. Materials still needed at the turbine site would be assembled and secured at the site, and those materials no longer needed would be returned to the construction staging area.

One designated area would be used for washing out concrete trucks. The washout area would include catchment with an impermeable liner. Washout water would be recycled in the batch plan or pumped into tank trucks and removed from the site. The location for disposal would be at an approved disposal facility.

Figure 2.13 Typical Wind Energy Facility O&M Building.

Table 2.5 Typical Construction Schedule for One Phase of Approximately 60 Turbines.

Activity	Amount of Time (Months)
Mobilization	1
Access roads, staging areas complete	3
Substation construction	3-6
Transmission construction	3-6
Foundations	3-6
Wind turbine generator erection	3-6
Commissioning	4-8
Acceptance testing	4-8

2.2.4.2 Traffic

Construction of the wind energy project would occur over a 4-year period utilizing various vehicles for installation of project components and for the delivery of equipment and personnel. The majority of the vehicles used during the construction would include pickup trucks, small flatbed trucks, water trucks, flatbed semis with a flatbed trailer, concrete delivery trucks, etc. Table 2.6 presents the estimated number of vehicle trips for component delivery. The single largest vehicle used for component delivery would be the blade truck (Figure 2.14). Table 2.7 presents information on the estimated number of vehicle trips that might occur during the construction phase of the Proposed Action.

Vehicle traffic would be confined within the site boundary for safety, fire control, and the control of invasive nonnative species. Signs on the public roads utilized by these trucks would be erected to warn the public of the increased construction traffic, and all signage would be coordinated through the Wyoming Department of Transportation and the Sweetwater County Road and Bridge Department. In addition, all vehicles would be washed down at a location approved by the BLM for the control of invasive nonnative species prior to entering the site.

2.2.4.3 Materials Receipt, Handling, and Storage

With the large number of items and materials arriving on-site, a plan has been developed for receipt, handling, and storage. A construction staging area would be developed at the site of the O&M building along the side of the substation 0.75 mi west of County Road 53 where most construction materials would be off-loaded and stored (refer to Figure 2.1). This temporary construction staging area would be approximately 2.0 acres in size. The staging area would be for deliveries taken before the site is available, either due to weather or road construction. Otherwise, wind turbine components would be taken directly to the site where they would be installed. Materials needed for the concrete batch plant, substation construction, and electrical collection system would be off-loaded near their use sites.

2.2.4.4 Fencing and Signage

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road. Signage would include speed limit signs and signs informing the public of construction activities and recommending the public proceed with caution and watch for large vehicles and equipment. The content and location of such signs would be coordinated with Wyoming Department of Transportation and Sweetwater County officials. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment. Teton would coordinate with the BLM, landowners, appropriate agencies, and Sweetwater County officials prior to equipment or component deliveries.

For those areas where public safety risks may exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), temporary fences would be erected. Similarly, temporary fencing would be installed around any staging areas or other areas deemed hazardous or where issues with security or theft are of concern. Teton would coordinate the fencing/security with the appropriate entity (e.g., BLM Authorized Officer, landowner, county personnel). The project substation and O&M building would be permanently fenced for public safety.

The staging area would be temporarily fenced with chain-link fencing. Temporary fencing around unfinished turbine bases is designed to warn people of the potential danger rather than to prevent physical access; therefore, this fencing is typically a high visibility plastic mesh material. Excavations would be fenced with chain-link fencing or other livestock fencing to prevent livestock from entering or falling into the open excavations.

Table 2.6 Estimated Number Vehicle Loads for Component Delivery.

Component Type	Number of Components Required per Turbine	Number of Components per Truck Load	Number of Truck Loads per Turbine
Tower section	3	1	3
Turbine blades	3	1	3
Nacelle	1	1	1
Rotor hub	1	1	1
Foundation components	2.5	1	2.5
Foundation concrete (cubic yards)	70	10	7
Total truck loads (components per turbine)			17.5
Number of truck loads for component delivery (240 turbines)			4,200
Number of truck loads for component deliveries for the substation			50
Number of truck loads for component deliveries for the O&M building			20
Number of trips for delivery of all components			4,270

2.2.5 Structural Construction Activities

2.2.5.1 Concrete Supply

A batch plant would be set up on-site (refer to Figure 2.2) to provide for the significant amounts of concrete necessary for the base foundations of the wind turbines and substation equipment. Attempting to bring trucks onto the site with premixed concrete is not feasible given the distances to the nearest concrete batch plants and the time needed to reach the various construction areas. Attempting such deliveries also would pose a hazard to public safety and have a greater impact on the environment.

A batch plant capable of producing approximately 50 yd^3 of concrete per hour would be needed for this project. To operate such a plant, a total of 30 tons of sand, 45 tons of aggregate, 15 tons of cement, and 3,000 gallons of water would be needed per hour while mixing concrete at peak production. The gravel and cement would be trucked to and temporarily stored next to the batch plant. The gravel and cement would be obtained from private sources that would be properly permitted by the appropriate state and county agencies located off-site, and water would be stored in a temporary aboveground storage tank. Teton would minimize the size of material stockpiles by ensuring that the gravel and cement would be trucked to the site on as close to an on-time use schedule as possible. Teton would also comply with applicable dust control requirements of the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD). Based on previous experience, Teton would use a total of 420 acre-ft of water for dust abatement and concrete production during the construction phase of the Proposed Action. All water would be secured from existing permitted water

Figure 2.14 Typical Wind Turbine Blade Delivery Truck (Photograph Obtained from Vestas).

Table 2.7 Estimated Number Vehicle Trips During Construction Operations.[1]

Activity	Number of Units	Vehicle Trips per Unit	Number of Vehicle Trips
Deliver components[2]			4,270
Road construction	49 mi	50	2,450
Batch plant construction and demo	1 plant	100	100
Turbine and foundation construction	240 turbines	80	19,200
Water Delivery[3]	111 acre-ft	41[4]	4,551
Substation construction	1 substation	500	500
Crane delivery and removal	1 crane	40	40
O&M building construction	1 building	250	250
Total number of vehicle trips			31,361

1 These vehicle trips would occur over a 4-year period.
2 Details on number of vehicle trips for component delivery are presented in Table 2.6.
3 Water for both dust abatement and for concrete mixing.
4 Assumes an 8,000-gallon water truck.

sources, and the water would be transported to the project area via water trucks.

2.2.5.2 Steel Placement

The construction of the numerous turbine foundations would require a considerable amount of steel reinforcement. Therefore, the staging area would also be used to store this rebar material until it is needed in the construction process. A fabrication area within the staging area would also be established to prefabricate sections of rebar before they are transported to the individual turbine base excavations.

2.2.5.3 Formwork

Depending on the type of turbine foundation selected, formwork may be necessary. Formwork with either timber or steel shuttering would be used to form a shape into which rebar is placed, and then the concrete is poured. The formwork shuttering is then removed when the concrete has cured. The shuttering may be re-used, but in the case of timber shuttering, it may be discarded at a proper disposal site when it is no longer fit for re-use.

2.2.6 Electrical Construction Activities

2.2.6.1 Buried Cable Placement

To protect all existing pipelines, cables, or other buried utilities and prior to the installation of any buried cables, Teton would properly locate and mark all existing pipelines, cables, or other buried utilities. Marking would prevent accidental or inadvertent disturbance or damage to these existing utility lines, and equipment traveling over these utility lines would not be heavy enough to damage any of these existing facilities.

There are two methods for the placement of the electrical collection system cable. The first is open trench placement, where a trench is dug using backhoe-type machines to the required depth of cable placement, the cable is placed in the trench, and the trench is then refilled. An example of an open trench is shown in Figure 2.15. If the geotechnical investigation shows that the soils present on-site would not conduct heat away from a buried cable properly, it would be necessary to install an engineered backfill material around the cable to improve heat dissipation. If such backfill is necessary, the open trench approach would be required. Until the geotechnical investigations are completed, it is not known which method would be used at the WMWE Project. As discussed in Section 2.2.2.7, excess materials excavated from the open trenches would be used for road fill or aggregate.

The second placement method is direct cable placement using a trenching or cable plowing machine. These types of machines cut an opening with a plow-type device just large enough for the cable, place the cable in the ground, and then refill the hole in a combined single pass with the cut material (Figure 2.16). While very efficient, these machines are hampered in areas where the soil conditions are very rocky.

The medium-voltage electrical collection system cable used for this project would be placed a minimum of 48 inches below grade, and the fiber optic communications cable used to control and communicate with the wind turbines would be placed a minimum of 18 inches below grade.

The final depths would be determined by the geotechnical conditions of the area and the manner in which the cable is installed. Direct buried cable would have warning tape placed over the top at a depth of 12 inches, which would act as a visual reminder of the cable's presence for future site work.

2.2.6.2 Grounding

Every wind turbine foundation would have a grounding mat cast in place when the base is constructed. This consists of a copper cable mat that discharges electric energy into the earth when the wind turbine is struck by lightning or experiences an equipment malfunction. The substation would also have a grounding grid laid below grade in trenches around the substation site to protect equipment and personnel in the case of electrical malfunction or lightning strike.

Figure 2.15 Typical Open Trench Placement of the Cable.

Figure 2.16 Typical Cable Plowing Machine in Operation.

Transmission poles also require grounding. The grounding crew would follow behind the pole assembly and erection crew installing the grounds. This crew would install the proper number of ground rods and measure the ground resistance. If the proper ground resistance is not initially achieved, they would install additional ground rods until the acceptable ground resistance is obtained.

2.2.6.3 Buswork and Electrical Line Connections

The majority of the electrical connection systems would be installed underground. However, some overhead electrical lines and buswork (rigid overhead meter conductors) connections would be made at the project substation. The electrical collection system would come into the substation underground then transition overhead into the 34.5-kV buswork. This buswork connects the wind turbines on different feeder lines (each feeder line connects 10 to 12 wind turbines) to a common bus. Any necessary voltage regulation devices would also connect to this buswork, which then connects to the low-voltage side of the substation transformer. On the high-voltage side of the transformer, an overhead connection would be made to the project transmission tie-line using a riser structure.

This buswork would be constructed using small overhead cranes, scissor-lifts, and other similar devices. These components would be bolted together on-site and placed on small foundations for support. All of this work would be performed within the fenced substation area. Figure 2.17 illustrates an example of buswork construction being performed.

2.2.6.4 Communications Systems Installation

Communications between the wind turbines and the substation would be achieved by installing underground fiber optic cables. These cables would be buried above the electrical collection system cables utilizing the same trenches in order to minimize the impact to the environment. Communications to the substation would also be achieved by using a buried fiber optic line to the O&M building.

Figure 2.17 Typical Construction of a Substation Buswork.

2.2.6.5 Aviation Marking and Lighting on Wind Turbines

Federal Aviation Administration (FAA) regulations require that an aeronautical study be conducted on structures taller than 200 ft. The purpose of the aeronautical study is to determine if the proposed structure poses a threat to air navigation in the area and to also determine marking and lighting requirements for the structure. The wind turbines proposed for this project would be taller than 200 ft, so an aeronautical study by FAA has been conducted. In accordance with FAA regulations, Teton submitted an individual Notice of Proposed Construction to the FAA for each of the 240 wind turbines for their review. The FAA has completed their review and determined that none of the 240 wind turbines exceed obstruction standards and would not be a hazard to air navigation with the following conditions: Teton would need to construct white turbines that meet marking requirement and night time flashing (L-864) and install synchronized red lights for select wind turbines.

