# APPENDIX A
# FRAMEWORK ACCESS ROAD SITING AND MANAGEMENT PLAN

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## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| AUMs | a unit of measure equal to the amount of forage needed to sustain one animal unit (or its equivalent) for one month |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CDOT | Colorado Department of Transportation |
| COM Plan | Construction, Operation, and Maintenance Plan |
| DEIS | Draft Environmental Impact Statement |
| EMM | Environmental Mitigation Measure |
| FEIS | Final Environmental Impact Statement |
| FSH | Forest Service Handbook |
| FSM | Forest Service Manual |
| IRAs | Inventories Roadless Areas |
| NDOT | Nevada Department of Transportation |
| NFS | National Forest System |
| NTP | Notice to Proceed |
| Plan | Access Road Siting and Management Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| ROD | Record of Decision |
| ROW | right-of-way |
| SWPPP | Stormwater Pollution Prevention Plan |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| UDOT | Utah Department of Transportation |
| USACE | United States Army Corps of Engineers |
| USFS | United States Forest Service |
| WDOT | Wyoming Department of Transportation |

# A1.0 INTRODUCTION

This framework Access Road Siting and Management Plan (Plan) addresses regulatory compliance, access road management practices, design features and Best Management Practices (BMPs) to reduce environmental impacts related to construction of new access roads during construction of the TransWest Express Transmission Project (TWE Project or Project) by TransWest Express LLC (TransWest or Applicant) and its Construction Contractor(s).

# A2.0 PLAN PURPOSE

The purpose of this plan is to provide the Bureau of Land Management (BLM), U.S. Forest Service (USFS) and other agencies with a description of the types and location of access roads associated with the construction, operation, and maintenance of the Project. The goal of this Plan is to establish management practices and mitigation measures that, when implemented, will avoid and minimize impacts from construction of the transmission line and any associated access roads. These practices and measures are intended to mitigate the effects of construction access on environmental resources.

# A3.0 PLAN UPDATES

The initial layout of all access roads to each structure location for the selected Agency Preferred Alternative will be provided in the Record of Decision (ROD) Plan of Development (POD). The Plan will include detailed mapping of the backbone access network, existing access, existing access with improvements, overland access and proposed new access. The Notice to Proceed (NTP) POD will include final field verified access road layouts specific to each construction segment. The Construction Contractor(s) will be responsible for developing and implementing the final Access Road Siting and Management Plan.

# A4.0 REGULATORY

A number of agencies have jurisdiction over the transportation-related components of the Project. These include the BLM, the USFS, Wyoming Department of Transportation (WDOT), Colorado Department of Transportation Department (CDOT), Utah Department of Transportation (UDOT), Nevada Department of Transportation (NDOT), Federal Highway Administration, local law enforcement and road departments, and local highway districts in the counties crossed by the Project. The Construction Contractor must file encroachment and oversized vehicle permit applications with appropriate road agencies prior to construction for those areas where the transmission line crosses public roads or where oversized vehicles will be used on public roads.

Other permits and approvals not directly related to transportation could affect the construction, use, and/or maintenance of roads in certain areas. Persons responsible for Project transportation activities must be familiar with all relevant sections of the Project's POD, of which this Plan is a part.

Where new roads are required or where improvements to existing roads are required, access roads will be designed in accordance with standards and guidelines for Non-constructed Roads and Routes as described in "The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (AASHTO 2006). Portions of the access road network requiring design and construction to a more stringent standard will be identified in this Access Road Siting and Management Plan to be submitted with the NTP POD.

On BLM-managed lands, new road construction and existing roads improved for Project use in some locations may be required to meet or exceed the minimum standards of width, alignment, grade, surface, and other requirements presented in the BLM Travel Management Program and BLM

Manual Section 9113 (BLM 1985). On USFS lands, road construction and existing roads improved for Project use in some locations may be required to comply with the Forest Service Manual (FSM) (USFS 1999a) and Forest Service Handbook (FSH) (USFS 1999b). Some example sections relative to the Project are FSH 7709.56 – *Road Preconstruction Handbook (Forest Service 2010)*, FSH 7709.57 – *Road Construction Handbook (Forest Service 1992)*, and 7709.58 – *Transportation System Maintenance Handbook (Forest Service 2009b).*

Existing travel and transportation networks identified in BLM and USFS land use plans or travel management plans will be used as guidance for the identification and siting of access roads for the Project. These federal plans are designed to provide decision-makers with information to manage road systems that are safe and responsive to public needs and desires, are economically and efficiently managed, and have minimal negative ecological impacts on the land. The plans include designated areas for motorized use, prohibition of some uses to protect resources, or limitations on road use at certain times of the year for resource protection. These plans federal land manager to be managed as part of an existing travel and transportation network in a land use plan or subsequent travel management plan(s).

No new or improved access roads may be sited within USFS Inventoried Roadless Areas (IRA). IRAs are identified as areas of National Forest Service (NFS) land currently inventoried for planning purposes as roadless. The 2001 Roadless Area Conservation Rule does not prohibit special use developments, but generally does prohibit the construction or reconstruction of any roads associated with these uses within the boundaries of an IRA. Construction of any portions of the TWE Project which fall within IRA or other areas where access road construction is prohibited or restricted will follow the Roadless Construction Methods described in Section 5.7.3 of the Final Environmental Impact Statement (FEIS) POD.

## A5.0 ACCESS ROAD MANAGEMENT PRACTICES

The TWE Project will require surface access to all structures and work areas during construction and operation to allow vehicles and equipment to access the location of each transmission structure. Existing public roads will be used as the backbone access road network to access the selected Agency Preferred Alternative. Construction of new access roads will be required only as necessary to access structure sites lacking direct access from existing roads, or where topographic conditions (e.g., steep terrain, rocky outcrops, and drainages) prohibit safe overland access to the site. New access road layouts will require the appropriate approvals from jurisdictional agencies.

A route-specific plan will be developed for the selected Alternative and will be described within the Access Road Siting and Management Plan to be submitted with the NTP POD. The types of access including backbone access, existing access with improvements, overland access and proposed new access will be identified. A detailed map book will be provided showing the location of the 250-foot-wide transmission line right-of-way (ROW), proposed structure locations, backbone access network, and existing access that do not require improvements, existing access that require improvements, and new access to be constructed. The surface type (gravel, paved or other) and terrain type (flat, rolling, steep and mountainous) will also be defined. The detailed Plan for the selected Agency Preferred Alternative will be used to define location-specific mitigation measures, as needed.

Prior to construction, authorized access roads and associated limits of disturbance will be clearly delineated and marked in the field. The Construction Contractor(s) will review the location of approved access and will be responsible for ensuring construction travel is limited to those approved access roads and limits of disturbance.

All field personnel will attend an environmental training program. As part of this program, field personnel will be instructed to use only approved access roads, drive within the limits of disturbance, obey posted and jurisdictional speed limits, and become familiar with the Flagging, Fencing and Signage Plan (Appendix I).

# A6.0 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

In addition to applicable design and operational standards, regulations, laws and permit requirements, the following design features and BMPs are intended to help reduce impacts related to construction of new access roads. Note that the Construction, Operation and Maintenance Plan will be incorporated into the NTP POD.

**TWE-5**: The Construction, Operation and Maintenance (COM) Plan will display the location of Project infrastructure (i.e. towers, access roads, substations) and identify short-term and long-term land and resource impacts and the mitigation measures that will be implemented for site-specific and resource-specific environmental impacts.

**TWE-6:** The Construction, Operation and Maintenance (COM) Plan will include an Access Road Plan that incorporates relevant agency standards regarding road design, construction, maintenance, and decommissioning. The Access Road Plan will incorporate BMPs, stipulated by the agencies in their respective decision documents and permits.

**TWE-8:** Crossings of streams and waterways will be done in compliance with federal, state, and local regulations. Roads will be built as near as possible at right angles to the streams and washes (Arizona crossing). Culverts will be installed where necessary. All construction and maintenance activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and intermittent or perennial stream banks. In addition, road construction will include dust-control measures during construction in sensitive areas. All existing roads will be left in a condition equal to, or better than, their condition prior to the construction of the transmission line. Structures will be sited with a minimum distance of 200 feet from streams, wherever possible.

**TWE-9:** All construction vehicle movement outside the ROW normally will be restricted to pre-designated access or public roads.

**TWE-12:** Except for repairs necessary to make roads passable, no widening or upgrading of existing access roads will be undertaken in the area of construction and operation, where soils or vegetation are sensitive to disturbance. In designated areas, structures will be placed to avoid sensitive features such as, but not limited to, riparian areas, water courses and cultural sites, or to allow conductors to clearly span the features within limits of standard structure design. This will minimize the amount of disturbance to the sensitive feature or reduce visual contrast.

Additional BMPs and Environmental Mitigation Measures (EMMs) identified in the Draft Environmental Impact Statement (DEIS) are listed below. These measures have not been finalized at this time and may be updated, changed, or eliminated in future revisions of this Plan.

**TRAN-1:** The Applicant shall prepare an access road siting and management plan that incorporates relevant agency standards regarding road design, construction, maintenance, and

decommissioning. Corridors would be closed to public access unless determined by the appropriate federal land manager to be managed as part of an existing travel and transportation network in a land use plan or subsequent travel management plan(s).

**TRAN-2:** The Applicant shall prepare a comprehensive transportation plan for the transport of transmission tower or pipeline components, main assembly cranes, and other large equipment. The plan should address specific sizes, weights, origin, destination, and unique equipment handling requirements. The plan should evaluate alternative transportation routes and should comply with state regulations and all necessary permitting requirements. The plan should address site access roads and eliminate hazards from truck traffic or impacts to normal traffic flow. The plan should include measures such as informational signage and traffic controls that may be necessary during construction or maintenance of facilities.

**TRAN-3:** Applicants shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) should be identified and addressed in the traffic management plan.

**TRAN-4:** Additional access roads needed for decommissioning shall follow the paths of access roads established during construction to the greatest extent possible; all access roads not required for the continued operation and maintenance of other energy systems present in the corridor shall be removed and their footprints reclaimed and restored.

**PHS-5:** The health and safety program shall establish a safety zone or setback from roads and other public access areas that is sufficient to prevent accidents resulting from various hazards. It should identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It should also identify measures to be taken during the operations phase to limit public access to those components of energy facilities that present health or safety risks.

**AGRI-3:** Minimize locating access roads within the two-mile transmission line corridor in areas with croplands. For croplands that cannot be avoided by access roads, establish procedures for determining temporary and permanent access road locations with landowners and operators, and establish protection methods for roads over croplands that cannot be avoided by construction activities. Restore locations of temporary access roads to pre-construction conditions and leave permanent access roads intact through mutual agreement with the landowner and operator.

**LU-1:** The proponent will develop an approved Plan of Development (POD) and shall coordinate with land managers on final structure placement, including all aboveground components, access roads, and permanent disturbance areas, to ensure optimal compatible land use.

**RANGE-1:** Prior to construction of each segment, access road, or ancillary facility crossing a BLM or USFS grazing allotment, TransWest shall coordinate with the associated BLM Field Office and USFS national forest concerning planned development and operations that will occur and identify potential livestock management issues. TransWest will provide a schedule and locations of construction activities on affected grazing allotments to the BLM Field Office and USFS national forest to be provided to the affected grazing permittees. The construction activities schedule and construction activity locations shall be provided on a date

early enough to allow grazing permittees sufficient time to make decisions and allocate their resources during the construction time period.

**RANGE-2:** Prior to construction of transmission line segments, access road, or ancillary facilities, active range improvement locations shall be inventoried. Based on the results of these inventories, no roads, or ancillary facilities would be placed within 200 meters of range improvements, including livestock and wildlife water sources/systems. If avoidance is not feasible, features would be relocated to an alternate location per BLM, USFS, or state wildlife agency guidance.

**RANGE-6:** Prior to construction and placement of permanent facilities and access roads, TransWest shall coordinate with the associated BLM Field Office and USFS forest to identify areas where the placement of tower structures, facilities, and access roads would prevent access to either a portion or all of a livestock grazing allotment resulting in the livestock grazing allotment becoming unusable or decreasing the AUMs (a unit of measure equal to the amount of forage needed to sustain one animal unit (or its equivalent) for one month) available to a point that requires the grazing permit to be modified. In these areas, corrective actions would then be identified including rearranging of grazing allotment fences, additional access roads to the grazing allotment, re-arrangement of project facilities and access roads as feasible, etc.

**GEN-5:** Corridors are to be efficiently used. The Applicant, assisted by the appropriate agency, shall consolidate the proposed infrastructure, such as access roads, wherever possible and utilize existing roads to the maximum extent feasible, minimizing the number, lengths, and widths of roads, construction support areas, and borrow areas.

**WAT-7:** A Stormwater Pollution Prevention Plan (SWPPP) permit will be obtained and its provisions implemented for all affected areas before any ground disturbance activities commence.