Marking and lighting of each wind turbine complies with FAA guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). For the WMWE Project, the FAA approved white towers, nacelles, and blades and a medium intensity red strobe synchronized flashing warning light (L-864) on top of the nacelle of the turbines located at the end of each turbine "string" plus lighting on every third or fourth turbine. Figure 2.18 illustrates the FAA-approved lighting plan for each wind turbine within the WMWE Project. If Teton wants to change the location of any of the wind turbines, they are required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location. In order to minimize potential impacts to avian species, flashing lights would be used on wind turbines or met towers requiring FAA pilot warning lights. This design feature complies with Gehring et al. (2009).

2.2.7 Wind Turbine Tower Erection

2.2.7.1 Turbine Component Delivery and Storage

As wind turbine components arrive at the WMWE Project site, they would be routed to the individual turbine sites where they would be installed. When trucks arrive at each site, a small crane mounted on rubber tires (rather than tracks) would remove the cargo. Each site would have a plan for the arrangement of major components before erection. These major components include the tower sections, nacelle, rotor hub, and blades (Figure 2.19). If the wind turbine foundation has had sufficient time to cure before the lowest tower section arrives, that section would be off-loaded directly onto the foundation. If turbine components arrive before the individual sites are ready, the major components would be off-loaded and temporarily stored at the staging area near the O&M building. These components would then be moved to the turbine site as soon as feasible.

While most of the major components would arrive in completed form, the rotor (consisting of the hub and blades) would need to be assembled. The rotor would be placed with the nose up, and a small crane would lift the blades so they can be attached to the rotor. Once these blades are attached and any hydraulic or electrical connections are made between the hub and blades, the completed rotor package would be lifted and connected to the turbine shaft located in the nacelle. A picture of a rotor being assembled is shown in Figure 2.20.

2.2.7.2 Crane Assembly and Movement

The crane used to lift the wind turbine components would arrive on-site disassembled, and the crane components would be taken to the crane assembly area, typically located at or near the first turbine site. Once the crane is assembled, the crane would be "walked" to the tower site, where the tower and turbine would be erected. After all of the large components of the wind turbines are erected, the crane would be "walked" to the next turbine site using the crane's tracked base (Figure 2.21). The requirements for walking the crane would set many of the design parameters for the turbine

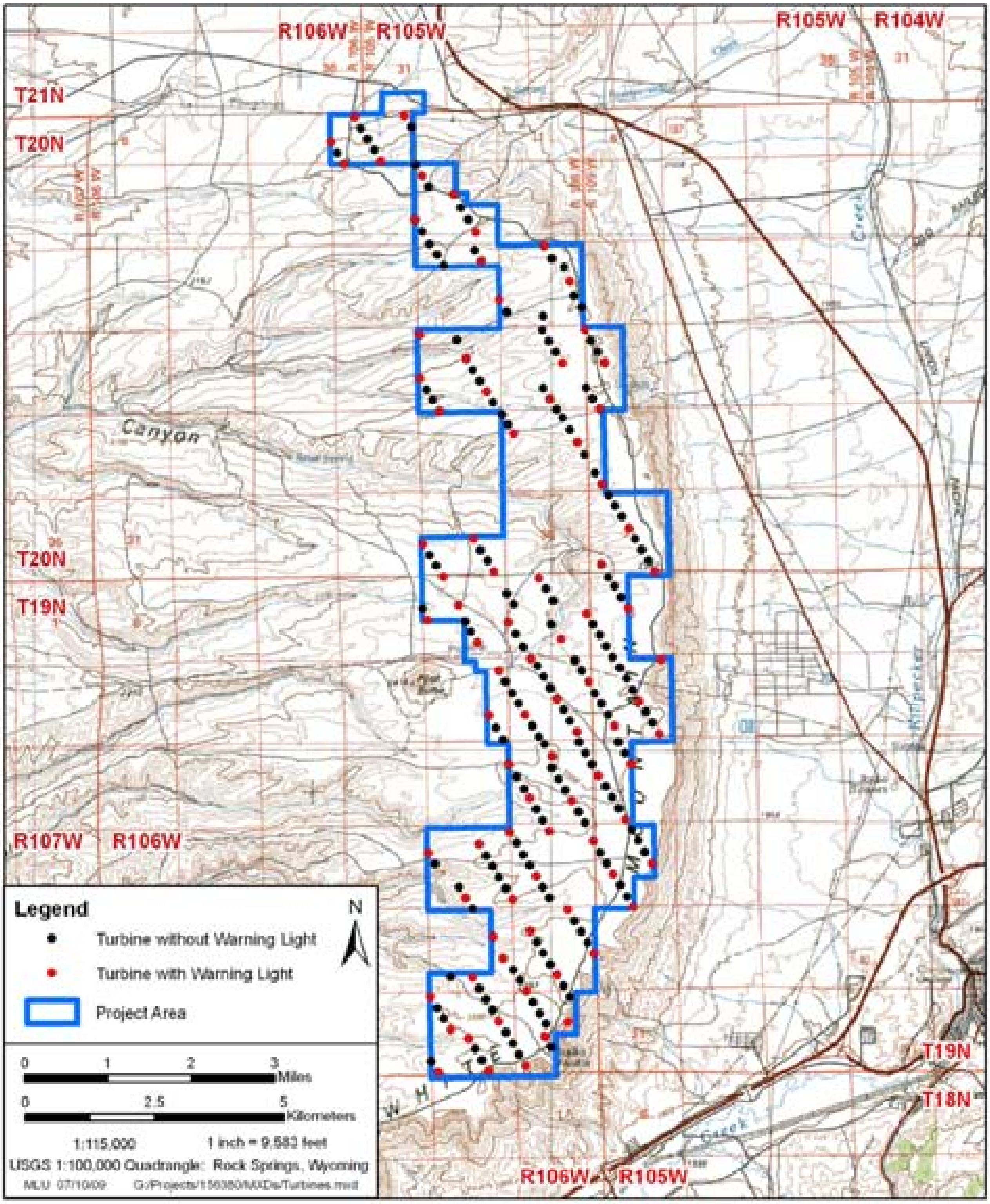

Figure 2.18 FAA-approved Wind Tower Lighting Layout.

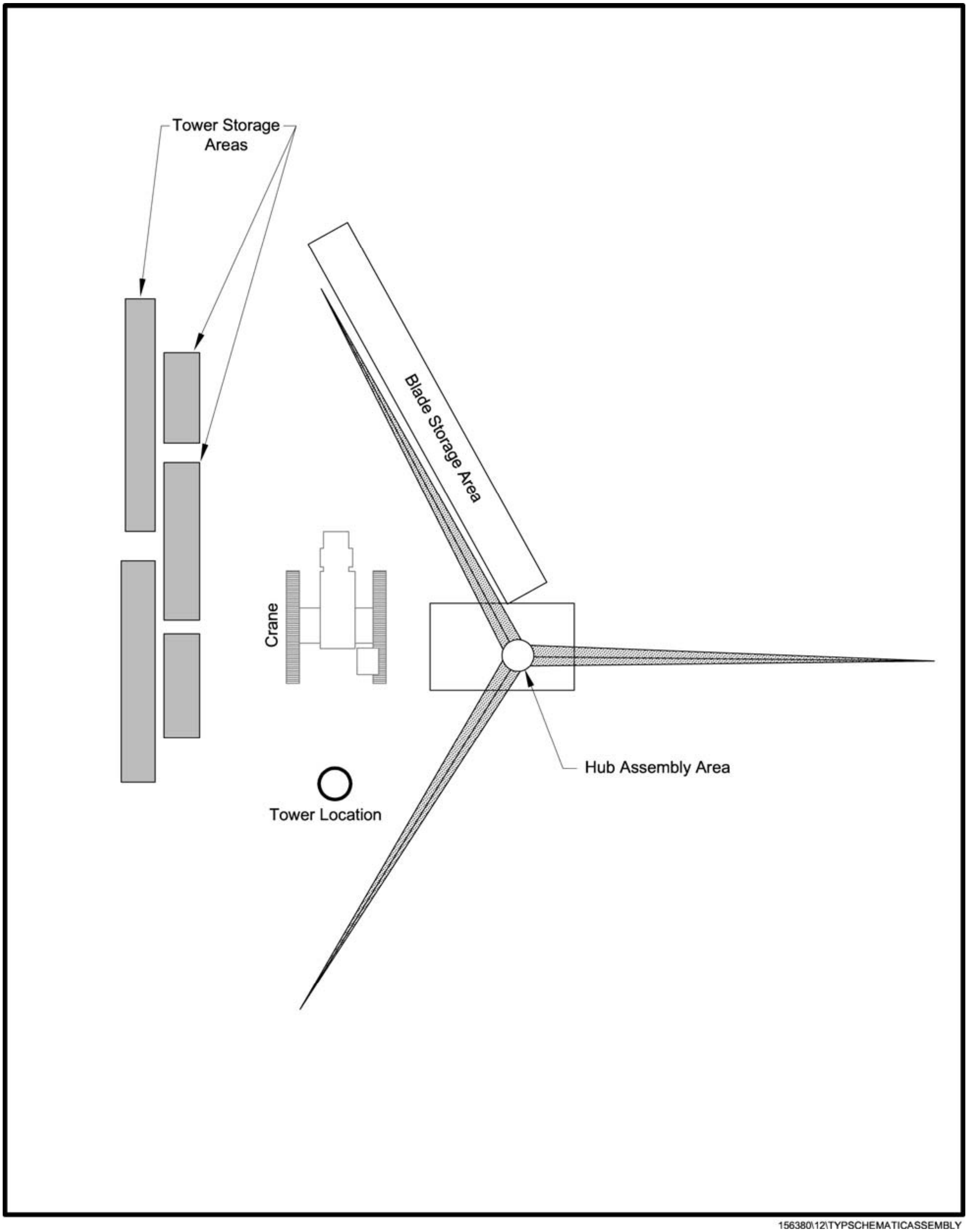

Figure 2.19 Typical Schematic of Turbine Assembly Area Plan.

Figure 2.20 Example of Rotor Assembly.

Figure 2.21 Typical Tracked Crane.

string road, including road width and slope. At locations where the road cannot be built within the tolerances for the crane, the crane would have to be disassembled, moved to the next site, and re-assembled.

2.2.7.3 Wind Turbine Component Lifts

Wind turbines are installed in large pre-assembled components that are interconnected in the field. The tower, which usually consists of three or four sections, is installed first. The first section is installed and bolted to the tower foundation, then subsequent sections are lifted one at a time and bolted together in place as shown in Figure 2.22. Once the last tower section is in place, the turbine nacelle is secured to the top of the tower as shown in Figure 2.23. Finally, the rotor (hub and blades) is lifted into place and secured onto the nacelle (Figure 2.24).

Once the crane and all wind turbine components have arrived at a site, the assembly of the major components typically takes 1-2 days. The lifting of large turbine components can only be done during periods of low winds and good visibility. Weather delays may occur at some sites.

To reduce the amount of time needed to complete the project, two or more large cranes may be used simultaneously to install the various wind turbines.

2.2.8 Reclamation Following Construction Operations

Teton would implement reclamation (described in Section 2.4.8) for those areas of temporary disturbance no longer needed during the O&M phase of the Proposed Action.

2.3 OPERATION AND MAINTENANCE

2.3.1 Health, Safety, and Environmental Plan

Prior to the start-up and operation of the wind energy facilities, the HSE Plan would be reviewed to incorporate additional requirements for O&M for the project. Specific procedures for complying with the BLM requirements that have not already been addressed in the plan would be added to ensure the continued focus on health, safety, and environmental awareness.

2.3.2 Project Operation and Maintenance Plan

The WMWE Project would require an O&M plan to achieve reliable and safe operation. The plan would be prepared in conjunction with the manufacturer of the turbines. Teton expects that full-time maintenance persons would be required for the entire 240 wind turbine project.

As with all operating equipment, some amount of unscheduled maintenance and repair would be necessary. It is just as important that these activities, while often important and urgent, still be performed according to the requirements of the POD, equipment specifications, and good industry practice.

As with the construction phase of the project, Teton understands that the project site is part of the public trust. As much as feasible, the site would be maintained and operated in a manner safe and compatible with public recreation, livestock grazing, Native American sensitivities, and other uses. During some maintenance or emergency response situations, it may be necessary to temporarily control access to a small portion of the project site to maintain public safety. Such situations would be discussed in the detailed project O&M plan.

2.3.3 Operation Activities

2.3.3.1 Orientation and Training

All maintenance employees of the project would receive training regarding safe work on wind turbines and the specific tasks necessary to provide scheduled and unscheduled wind turbine maintenance. All employees (regardless of job requirements) would be trained in the environmental management and monitoring requirements of the project ROW grant.

2.3.3.2 Wind Facility Performance Monitoring

Wind turbines generally operate autonomously, guided by sophisticated computers and software.

Figure 2.22 Typical Midsection Tower Assembly.

Figure 2.23 Typical Turbine Nacelle Placement.

Figure 2.24 Typical Complete Rotor Pickup.

The site manager and staff monitor the performance of the turbines and initiate manual control only as needed for maintenance and troubleshooting.

Periodically, plant management would analyze the performance trends of individual wind turbines and the overall project to ascertain the overall efficiency of operation. This analysis would utilize data collected from the wind turbines and the permanent met towers. It is possible some scheduled maintenance activities would be added or adjusted to improve the performance of the project-related equipment.

2.3.4 Maintenance Activities

The activities necessary to perform preventive maintenance, as well as equipment repairs as needed, are described in general below.

2.3.4.1 Project Inspections

As proponent personnel drive through the project area to perform scheduled activities, they would also perform a visual inspection of the project. The purpose of this inspection is to identify any obvious problems with the wind turbines that may require maintenance. If staff identifies a turbine that may be operating in an unsafe manner, that turbine would be stopped (remotely) until the condition can be fixed. This inspection is a redundant check because the turbine has many internal sensors that watch for any potentially unsafe operational condition.

Staff would also review, along with the turbines, the condition of the project roads and other visible aspects of the project infrastructure. This would include reviewing the condition of substation fencing and components, looking for any loose trash on-site, and checking for any vandalism. Any conditions found that could impact public safety, wildlife, livestock, or the environment in general that cannot be immediately fixed would be reported to the BLM Authorized Officer or other appropriate authority (e.g., landowners or county personnel).

While normal project operations would allow these inspections to occur frequently, there may be periods when the site cannot be accessed and these inspections are suspended. Conditions causing such suspensions could include extremely high winds, blizzards, or heavy rain. The criteria for conditions in which the site would not be accessible would be described in detail in the HSE Plan and would also be subject to the judgment of the project manager and maintenance staff.

2.3.4.2 Scheduled Wind Turbine Maintenance

As with all machinery, regularly scheduled preventive maintenance is the best way to ensure that wind turbines operate in a safe and efficient manner. The project O&M Plan would include the scheduled minor and major maintenance and inspection activities anticipated during the calendar year.

Various inspections would be performed on a daily, weekly, or monthly basis. Results of these inspections are logged and used to plan future maintenance activities. Visual inspections inside the rotor head, nacelle, and tower bottom are done on a regularly scheduled basis. Information collected in these inspections is utilized to plan future maintenance activities. Particular attention would be paid to identify minor oil leaks so that appropriate repair work can be performed before the leaks pose a potential environmental issue.

Regularly scheduled preventive maintenance activities also are performed on a daily, weekly, or monthly basis. A list of all scheduled preventive maintenance activities would be included in the O&M Plan.

Two annual wind turbine maintenance cycles are anticipated. These would be planned for the spring and fall months of each year. While not currently anticipated, it may be necessary for blade washing to also be performed to improve wind turbine performance.

Over the project operational period, major maintenance or repair events are recorded so that underlying causes can be determined and analyzed. These analyses may lead to modifications to the turbines, project operation, or maintenance practices to improve the efficiency and safety of the project.

Teton anticipates that a maximum of approximately 57 direct O&M jobs would be required to service the project. In addition, pickups and other small service trucks would be used by on-site personnel, and Teton anticipates that 20 road trips per day would be required to perform maintenance activities on the entire project. This would result in approximately 5,000 road trips per year. The typical activities necessary to operate and maintain the WMWE Project are described below.

2.3.4.3 Unscheduled Wind Turbine Maintenance

Introduction

Wind turbine maintenance and internal inspection activities are normally performed on a scheduled basis. However, when problems occur, unscheduled maintenance would be required in order to maintain the operating efficiency of the project.

During the first several years of operation, the turbines would be new and major repairs are not anticipated; however, they cannot be ruled out. Any turbine experiencing mechanical difficulties that could result in safety or environmental risks or damage to the equipment would be taken offline until repairs can be completed. Otherwise, repairs would be planned for the first convenient opportunity.

The three levels of unscheduled maintenance are discussed below. All potential repair activities would be described in more detail in the manuals for the wind turbine design chosen for the project.

Minor Repairs and Component Replacement

Making minor repairs to the turbines or replacing faulty internal components are the most common form of unscheduled turbine maintenance.

All of these repairs can be done using small tools and the turbine-integrated winch system. It should not be necessary to bring even a small crane onto the site. No vehicles other than the project pickups and sport utility vehicles would likely be needed. These vehicles would stay on the project roads or in the clearing beneath each wind turbine.

Major Repairs and Component Replacement

Although far less common, it is possible that major components could need to be replaced during the operational phase of the project. These components could include the following:

- blades,
- generator,
- gearbox, and
- transformer (if in the nacelle).

Such a replacement may require at least one large crane be brought back to the site, and trucks would be needed to bring the crane to the turbine location. If the crane pad installed for the construction phase of the project was no longer available, such a pad would need to be installed.
If a major component becomes damaged and requires replacement, the turbine would be stopped and placed out of service until the component replacement is completed. Once the crane and replacement component arrive on-site and are prepared for service, the actual component replacement would only take 1 or 2 days. Once the new component is installed, the crane would be removed from the site and the turbine returned to service. This activity would be planned to minimize crane time on-site and the overall impact to the environment.

Wind Turbine Replacement

The replacement of a complete wind turbine at a project prior to decommissioning the facility is uncommon. It would only be necessary if there were problems with the wind turbine tower or foundation, as all other components can be replaced without removing the entire turbine.

The replacement of a wind turbine would require the same crane assembly as described above. The wind turbine components would be removed in the reverse order they were installed. Each of the removed components not used on the replacement wind turbine would then be loaded onto trucks and removed from the site. After the old components have been removed, replacement components would be brought to the site and arranged in a manner similar to that discussed above. The wind turbine would once again be erected using the appropriate combination of original and replacement components. Given the need to remove old components and bring new components to the site after the original wind turbine was disassembled, the entire wind turbine replacement activity could require the crane to remain on-site for a week or longer.

2.3.4.4 Balance of Plant Maintenance

Introduction

While the wind turbines are the major components of the project expected to require the most maintenance services, some maintenance would be needed for the balance of the project. Those maintenance services are described below.

Substation Maintenance

The project substation would be inspected periodically to look for any obvious problems or areas of concern. Additionally, the substation would undergo an annual inspection and maintenance cycle to ensure all protection equipment is functioning properly. This generally involves inspection of the breakers and switches to be certain they would operate as needed in a fault or emergency. Electrical connections would also be inspected and tested as needed to ensure no unsafe situations exist.

Maintenance to the substation transformer, switchgear, and buswork would require the substation be de-energized and, therefore, the project shutdown. Teton would schedule this maintenance for low wind months of the year as much as possible. Most maintenance activities can be performed during a single day each year.

All substation equipment is within a fenced area, minimizing any potential impacts to the public, wildlife, or livestock.

Road Maintenance

Road maintenance within the WMWE project area would be performed by Teton on an as needed basis. Regular snow removal is expected to be required during the winter months to maintain access to the turbines and substation. Teton would also plow openings at least every 0.25 mi, or as directed by the BLM, in the snow berms to allow big game species to move off of and away from road activities. During periods of heavy snow, Teton may use snowmobiles to access some wind turbines. All snowmobile use would be restricted to existing roads and no off-road travel would be allowed. It is expected that minor amounts of surface dragging, blading, or grading would be required after the spring thaw to remove vehicle ruts. Other similar surface work may be needed after periods of heavy rainfall or just periodically due to maintenance traffic. Any identified needed repairs would be promptly addressed. Also, any culverts, drains, or other water management devices would be kept clear to allow effective drainage.

To mitigate against dust, the road surfaces would be watered or otherwise treated with dust control measures. These treatments would occur as needed based on weather conditions and the amount of traffic on the road. Teton estimates that approximately 14 acre-ft of water would be required annually over the life of operation for dust control. Water would be secured from existing permitted water sources, and it would be hauled by truck to the project area. Any treatment substance other than water would only be used after consultation with the BLM Authorized Officer or county personnel, if applicable.

O&M Building Maintenance

Any maintenance requirements for the O&M building are expected to be typical for a building of this type of construction and would be performed on an as-needed basis. Exterior maintenance would be performed in a timely manner to maintain a presentable appearance to the general public. Housekeeping and area cleanup would be done on a regular basis to avoid the buildup of litter and other unsightly materials.

2.4 DECOMMISSIONING

As with any energy project, the WMWE Project would have a fixed time after which it may no longer be cost effective to continue operation. At that time, the project would be decommissioned, and the existing equipment, facilities, and structures would be removed and the disturbed areas revegetated. While it is possible the project owners may want to work with the BLM, landowners, state, and county to repower the site (replace the existing wind energy project with a new project on the same site), repowering is not being considered in this plan.

2.4.1 Health, Safety, and Environmental Plan

When the project moves into the decommissioning stage, the operation's HSE Plan would be modified to include the decommissioning activities. Decommissioning requires outside contractors, cranes, and large equipment to be brought back to the site.