**WAT-10:** The Applicant shall minimize stream crossings by access roads to the extent practicable. All structures crossing intermittent and perennial streams should be located and constructed so that they do not decrease channel stability, increase water velocity, or impede fish passage.

**WET-3:** Access roads will be routed around riparian areas, wetlands, intermittent or perennial drainages, and ephemeral channels to the extent practical. If jurisdictional wetlands or waters of the U.S. cannot be avoided, U.S. Army Corps of Engineers (USACE) approved construction techniques for construction in wetlands and waters of the U.S. will be applied. BLM and USFS construction techniques for non-jurisdictional wetlands, riparian areas, intermittent drainages, and ephemeral channels would be applied on BLM and USFS lands, as appropriate. These include the use of timber mats, erosion controls, and the placement of equipment outside of the wetland, riparian areas, intermittent drainages, and ephemeral channels boundaries.

## A7.0 REFERENCES

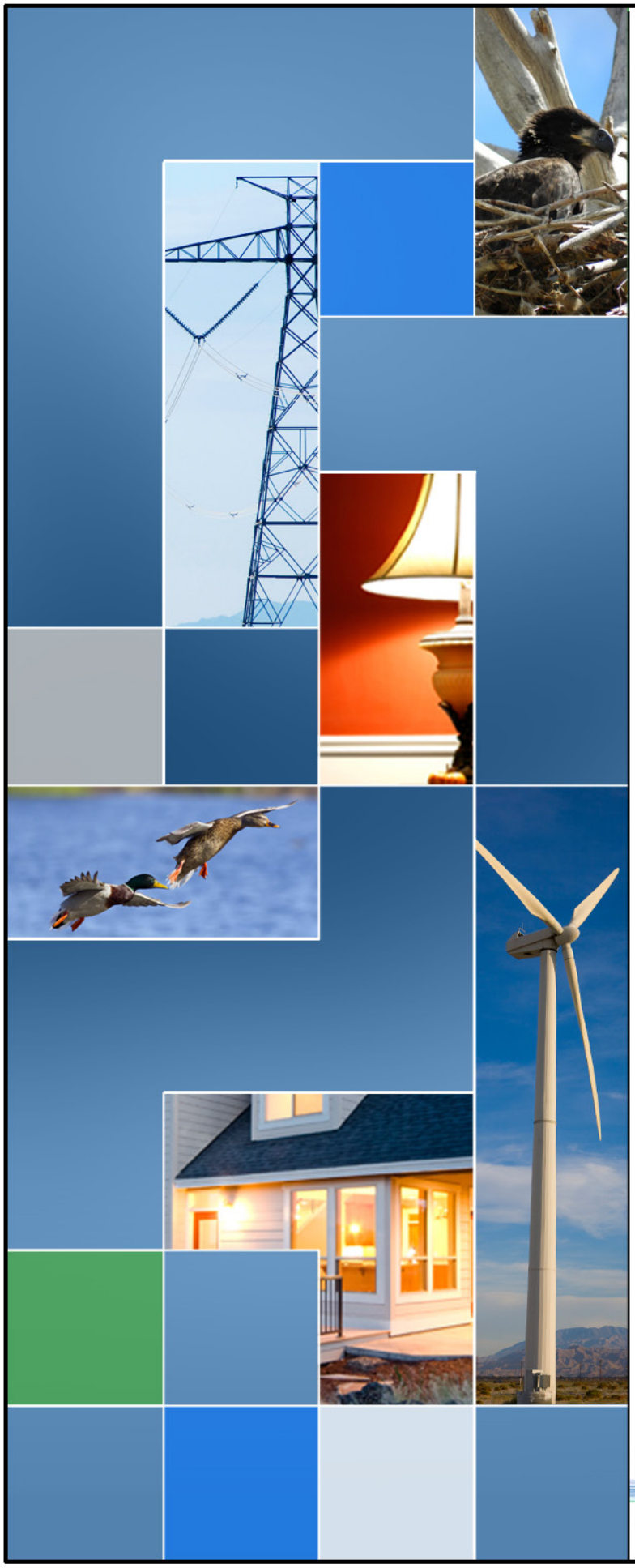
American Association of State Highway and Transportation Officials (AASHTO). 2006. The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" AASHTO, 4th Edition, 2006.

Bureau of Land Management (BLM). 1985. Travel Management Program Manual, Section 9113. Internet website: http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_programs/energy/oil_and_gas/operations/gold_book.Par.10040.File.dat/9113.pdf. Accessed August 3, 2011.

United States Forest Service (USFS). 1999a. Forest Service Manual. Internet website: http://www.fs.fed.us/im/directives/dughtml/fsm.html. Accessed on August 10, 2011.

_____. 1999b. Forest Service Handbook. Internet website: http://www.fs.fed.us/im/directives/dughtml/fsh_1.html. Accessed on August 10, 2011.

# APPENDIX B
# AVIAN PROTECTION PLAN



# Avian Protection Plan

Prepared by

TRANSWEST EXPRESS LLC

May 2014

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# 1.0 INTRODUCTION

TransWest Express LLC (TransWest) is an independent transmission developer committed to responsible practices across all aspects of transmission line siting, operations and design. Based in Denver, Colorado, the company guides its operations under environmental programs and principles led by a dedicated environmental team with over 50 years of experience in the energy development, generation and transmission industries. TransWest also retained independent consultants, ecologists and biologists to help the firm develop a comprehensive wildlife conservation strategy. Designed to avoid and minimize potential impacts on wildlife in general and avian species in particular, the strategy is based on science and best practices from the electric transmission industry and other appropriate sources.

TransWest is developing the TransWest Express Transmission Project (the TWE Project or Project), an extra high-voltage, direct current regional electric transmission system. The TWE Project will reliably deliver cost-effective renewable energy produced in Wyoming to the Desert Southwest region (California, Nevada, Arizona), ultimately helping contribute to a cleaner world, strengthen the electric grid, and provide much-needed electricity to millions of homes and businesses every year. The TWE Project will deliver enough clean, sustainable energy to power nearly 2 million homes and reduce greenhouse-gas emissions equivalent to taking 1.5 million cars from the road.

Major components of the TWE Project include a ±600 kilovolt (kV) DC transmission line and two alternating current (AC)/ direct current (DC) converter stations - a Northern AC/DC Converter Station (Northern Terminal) to be located near Sinclair, Wyoming and a Southern AC/DC Converter Station (Southern Terminal) to be located at the Marketplace Hub in the Eldorado Valley, approximately 15 miles south of Boulder City, Clark County, Nevada. The TWE Project will also include, among other facilities, two ground electrode systems and a low voltage overhead line to connect the ground electrode system to each AC/DC converter. The low voltage overhead line will be similar to a 34.5 kV subtransmission line.

# 2.0 BACKGROUND

TransWest is committed to protecting avian species that occur within the vicinity of its facilities. This Avian Protection Plan (APP) has been developed to protect resident and migrant birds that may interact with the TransWest Express Transmission Project (TWE Project or Project). TransWest is committed to maintaining the reliability of the TWE Project in a cost effective manner while meeting the regulatory requirements to conserve avian species.. The responsibility of effectively improving avian safety and minimizing avian risk at its facilities lies with both TransWest management and its employees.

To this end, TransWest will:

- Implement this APP;
- Ensure that its actions comply with the most recent applicable laws, regulations, and permits, and incorporate as applicable Avian Power Line Interaction Committee (APLIC) guidelines;
- Document bird mortalities; problem structures or locations; and problem nests;
- Provide information, resources, and training to improve its employees' knowledge and awareness of avian protection and the implementation of the TransWest avian protection program; and
- Maintain the integrity of the transmission line and repair or retrofit structures as necessary if impacts to avian species are detected.

- Provide information, resources, and training to improve its employees' knowledge and awareness of avian protection and the implementation of the TransWest avian protection program.

The purpose of this APP is to establish a program to manage avian safety on the TWE Project. This APP has been developed consistent with APLIC's principles of avian protection (APLIC 2005) to support TransWest's commitment to reduce impacts to avian resources. This APP supports compliance with the Migratory Bird Treaty Act (MBTA) of 1918 (16 United States Code [U.S.C.] §§703 – 712), the Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. §§668 – 668d), and the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §§1531 – 1544), and appropriate state requirements. Plans, methods, and direction are outlined to ensure that birds are protected on TransWest facilities associated with the TWE Project, providing a framework for documenting the success of TransWest's good-faith efforts to protect avian species and to comply with the laws and regulations discussed in Section C2.1.

This APP has been written with consideration to and guidance from the data and suggestions presented in APLIC's Mitigating Bird Collisions with Power Lines: The State of the Art in 2012 (APLIC 2012), Avian Protection Plan Guidelines (APLIC 2005) and Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). In addition, existing information on bird use in the Project area will be combined with pre-construction Project-specific survey information to effectively address avian safety specific to the long-term operation of the TWE Project. The protective measures and methods described in this document provide a mechanism for implementing and tracking mitigation measures to operate the TWE Project in the most avian safe manner possible.

## 2.1 Scope and Limitations

This APP presents the framework for developing a program of specific actions implemented comprehensively to support avian safety on the TWE Project. It is not to be considered a delineation of legal requirements. Instead, it provides guidance for achieving and maintaining legal compliance under the regulations related to avian protection, minimizing avian-related interruptions in service, and documenting efforts to improve avian safety.

TransWest has set the overall goal of advancing progress toward an avian safe transmission system. Through a policy of avian protection, TransWest will improve its service to customers, ensure regulatory compliance, reduce costs, and document good-faith efforts to diminish risks to avian species. As such, this plan is considered a "living document" and is intended to be revised and updated as goals are achieved, innovative solutions are developed to mitigate impacts, agency guidance is adjusted, and conditions of the TWE Project warrant.

# 3.0 AVIAN PROTECTION PLAN PURPOSE AND NEED

Under certain conditions, power lines may present risk to avian species (APLIC 2006). However, empirical data is highly limited and usually site-specific, which allows for broad estimates of risk based on a series of assumptions. While the exact risk or level of impacts may be difficult to quantify, the most obvious risks from power lines are associated with birds directly contacting facilities and being killed either by electrocution or impact. In addition, birds nesting on utility structures may face increased risk of mortality by regularly maintaining close contact with transmission structures. Such risks also become costly to the utility company because of the risk of outages due to fault-triggering electrocutions, contact of nesting material with energized elements, prey falling on live equipment, and flashover caused by bird waste (streamers). Regulatory agencies and utilities recognize that avian interactions can be ecologically significant events and have worked collaboratively (through organizations such as APLIC) for several decades to reduce both system and avian impacts.

One mechanism for utilities to cooperatively engage agencies on operational avian safety issues is the APP. This APP exclusively addresses TransWest's avian protection program for construction as well as operations and maintenance (O&M), and initiates an avian safety framework for the life of the TWE Project.

The TWE Project is a ±600 kilovolt (kV) extra-high voltage (EHV) direct current (DC) transmission system extending from south-central Wyoming to southern Nevada. The TWE Project begins at a northern terminal near Sinclair, Wyoming and terminates at a southern terminal at the Marketplace Hub in the Eldorado Valley near Boulder City, Nevada. At each of the terminals, there will be an alternating current/direct current (AC/DC) converter station designed to convert the DC current carried by the TWE Project to AC current to be carried on the western United States AC electrical grid (the northern and southern terminals). The TWE Project is planned to interconnect into the Eldorado Substation, the McCullough Switching Station, the Marketplace Substation and the Mead Substation.

The TWE Project area spans approximately 750 miles of four western states. It passes through landscapes considered ecologically diverse because of their species' richness and endemicity. The extreme northeastern portion of the Project crosses the Central Flyway, a north south migration flyway along the eastern slope of the Rocky Mountains. The remainder of the Project occurs within the Pacific Flyway (USFWS 2012). Southern Utah and Nevada, with their mild climate, is a wintering destination for many migrant birds.

As a responsible corporation, TransWest strives to protect ecosystems and safeguard wildlife. Stewardship of the West's natural resources is the impetus for this avian protection program. There are four factors underlying the development of the program which are briefly presented in this section:

- Federal and State laws and regulations
- Conditions of approval and requirements identified in the right-of-way grants and special use authorizations for the Project
- Reliability
- Customer relations

## 3.1 Applicable Laws And Regulations

Most birds are protected under one or more state or federal regulations. Below is a brief summary of laws and other regulations governing avian protection applicable to the TWE Project.

### *3.1.1 Federal*

#### Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It has been described as a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of an USFWS permit or regulatory authorization, are a violation of the MBTA.

The MBTA states, "Unless and except as permitted by regulations . . . it shall be unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill . . . possess, offer for sale, sell . . . purchase . . . ship, export, import . . . transport or cause to be transported . . . any migratory bird, any part, nest, or eggs of any such bird . . . . [The Act] prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when

specifically authorized by the Department of the Interior." *16 U.S.C. § 703.* The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." *50 C.F.R. § 10.12.*

USFWS maintains a list of all species protected by the MBTA at 50 C.F.R. § 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. The MBTA does not protect introduced species such as the house (English) sparrow, European starling, rock dove (pigeon), Eurasian collared-dove, and non-migratory upland game birds. The USFWS maintains a list of introduced species not protected by the Act. *See* 70 Fed. Reg. 12,710 (2005).