Components of the management system that would be addressed in the plan include, but are not limited to, risk management analysis, emergency response, HSE planning and procedures, implementation, monitoring and reporting results, setting performance targets, incident classification, investigation and reporting results, audits and inspections, and HSE management review.

Minimum contractor HSE requirements would be included in the plan. These are typically such requirements as personal protective equipment, housekeeping, maintaining a safe workplace, fire prevention, safe work practices, etc. Contractors are expected to comply with these requirements at a minimum. Contractor safety plans would be reviewed for compliance. Contractor BMPs would be reviewed and incorporated into the plan as appropriate.

Once the framework of the plan is completed, the project would be reviewed for site-specific HSE requirements and would be modified to incorporate them.

Also included in the HSE Plan is a risk register that identifies potential hazards and the risks associated with them. Contractors are expected to address these risks and to develop mitigation plans for incorporation into the register. The risk register would be used and updated on a continuous basis to identify and mitigate risks as they arise. It is conceivable that mitigation plans as developed may not prove to be sufficient. In this case, the plan would be adjusted to provide a suitable solution to project risks.

Observation of HSE performance is key to avoiding incidents. Project personnel would be expected to regularly observe work practices and to provide positive reinforcement and guidance to fellow employees. Work practices that may be considered to place employees or the environment at risk would be identified, evaluated, and modified as necessary to eliminate or substantially reduce the risk.

2.4.2 Project Decommissioning Plan

The goal of project decommissioning is to remove the installed power generation equipment and return the site to a condition as close to a preconstruction state as feasible.

These activities are discussed in more detail in the subsequent sections. The specific requirements and approach for each activity is an estimate since the technologies and construction techniques available when the project is decommissioned are expected to change.

2.4.3 Wind Turbine/Meteorological Tower Removal

The decommissioning activity most notable to the general public would be the removal of the wind turbines and met towers. The disassembly and removal of this equipment would essentially be the same as its installation but in reverse order.

2.4.3.1 Crane Movement and Assembly

When a large crane first arrives onto the project site, it would be taken to the location for the first turbine removal. The crane would be assembled on that site, and then used to disassemble the wind turbine. Once the turbine at that site is disassembled, the crane would be "walked" to the next turbine site using the cranes tracked base (see Figure 2.12). If the requirements for walking the cranes to the met towers on the project roads cannot be accomplished, road improvements may be necessary. At locations where the road cannot be improved to within the tolerances for walking the crane, the crane would be dissembled, moved to the next site, and re-assembled.

If the crane pads built for the construction of the project were subsequently removed or no longer meet the requirements for the crane, then crane pads would need to be installed or improved.

2.4.3.2 Wind Turbine/Meteorological Tower Disassembly

The large components that make up a wind turbine would be dissembled in the reverse order that they were assembled. The rotor (hub and blades) are removed from the nacelle and, with the help of a smaller crane, turned horizontally and set on the ground. Next, the nacelle would be removed from the top of the tower, followed by each portion of the tower. The met tower would similarly be disassembled by a crane, starting with the upper tower section and moving downward.

Once the turbine rotor has been removed, a crew and small crane would disassemble it into the hub and three loose turbine blades.

2.4.3.3 Component Removal

The most efficient manner for component removal (other than the rotor) would involve individual parts being lowered from the turbine and placed directly onto a truck bed. These trucks can then immediately take the component off-site. This approach would limit the need for clearing an area around the turbine base to set down the rotor.

When the rotor is disassembled, the blades would be placed into a carrying frame. The blades in the frame can then be loaded onto a truck for removal from the site. The hub can also be removed once it is disassembled from the blades.

2.4.4 Electrical System Removal

2.4.4.1 Buried Cable Removal

The buried electrical cable and fiber optic cable located between each turbine would be cut off 24 inches below grade and left in place.

2.4.4.2 Substation Disassembly and Equipment Removal

Once the project and transmission line is de-energized, the substation would be disassembled. Major components would be removed from their foundations and placed onto trucks using a small crane. The steel structures and control building would be disassembled and removed from the site. The fence would be taken down, and fence posts would be removed. The gravel placed in the substation would be removed if it was not native rock that had been removed from excavations and crushed. Native rock would be scattered on-site.

Once again, buried grounding equipment would be cut off at least 24 inches below grade and left in place.

2.4.4.3 Transmission Line Removal

Assuming the transmission line no longer serves a purpose for this project, it would be disassembled and removed. Initially, the wires would be removed from the tower hangers and collected for recycling. The power line structures would then be disassembled and removed, including grounding rods to 24 inches below grade. The areas around the poles, along with any two-track access roads that were necessary, would be reclaimed.

2.4.5 Operations and Maintenance Building Removal

All equipment and furniture in the O&M building would be removed, and then the building would be disassembled or demolished and removed from the site. All debris from the demolition would be removed from the project site and either disposed of at an approved landfill, recycled, or re-used. Any installed septic system would also be abandoned in a manner consistent with state and local regulations.

2.4.6 Structural Foundation Removal

When the wind turbines, met towers, and substation components are removed from their foundations, the foundations would be removed according to the requirements of the ROW grant and/or landowner agreement. Teton expects that the concrete and steel in the foundations would be broken up and removed to a depth of 24 inches below grade. Shallow foundations (like that for the O&M building) would be removed in their entirety. All concrete and steel debris would be removed from the site and either disposed of at an approved landfill, recycled, or re-used.

2.4.7 Road Removal

The BLM, in conjunction with the landowners, would have the choice when the project is decommissioned as to whether the access roads constructed for this project would be removed or left in place to facilitate public access in the area. However, if the BLM, in conjunction with the landowner, chooses to leave the roads in place, they would become the responsibility of the BLM and/or the landowners.

Once all the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, it can be removed. The road surface and bed materials would be removed down to the original grade. Any native materials would be used for reclamation of the site, and foreign materials would be removed and properly disposed.

2.4.8 Reclamation Plan

2.4.8.1 Introduction

Teton would be responsible for stabilizing and reclaiming all disturbance created by the WMWE Project, and Teton would use appropriate stabilization and reclamation methods and materials for the area. Teton would also reclaim all temporary disturbances in accordance with these procedures as soon as physically possible.

2.4.8.2 Regrading and Retopsoiling Operations

For areas where equipment or materials are removed, those areas would be regraded back to preconstruction contours (if possible), and stockpiled subsoil would be replaced and hipped/disced to reduce compaction. Holes where foundations have been removed would be refilled with native material. Removed roads would be regraded to original contours, if cuts and fills make such regrading practical. Crane pads would also be regraded.

2.4.8.3 Topsoil Replacement and Seedbed Preparation

Once regrading operations have been completed, available stockpiled topsoil would be replaced on the disturbed areas. After the topsoil has been replaced, compacted soils or disturbed soils would be lightly disced or harrowed to loosen soils and break soil clods; surfaces would be roughened to provide a suitable seedbed to reduce the potential for wind and water erosion and to improve the infiltration. Use of fertilizers or other soil amendments is not anticipated because fertilizers tend to promote weed growth. If reclamation is unsuccessful, the need for fertilizers would be re-evaluated in consultation with the BLM and the landowners.

2.4.8.4 Revegetation Operations

The seed mixture to be used for revegetation operations is presented in Table 2.8. Species selection is based on existing species composition, establishment potential, growth characteristics, soil stabilizing qualities, palatability to wildlife, commercial availability, existing land uses, and agency recommendations.

Certified seed of native species adapted to conditions along the project area would be purchased. Alternative species may be used, with prior approval from the BLM Authorized Officer and/or private landowners if any of these species become unavailable or if alternative species would be better suited to site-specific conditions. All seed mixtures would be tested for purity; noxious, poisonous, and/or prohibited plant species; and viability. The seed mixture would not contain any noxious weed seeds. Test results would be submitted to and approved by the BLM Authorized Officer and landowner, unless certified weed-free seed is procured for this reclamation project.

Grass seed would be planted using a rangeland-type of drill equipped with a depth regulator to ensure proper depth of planting. Each species would be planted at an appropriate depth, generally 0.25 to 0.50 inch. Forb and shrub seeds would be planted using a cyclone-type broadcast seeder, and seeding rates would be doubled. In areas where it is not possible to drill seed, seed would be hand-broadcast or broadcast using a cyclone-type broadcast-seeder and seeding rates would be doubled. The seeded area would then be raked with a harrow or chain to cover seed and would be packed with a multipacker or similar implement to ensure appropriate soil/seed contact. In areas that are not accessible with revegetation equipment, broadcast-seeded areas would be hand-raked to cover seed. Areas where vegetation was only driven over (e.g., along the transmission line corridor) during construction would be broadcast seeded and raked to facilitate soil stabilization and vegetative regrowth. Temporary forage around the turbines may be necessary to facilitate the establishment of designated vegetation due to impacts from livestock, wildlife, and wild horses.

Table 2.8 Reclamation Seed Mixture.

Species	Seeding Rate (lbs PLS/acre)[1]
Grasses (Three to four species would be selected)	
Indian ricegrass (*Oryzopsis hymenoides*)	2.0
Bottlebrush squirreltail (*Elymus elymoides*)	2.0
Thickspick wheatgrass (*Elymus lanceolatus*)	6.0
Sandberg bluegrass (*Poa secunda*)	6.0
Forbs (Two species would be selected)	
Blue flax (*Linium lewisii*)	0.5
Scarlet globemallow (*Sphaeralcea coccinea*)	0.5
Rocky Mountain beeplant (*Cleome serrulata*)	0.5
Shrubs (Two species would be selected)	
Gardner's saltbush (*Atriplex gardneri*)	2.0
Winterfat (*Krascheninnikovia lanata*)	2.0
Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)	1.0
Sterile Nonnative Species (May be used for site stabilization)	
Sterile Triticale (quick guard)	8.0-10.0
Sterile wheatgrass, barely, or rye	8.0-10.0

[1] PLS = pure live seed.

2.4.8.5 Reclamation Monitoring Plan

Teton would be responsible for annual monitoring of reclamation success along the project area until it can be demonstrated to the BLM that revegetation success criteria have been met. Monitoring would also be conducted to ensure that erosion control, weed management, and revegetation efforts continue to meet the objectives of stabilization and productivity along the ROW. These efforts would continue until erosion control, weed management, and revegetation is deemed successful by the BLM/landowner or until the BLM/landowner determines that continued efforts are not necessary.

2.4.8.6 Stability and Erosion Control

Teton would implement stability and erosion control practices for all temporary and permanent reclamation in accordance with the SWPPP.

Reclaimed areas within the project area would be considered stable if there are no large rills or gullies, no substantial soil movement, no headcutting in drainages, no slope instability, no subsidence, and no slumping that can be attributed to construction, operations, or maintenance. Teton would be responsible for annual inspections for the following types of problems as determined by the BLM Authorized Officer or landowner:

- soil movement where the depth of recent deposits around obstacles is greater than 0.5 inch;
- surface litter movements where more than 25% of surface litter has been transported and redeposited against obstacles downslope;
- development of rills greater than 3 inches deep at intervals of 10 ft or less;
- gully formation at intervals of 200 ft or less; and
- channel erosion where more than 25% of the channel bed and walls show active erosion, gully formation, and/or headcutting or bank failure.