The MBTA provides criminal penalties for persons who commit any of the acts prohibited by the statute in Section 703 on any of the species protected by the statute. *See 16 U.S.C. § 707.*

#### Endangered Species Act

In addition to the MBTA, some at risk bird species in the United States receive further protection under the Endangered Species Act of 1973 (16 U.S.C. §§1531-1544, as amended) (ESA). The ESA protects federally listed threatened or endangered species and their habitats from unlawful take, where "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." It also prohibits the illegal import, export, carrying, transport, or shipment of any listed species without authorization from the Secretary of the Interior. With a submitted conservation plan, the Secretary may permit exceptions for scientific purposes, the propagation or survival of the affected species, or for instances where "taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Violations of the ESA can result in civil penalties or, criminal violations.

#### Bald and Golden Eagle Protection Act

Under the authority of the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. §§ 668–668d, bald eagles and golden eagles are afforded additional legal protection. BGEPA prohibits the "take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof." *See 16 U.S.C. § 668.* BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," 16 U.S.C. § 668c, and includes criminal and civil penalties for violating the statute. *See 16 U.S.C. § 668.* USFWS has further defined the term "disturb" as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. *See 50 C.F.R. § 22.3*. BGEPA authorizes the USFWS to permit the take of eagles for certain purposes and under certain circumstances, including scientific or exhibition purposes, religious purposes of Indian tribes, and the protection of wildlife, agricultural, or other interests, so long as that take is compatible with the preservation of eagles. *See generally, 16 U.S.C. § 668a.*

### *3.1.2 State*

State-specific regulations regarding species addressed in this APP have not been identified at this time.

## 3.2 Conditions of Approval and Requirements

TransWest has filed an application for Transportation and Utility Systems and Facilities on Federal Land (SF 299) for the TWE Project with the Bureau of Land Management (BLM) for the right-of-way grants necessary to construct, operate and decommission the TWE Project on federal land. The BLM determined that responding to TransWest's right-of-way application required the preparation of an Environmental Impact Statement (EIS) under the National Environmental Policy Act of 1969, as amended (NEPA). Western Area Power Administration, a Federal power marketing administration

within the United States Department of Energy (Western), is acting as a joint lead agency with the BLM in the preparation of the EIS. Western is TransWest's development partner under its Transmission Infrastructure Program. In July 2013, BLM and Western published the Notice of Availability of the Draft Environmental Impact Statement for the TWE Project (DEIS)

The DEIS contains a description of the environment in which the TransWest Project will be built and discloses potential impacts to resources that may be affected by the construction, operation and development of the TWE Project, including avian species. The DEIS presents general practices for wildlife protection as well as conservation measures specifically addressing issues of avian protection. As appropriate, these measures have been integrated into this APP.

### 3.3 Reliability

Avian interactions with transmission systems have the potential to cause outages, result in equipment failures, shorten the lifespan of equipment, increase maintenance costs, and create safety issues. An avian-safe system increases reliability, results in fewer outages, reduces the exposure to risks for company personnel that respond to outages, and leads to less replacement of expensive equipment.

### 3.4 Customer Relations

The public places a high value on reliable electric service. TransWest, through implementation of this APP, seeks to minimize potential service disruptions and outages caused by avian interactions with TWE Project facilities. Communicating a program of avian protection administered in a cost conscious manner improves customer relations and makes good business sense.

## 4.0 PRINCIPLES OF AVIAN PROTECTION

The roots of APLIC avian protection planning lie in the development of system-wide avian safety programs to direct new-builds, implement remedial actions and track success, expenditures and incidents. Under this framework, twelve elements of avian safety were identified (APLIC 2005):

- Corporate policy
- Training
- Permit compliance
- Construction design standards
- Nest management
- Avian reporting system
- Risk assessment methodology
- Mortality reduction measures
- Avian enhancement options
- Quality control
- Public awareness
- Key resources

As originally conceived by APLIC, these principles served as an outline for an effective plan. However, not all APPs need to contain information about all twelve principles, as each document should be specific to an individual utility's operations, site-specific avian issues, and agency collaboration history. The TWE Project is a new project constructed to current APLIC construction

recommendations, sited and designed to ameliorate potential avian risk within the constraints of feasibility and the Project purpose and need. There are no elements of the Project involving rebuilding or retrofitting activities. In addition, there is neither history of avian safety issues nor mortality data from which to conduct a risk assessment. In the following sections, background information is provided where appropriate on how each component is relevant to the Project and how it will be implemented. As a "living document," as circumstances change, sections will be added to future revisions of this Plan.

# 5.0 AVIAN INTERACTIONS AND POTENTIAL ISSUES

Though power lines and associated facilities may provide some benefit to avian species through increased perching, roosting and nesting opportunities, the addition of power line structures with electrical elements also presents the potential risk of direct mortality through electrocutions and collisions. Risk of direct mortality to individual birds and local populations varies with project characteristics as well as a number of natural factors. These include bird size, flight characteristics, behavior, habitat, weather conditions, time of day, and topography. The TWE Project traverses a diverse landscape ranging from flat desert scrub, rolling chaparral, steep mountains, ridgelines, cliffs, large water bodies, streams, wetlands, and forests. In the resulting mosaic of habitats, a rich avian fauna is present with an assortment of resident and seasonally transient species. The potential exists for system elements, avian behavior, and environmental factors to interact in complex ways resulting in varying levels of risk to birds throughout the Project area. As a new project, TransWest considered risks to avian species and sought to enhance their safety through routing, siting, and design decisions. Through this APP, TransWest and agencies can continue to work collaboratively to actively minimize risk and adaptively manage the TWE Project to proactively respond to specific issues that may arise.

## 5.1 Avian Electrocutions

Avian electrocution may occur because of a combination of biological and electrical design factors (Janss and Ferrer 2001). Biological factors such as habitat, prey, and species, are those that influence avian use of structures. Raptors often use structures for perch-hunting, an energy-saving foraging behavior utilized by many species (APLIC 2006). Raptors and other species will use poles and towers for nesting, especially in open areas or areas where there are few natural nesting locations (Bevanger 1994; APLIC 2006).

Power lines electrocute birds when they simultaneously contact two conductors, or an energized conductor and a ground wire or grounded hardware (Bevanger 1998). Wet feathers raise the risk of electrocution for a bird by increasing conductivity. Wet feathers can conduct dangerous amperages beginning at around 5 kV, whereas dry feathers require currents greater than 70 kV before they will begin conducting current (APLIC 2006).

Body size (wingspan and perching height) and behavior, such as perching and roosting on poles or wires, are the keys to understanding why and how birds become electrocuted. Generally speaking, some species are more prone to mortality from electrocution than from collision, primarily birds of prey and ravens (Bevanger 1998). Because of the greater vertical and horizontal spacing required on higher voltage lines, the majority of raptor electrocutions occur on lines that are energized at voltage levels of 69 kV and below. The risk of electrocution from lines energized above 69 kV is highly unlikely on properly designed and maintained facilities (APLIC 2006). An APLIC avian-safe line has horizontal spacing that has considered the "wrist-to-wrist" wingspan distance for the largest bird species likely to be at risk in the area (APLIC 2006). The TWE Project transmission line is a high voltage transmission line and therefore presents a low avian electrocution risk. Even for the largest avian species present in the Project area (California condor), the proposed vertical and horizontal

separation distances between energized components and between energized components and grounded elements exceed APLIC recommendations of the "wrist-to-wrist" measurements.

The overhead ground electrode line will be designed to APLIC recommendations by ensuring that vertical and horizontal separation distances between energized components and between energized components and grounded elements meet or exceed APLIC recommendations of the "wrist-to-wrist" measurements of the largest bird that may occur within the local vicinity of the Project (golden eagles in the north and California condors in the south). The terminals for the TWE Project will also be designed to be avian safe.

Based on the above discussion, avian electrocutions on the TWE Project do not present a significant risk and will not be addressed further in this APP.

## 5.2 Avian Collisions

Avian collisions with transmission lines may be a major cause of avian mortality. Factors that influence collision risk can be divided into three categories: those related to the biology of the avian species, those related to the environmental conditions, and those related to the configuration and location of transmission lines (APLIC 2012, 2006; Savereno et al. 1996).

## 5.3 Biological Factors Related to Bird Collisions

Biological factors include body size, flight behavior, age, sex, habitat use, and flocking behavior. These relate to the bird's ability to detect and avoid a power line. Birds that spend an abundance of time in the air may face a greater risk of collision than those that are predominantly ground-based (Bevanger 1994). For example, swallows swarming after insects may be more likely to collide with a power line than grouse (Sporer et al. 2013). A bird's flight manner has been shown to be one of the most important factors determining the chances of collision with a transmission line, perhaps more important than the sheer frequency of birds flying near the lines (Janss 2000). Juvenile birds, which are not as familiar with their surroundings and are less experienced in both flight and landing can be expected to have a greater likelihood of colliding with transmission lines (Bevanger 1994, 1998; Dorin and Spiegel 2005). In general, birds are quick-moving, visual-orienting animals that are very adept at identifying and avoiding obstacles in their flight paths; however, large-bodied birds with low maneuverability and birds that are distracted by specific behaviors (e.g., foraging, flocking, territorial displays, competition, courtship, soaring) tend to be more likely to collide with power lines. In addition, birds that are unfamiliar with an area and its power lines (such as migrants) may be at elevated risk.

### *5.3.1 Environmental Factors Related to Bird Collisions*

Environmental factors influencing collision risk include the effects of weather and time of day; transmission line visibility; surrounding land use practices that may attract birds; and human activities that may flush birds toward transmission lines. Overcast weather and thick fog tends to cause birds to lower their flying altitudes. Likewise, headwinds generally cause birds to fly lower, whereas tailwinds may cause birds to fly higher (Bevanger 1994; Perdeck and Speek 1984). High winds may cause some species, especially waterfowl, to fly at lower elevations (Hunting 2002). If winds are blowing perpendicular to conductors, this can also increase collision possibility (Hunting 2002). Weather conditions may also make transmission lines more difficult to see, thus increasing the likelihood of a collision (Mathiasson 1992). Visibility can also be affected by the time of day. Additionally, lines become increasingly difficult to see at times with poor lighting, such as night, dawn, or dusk. Hunting (2002) observed increased transmission line strikes occurring at night or during poor weather. Further studies by Stout and Cornwell (1976) also emphasize the risk of power line collision that poor visibility poses to waterfowl.

Wetlands, lakes, and streams all have potential for avian risk if they are located near power lines. Because water is often used by birds for foraging, nesting and roosting activities, adjacent power lines can pose collision risks to birds that utilize these areas (APLIC 2012). Stout and Cornwell (1976) found that in a review of reported non-hunting mortality of wild waterfowl from 1930 to 1964, 65% of collision mortalities were due to telephone and power lines.

Disturbance of birds perched near power lines can pose a risk. If birds are startled into leaving a water body or feeding area adjacent to power lines, the likelihood of a bird flying into the lines increases. Wetlands tend to have a high concentration of birds nesting, feeding, roosting, and shuttling back and forth among use areas, thus adding to the collision risk with nearby transmission lines (Bevanger 1994).

Anthropogenic land use may attract birds into areas that contain transmission lines. For instance, a section of highway may be an attractant to vultures or similar scavenging species because of the presence of road-killed animals. Agriculture activities may attract birds and raptors to certain areas for foraging opportunities. Birds avoiding urban area may be funneled into transmission corridors and be exposed to the risk of collision.

### *5.3.2 Power Line Factors Related to Bird Collisions*

Power line factors that may relate to avian collisions include the type of structures supporting the transmission line and their placement in the landscape. Equipment placed on the structure and the manner that conductors are arranged also influences risk. While it is believed that flat-line configurations are less of an avian risk than vertical configurations (Bevanger 1994), power line structure design has not been sufficiently analyzed to determine a specific correlation with bird collisions (Janss 2000). However, there seems to be a positive correlation between the presence of a static wire and the number of bird collisions (Bevanger 1994; Savereno et al. 1996; APLIC 2012). It is thought that when a bird sees the larger conductor wires, it increases its altitude to avoid them, and subsequently collides with the thinner, less-visible static wire. This has been supported by studies that have demonstrated an average mortality decline of 50 to 60% when markers are placed on static wires in relation to wires left unmarked (Savereno et al. 1996).

Transmission line location may also influence the risk of collision for birds. Generally, there is more of a risk in placing a transmission line corridor in an open area than against an existing obstruction; however, the visual contrast of the conductors against the background is a consideration (Bevanger 1994). The risks to birds flying across a single corridor in an open space become dependent not only on the line's visibility, but on the altitude of the bird and its ability to first see the transmission line wires, and then change its flight pattern to avoid them. On the other hand, lines are grouped with existing lines or against a landscape reference such as tall trees are theoretically easier to avoid. Multiple lines in one corridor allow birds to avoid several sets of lines at once (Bevanger 1994). The perpendicular placement of transmission line corridors relative to avian flyways can increase the risk posed by the lines. There is also a greater risk of collision when lines are in between areas used by birds, such as between foraging and roosting areas (APLIC 2012). The problem is compounded when the areas are close enough that only a short, low level flight is required (Bevanger 1994).

Lines placed near a ridgeline also can create a hazard. When horizontal winds get deflected upward by ridgelines, the resulting updrafts attract raptors that seek to gain elevation for gliding and soaring purposes (Pope et al. 2006). Passes or valleys may act as funnels for migrating birds crossing mountain ranges. River courses are also followed by migrants. Power lines spanning passes, valleys and rivers create a risk of collision.

It is difficult to predict the frequency of collision-caused bird mortality without long term information on bird species activity and both daily and seasonal movements in the Project area. These data are not available for the TWE Project; however, it is generally expected that collision mortality would be

greatest where the movements of susceptible species are the greatest (e.g., near open bodies of water, wetlands, nesting habitats, ridgelines). It is possible that birds will strike the new transmission lines, but it is not expected to result in a substantial increase from current conditions. TransWest has also utilized existing transmission corridors to a large extent, including the West-Wide Energy Corridor (WWEC) and corridors identified in various BLM Resource Management Plans. By placing the Project in existing transmission corridors, collision-related impacts will be reduced.

# 6.0 CONSTRUCTION DESIGN STANDARDS

All aspects of the Project were designed to meet APLIC construction recommendations both in the *State of the Art,* 2006 and *Reducing Avian Collisions,* 2012 documents. No further action is directed in this APP.

# 7.0 TRAINING / MONITORING, DEVELOP TRAINING MATERIALS

TransWest supervisors, construction crews, linemen, environmental contractors, and any other transmission-related field personnel will undergo avian protection awareness training prior to beginning work on the TWE Project. Ensuring that Project personnel are knowledgeable and aware of the protocols and methods outlined in this APP will decrease the likelihood of avian interactions with the transmission line and increase the likelihood of quick and efficient responses to incidents. Personnel will undergo a Worker Environmental Awareness Program (WEAP) that places emphasis on TransWest's avian protection policy. Also addressed are any ongoing Project permits that may be issued for avian protection; special-status avian species that could occur and where they would be most likely to occur. Workers will be instructed in how to identify these species; their natural histories where relevant to areas of probable occurrence; and what steps to take should an avian injury or mortality occur. Training will also include a discussion of the law and the consequences for non-compliance with this APP and/or with applicable permits or regulations. All new transmission-related personnel will be required to undergo WEAP training prior to conducting any construction or O&M work on any TWE Project components. For a more explicit discussion of how newly discovered nests or avian incidents will be reported, see Section 9.0 Nest Management, and Section 10.0 Adaptive Management.

**Summary**

- All TransWest supervisors, construction crews, linemen, environmental contractors, and any other transmission-related field personnel will undergo an avian protection awareness training prior to beginning work on the Project.
- All TransWest on-site personnel will undergo WEAP training with emphasis on avian protection prior to the start of construction.
- All new contractors will undergo WEAP training before they begin work.

# 8.0 AREAS OF RESPONSIBILITY AND PERMIT COMPLIANCE

The APP will be administered by designated TransWest staff members to be identified at a later date. A list of responsible persons, chain of responsibility, and contact information will be established at a later date.

TransWest management tasks all line crews, field engineers, operators, foremen, and design personnel with understanding this plan and complying with its direction.

Currently, TransWest does not possess federal or state permits pertaining to migratory birds, eagles or federal ESA listed avian species. It is not authorized to capture injured birds, remove inactive eagle or colonial bird nests, disturb active nests of any bird species, or remove or store carcasses. Any such activity will be conducted by the USFWS or under their direct supervision. This APP will be modified if TransWest obtains a permit in the future.

Should it be warranted in the future, TransWest may apply for federal or state permits. The following permits are described to inform APP managers in making decisions regarding future permits. It does not imply that TransWest possesses these permits or may conduct any covered action described below.

- **Incidental Take Permits** – Incidental take permits are issued to allow the unintentional take of specified individuals per the conditions within each permit.
    - **Section 7 Incidental Take Statement** – None of the federally listed avian species known to be in the Project area are at an elevated risk for collision or mortality. Because of the voltage of TransWest transmission lines and the large separation distance that will be required, electrocution is highly unlikely.
    - **Bald and Golden Eagle Act Permit** – Based on known occurrences and activities in the vicinity of the Project area, both species could occur in various locations along the Project route. Should any eagle electrocution or collision incidents occur during construction or should an eagle nest be discovered that will be impacted by construction, TransWest construction crews will carry out measures described in Section 9.0, Nest Management, and Section 10.0, Adaptive Management, and immediately notify TransWest designated staff members.
- **Collection/Salvage Permits** – These permits are required to collect, salvage, or handle birds.
    - **State Scientific Collecting Permit** – These permits are issued by state resource agencies and allow the collection, salvage, or capture and release of special-status species as allowed by the individual permit conditions. TransWest will seek this permit from the appropriate state agencies if any of these actions is required during Project construction.
    - **Federal Migratory Bird Permit** – These permits are issued by the USFWS under the MBTA and may be required if it is necessary to salvage and/or rehabilitate birds protected by the MBTA during construction. Fish and Game Code 3513 also prohibits the take or possession of any migratory nongame bird protected by the MBTA, except where allowed by the Secretary of the Interior.
- **Nest Removal and Relocation Permits** – Bird nests are protected by the MBTA and by the Fish and Game Code. Under the MBTA, it is illegal to possess, sell, purchase, barter, transport, import, export, or take—defined as collecting, for nests—or attempt any of those actions on a migratory bird nest (USFWS 2003). Under Fish and Game Code Sections 3503 and 3503.5, it is illegal to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by the Fish and Game Code or pursuant regulations. However, it is lawful to remove inactive nests or nests during the non-breeding season for most birds, excepting those of eagles. When it is necessary to remove a protected nest as dictated by the MBTA and Fish and Game Code, TransWest will seek permits from the USFWS prior to taking any further actions other than those described under Section 9.0, Nest Management.

# 9.0 NEST MANAGEMENT

Nest management addresses both nests that may be constructed on facilities and nests near facilities that may be affected by construction or O&M activities. Under the MBTA, it is illegal to possess, sell, purchase, barter, transport, import, export, or take—defined as collecting, for nests—or attempt any of those actions on a migratory bird nest (USFWS 2003). In order to comply with these regulations, the various best management practices (BMPs) and protocols that will be utilized by TWE Project staff to avoid and minimize impacts to nesting avian species on structures or in the Project ROW are discussed below. Additionally, all Bureau of Land Management (BLM) and U.S. Forest Service (USFS) spatial and timing stipulations regarding nesting birds will be followed as set forth in the right-of-way grants and special use authorizations for the TWE Project.

## 9.1 Definition of an Active Nest

Nests of native bird species are protected by the MBTA. The USFWS has clarified that the federal regulations only pertain to active nests except in the cases of listed species and eagle nests, which are protected under the Endangered Species Act and the Bald and Golden Eagle Protection Act, respectively, whether they are active or inactive. Regarding all other bird species however, the MBTA does not clearly define what an active nest is. This being the case, it is left to qualified biologists to determine what constitutes an active nest. For the TWE Project, a nest will be considered active when construction of a new nest or use of an existing nest commences, and its formal status will remain active as long as adults, viable eggs, and/or living young are present at the nest. A nest may be abandoned, fail, or fledge young and become inactive during the breeding season. Prior to removal of the buffer around an inactive nest, a biologist will confirm that the nest is inactive using appropriate survey methodology.

A number of species will utilize existing nests built in prior years. These include owls (Strigiformes) and diurnal raptors such as falcons, hawks, vultures, and eagles (Falconiformes). Because known nesting sites are likely to be utilized in the current year, each existing nest suitable for use by owls and diurnal raptors should be considered active when the designated seasonal avoidance period begins. Its formal status should remain active until such time as a qualified biologist determines the nest is inactive.

## 9.2 Inactive Nests

Inactive nests may be removed and/or destroyed in compliance with the MBTA, unless they are nests of listed species or eagles as discussed above. In most cases, a previously active nest becomes inactive when it no longer contains viable eggs or young and is not being used by a bird as part of the reproductive cycle. According to the Migratory Bird Permit Memorandum regarding nest destruction, “the MBTA does not contain any prohibition that applies to the destruction of a bird nest alone (without birds or eggs), provided that no possession occurs during the destruction” (USFWS 2003).

Nests known to be used by ESA-listed species or bald or golden eagles will not be removed unless coordination with state or federal agencies has deemed it appropriate to remove them. Active nests will be protected through establishment of buffers determined by BLM and USFS and set forth in the right-of-way grants and special use authorizations for the TWE Project.

## 9.3 Operations and Maintenance Procedures

In order to properly assess and document any potential nesting issues, O&M activities occurring during the avian breeding season, generally from mid-February through late-July, will be subdivided into activities that strictly involve work on overhead structures and activities on the ground that involve ROW vegetation management. For activities strictly occurring on towers and other overhead structures, linemen and O&M personnel will conduct visual surveys of the maintenance area prior to beginning work to determine whether any bird nest are present in the work area. For activities

involving ROW vegetation management, a qualified biologist would conduct a nesting bird survey not more than 14 days prior to the O&M activites to determine if active nests of any bird species are present within the work area. All active bird nests that are encountered are to be documented using the nest reporting form (Attachment B). All construction and O&M work that might disturb an active nest is to be halted immediately and a TransWest designated staff member contacted. The TransWest designated staff member will develop a treatment plan that will protect the active nest or contact the USFWS for guidance.

TransWest will comply with all federal and state laws regarding nest management or removal. Removal of an inactive, non-eagle nest outside the breeding season may be conducted for safety or maintenance issues without a take permit. When in doubt about the status of a nest (or type) field engineers will consult with the managing engineer who may seek professional opinion from TransWest designated staff members or an agency. Active problem nests will be addressed on a case-by-case basis and in coordination with the USFWS and appropriate state agencies.

While inactive bird nests—those without birds or eggs—are not protected from destruction by the MBTA, some inactive nests are protected by other regulations, including those of ESA-listed species or of bald and golden eagles. Nests of eagles cannot be altered, moved, or destroyed without specific authorization from the applicable agency (APLIC 2006). Recent legislation changes in 2009 allow take of eagle nests when there is a safety concern to people or eagles, when it is a public health and safety concern, when the nest prevents use of a human-engineered structure, or when the activity or its mitigation will have a net benefit to eagles; only inactive nests can be taken except in safety emergencies (50 Code of Federal Regulations [CFR] Part 22.27). However, permits are still required for nest removal and ground crews must notify TransWest designated staff members if a problem nest is discovered. Therefore, determining the active or inactive status of a nest in the vicinity of planned work is paramount to protecting the birds that may be occupying it and protecting the Project by ensuring smooth and avian-safe construction.

If there is question as to whether an observed nest is active or inactive, TransWest designated staff members and the appropriate land management agency are to be consulted for assistance. Under no circumstances is an active nest to be disturbed until TransWest designated staff members have been notified and applicable permits and/or resource agencies have been consulted for further action. The nest reporting form must be completed for all active nests. Construction may only proceed within an established distance of an active nest after the nest has been determined to be inactive or after approval has been given by TransWest designated staff members or the applicable regulatory agency.

Should a nesting bald eagle be encountered prior to work, the USFWS has issued recommendations for avoiding or minimizing disturbance to the nest and its inhabitants (USFWS 2007). If the construction will be visible from the nest, the USFWS recommends a buffer of 660 feet if there is no similar activity occurring within one mile of the nest; if a similar activity is occurring within one mile of the nest, the USFWS recommends a construction buffer of 660 feet or as close as the other activity is allowed. Landscape buffers are recommended as available. If construction is not visible from the nest, the USFWS recommends a buffer of 330 feet from the nest if there is no similar activity within one mile of the nest; if a similar activity is occurring within mile of the nest, the USFWS recommends a construction buffer of 330 feet or as close as the other activity is allowed. All clearing, external construction, and landscaping between 330 and 660 feet of the nest should be conducted outside of the breeding season. The USFWS recommends that the temporary use of loud machinery be restricted to outside of the breeding season. While the breeding season for bald eagles can range from January through August, the most critical time periods when bald eagles are most sensitive to disturbance—courtship, nest building, egg-laying, and incubation—are generally from January through May (USFWS 2007).