If these features are discovered during reclamation inspections and their existence can be attributed to construction, O&M, or decommissioning operations of the WMWE Project, Teton would, in consultation with BLM and landowner, implement appropriate remedial action until reclamation objectives are met.

2.4.8.7 Reclamation/Revegetation Success Monitoring

Reclamation and revegetation would be considered successful on BLM-administered land when the Wyoming Rangeland Standard (BLM 2009a) has been met. On private and state-owned land, revegetation would be considered successful if it meets the specific standards established in the applicable agreements.

Reclaimed areas would be monitored by Teton for as long as determined by the BLM Authorized Officer or landowner. If any noxious weed species are discovered on project-related reclamation, Teton would implement appropriate weed control measures.

2.5 DESIGN FEATURES OF THE PROPOSED ACTION AND ALTERNATIVE A

The following design features would be implemented by Teton. Design features are based on applicable policies and BMPs provided in IM 2009-043, land use plan requirements, or other best management practices. Prior to construction, Teton would implement appropriate avoidance in areas and/or setbacks (discussed below) in order to minimize impacts to public safety, operation of existing facilities, and environmental resources.

2.5.1 Public Safety, Occupational Safety, and Hazardous Materials and Waste Management

The project cannot limit public access to the site to a level lower than it was prior to the start of construction, except in those areas where public safety could be jeopardized (or where theft control measures are appropriate). The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when the roads are physically and temporarily blocked by the movement of project-related vehicles or equipment.

During construction activities such as wind turbine assembly, Teton would have crews on-site performing the activity and monitoring overall safety. Construction personnel would comply with all applicable federal and state safety regulations. Construction crew members and safety monitors would be trained to ask members of the public to maintain a safe distance from the work zone. Neither the crew members nor the safety officers have the authority or responsibility to keep members of the public away from the construction zone, especially if members of the public choose to ignore posted signs.

During the operation phase of this project, Teton would attempt to minimize vandalism and trespassing by having secured and locked access to wind turbine towers and electrical equipment and having O&M staff regularly patrol the area. In addition, the area around the substation and O&M building and storage area would be fenced for public safety. Fencing would be a minimum of 6 ft high and would be equipped with Sweetwater County approved screening material to minimize visual intrusion. Fencing will be maintained. No other permanent fencing is currently anticipated, but this plan could be adjusted if additional fencing is needed. During some scheduled or unscheduled maintenance activities that could involve open pits or other potentially unsafe areas, temporary safety fencing would be installed. Teton would also install speed limit signs in the project area in cooperation with Sweetwater County officials.

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road, informing the public of construction activities and recommending the public proceed with caution and watch for large vehicles and equipment. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment.

A project web site would be established during construction to describe the project and would explain current activities and provide recommendations regarding safe practices on the project site. Additional outreach would be performed as necessary. The goal of this program is to provide information to the curious public without them needing to physically access the site.

Because of the improvements in wind turbine, tower, and blade designs over the past 10 years, Teton does not anticipate that ice throws from blades or tower failures would be a concern for public safety.

Teton has evaluated the Proposed Action for shadow flicker and determined that shadow flicker would not likely be visible outside of the project area, and there would be no impacts to any residences in the Rock Springs/Green River area since the closest residence is located 0.92 mi east and 700 ft below the rim of White Mountain.

Teton would provide a setback of 110% for all wind turbines (as measured from the ground to the top of the blade) from all property lines not included in the proposed project, from the ROW of all county roads in the project area, and from existing aboveground facilities. Teton would coordinate with the owners of the facilities (including buried facilities) to ensure that such facilities would be protected from disturbance and that existing operators are protected.

All terms and conditions regarding private, state, and federal leases would be conveyed to any subsequent property owner. The proposed project would not impact any existing cathodic protection equipment located within the proposed project area. All geotechnical holes or test pits would be backfilled in accordance with applicable requirements. Any required material or excess material would be obtained or dispersed of at a properly permitted facility.

During construction and decommissioning, portable toilets would be provided for workers on-site, and the waste would be properly disposed of through an approved waste disposal facility on an as-needed basis. During the O&M phase, permanent toilet facilities would be placed in the O&M building, and waste would be disposed of through a state and county approved septic system. Solid waste such as garbage and other discarded solid materials would be collected at designated collection sites and disposed of at an approved solid waste management facility. Solid waste would not be imported into or disposed of within the WMWE project area. Some large equipment would be fueled on-site, and some small spills of petroleum products may occur due to periodic equipment maintenance and/or accidents. If such spills occur, petroleum-contaminated soils would be disposed of in accordance with the Spill Prevention, Control, and Countermeasures Plan (SPCCP) and direction from the BLM and/or WDEQ as appropriate. Typical hazardous chemicals and petroleum products used in equipment during the construction and decommissioning phases of a wind energy facility include diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, cleaning fluids, paints, degreasers, and other similar substances. Typical hazardous chemicals and petroleum products used in equipment during the O&M phase of the wind energy project include mineral oil, diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, and cleaning fluids. All nonhazardous wastes would be disposed of in accordance with appropriate county, state, and federal regulations.

Operators would handle and dispose of all hazardous wastes in accordance with applicable state and federal rules and regulations. Any release of hazardous substances in excess of reportable quantities, established in 40 CFR 117, would be reported as required by *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (as amended). If a release of a reportable quantity of any hazardous substances occurs, a report would be provided to WDEQ and all other appropriate federal, state, and county agencies.

Teton has evaluated potential interference to existing radio transmitters and microwave reflector facilities and made appropriate adjustments to the turbine layout to avoid any potential areas of interference.

Teton has submitted and received "determinations of no hazard to air navigation" from the FAA for all 240 wind turbines in the WMWE project area. There are no known military operating areas within or near the WMWE project area that could pose a hazard to military flight operations.

Prior to the construction of specific phases, Teton would obtain all required permits from all appropriate federal, state, and county agencies.

2.5.2 Construction and O&M Operations

Prior to the construction of any project-related equipment, structures, or facilities, all available vegetation and all available topsoil would be salvaged and stockpiled for future reclamation operations. If less than 6 inches of topsoil are available, topsoil along with an appropriate quantity of other suitable subsoil (with BLM or landowner approval) would be salvaged so that a minimum of 6 inches of plant growth material would be available for use during revegetation operations. Topsoil and suitable subsoil would be stockpiled separately, and appropriate signs would be installed on each topsoil or subsoil pile.

Topsoil salvage operations would apply to all construction activities except for the construction of any required overhead transmission power lines. Topsoil salvage operations are not required for the construction of overhead power lines because these activities would result in minimal disturbance from wheeled vehicles driving over the vegetation and soil. In addition, natural revegetation would occur more rapidly if the vegetation and soil is left in place.

Teton would not conduct any construction, O&M, or decommissioning activities when soils in the work area are too wet to adequately support construction equipment. If construction equipment creates ruts greater than 4 inches deep, support would be deemed inadequate, and activities would be discontinued until soil conditions improve or appropriate remediation action is taken to ensure operations could continue without deep rutting.

In order for equipment and personnel to reach the wind turbine locations, existing roads would be used whenever possible; although, some existing two-track roads would need to be upgraded and new roads would need to be constructed. Designers would work to minimize the amount of work area required at each site, and, where possible, only a minimal amount of vegetation would be removed to allow for component delivery.

Once construction of the roads and turbine pads is complete, reclamation would be performed around the areas disturbed by the civil construction operations. Cut materials used during the road construction would be used to return contours to near preconstruction conditions. Any remaining cut materials would be distributed across the mountain in a manner that would not increase dust and erosion or change drainage conditions but would keep the materials on the mountain. Any exposed areas that are not covered by road materials would be revegetated using a seed mixture specified by the BLM. Control of invasive nonnative species would continue on-site during the revegetation process and during the life of the project.

The BLM has indicated that all excavated materials from their lands should be used within the boundaries of their land. If Teton determines that some native materials would need to be removed from BLM-administered land, Teton would obtain approval from the BLM before undertaking any such activities.

If additional met towers are required, Teton would obtain all required federal, state, and county permits before the structure would be installed. In addition, all new met towers would be self-supporting and would not require any guy wires.

The O&M building would meet Sweetwater County Building Code requirements, and it would be painted a shale green color.

All engineered plans and/or as-built drawings would be provided to BLM and Sweetwater County and would be certified by a Wyoming licensed Professional Engineer.

One area within the project area would be designated and used for washing out concrete trucks. The washout area would include catchment with an impermeable liner. Washout water would be recycled in the batch plant or pumped into tank trucks and removed from the site. The location for disposal would be at an approved disposal facility.

For those areas where public safety risks may exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), temporary fences would be erected. Similarly, temporary fencing would be installed around any staging areas or other areas deemed hazardous or where issues with security or theft are of concern. Teton would coordinate the fencing/security with the appropriate entity (e.g., BLM Authorized Officer, landowner, county personnel). The project substation and O&M building would be permanently fenced for public safety.

The staging area would be temporarily fenced with chain-link fencing. Temporary fencing around unfinished turbine bases is designed to warn people of the potential danger rather than to prevent physical access; therefore, this fencing is typically a high visibility plastic mesh material. Excavations would be fenced with chain-link fencing or other livestock fencing to prevent livestock from entering or falling into the open excavations.

The gravel and cement for this project would be obtained from private sources that would be properly permitted by the appropriate state and county agencies located off-site, and water would be stored in a temporary aboveground storage tank. Teton would minimize the size of material stockpiles by ensuring that the gravel and cement would be trucked to the site on as close to an on-time use schedule as possible. Teton would also comply with applicable dust control requirements of the WDEQ/AQD.

Concrete forms (i.e., shuttering) may be re-used, but in the case of timber shuttering, it may be discarded at a proper disposal site when it is no longer fit for re-use.

Marking and lighting of wind turbine and met towers complies with FAA guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). For the WMWE Project, the FAA would require that all wind towers be painted white and a medium intensity red strobe (flashing) warning light would be placed on top of the nacelle of the turbines located at the end of each turbine "string," plus lighting on every third or fourth turbine. In order to minimize potential impacts to avian species, flashing lights would be used on wind turbines or met towers requiring FAA pilot warning lights.

Any conditions found that could impact public safety, wildlife, livestock, or the environment in general that cannot be immediately fixed would be reported to the BLM Authorized Officer or other appropriate authority (landowner, county personnel).

2.5.3 Decommissioning and Reclamation Operations

During the decommissioning phase of this project, all above-grade project-related facilities (e.g., wind turbines, towers, roads, buildings, and substation) would be removed from the site to a depth of at least 24 inches below grade and backfilled with native materials. The gravel placed in the substation would be removed if it was not native rock that had been removed from excavations and crushed, and native rock would be scattered on-site.

The BLM, in conjunction with the landowners, would have the choice when the project is decommissioned as to whether the access roads constructed for this project would be removed or left in place to facilitate public access in the area. However, if the BLM, in conjunction with the landowner, chooses to leave the roads in place, they would become the responsibility of the BLM and/or the landowners.