For active golden eagle nests, the USFWS recommends a spatial buffer in non-urban areas of 0.5 miles (USFWS 2008). In the DEIS and relevant Resource Management Plans, BLM has identified appropriate spatial buffers surrounding golden eagle nests. Similar to the measures for bald eagle, it is recommended that use of loud machinery as well as all clearing, external construction, and landscaping within the spatial buffers for golden eagle nests should be conducted outside of the golden eagle breeding season.

## 9.4 Problem Nests

Many birds build nests on power poles. Nests that do not pose safety, reliability, outage, or bird electrocution risks will be left undisturbed. Nests that may present safety, reliability, outage, or bird electrocution risks are referred to as "problem nests". Managing problem nests involves several components:

- Discouraging birds from nesting in problem areas
- Providing an alternative nest site
- Ensuring that surrounding utility facilities are avian-safe

Problem nests may be removed or relocated if inactive unless it is an ESA-listed species or a bald or golden eagle nest. If active, an ESA-listed species, or a bald or golden eagle nest then the TransWest designated staff member must be contacted before any further action is taken. If a problem with a specific nest is anticipated in the future, permit requirements may be minimized by taking appropriate action during the non-breeding season before the nest is active.

**Summary**

- If O&M efforts such as repairs, equipment replacement or routine vegetation removal are to occur during the avian breeding season, generally from mid-February through late-July, line maintenance crews will conduct a nesting bird survey prior to construction on above ground structures to determine if active nests of any bird species are present within the work area. If any ROW vegetation management will occur, a qualified biologist will conduct a nest survey no more than 14 days prior to work. All active bird nests that are encountered are to be documented using the nest reporting form (Attachment B).
- If an active nest is present, then all construction and O&M work that might disturb the nest is to be halted immediately and a TransWest designated staff member contacted. The TransWest designated staff member will develop a treatment plan that will protect the active nest or contact the USFWS for guidance. Any bald eagle nest will be given a 660-foot buffer if maintenance activity is visible from the nest or a 330-foot buffer if it is not. Active golden eagle nests will be given a 0.5 mile buffer.
- All active nests will be documented with the attached Avian Nest Reporting Form (Attachment B).
- Active nests of any species protected under the MBTA, active or inactive eagle nests, or active nests of ESA listed species are not to be moved without approval from TransWest designated staff members, who will first consult with the USFWS. When in doubt about the status of a nest (or type) field engineers will consult with the managing engineer who may seek professional opinion from TransWest designated staff members or an agency. Active problem nests will be addressed on a case-by-case basis and in coordination with the USFWS and appropriate state agencies.
- Inactive nests of common species (i.e. non-eagles and non-ESA listed species) can be removed where they are in the path of the work.

# 10.0 ADAPTIVE MANAGEMENT

As stated previously, this APP will be a living document that will be revised and updated as goals are achieved, innovative solutions are developed to mitigate impacts, agency guidance is adjusted, and conditions of the TWE Project warrant. As such, TransWest will utilize an adaptive management approach to address issues with the Project as they arise. Through this process, TransWest will better be able to identify potential risk and avoid and minimize impacts to avian species. Set out below are examples of some areas where adaptive management will serve to benefit avian species as well as the TWE Project.

## 10.1 Retrofit/ Remedial Protective Measures

The TWE Project is a new build transmission line that will be built to APLIC construction recommendations, which eliminates the need for retrofit devices and remedial protection. However, if an area is identified where avian species are being impacted by the transmission line, the issue will be investigated, identified and corrected through the use of retrofit devices or other accepted protective measures which will again reduce the potential risk to avian species. General types of equipment that may be used for these situations include covers for hardware and conductors; perching dissuaders; flight path diverters; line marking devices; and other similar types of equipment. Records will be kept of the nature of any problems requiring avian protection equipment, bird species involved, site conditions, materials, performance characteristics of equipment and lifespan.

The APP will be updated based on field data on retrofitted equipment and monitoring of any system changes to improve avian safety. The overarching goal of the APP is to be a living document that will strive to protect avian species by reducing the potential risk created by the Project.

## 10.2 Incident Tracking

Avian incidents and mortalities will be documented during all phases of the TWE Project by supervisors, construction crews, linemen, environmental contractors, O&M personnel, and any other transmission-related field personnel. Personnel will undergo avian protection awareness training prior to beginning work on the TWE Project that will include recognition and effective documentation of observed avian issues and mortalities. All avian injuries or mortalities that are a result of collision or electrocution with the transmission lines or other Project components are to be documented and reported to TransWest designated staff members. Following initial notification, the employee or contractor is to fill out the avian reports included as Attachment C. Avian incidents will also be recorded into a Geographic Information Systems (GIS) database for tracking purposes and to determine particular repeat problem areas.

If the affected bird is a special-status species or if it is discovered that a particular area or stretch of transmission line is a “hot spot” for avian safety issues, TransWest will investigate remedial measures to alleviate the issue, as discussed in Section C9.1.

TransWest will maintain an annual list of avian mortalities, including dates, locations, and the species involved, as well as a list of remedial measures implemented (e.g., retrofitting, avian safety devices installed), a shape file or map of the annual avian incident data, and an itemized breakdown of the annual cost of implementing this APP.

TransWest management and designated staff members will review the annual list of avian mortalities and the annual report for compliance with this APP and to insure that adequate measures are being taken to avoid and minimize risks to birds. Where areas of substantial concern are identified through the internal reporting described above, mortality surveys may be conducted to identify the location and scope of the problem, which will then inform the adaptive management process and result in the correction of aspects of the TWE Project that may be causing impacts to avian species.

# 11.0 EXPENDITURE TRACKING

To determine the amount of investment being expending on measures set out in Section C9.0, TransWest will track its expenses in order to inform the agencies (e.g., USFWS) of these costs. Cost capture is a mechanism agencies use to track efforts utilities expend to improve and sustain avian safety of their systems. As a new project, no data exist to meaningfully prepare a scope and budget for mortality reduction measures. Within one year of commencement of Project operations, TransWest will establish an annual budget and cost tracking mechanism for remedial actions (purchase and installation of avian protection equipment), training, and other activities such as attendance of avian protection workshops.

Examples of potential work that will be tracked in the APP reporting system include the following:

1) Modification of poles associated with a raptor mortality

2) Installation of bird flight diverters/markers to prevent bird collisions

3) Proactive installation of bird guards to prevent squirrel/bird outages

4) Proactive modification of existing poles considered to have a high risk of electrocution.

# 12.0 QUALITY CONTROL

TransWest will implement quality control measures to ensure that this APP is accurate, up-to-date, and used effectively during the long-term operation of the Project. These measures will include the following:

- TransWest line crews, field engineers, operators, foremen, design personnel, and all contractors associated with the Project, are tasked with understanding and complying with this Plan.
- Quality control will be overseen by a senior staff member(s) of TransWest who will provide quarterly reports to TransWest's General Management.
- The TransWest designated staff member(s) will review submitted nest reporting forms and avian incident reporting forms and ensure that they are properly and adequately completed. Any missing information will be obtained from the worker who completed the form. The staff member(s) will ensure that a local (TransWest) incident database is kept up-to-date. Any problems with the reporting system will be reported to management for review and remedial action will be taken.
- Any transmission towers or sections of conductor that are retrofitted with avian safety measures as described under Section 10.0 Adaptive Management, will be monitored for effectiveness by checking for injured birds, carcasses, or signs of potentially risky nest-building weekly for the first month after the retrofitting. Any observed incidents of additional nesting, injury, or mortality will be investigated for further remedial actions, which will then be determined and implemented.
- TransWest will keep an internal database which tracks detected avian injuries or mortalities, a list of retrofitting operations over the last year, a shape file or map of the last year's avian incident data, and an itemized list of the operating costs associated with implementing the protective measures in this APP. TransWest management and designated staff members will discuss and implement any necessary changes to this APP or avian protection methods based on this annual report.