Once all the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, the road itself would be removed. The road surface and bed materials would be removed down to the original grade. Any native materials would be used for reclamation of the site, and foreign materials would be removed and properly disposed.

During reclamation operations, available stockpiled topsoil would be replaced on the disturbed areas. After the topsoil has been replaced, compacted soils or disturbed soils would be lightly disced or harrowed to loosen soils and break soil clods; surfaces would be roughened to provide a suitable seedbed to reduce the potential for wind and water erosion and to improve the infiltration.

Teton would use the reclamation seed mixture presented in Table 2.8 and only certified seed of native species adapted to conditions along the project area would be purchased. Alternative species may be used, with prior approval from the BLM Authorized Officer and/or private landowners, if any of these species become unavailable or if alternative species would be better suited to site-specific conditions. All seed mixtures would be tested for purity; noxious, poisonous, and/or prohibited plant species; and viability. The seed mixture would not contain any noxious weed seeds. Test results would be submitted to and approved by the BLM Authorized Officer, unless certified weed-free seed is procured for this reclamation project.

Grass seed would be planted using a rangeland-type of drill equipped with a depth regulator to ensure proper depth of planting. Each species would be planted at an appropriate depth, generally 0.25 to 0.50 inch. Forb and shrub seeds would be planted using a cyclone-type broadcast seeder, and seeding rates would be doubled. In areas where it is not possible to drill seed, seed would be hand-broadcast or broadcast using a cyclone-type broadcast-seeder, and seeding rates would be doubled. The seeded area would then be raked with a harrow or chain to cover seed and would be packed with a multipacker or similar implement to ensure appropriate soil/seed contact.

In areas that are not accessible with revegetation equipment, broadcast-seeded areas would be hand-raked to cover seed. Areas where vegetation was only driven over (e.g., along the transmission line corridor) during construction would be broadcast seeded and raked to facilitate soil stabilization and vegetative regrowth.

Teton would be responsible for the monitoring of reclamation success within the project area until it can be demonstrated that revegetation success criteria have been met. Monitoring would also be conducted to ensure that erosion control, weed management, and revegetation efforts continue to meet the objectives of stabilization and productivity along the ROW. These efforts would continue until erosion control, weed management, and revegetation is deemed successful by the BLM/landowner or until the BLM/landowner determines that continued efforts are not necessary.

Teton would implement stability and erosion control practices for all temporary and permanent reclamation in accordance with the SWPPP.

Reclaimed areas within the project area would be considered stable if there are no large rills or gullies, no substantial soil movement, no headcutting in drainages, no slope instability, no subsidence, and no slumping that can be attributed to construction, operations, or maintenance. Teton would be responsible for annual inspections for the following types of problems as long as the ROW grant(s) are still active:

- soil movement where the depth of recent deposits around obstacles is greater than 0.5 inch;
- surface litter movements where more than 25% of surface litter has been transported and redeposited against obstacles downslope;
- development of rills greater than 3 inches deep at intervals of 10 ft or less;
- gully formation at intervals of 200 ft or less; and
- channel erosion where more than 25% of the channel bed and walls show active erosion, gully formation, and/or headcutting or bank failure.

If these features are discovered during reclamation inspections and their existence can be attributed to construction, O&M, or decommissioning operations of the WMWE Project, Teton would, in consultation with BLM, implement appropriate remedial action until reclamation objectives are met.

Reclaimed areas would also be monitored by Teton for as long as the ROW grant(s) are still active for invasive nonnative weeds annually in late spring. If any noxious weed species are discovered on project-related reclamation, Teton would, in cooperation with the landowners and Sweetwater County officials, implement appropriate weed control measures.

2.5.4 Transportation

Where possible, the design of access and turbine string roads would utilize the flow of the natural contours and the cut and fill required for the access road would be balanced to minimize the amount of materials that would need to be brought onto or removed from the site.

During the life of the project, Teton would be responsible for maintenance on all project roads including those roads described in the Sweetwater County Road Maintenance Agreement as approved by County Board of County Commissioners. The Sweetwater County Road Agreement would outline the procedures and responsibilities for use and maintenance of utilized county roads. This Agreement would address all on and off project site county roads utilized by Teton and their contractors including transportation planning, construction/alteration, dust control, access, drainage, parking, signage, traffic control, maintenance, snow removal, road use, compliance, phasing, bonding and other road related issues. Teton would obtain all required approvals from the Wyoming Department of Transportation, including possible improvements to the intersection of the County Road 4-14 and U.S. Highway 191.

During the life of the project, Teton or its subcontractors would not access County Road

4-53 through the City of Green River to move large equipment or components or resources.

Teton would post warning signs along the access roads, including County Road 53 and Fourteenmile Road. Signage would include speed limit signs and signs informing the public of construction activities, recommending the public proceed with caution and watch for large vehicles and equipment. The content and location of such signs would be coordinated with the Wyoming Department of Transportation and Sweetwater County officials. The existing access roads (County Road 53 and Fourteenmile Road) would remain open at all times except when they are physically and temporarily blocked by the movement of project-related vehicles or equipment. Such road closures would be coordinated with Sweetwater County officials.

Vehicle traffic would be confined within the site boundary for safety, fire control, and the control of invasive nonnative species. Signs on the public roads utilized by these trucks would be erected to warn the public of the increased construction traffic, and all signage would be coordinated through the Wyoming Department of Transportation and the Sweetwater County Road and Bridge Department. In addition, all vehicles would be washed down at a location approved by the BLM for the control of invasive nonnative species prior to entering the site.

Road maintenance within the WMWE project area would be performed by Teton on an as-needed basis. Regular snow removal is expected to be required during the winter months to maintain access to the turbines and substation. Teton would also plow openings in the snow berms to allow big game species to move off of and away from road activities.

Teton would also obtain all required permits associated with the proposed project from appropriate federal, state, and local government agencies.

2.5.5 Wildlife

2.5.5.1 Raptors

To avoid impacts on the nesting raptors, Teton has adopted established seasonal restriction areas in accordance with BLM policy (BLM 1997). Teton would comply with these buffers during the construction and O&M phases of this project. Table 2.9 lists the seasonal restrictions and no surface occupancy buffers. In addition, all electrical systems and components would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other restrictions, and no surface occupancy buffers for various raptor species are expected to occur in the project area. Teton would not place any wind turbines within the designated applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). Teton would not place any wind turbines within 50 m (164 ft) of the eastern edge of White Mountain.

2.5.5.2 Passerine and Other Small Birds

To minimize potential impacts to passerine and other small birds, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of vegetation. To minimize potential impacts to birds flying at night, Teton would utilize flashing lights on any wind turbines or met towers that require FAA lighting.

In order to minimize potential impacts to avian species, wind turbines would be setback at least 50 m (164 ft) from the east edge of White Mountain and at least 50 m (164 ft) from drainages within the project area. In addition, to the extent possible, surface disturbance would be minimized during the nesting season to avoid taking of nests, eggs, or individuals.

Table 2.9 Season Restrictions for Surface Disturbance Activities.[1]

Species	Construction Restriction	Seasonal Restriction Area	No Surface Occupancy Buffer
Golden eagle nest	February 1 - July 31	Within 0.5-mi radius from active nest	Within 600 m of active nests
Ferruginous hawk nest	February 1 - July 31	Within 1.0-mi radius from active nest	Within 400 m of active nests
Burrowing owl nest	April 1 - September 10	Within 0.5-mi radius from active nest	Within 250 m of active nests
Other raptors	February 1 - July 31	Within 0.5-mi radius from active nest	Within 250 m of active nests

[1] BLM RMP for the Rock Spring Field Office (BLM 1997).

2.5.5.3 Bats

During construction, to minimize potential impacts to bats, wind turbines would be setback at least 50 m (164 ft) from drainages within the project area. To minimize potential impacts to bats during the O&M phase of the project, Teton would work with the BLM to develop and implement an operational protocol to modify the cut-in speeds of wind turbines within the WMWE project area. These protocols would be implemented during a portion of evening and night time hours of operations during the peak bat migration season. This protocol would be developed based on the preliminary results of the Arnett et al. (2009) study that documented reduced bat fatalities by changing the cut-in speed of wind turbines. In this study, the experimental cut-in speeds ranged between 11.1 mph (5.0 m/s) and 14.5 mph (6.5 m/s) with a corresponding nightly reduction in bat fatalities from 53 to 87%. The results of on-site post-construction avian and bat mortalities would be used by Teton and the BLM to fine tune the cut-in speed protocol.

2.5.5.4 Pygmy Rabbits

To mitigate potential impacts to pygmy rabbits, the removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of soil. In addition, presence/ absence surveys for pygmy rabbits and their associated habitat would be conducted prior to vegetation removal and construction. If pygmy rabbits are found, Teton would work with the BLM to modify turbine placement to avoid habitat to the extent possible.

2.5.5.5 Mule Deer, Pronghorn Antelope, and Elk

The loss of habitat (i.e., disturbance) would be minimized to the extent possible. Indirect effects that could cause degradation of remaining habitat would be minimized by controlling activities that could result in the spread of invasive nonnative species, avoiding impacts to areas not associated with the project, and revegetating areas with native vegetation.

A small portion (519 acres) of the WMWE project area is located in crucial winter/yearlong range for elk. Based on the layout for the Proposed Action, approximately 80.0 acres of initial disturbance and 33.9 acres of life-of-project disturbance would occur in crucial elk winter/yearlong range located on privately owned land. In addition, approximately 1,011 acres of the WMWE project area occurs in pronghorn antelope habitat the WGFD has designated as crucial winter/yearlong range. In order to minimize potential impacts to elk and pronghorn antelope in these areas, Teton would comply with seasonal restrictions and would not conduct any project-related construction activities within elk and antelope crucial/yearlong range from November 15 to April 30. However, Teton may request an exception from the seasonal restriction stipulation from the landowner and the BLM, and the request would be evaluated on a case-by-case basis, and the landowner and BLM would inform Teton if the exception would be granted.

Construction and O&M personnel would be informed that big game occurs in the project area. They are not allowed to haze or harass the animals, and they should minimize any direct disturbance to the animal whenever possible. Any incidents of poaching would be immediately reported to the WGFD.

2.5.5.6 Greater Sage-grouse

Construction and O&M personnel would be informed that greater sage-grouse occur in the project area. They are not allowed to haze or harass greater sage-grouse, and they should minimize any direct disturbance to the greater sage-grouse whenever possible.

2.5.5.7 Cedar Rim Thistle

To mitigate potential impacts to cedar rim thistle, Teton would conduct surveys for cedar rim thistle and their associated habitat prior to vegetation removal and construction. If any cedar rim thistle is found, Teton would work with the BLM to modify turbine/road placement to avoid impacts to these plants.

2.5.5.8 Colorado River Endangered Fish Species

In order to mitigate potential impacts of the project on endangered fish species found in the upper Colorado River Basin, Teton would provide a financial contribution to the Colorado River Recovery Program as determined by the USFWS for water depletion exceeding 100 acre-ft.