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# ATTACHMENT A
# SPECIAL STATUS AVIAN SPECIES

**TABLE A1 POTENTIAL SPECIAL STATUS AVIAN SPECIES IN TWE PROJECT AREA**

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| American white pelican | *Pelecanus erythrorhynchos* | BLM; UT-SS Tier II | Range: The American white pelican breeds in widely distributed island colonies from Canada to northeastern California, Utah, Nevada, Wyoming, and Colorado.<br><br>Habitat: The species breeds on islands in large bodies of water. It forages in marshes, lakes, and rivers. It constructs a scrape nest on flat, open ground, near water. It is a colonial nester. | Wetlands: ground nester | Regions I and II: High. The species has been documented within the 2-mile transmission line corridor in Millard County, Utah. It has also been documented within 5 miles of the reference line in Iron, Juab, Millard, Sevier, Uintah, and Washington counties, Utah. No suitable habitat for the American white pelican is crossed by the project alternatives in Region III. A breeding colony has been documented within 5 miles of the reference line in Carbon County, Wyoming. |
| Least bittern | *Ixobrychus exilis* | BLM; NV-P | Range: The least bittern nests throughout the eastern United States and in select areas of Oregon, California, Colorado, Arizona, New Mexico, Texas, Utah, Nebraska, Nevada, Mexico, and South America.<br><br>Habitat: The species breeds and forages in freshwater marshes. It nests on a platform of marsh vegetation with a canopy. | Wetlands: ground nester | Regions I, III, and IV: Moderate. The species has been documented within 5 miles of the reference line in Clark County, Nevada. Probable breeding records exist for the Pahranagat National Wildlife Refuge in Lincoln County, Nevada. |
| White-faced ibis | *Plegadis chihi* | BLM | Range: The white-faced ibis nests from central Mexico to coastal Texas and Louisiana and through the Great Basin. Isolated colonies exist in Alberta, New Mexico, California, Montana, North Dakota, Iowa, Kansas, and South America.<br><br>Habitat: The species breeds in tall emergent vegetation growing as “islands”, surrounded by water (at least 18 inches deep). It forages in wet hay meadows and flooded agricultural croplands, marshes, shallow ponds, lakes, and reservoirs. It constructs a nest of emergent vegetation in bulrushes, cattails, or reeds; on floating mats; or in low trees. | Wetlands: ground nester | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Carbon County, Wyoming. It has also been documented within 5 miles of the reference line in Sweetwater County, Wyoming. Possible breeding colonies exist in northwestern Colorado and in Clark County, Nevada. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| Barrow's goldeneye | *Bucephala islandica* | BLM | Range: The Barrow's goldeneye breeds in the western mountains of North America, from Alaska to central California.<br><br>Habitat: The species breeds near densely vegetated water bodies with abundant aquatic vegetation. It forages in water bodies. It nests in cavities, usually in dead trees close to cold-water lakes, pools, or rivers. The species exhibits high nest fidelity. | Wetlands: cavities | Region I: Low. The species is a confirmed breeder in Sweetwater and Carbon counties, Wyoming. |
| Trumpeter swan | *Cygnus buccinator* | BLM | Range: The trumpeter swan was once distributed across most of North America and currently occurs locally from Alaska south to Oregon and east to Michigan.<br><br>Habitat: The species breeds in areas with stable, quiet, and shallow waters where small islands, muskrat houses, or dense emergent vegetation provide nesting and loafing habitat. It forages in shallow marshes, ponds, lakes, and river oxbows with nutrient-rich waters, and dense aquatic plants and invertebrates. It constructs a nest of aquatic and emergent vegetation, often on a muskrat house surrounded by water. | Wetlands: ground nester | Region I: High. The species has been documented within the 2-mile transmission line corridor in Sweetwater County, Wyoming. |
| Bald eagle | *Haliaeetus leucocephalus* | BLM; USFS; CO-ST; UT-SS Tier I; NV-P | Range: The bald eagle occurs throughout the United States and Canada, south into central Mexico.<br><br>Habitat: The species breeds near large lakes and rivers, in forested habitat where adequate prey and large, old cottonwood or conifer trees are available for nesting. It constructs a large stick nest, and exhibits high nest fidelity. | Raptor: trees | Regions I, II, III, and IV: High. This species has been documented throughout Wyoming, Colorado, Utah, and Nevada. Bald eagles nest and winter along major waterbodies in mature riparian woodlands. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| Ferruginous hawk | *Buteo regalis* | BLM; UT-SS Tier II; NV-P | Range: The ferruginous hawk occurs in Canada, eighteen western and central states, and Mexico.<br><br>Habitat: The species breeds in semiarid open country, primarily grasslands, basin prairie shrublands, and badlands, typically near prairie dog colonies. It requires large tracts of relatively undisturbed rangeland for foraging habitat. It constructs a large stick nest on rock outcrops, knolls, cutbanks, cliff ledges, or trees, and exhibits high nest fidelity. | Raptor: cliffs/trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming; in Beaver, Duchesne, Emery, Grand, Iron, Juab, Millard, Uintah, and Washington counties, Utah; and in Lincoln County, Nevada. Suitable habitat also occurs within the study area in Clark County, Nevada. |
| Golden eagle | *Aquila chrysaetos* | BLM | Range: The golden eagle occurs throughout North America, from Alaska to central Mexico.<br><br>Habitat: The species breeds and forages in a variety of habitats, including large expanses of grasslands, sagebrush, agricultural lands, and tundra. It constructs a large stick nest on cliffs and in large trees, and exhibits high nest fidelity. | Raptor: cliffs/trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, and in White Pine and Lincoln counties, Nevada. Suitable habitat also occurs within the 2-mile transmission line corridor in Colorado, Utah, and Nevada. |
| Northern goshawk | *Accipiter gentilis* | BLM; USFS; UT-SS Tier I; NV-P | Range: The northern goshawk occurs in Alaska, Canada, and south through the southern Rocky Mountains and Mexico.<br><br>Habitat: The species breeds and forages in mixed coniferous forest and mature aspen stands with tall trees, intermediate canopy coverage for nesting, and small open areas for foraging. It constructs a stick and twig nest on a large horizontal limb, usually against or near the truck. | Raptor: trees | Regions I and II: High. The species is known to occur within the 2-mile transmission line corridor in Sweetwater County, Wyoming and in Emery and Millard counties, Utah. It has also been documented within 5 miles of the reference line in Carbon County, Wyoming; Garfield and Rio Blanco counties, Colorado; in Daggett, Duchesne, Emery, Millard, Sanpete, Sevier, Uintah, Utah, and Wasatch counties, Utah; and in Lincoln County, Nevada. No suitable habitat for the northern goshawk is crossed by the project alternatives in Region III. |
| Peregrine falcon | *Falco peregrinus* | BLM; USFS; NV-P | Range: The peregrine falcon occurs throughout most of North America.<br><br>Habitat: The species breeds and forages in a | Raptor: cliffs | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Sweetwater County, Wyoming, Uintah |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| | | | variety of open habitats, including woodlands, forests, shrub-steppe, grasslands, marshes, and riparian habitats. It nests on cliffs and rarely on tall buildings near habitats with abundant prey. It constructs a well-rounded scrape nest of accumulated debris on a ledge. | | County, Utah, and Clark County, Nevada. It has also been documented within 5 miles of the reference line in Carbon County, Wyoming, and in Utah (Daggett, Duchesne, Emery, Sevier, and Washington counties). |
| Prairie falcon | *Falco mexicanus* | BLM | Range: The prairie falcon occurs throughout western North America from Canada to Mexico.<br><br>Habitat: The species breeds and forages in open terrain, including sagebrush, grasslands, and other arid habitats. It nests on cliff ledges facing open habitat. | Raptor: cliffs | Regions I, II, III, and IV: High. Potential habitat for this species occurs in the 2-mile transmission line corridor. It has been documented within 5 miles of the 2-mile transmission line corridor in Lincoln County, Nevada, and in Colorado. |
| Swainson's hawk | *Buteo swainsoni* | BLM | Range: The Swainson's hawk breeds in western North America, from Alaska south into northern Mexico, and east to Oklahoma and Iowa. The species range includes Wyoming, Colorado, Utah, and Nevada.<br><br>Habitat: The species breeds and forages in arid grasslands, desert, and agricultural areas with scattered trees and shrubs. It constructs a modest nest in trees and exhibits moderate nest fidelity. | Raptor: trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Utah. Suitable habitat is present along the 2-mile transmission line corridor in Wyoming, Colorado, Utah, and Nevada. |
| Columbian sharp-tailed grouse | *Tympanuchus phasianellus columbianus* | BLM; USFS; UT-SS Tier II | Range: The Columbian sharp-tailed grouse occurs locally from Canada, south to Nevada and east to Colorado. It has been extirpated from Oregon, California, and Nevada.<br><br>Habitat: The subspecies inhabits mountain-foothill shrub communities, sagebrush, grassland, and riparian habitats. Leks are located in flat areas with low, sparse vegetation. Nests occur within 0.6 mile of the lek area. | Shrublands: ground nester | Regions I and II: Low. The subspecies occurs in suitable habitat in isolated locations in south-central Wyoming, and northwestern Colorado. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| Greater sage-grouse | *Centrocercus urophasianus* | FC; BLM; USFS; UT-SS Tier II; | Range: The greater sage-grouse is found throughout the western United States.<br><br>Habitat: The species breeds and forages in sagebrush grasslands. Leks are located in open areas (e.g., ridges, knolls, dry lake beds, burned areas) in close proximity to taller sagebrush which is used as escape cover. Most nests are located under sagebrush plants, typically within 4 miles of the lek. Brooding habitat consists of grassy areas near sagebrush. Winter habitat consists of south and east facing slopes with minimal snow cover. | Shrublands: ground nester | Regions I, II, and III: High. Active leks occur within the 2-mile transmission line corridor in Wyoming, Colorado, and Utah. Suitable nesting, brooding, and wintering habitat also occurs within the 2-mile transmission line corridor in these states. The 2-mile transmission line corridor includes greater sage-grouse core habitat areas in Wyoming. |
| Black tern | *Chlidonias niger* | BLM | Range: The black tern occurs locally in Canada and the northern two-thirds of the United States.<br><br>Habitat: The species breeds in large marshes, usually greater than 50 acres and forages in marshes and aquatic areas. It nests in small, loose colonies, in still water. It constructs a floating nest of dead rushes in marshes, or on grass tufts in wetlands | Wetlands: ground nester | Regions I and II: High. Breeding colonies of this species have been documented within the 2-mile transmission line corridor in Carbon County, Wyoming and within 5 miles of the 2-mile transmission line corridor in Sweetwater County, Wyoming. The species has been documented within 5 miles of the reference line in Uintah County, Utah. Suitable habitat occurs at Pelican Lake, and on sandbars in the Green River, Utah. |
| Long-billed curlew | *Numenius americanus* | BLM; UT-SS Tier II | Range: The long-billed curlew occurs from southern Canada into most of the western United States.<br><br>Habitat: The species breeds and forages in a variety of grassland habitats, including moist meadow grasslands, agricultural areas, and dry prairie uplands, usually near water. It nests in grass less than 12 inches tall, with bare ground, shade, abundant invertebrate prey. | Grasslands: ground nester | Regions I, II, and III: High. This species has been documented within the 2-mile transmission line corridor in Carbon County, Wyoming and Juab, Millard, and Uintah counties, Utah. It has also been documented within 5 miles of the reference line in Beaver, Grand, and Iron counties, Utah. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| Mountain plover | *Chardrius montanus* | BLM; USFS; UT-SS; | Range: The mountain plover occurs in dry short-grass prairies from south-central Canada to Texas.<br><br>Habitat: The species breeds and forages in flat, short-grass prairie habitat and fallow agricultural fields with sparse vegetation. It constructs a ground nest of cow manure chips, grass, and roots. | Grasslands: ground nester | Regions I and II: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming. It has been documented within 5 miles of the reference line in Grand County, Utah. Historic records also exist for mountain plovers in Duchesne and Uintah counties, Utah. |
| Yellow-billed cuckoo (western) | *Coccyzus americanus* | FC; BLM;UT-SS Tier I; NV-P | Range: The western yellow-billed cuckoo occurs west of the continental divide in North America.<br><br>Habitat: The species breeds and forages in dense woodlands along riparian corridors in otherwise arid areas. It requires a multi-storied canopy, and dense, shrubby vegetation, adequate invertebrate prey, cover, and water. It constructs twig nests, in shrubs. | Wetlands: trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Utah county, Utah. It has also been documented within 5 miles of the reference line in Emery, Grand, Uintah, and Washington counties, Utah. The species is documented in Meadow Valley Wash in Lincoln County, Nevada. It is also a confirmed breeder along the Muddy River in Nevada. |
| Boreal owl | *Aegolius funereus* | USFS | Range: The boreal owl occurs from Alaska, south through the Rocky Mountains to northern New Mexico.<br><br>Habitat: The species breeds and forages in mature, high elevation (above 9,000 feet amsl) coniferous forests, interspersed with mature aspen stands for nesting cavities. It requires large areas of forested habitat. It nests in large woodpecker holes or natural cavities in trees. | Raptor: cavities | Regions I and II: Moderate. The species is documented within 5 miles of the reference line in Carbon County, Wyoming. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| Burrowing owl | *Athene cunicularia* | BLM; CO-ST; UT-SS Tier II | Range: The burrowing owl occurs from Canada, south through most of the western United States to central Mexico.<br><br>Habitat: The species breeds and forages in a wide variety of arid and semiarid environments, including grassland, desert, and shrub-steppe habitats, and agricultural areas. It generally nests in burrows excavated by small mammals, particularly prairie dogs and ground squirrels. | Raptor: burrow nester | Regions I, II, III, and IV: High. The species is documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, Moffat County, Colorado, throughout Utah, and in Clark and Lincoln counties, Nevada. |
| Flammulated owl | *Otus flammeoulus* | BLM; USFS | Range: The flammulated owl breeds from Canada, south through Washington, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, New Mexico, western Texas, and Mexico.<br><br>Habitat: The species breeds and forages in montane forests, especially ponderosa pine where it feeds on moths. It nests in cavities, especially abandoned woodpecker holes. | Raptor: cavities | Regions I and II: Moderate. The species is known to occur in Colorado, Utah, and Nevada. Suitable habitat occurs in Rio Blanco County, Colorado, Daggett, Sevier, and Uintah counties, Utah, and Carbon County, Wyoming. It has been documented within 1 mile of the reference line. No suitable habitat for the flammulated owl is crossed by the project alternatives in Region III. |
| Long-eared owl | *Asio otus* | BLM | Range: The long-eared owl occurs from southern Canada through most of the United States, except in the southeast.<br><br>Habitat: The species breeds and forages in dense, woody vegetation for roosting, and open country for hunting. It nests in abandoned corvid nests in trees or brush. | Raptor: trees | Regions I, II, III, and IV: Low. The species is known to occur in Wyoming, Colorado, Utah, and Nevada. Suitable habitat occurs along the 2-mile transmission line corridor. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| Short-eared owl | *Asio flammeus* | BLM; UT-SS Tier II | Range: The short-eared owl occurs from Alaska and Canada, south to central California and east to Maryland.<br><br>Habitat: The species breeds and forages in broad expanses of open habitat, with dense, low vegetation, including grasslands, meadows, marshes, and open sagebrush shrublands. It is strongly associated with ungrazed and undisturbed native grasslands and wetlands that support dense small mammal populations. It constructs a grass nest in low vegetation. | Raptor: ground nester | Regions I, II, and III: High. The species is documented within the 2-mile transmission line corridor in Millard County, Utah and Carbon and Sweetwater counties, Wyoming. It has also been documented within 5 miles of the reference line in Beaver, Juab, and Uintah counties, Utah. |
| Black swift | *Cypseloides niger* | BLM; UT-SS Tier II | Range: The black swift occurs in scattered colonies throughout western North America, from southeast Alaska to central Mexico.<br><br>Habitat: The species breeds and forages in a variety of habitats, foraging far from nesting areas. It nests on vertical rock faces, near waterfalls, or in dripping caves. Nests are constructed of ferns and algae in small colonies. | Cliffs | Regions I and II: High. Nesting colonies are known to occur in Utah County, Utah. The species has been documented within the 2-mile transmission line corridor in Duchesne County, Utah. It has also been documented within 5 miles of the reference line in Uintah County, Utah. |
| Lewis's woodpecker | *Melanerpes lewis* | BLM; UT-SS Tier II | Range: The Lewis's woodpecker occurs from southern Canada, to south-central California and New Mexico.<br><br>Habitat: The species breeds and forages in open country with scattered trees, usually below 9,000 feet amsl. Habitat includes open ponderosa pine forests, burned-out coniferous stands, riparian and oak woodlands, and deciduous forests. It excavates cavities for nests in trees. | Forests: cavities | Regions I, II and III: High. The species has been documented within the 2-mile transmission line corridor area in Juab and Utah counties, Utah. It has also been documented within the 2-mile transmission line corridor in Millard and Uintah counties, Utah. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| Red-naped sapsucker | *Sphyrapicus nuchalis* | BLM | Range: The red-naped sapsucker occurs from the Rocky Mountains, west to eastern California and Oregon, and from southern Canada to Arizona and New Mexico.<br><br>Habitat: The species breeds and forages in aspen, cottonwood riparian stands, and mixed aspen/coniferous forests from 5,000 to 9,000 feet amsl. It nests in tree cavities and exhibits some nest fidelity. | Forests: cavities | Regions I, II, III, and IV: Low. The species is known to occur in Wyoming, Colorado, Utah, and Nevada. |
| American three-toed woodpecker | *Picoides dorsalis* | BLM; USFS; UT-SS Tier II | Range: The American three-toed woodpecker occurs from Canada and Alaska, south through the Rocky Mountains to New Mexico.<br><br>Habitat: The species is a high elevation spruce-fir forest obligate. It breeds and forages in coniferous forests, particularly in burned and beetle killed areas where it scales off bark in search of prey. It nests in tree cavities. | Forests: cavities | Regions I and II: Moderate. The species has been documented within 5 miles of the reference line in Emery and Sevier counties, Utah. Suitable habitat is present within the 2-mile transmission line corridor in Wyoming, Colorado, and Utah. No suitable habitat for the American three-toed woodpecker is crossed by the project alternatives in Region III. |
| Bobolink | *Dolichonyx oryzivorus* | BLM; UT-SS Tier II | Range: The bobolink occurs from Canada, south to eastern Oregon, central Colorado, central Illinois, and western North Carolina.<br><br>Habitat: The species breeds and forages in large grassland expanses. It constructs a grass nest in a depression in wet meadows, flooded pastures, and fields. | Grasslands: ground nester | Regions I, II, and III: Moderate. The species has been documented within 5 miles of the reference line in Carbon County, Wyoming; Uintah County, Utah; and Moffat County, Colorado. Suitable habitat occurs within the 2-mile transmission line corridor in Wyoming, Colorado, and Utah. |
| Baird's sparrow | *Ammodramus bairdii* | BLM | Range: Baird's sparrow occurs from Canada south through the northern Great Plains.<br><br>Habitat: The species breeds and forages in shortgrass prairie. It constructs a ground nest in a depression. | Grasslands: ground nester | Region I: Low. This species may be found in grasslands and weedy fields in the Rawlins Field Office, but likely outside of the Special Status Bird Analysis Area. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
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| Brewer's sparrow | *Spizella breweri* | BLM | Range: The Brewer's sparrow occurs from southeastern Alaska south to southern California and southwestern Kansas.<br><br>Habitat: The species is a sagebrush obligate. It breeds and forages in sagebrush shrublands with abundant, scattered shrubs and short grasses. It constructs a nest of grass, forbs, and roots in a shrub or low tree. | Shrublands: shrubs/trees | Regions I, II, and III: High. The species has been documented within the 2-mile transmission line corridor in Lincoln County, Nevada. It has been documented within 5 miles of the reference line in Carbon and Sweetwater counties, Wyoming. Suitable habitat occurs throughout the 2-mile transmission line corridor in Wyoming, Colorado, Utah, and Nevada. No suitable habitat for the Brewer's sparrow is crossed by the project alternatives in Region IV. |
| Grasshopper sparrow | *Ammodramus savannarum* | BLM; UT-SS Tier II | Range: The grasshopper sparrow occurs from Canada east to southern Maine, and south to southern California and central Georgia. The main population occurs in the Great Plains.<br><br>Habitat: The species breeds and forages in mid- and long-grass prairie, mixed grasslands, meadows, and open sagebrush-grasslands. It constructs a grass nest in a depression. | Grasslands: ground nester | Region I: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming. |
| Gray vireo | *Vireo vicinior* | BLM | Range: The gray vireo occurs in Arizona, New Mexico, Colorado, Utah, Nevada, and southern California.<br><br>Habitat: The species breeds and forages in hot, arid mountains, in desert scrub, pinyon-juniper, pine-oak scrub, and high plains scrubland. It constructs a deep, rounded grass nest, suspended in a forked twig in a shrub. | Shrublands: shrubs | Regions I, II, III, and IV: High. This species has been documented within the 2-mile transmission line corridor in Lincoln County, Nevada. It has been documented within 5 miles of the reference line in Moffat, and Rio Blanco counties, Colorado. Suitable habitat occurs throughout the 2-mile transmission line corridor in Utah and Nevada. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| Juniper titmouse | *Baeolophus griseus* | BLM | Range: The juniper titmouse occurs in western North America, from southern Oregon west to Wyoming, and south to Arizona, western Texas, and Mexico.<br><br>Habitat: The species breeds and forages in juniper woodlands interspersed with sagebrush and other shrubs. It nests in a natural cavity or in an abandoned woodpecker hole. | Woodlands: cavities | Region I and II: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, and Lincoln County, Nevada. Suitable habitat occurs throughout the 2-mile transmission line corridor in Colorado, Utah, and Nevada. No suitable habitat for the juniper titmouse is crossed by the project alternatives in Regions III and IV. |
| Loggerhead shrike | *Lanius ludovicianus* | BLM | Range: The loggerhead shrike occurs from south-central Canada, throughout the United States, and Mexico.<br><br>Habitat: In the western U.S., the species breeds and forages in arid, open country with scattered small trees and shrubs or hedgerows. It constructs a twig nest in a thorny tree or shrub. | Shrublands: shrubs/trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, and Lincoln County, Nevada. Suitable habitat occurs throughout the 2-mile transmission line corridor in Wyoming, Colorado, Utah, and Nevada. |
| Pinyon jay | *Gymnorhinus cyanocephalus* | BLM | Range: The pinyon jay occurs from central Oregon, Montana, and South Dakota, south to Baja California, Arizona, and New Mexico.<br><br>Habitat: The species breeds and forages in ponderosa pine savannah, pinyon-juniper, and montane shrublands. It constructs a bulky twig nest in a juniper or pine tree. | Woodlands: trees | Regions I, II, and III: High. The species has been documented within the 2-mile transmission line corridor in Lincoln County, Nevada. It is known to occur in Wyoming, Colorado, Utah, and Nevada. No suitable habitat for the pinyon jay is crossed by the project alternatives in Region IV. |
| Sage sparrow | *Amphispiza belii* | BLM | Range: The sage sparrow occurs from central Washington, east to northwestern Colorado and south to Baja California and northwestern New Mexico.<br><br>Habitat: The species is a sagebrush obligate. It breeds and forages in habitat with tall shrubs (3 to 6 feet tall) and low grass cover, and requires large blocks of unfragmented habitat. It constructs a twig nest in sagebrush. | Shrublands: shrubs | Regions I, II, and III: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, Moffat County, Colorado, and Lincoln County, Nevada. It has also been recorded within 5 miles of the reference line in Rio Blanco County, Colorado. Suitable habitat occurs throughout the 2-mile transmission line corridor in Wyoming, Colorado, Utah, and in Lincoln County, Nevada. |

| COMMON NAME | SCIENTIFIC NAME | STATUS[1] | RANGE AND HABITAT REQUIREMENTS | NESTING STRUCTURE | POTENTIAL FOR OCCURRENCE2 |
|---|---|---|---|---|---|
| Sage thrasher | *Oreoscoptes montanus* | BLM | Range: The sage thrasher occurs from Canada, south through the Great Basin, to Arizona and New Mexico.<br><br>Habitat: The species is a sagebrush obligate. It breeds and forages in habitat with tall shrubs (3 to 6 feet tall) and low grass cover. It constructs a bulky, twig nest in sagebrush. | Shrublands: shrubs | Regions I, II, and III: High. The species has been documented within the 2-mile transmission line corridor in Carbon and Sweetwater counties, Wyoming, and Lincoln County, Nevada. Suitable habitat occurs in Wyoming, Colorado, Utah, and in Lincoln County, Nevada. |
| Vesper sparrow | *Pooecetes gramineus* | BLM | Range: The vesper sparrow occurs from southern Canada to the Appalachian Mountains, along the Ohio River, and in much of the western United States.<br><br>Habitat: The species breeds and forages in a variety of open, grass habitats, including sagebrush steppe, meadows, pastures, and roadsides. It constructs a grass nest in a depression. | Grasslands: ground nester | Regions I, II, and III: Low. The species is known to occur in Wyoming, Colorado, Utah, and in Lincoln County, Nevada. |
| Yellow-breasted chat | *Icteria virens* | BLM | Range: The yellow-breasted chat occurs throughout the United States and northern Mexico.<br><br>Habitat: The species breeds and forages in riparian shrub and marshes below 7,000 feet amsl. It constructs a large leaf and weed nest in a deciduous shrub. | Woodlands: trees | Regions I, II, III, and IV: High. The species has been documented within the 2-mile transmission line corridor in Lincoln County, Nevada. It is known to occur in Wyoming, Colorado, Utah, and Nevada. |

[1]Status:
FE = Federally Endangered; FT = Federally Threatened; FC = Federal Candidate; FP = Federal Proposed; EXP/NE = Experimental Non-essential population; BLM = BLM Sensitive; USFS = USFS Sensitive; CO-E = Colorado State Endangered; CO-T = Colorado State Threatened; NV-P = Nevada State Protected; UT-SS = Utah Sensitive Species (Tier I and Tier II species are defined in Utah's Comprehensive Wildlife Strategy)

[2]Potential for Occurrence
High = The species is known to occur within suitable habitat within the 2-mile transmission line corridor.
Moderate = The species is known to occur within 5 miles of the study area and suitable habitat for the species occurs within the 2-mile transmission line corridor.
Low = The known geographic range of the species is within the 2-mile transmission line corridor.
None = The geographic range of the species is outside the 2-mile transmission line corridor.

# ATTACHMENT B
# AVIAN NEST AND INCIDENT REPORTING FORM

# Avian Nest Reporting Form

**Discoverer's Name**

**Discoverer's Phone Number**

**Date of Nest Discovery**

**Nest Location (circle one)** Tower/Pole Tree Shrub Ground

**Line Name, Voltage, and Closest Tower/Pole ID**

**Other Specific Location Information**

**Surrounding Habitat (circle all that apply)**

| | | |
|---|---|---|
| Agricultural | Chaparral/Shrubs | Desert Scrub |
| Disturbed/Developed | Grassland | Riparian |

**Nest Condition (circle one)** Active Inactive, Intact Inactive, Partial Deterioration Inactive, Heavy Deterioration

**Describe any Bird Signs Around the Nest (feathers, scat, prey remains)**

**Are Birds Present? (circle one)** Yes No

**Number of Birds Visible**

**Age of Bird(s) (circle all that apply)** Adult Juvenile Nestling Eggs Unknown

**Bird Species (if known)**

**Type of Bird (circle one if species unknown)**

Raptor (hawk, falcon, eagle) Owl Crow/Raven

Passerine (small bird) Unknown

**Risk to Birds/Construction (circle one)**

No Risk Potential Risk – Imminent Potential Risk – Not Imminent

**Additional Comments**

# ATTACHMENT C
# AVIAN INCIDENT REPORTING FORM

# Avian Incident Reporting Form

**Discoverer's Name**

**Discoverer's Phone Number**

**Date of Nest Discovery**

**Date of Incident/Discovery**

**Time of Incident/Discovery**

**Line Name, Voltage, and Tower/Pole ID**

**GPS Coordinates of Incident (if available)**

**Species (if known)**

**Type of Bird (circle one if species unknown)**

| | | |
|---|---|---|
| Raptor (hawk, falcon, eagle) | Owl | Crow/Raven |
| Passerine (small bird) | Waterfowl | Unknown |

**Number of Birds**

**Age of Bird(s) (circle all that apply)** Adult Juvenile Nestling Eggs Unknown

**Surrounding Habitat (circle all that apply)**

| | | |
|---|---|---|
| Agricultural | Chaparral/Shrubs | Desert Scrub |
| Disturbed/Developed | Grassland | Riparian |

**Type of Incident (circle one)** Injury Mortality

**Description of Incident**. Include condition of bird, circumstances of incident and cause of injury or mortality, and any damage or impacts to construction.

# APPENDIX C
# FRAMEWORK BLASTING PLAN

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## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| ATF | Bureau of Alcohol, Tobacco, Firearms, and Explosives |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CFR | Code of Federal Regulations |
| CIC | Compliance Inspection Contractor |
| COM Plan | Construction, Operation, and Maintenance Plan |
| DEIS | Draft Environmental Impact Statement |
| NESC | National Electrical Safety Code |
| NTP | Notice to Proceed |
| OSHA | Occupational Safety and Health Administration |
| Plan | Blasting Plan |
| POD | Plan of Development |
| PPE | Personal Protective Equipment |
| Project | TransWest Express Transmission Project, also TWE Project |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| USDOT | United States Department of Transportation |
| USFS | United States Forest Service |

# C1.0 INTRODUCTION

This framework Blasting Plan (Plan) outlines the contents, procedures, safety measures, and environmental protection measures that will go into a final Blasting Plan for the TransWest Express Transmission Project (TWE Project or Project) where blasting activities are required during construction. The final Blasting Plan will be prepared by the Construction Contractor(s) prior to construction of the Project. The TWE Project is being developed by TransWest Express LLC (TransWest or Applicant).

# C2.0 PLAN PURPOSE

The purpose of the Blasting Plan is to provide safe procedural practices, environmental protection measures, and other specific stipulations and methods to minimize the environmental impact of blasting during Project construction. The final Blasting Plan will provide construction crews, environmental monitors, and the Compliance Inspection Contractor (CIC) with Project-specific information concerning blasting procedures. The primary objective of this Plan is to prevent adverse impacts to human health and safety, property, and the environment that could potentially occur as a result of construction of the TWE Project. This Plan incorporates Best Management Practices (BMPs) and Mitigation Measures identified in the Draft Environmental Impact Statement (DEIS) for the TWE Project.