2.5.5.9 Midget-faded Rattlesnake and Other Reptiles and Amphibians

Teton would conduct surveys in rock outcroppings for rattlesnake dens and other reptiles. These surveys would be conducted in the spring when temperatures are conducive to locate rattlesnakes. If den(s) and/or foraging areas are found, Teton would work with the BLM and WGFD to determine the appropriate mitigation measures (e.g., road and turbine placement) to eliminate or reduce these impacts. Any observations of amphibians would be noted and appropriate mitigation determined.

2.5.5.10 Wildlife Monitoring

During the construction and decommissioning of the project, active raptor nests would be visually monitored on a weekly basis to determine which nests could potentially be impacted during the construction period. Teton would coordinate with the BLM Authorized Officer or landowner to ensure that potentially impacted nests are being monitored and that the seasonal restrictions are being enforced or if a waiver is appropriate.

Presence/absence surveys for mountain plover and pygmy rabbits and their habitat would be conducted prior to vegetation clearing and construction.

During the construction phase, Teton would visually monitor the project area on a weekly basis, at a minimum, to ensure that construction sites, staging areas, roadways, and associated activities potentially impacting habitat are limited to areas agreed to prior to construction. Irregularities would be reported immediately to project management and corrective actions would be taken.

Teton would conduct a 3-year post-construction avian and bat mortality study for the project unless sufficient evidence determines that continued monitoring is unnecessary. This study would collect data on the number of avian species (including birds and bats) that have been struck by wind turbines in the project area. The specific protocols to be used in this study would be developed in cooperation with the BLM, the WGFD, and the USFWS.

To evaluate spatial distribution and potential effects of turbine construction on big game (elk, mule deer, pronghorn, and greater sage-grouse), pellet count distribution surveys will be conducted. Surveys will be conducted preconstruction, during construction, and post-construction. The surveys will consist of the following:

- Six survey plots per proposed turbine location will be established next to a maximum of 35 proposed wind turbines (210 plots) that will be located on BLM-administered lands.
- Survey plots will be established at random distances from 10 to 80 m (33 to 265 ft) from each proposed turbine along a transect line.
- For reference (or control) data, six plots will also be established along transect lines at an equal number of random points located in an area of similar topography and vegetation as the turbine survey plots (a maximum of 210 plots). The reference survey plots will be located at least 1 mi from the nearest turbine in an area defined by the assigned BLM RSFO wildlife biologist on BLM-administered lands and would be surveyed at the same time as the turbine plots are surveyed.
- Each plot will be marked with a 12-inch piece of rebar, and the location will be recorded with a global positioning system unit.
- All pellet groups within a 2-m (7-ft) radius of the center of the survey plot will be identified by species, counted, and then removed from the survey plot area.
- Surveys will be conducted during the spring and fall. The spring count surveys will document the previous winter's use, and the fall surveys will evaluate the previous summer's use.
- Preconstruction surveys will be conducted during the fall of 2009 and the spring of 2010.
- Construction surveys will be conducted during the fall of 2010 and the spring of 2011.
- Post-construction surveys will be conducted in the spring of 2015 and the fall of 2015. During the fall of 2014, plots will be visited, and all pellet groups will be cleared off; no data will be collected.

Teton would report all incidents of poaching in the project area immediately to the WGFD.

2.5.6 Wild Horses

Despite the loss of a limited amount of grazing habitat and noise, wild horses are expected to adjust to the increased traffic during construction, as well as the presence of the wind turbines and associated structures and facilities. It is possible that wild horses could be involved in an accident with construction vehicles or harmed by becoming trapped in open trenches or excavations. Speed limit signs would be posted, and construction and O&M personnel would be informed that wild horses occur in the project area. They are not allowed to haze or harass wild horses, and they should minimize any direct disturbance to the wild horses whenever possible. Should an accident occur, the BLM Authorized Officer would be notified immediately. To facilitate wild horse roundups and/or surveys, the BLM would coordinate with Teton, who would agree to shut wind turbines down for a maximum of 4-6 hours at any one time for a course of 2 days.

2.5.7 Livestock

Teton would coordinate with grazing permittees during each phase of development to ensure that permittees are aware of construction activities. Initial mitigation would be in the form of revegetation efforts applied to areas disturbed by construction activities. Re-establishment of desirable native vegetation is expected to take several years; however, Teton expects native plant communities to become re-established, and there would be minimal long-term impacts to livestock. Construction and O&M personnel would be informed that they are working in an area of open livestock grazing and to drive the posted speed limit and to watch for livestock and wildlife that may be on the roads. In addition, open trenches or excavations that are left unattended overnight would be fenced for safety, and existing cattle guards would be left in place. If livestock are involved in an accident involving Teton vehicles, the responsible party would be liable to provide appropriate compensation to the livestock owner.

If necessary, Teton would place livestock crossing signs, where appropriate.

2.5.8 Control of Invasive Nonnative Species

The control of invasive nonnative species is difficult, and some weeds can enter the project area on equipment and vehicles, while others may spread from distant areas by spores blowing onto the site in the wind. Teton would design and build the project so that the least amount of ground disturbance occurs, thereby exposing the least amount of soil possible. Large construction equipment that travels off project roads would be cleaned prior to entering the site. Teton would work with the BLM, landowners, other county or state agencies as appropriate, and the Sweetwater County Board of Weed and Pest Control to establish a weed control and monitoring program for the life of the project. This may entail spot spraying with an approved herbicide along disturbed areas for invasive nonnative species.

Teton would also use only certified-weed-free reclamation materials.

2.5.9 Air Quality and Fugitive Dust Control

During the construction, O&M, and decommissioning phases of this project, some localized increases in dust levels would be unavoidable. To minimize these levels, Teton would use water or other dust control measures on heavily used project-related roads and other construction areas should dust become a problem. Teton would coordinate with Sweetwater County and Sweetwater County Conservation District officials on dust control measures on county roads and agency staff or landowners on project roads. Traffic speed would also be held to appropriate levels. In addition, disturbed areas would be revegetated as soon as possible following disturbance, and engines would be maintained in accordance with manufacturer recommendations to minimize emissions.

2.5.10 Noise

The largest source of noise during construction and decommission phases of the operation would be diesel-powered equipment. Therefore, all equipment would be operated with the manufacturer's suggested noise control systems (e.g., mufflers and noise dampening materials), and all construction operations would take place during daylight hours. Additional information concerning noise during the O&M phase is addressed in Section 4.5.1.2 of this EA.

2.5.11 Water Resource Protection

Before the construction and decommissioning phases of this project, an SWPPP would be prepared for the project, and the construction contractor would implement the appropriate BMPs for each specific situation. The use of appropriate BMPs would reduce the amount of sediment being produced and would minimize the amount of sediment being released into the environment, thereby mitigating impacts to water resources. A detailed description of the specific BMPs would be presented in the SWPPP and would be submitted to Sweetwater County and BLM officials with the construction permit application. A SPCCP is required under federal regulation, and Teton would prepare and implement a SPCCP that would be used to control the release of fuels, oil, or other fluids, and BMPs are included in the SWPPP and will not be repeated here. Any spills would be reported to the appropriate federal, state, and/or county agencies.

A SWPPP would be prepared for the construction and O&M phase of this project, and O&M personnel would implement the appropriate BMPs for each specific situation. The use of appropriate BMPs would reduce the amount of sediment being produced and would minimize the amount of sediment being released into the environment, thereby mitigating impacts to water resources. This includes design and installation of culverts, rip rap, and catchment basins where appropriate. An SPCCP would be required during the construction and O&M phases of this project, and Teton would have an SPCCP prepared in accordance with applicable federal regulations and guidelines. The BMPs in the SPCCP would control the release of fuels or oil.

To minimize impacts to surface water drainages, wind turbines would be set back at least 50 m (164 ft) from major drainages within the project area.

2.5.12 Fire Prevention Plan

The project HSE Plan would provide a list of emergency contacts and protocols in case of a wildfire. During the construction, O&M, and decommissioning phases of this project, fire extinguishers, 5-gallon backpack hand water pumps, and fire-fighting hand tools such as shovels, Pulaskis, or McLeods would be located in the base of each wind turbine tower, in each project construction vehicle, in the substation control building, and in the O&M building. Personnel performing "hot work" such as welding would be required to have the same fire-fighting equipment listed above. The water tank truck used for dust abatement would be left full of water and fuel at a location designated by the Teton project manager so that it is in a condition where it could be readily used in case of a fire. Smoking and off-road parking would be restricted to designated areas. Signs would be posted in strategic locations on-site to remind personnel of the emergency response procedures, liabilities, and telephone contact numbers for fire emergencies.

Mitigation would depend on specific fire conditions and other special circumstances prevailing in the project area. If necessary, site-specific actions could include, but are not be limited to, actions such as the following:

- establishment of spotter positions on key locations within the project area;
- prepositioning fire suppression capabilities (e.g., contracted engine crews) under high or extreme fire conditions;
- restriction of certain on-site high risk activities (e.g., welding) or suspension of all construction activities under high or extreme fire conditions;
- avoidance of sensitive sites and/or those having high fire potential when extreme fire conditions occur; and
- travel restrictions for contractor personnel when fire dangers are high.

Determinations of need for additional protection measures would be made by the Teton project manager in cooperation with the BLM Authorized Officer.

2.5.13 Cultural Resources

Prior to ground-disturbing activities, Teton would contract to have a qualified archaeological firm conduct a Class III cultural resource inventory of areas to be disturbed or additional ROW areas located on BLM-administered, privately owned, and state-owned land that had not been previously inventoried. If a cultural resource site considered eligible for or already listed on the National Register of Historic Places (NRHP) is identified, Teton would utilize avoidance as the preferred method of mitigating potential adverse effects to the property.

Teton would mitigate adverse effects to cultural/historical properties that cannot be avoided by the preparation and implementation of a BLM/State Historic Preservation Office (SHPO)-approved Data Recovery Plan and/or Programmatic Agreement (PA) before authorizing surface disturbing activities. Teton, the BLM, SHPO, and other interested parties would complete the Section 106 process and appropriate mitigation measures would be implemented as part of the PA.

Construction and O&M personnel would be instructed that they are not allowed to search for cultural resources (i.e., arrowhead hunting) while working on this project. If any cultural resources are discovered on BLM-administered, privately owned, or state-owned lands during construction, O&M, or decommissioning operations, all construction activities within the immediate vicinity would be suspended, and the BLM Authorized Officer would be immediately notified. Work in the area would not resume until a Notice to Proceed is issued by the BLM.

2.5.14 Paleontology

If required by the BLM, an on-the-ground survey of areas to be impacted would be performed by a qualified paleontologist holding a BLM

Paleontological Resources Use Permit prior to approval of any surface disturbing activities. The need for an on-the-ground survey could be waived by the BLM if it is determined that the proposed activities would not impact important geologic outcrop areas, the area has previously been surveyed for paleontological resources, or the area has been previously disturbed. If a survey is conducted and significant fossils are discovered during the survey, BLM may require the proponent to alter the construction plan to avoid disturbing the locality or mitigate the site by either collecting a sample of the fossil material or fully excavating the locality. The BLM may require, based on the paleontologist's recommendation, that construction activities be monitored during surface disturbances for the presence of previously undocumented scientifically important fossils.

If paleontological resources are discovered during construction operations, the find would be reported to the BLM Authorized Officer immediately and construction operations would be suspended within 250 ft of said find. An evaluation of the paleontological discovery would be made by a BLM-approved professional paleontologist within 5 working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 ft of such discovery would not be resumed until written authorization to proceed is issued by the BLM Authorized Officer. Teton would bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils or important scientific interest discovered during the operations.

Teton would inform all field personnel not to search for, scavenge, or remove any paleontological resources found while working in the WMWE project area.

2.5.15 Visual Resources

To minimize visual impacts, Teton would adopt the following visual mitigation measures:

- The design of the WMWE Project would provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived "disorder, disarray, or clutter."
- To the extent possible given the terrain of a site, Teton would create clusters or groupings of wind turbines when placed in large numbers, avoid a cluttering effect by separating otherwise overly long lines of turbines or large arrays, and insert breaks or open zones to create distinct visual units or groups of turbines.
- Teton would create visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Teton would use tubular towers. Tubular towers present a simpler profile and less complex surface characteristics and reflective/shading properties.
- Components of the wind turbines would be in proper proportion to one another. Nacelles and towers would be planned to form an aesthetic unit and would be combined with particular sizes and shapes in mind to achieve an aesthetic balance between the rotor, nacelle, and tower.
- Color selection for turbines would be applied uniformly to tower, nacelle, and rotor in accordance with FAA requirements.
- The wind turbines would use nonreflective coatings to reduce reflection and glare.
- The O&M building would be painted before or immediately after installation with a green shale color.
- Uncoated galvanized metallic surfaces would be avoided whenever possible because they would create a stronger visual contrast, particularly as they oxidize and darken.
- Commercial messages on turbines and towers would be prohibited.
- The site design would be integrated with the existing landscape by using as many of the existing roads as possible.
- The operator would bury power collection cables or lines on the site in a manner that minimizes additional surface disturbance.
- Site design would minimize security lights, and any security lights located at the O&M building would be turned off except when activated by motion detectors. All lighting fixtures shall be down focused and full cut-in design.

Minimum wattage should be selected for the luminaries.

- Teton would minimize ground disturbance and control erosion by avoiding steep slopes and by minimizing the amount of construction and ground clearing needed for roads, staging areas, and turbine pads.
- Dust suppression techniques would be employed where and when required to minimize impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.
- Disturbed areas would be regraded as soon as possible to their original contour and revegetated immediately after, or as contemporaneously as possible with construction. Teton would be prompt to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.
- Teton would maintain the WMWE Project during operation as inoperative or incomplete turbines cause the misperception to viewers that "wind power does not work" or that it is unreliable. Inoperative turbines would be completely repaired, replaced, or removed. Except during specific maintenance operations, nacelle covers and rotor nose cones would always be in place and undamaged.
- The WMWE Project would evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power. Nacelles and towers would also be kept clean to remove any spilled or leaking fluids and the dirt and dust that would accumulate.
- Facilities would be kept clean of debris, "fugitive" trash or waste, and graffiti.
- Scrap heaps and material dumps would be prohibited and prevented.
- The material stored at the O&M building would be kept to an absolute minimum. Any surplus, broken, or disused materials and equipment would be maintained in an orderly manner.
- Teton would prepare a decommissioning plan, and it would include the removal of all turbines and ancillary structures and reclamation and revegetation of the site.

2.5.16 Bonding

Teton would provide appropriate reclamation bonding for each project component (e.g. roads, wind turbine, substation, O&M building, etc). The amount of the bond on BLM-administered public lands would be determined in accordance with BLM IM 2009-043 or subsequent instruction memoranda. Bonding on State of Wyoming lands would be determined in accordance with an approved wind energy lease agreement issued by the Wyoming Office of State Lands & Investment. Bonding on private lands would be determined by the land owner. Sweetwater County wind farm zoning regulations also require reclamation bonding for wind energy projects; however, Teton would provide acceptable evidence demonstrating that an adequate reclamation bond has been approved or accepted by the specific landowners. Therefore, separate bonding for Sweetwater County would not be required. The amount of each bond would include the cost of removal and surface restoration obligations.

2.6 ALTERNATIVE A - DEVELOPMENT ONLY ON PRIVATE LANDS

Under Alternative A, up to 170 wind turbines could be constructed on private lands or State of Wyoming lands. No wind turbines would be constructed on public lands administered by the BLM (Figure 2.25). The BLM would authorize as needed, ROWs for access roads, and collector lines that would have to cross BLM-administered land to allow the project to be feasible. Details of how this alternative would be implemented during the construction, O&M, and decommissioning phases would be identical to those described in the Proposed Action. Table 2.10 presents the acres of potential disturbance associated with Alternative A.

Applicant proposed design features outlined in Section 2.5 would apply with the exception of required turbine bonding on public land since no turbines would be constructed on public lands. Other design features could be modified in order to recognize that construction of turbines would not occur on public land or to meet the needs of the landowner.

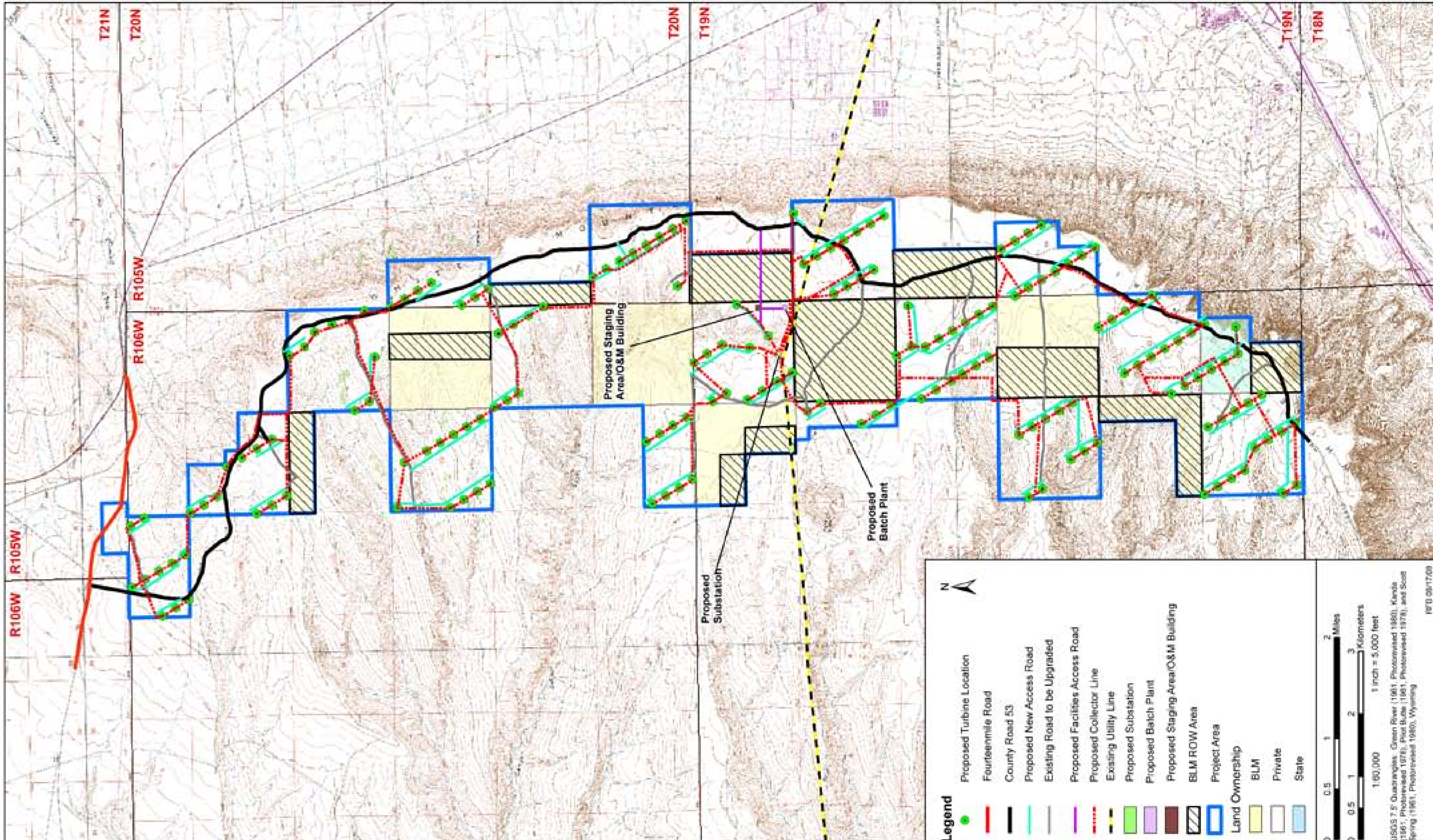

Figure 2.25 Layout of WMWE Project, Alternative A.

Table 2.10 Estimated Acres of Surface Disturbance Within the WMWE Project Area Under Alternative A.

Disturbance Type	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Corridor access roads[1]	244.1	117.6
Staging area and O&M building	2.0	0.8
Substation and transmission line	11.0	0.3
Turbine pads[2]	124.9	25.0
Collection line trenches[3]	273.2	0.0
Concrete batch plant	2.0	0.0
Total	657.2	143.7

[1] Initial disturbance: 37.3 mi x 54 ft = 244.1 acres; life-of-project disturbance: 37.3 mi x 26 ft = 117.6 acres.

[2] Initial disturbance: 160 ft x 200 ft x 170 turbines = 124.9 acres; life-of-project disturbance: 80 ft x 80 ft x 170 turbines = 25.0 acres.

[3] Initial disturbance: 49.0 mi x 46 ft = 273.2 acres; life-of-project disturbance: 0.0 acres, all temporary construction-related disturbance would be reclaimed immediately.

2.7 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed wind energy facility would not be authorized or approved. No ground would be disturbed, and no impacts to the existing physical or biological environment would take place beyond those that already exist.

The analysis of a No Action Alternative provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of each action alternative. Under the No Action Alternative, the BLM would deny the request for a ROW grant for the proposed wind energy facility or components (e.g., buried cables, access roads) on public lands, thereby preventing most, if not all, development on the adjacent private and state lands.

2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.8.1 Alternative Wind Energy Facility Site

Lands outside of the proposed project area were considered for development of the wind energy facility. However, the other sites were eliminated because wind resources were not as favorable as they were within the existing WMWE project area or public lands already have testing and monitoring ROWs held by other entities that preclude consideration by Teton. Therefore, this alternative was eliminated from detailed consideration in this EA.

2.8.2 Place More Wind Turbines Within the WMWE Project Area

Teton has considered the placement of more wind turbines within the WMWE project area; however, based on the size of wind turbines to be used for this project, the spacing required for the wind turbines, topography, and the available wind resources, Teton has designed the maximum number of wind turbines within the project area. Therefore, Teton is not interested in placing any additional wind turbines within the project area, and this alternative was eliminated from further consideration in this EA.