# C3.0 REGULATORY

The Construction Contractor(s) will be responsible for preparing and implementing the Blasting Plan in compliance with all local, state, and federal regulations pertaining to blasting. No blasting operations will be undertaken until approval and appropriate permits have been obtained from the applicable agencies. The Construction Contractor(s) will use qualified, experienced, and licensed professionals that will perform blasting using current and professionally accepted methods, products, and procedures to maximize safety during blasting operations.

# C4.0 BLASTING PLAN GUIDANCE

Prior to blasting, the Construction Contractor(s) will prepare a final Blasting Plan for review by the Bureau of Land Management (BLM), CIC, and any other relevant jurisdictional organization as applicable. The final Blasting Plan will address blasting operations and safety and include full details of the drilling and blasting patterns, as well as the procedures the Construction Contractor(s) proposes to use for both production and controlled blasting. If at any time changes are proposed to the final Blasting Plan, the Construction Contractor(s) will submit them to BLM and CIC for review. The following items should be addressed in a Blasting Plan:

1. Identify proposed methods to achieve the desired excavations using individual shot plants (where the explosives are planted).

2. Address the proposed methods for controlling fly rock, blasting warnings, and use of non-electrical blasting systems.

3. Map explosive storage locations and areas where blasting will occur, including identification of blasting within 0.25 mile of a known sensitive resource; as well as blasting in the vicinity of pipelines, and wells and springs that may be impacted.

4. Identify blasting procedures including safety, use, storage, and transportation of explosives that will be employed where blasting is needed, and will specify the locations of needed blasting.

5. All blasting will be performed by current registered licensed blasters who will be required to secure all necessary permits and comply with regulatory requirements in connection with the transportation, storage, and use of explosives, and blast vibration limits for nearby structures, utilities, and wildlife.

6. Appropriate flags, barricades, and warning signals will be used to ensure safety during blasting operations. Blast mats will be used when needed to prevent damage and injury from fly rock.

7. Blasting near buildings, structures, and other facilities susceptible to vibration or air blast damage will be carefully planned by the contractor and controlled to eliminate the possibility of damage to such facilities and structures. The Blasting Plan will include provisions for control to eliminate vibration, fly rock, and air blast damage.

8. Blasting in the vicinity of pipelines will be coordinated with the pipeline operator, and will follow operator-specific procedures, as necessary.

9. Damages that result from blasting will be repaired or the owner fairly compensated.

## C5.0 BLASTING PLAN CONTENTS

The Blasting Plan will include at a minimum the following information:

1. Blast officer
    a. Other personnel who will be present
2. Site and location of planned blasting
    a. Date of planned blasting
3. Environmental protection Measures
4. Safety Considerations
5. Explosives
    a. Type
    b. Quantity
    c. Detonator device
6. Means of transporting explosives
    a. Provisions for storing and securing explosives on site
7. Minimum acceptable weather conditions
    a. If electrical initiation to be used – considerations for stray radio frequency energy and electrical currents
8. Procedures
    a. Handling explosive charges
    b. Setting explosive charges

c. Wiring explosive charges

d. Firing explosive charges

9. Required Personal Protective Equipment (PPE)
10. Minimum standoff distances
    a. Procedures for clearing and controlling access to blast danger
11. Procedures for handling misfires or other unusual occurrences
12. Emergency action plan
    a. Phone numbers
        i. Ambulance
        ii. Fire department
        iii. Police
    b. Location and phone number of nearest medical services facility
    c. Actions to be taken when a person is injured
13. Attach a copy of material safety data sheet for each explosive or other hazardous material expected to be used

# C6.0 SAFETY MEASURES

## C6.1 Transportation

Transportation of explosives will comply with all applicable federal, state, and local laws, including Title 49 of the Code of Federal Regulations (CFR), Chapter III. These regulations are administered by the U.S. Department of Transportation (USDOT) and govern the packaging, labeling, materials compatibility, driver qualifications, and safety of transported explosives. In general, these regulations require vehicles carrying explosive materials must be well-maintained, properly marked with placards, and have a non-sparking floor. Materials in contact with the explosives will be non-sparking, and the load will be covered with a fire- and water-resistant tarpaulin. Vehicles also must be equipped with fire extinguishers and a current copy of the USDOT and Transport Canada's 2012 *Emergency Response Guidebook*. Every effort will be made to minimize the transportation of explosives through congested or heavily populated areas.

Prior to loading an appropriate vehicle for carrying explosives, the vehicle shall be fully fueled and inspected to ensure its safe operation. Refueling of vehicles carrying explosives shall be avoided. Smoking shall be prohibited during the loading, transporting, or unloading of explosives. In addition, the following specific restrictions apply to transport of other items in vehicles carrying explosives:

- Tools may be carried in the vehicle, but not in the cargo compartment.
- Detonation devices can, in some cases, be carried in the same vehicle as the explosives, but they must be stored in a specially constructed compartment(s).
- Batteries and firearms shall never be carried in a vehicle with explosives.
- Vehicle drivers must comply with the specific laws related to the materials being transported.

- Vehicles carrying explosives shall not be parked or left unattended except in designated parking areas with approval of the State Fire Marshall. When traveling, vehicles carrying explosives will avoid congested areas to the maximum extent possible.

## C6.2 Storage

Explosives must be stored in an approved structure (magazine) and kept cool, dry, and well-ventilated. The Construction Contractor will provide the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Cheyenne Wyoming, Denver Colorado, Salt Lake City Utah, and Las Vegas Nevada Field Offices with a list of dates and locations for the explosives and blasting agent storage facilities to be used on the Project at least 14 days before the establishment of such storage facilities.

At a minimum, the following storage requirements will be implemented:

- Explosives must be stored in an approved structure (magazine), and storage facilities will be bullet-resistant, weather-resistant, theft-resistant, and fire-resistant.
- Magazine sites will be located in remote (out-of-sight) areas with restricted access; kept cool, dry, and well ventilated; and will be properly labeled and signed.
- Detonators will be stored separately from other explosive materials.
- The most stringent spacing between individual magazines will be determined according to the guidelines contained in the ATF publication or state or local explosive storage regulations.
- Both the quantity and duration of temporary on-site explosives storage will be minimized.
- The Construction Contractor will handle and dispose of dynamite storage boxes in accordance with relevant federal, state, and local laws.

## C6.3 Fire Safety

The presence of explosive materials on the Project site could potentially increase the risk of fire during construction. Special precautions will be taken to minimize this risk in conjunction with Appendix H - Fire Protection Plan, including but not limited to:

- Prohibiting ignition devices within 50 feet of explosives storage areas;
- Properly maintaining magazine sites so they are clear of fuels and combustible materials, well ventilated, and fire-resistant;
- Protecting magazines from wildfires that could occur in the immediate area;
- Posting fire suppression personnel at the blast site during high fire danger periods; and
- Prohibiting blasting during extreme fire danger periods.

# C7.0 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

In addition to applicable design and operational standards, regulations, laws and permit requirements, the following design features and BMPs have been developed to avoid or minimize potential blasting

related impacts. Note that the Construction, Operation and Maintenance (COM) Plan will be a part of the Notice to Proceed (NTP) Plan of Development (POD).

**TWE-51:** The TWE Project will be designed, constructed, and operated to meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) standards, and the Applicant's requirements for safety and protection of landowners and their property.

**TWE-53:** The Construction, Operation and Maintenance (COM) Plan will include a Blasting Plan, which will identify methods and mitigation measures to minimize the effects of blasting, where applicable. The Blasting Plan will document the proposed methods to achieve the desired excavations, proposed methods for blasting warning, use of non-electrical blasting systems, and provisions for controlling fly rock, vibrations, and air blast damage.

**TWE-56:** As part of the COM Plan, the Applicant will provide a Health and Safety Plan, which will outline measures to protect workers and the general public during construction, operation, and decommissioning of the TWE Project. The Plan will identify applicable federal and state occupational safety standards, establish safe work practices, and define safety performance standards.

**TWE-64:** The COM Plan will include a Fire Protection Plan. The Applicant or its Contractor(s) will notify the BLM of any fires and comply with all rules and regulations administered by the BLM and U.S. Forest Service (USFS) concerning the use, prevention, and suppression of fires on federal lands, including any fire prevention orders that may be in effect at the time of the permitted activity. The Applicant or its Contractor(s) may be held liable for the cost of fire suppression, stabilization, and rehabilitation. In the event of a fire, personal safety will be the first priority of the Applicant or its Contractor(s). The Applicant or its Contractor(s) will:

- Operate all internal and external combustion engines on federally-managed lands per 36 CFR Part 261.52(j), which requires all such engines to be equipped with a qualified spark arrester that is maintained and not modified;

- Carry shovels, water, and fire extinguishers that are rated at a minimum as ABC-10 pound on all equipment and vehicles. If a fire spreads beyond the suppression capability of workers with these tools, all workers will cease fire suppression action and leave the area immediately via pre-identified escape routes;

- Initiate fire suppression actions in the work area to prevent fire spread to or on federally-administered lands. If fire ignitions cannot be prevented or contained immediately, or it may be foreseeable that a fire would exceed the immediate capability of workers, the operation must be modified or discontinued. No risk of ignition or re-ignition will exist upon leaving the operation area;

- Notify the appropriate fire center immediately of the location and status of any escaped fire;

- Review weather forecasts and the potential fire danger prior to any operation involving potential sources of fire ignition from vehicles, equipment, or other means. Prevention measures to be taken each work day will be included in the specific job briefing. Consideration will be given to additional mitigation measures or temporary discontinuance of the operation during periods of extreme winds or dryness;

- Operate all vehicles on designated roads vehicle parking to be restricted to areas free of vegetation on roads or within the permitted ROW and designated work areas.;

- Operate welding, grinding, or cutting activities in areas cleared of vegetation within range of the sparks for that particular action. A spotter will be required to watch for ignitions; and

- Use only diesel-powered vehicles in areas where excessive heat from vehicle exhaust systems could start brush or grass fires.

Additional BMPs and Mitigation Measures identified in the Draft EIS are listed below. The identified BMPs and Mitigation Measures have not been finalized at this time and may be updated, changed, or eliminated in future revisions of this Plan.

**PHS-1:** The applicant shall prepare an explosives use plan that specifies the times and meteorological conditions when explosives will be used and specifies minimum distances from sensitive vegetation and wildlife or streams and lakes.

**PHS-2:** If blasting or other noisy activities are required during the construction period, the applicant must notify nearby residents in advance.

**PHS-4:** A health and safety program shall be developed by the applicant to protect both workers and the general public during construction, operation, and decommissioning of an energy transport project. The program should identify all applicable federal and state occupational safety standards, establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses, OSHA standard practices for safe use of explosives and blasting agents, measures for reducing occupational electromagnetic field exposures), and define safety performance standards (e.g., electrical system standards). The program should include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies should be established.

**AIR-2:** To minimize fugitive dust generation, the applicant shall water land before and during surface clearing or excavation activities. Areas where blasting will occur should be covered with mats.

**WAT-1:** Blasting activities will be avoided or minimized in the vicinity of sole source aquifer areas to reduce the risk of releasing sediments or particles into the groundwater and inadvertently plugging water supply wells.

**NOISE-1:** The applicant shall limit noisy construction activities (including blasting) to the least noise-sensitive times of day (i.e., daytime only between 7 a.m. and 10 p.m.) and weekdays.

# APPENDIX D
# FRAMEWORK CULTURAL RESOURCES PROTECTION AND MANAGEMENT PLAN

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## ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| AHPA | Archaeological Historic Preservation Act of 1974 |
| AIRFA | American Indian Religious Freedom Act of 1978 |
| Applicant | TransWest Express LLC, also TransWest |
| ARPA | Archaeological Resources Protection Act of 1979 |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| CFR | Code of Federal Regulations |
| CRS | Colorado Revised Statutes |
| NAGPRA | Native American Grave Protection and Repatriation Act of 1990 |
| NHPA | National Historic Preservation Act |
| NPS | National Park Service |
| NRS | Nevada Revised Statutes |
| NTP | Notice to Proceed |
| PA | Programmatic Agreement |
| Plan | Cultural Resources Protection and Mitigation Measures Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| Reclamation | Bureau of Reclamation |
| ROD | Record of Decision |
| ROW | right-of-way |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| U.S.C. | United States Code |
| UCA | Utah Code Annotated |
| USFS | United States Forest Service |
| USFWS | United State Fish and Wildlife Service |
| Western | Western Area Power Administration |
| WS | Wyoming Statutes |

# D1.0 INTRODUCTION

This framework Cultural Resources Protection and Management Plan (Plan) outlines the contents, procedures, and environmental protection measures that will be taken by TransWest Express LLC (TransWest or Applicant) and its Construction Contractor(s) for the TransWest Express Transmission Project (TWE Project or Project). This Plan is largely related to the development of a Programmatic Agreement (PA) between TransWest and various agencies and consulting parties.

# D2.0 PLAN PURPOSE

The Bureau of Land Management (BLM) has determined that issuance of the right-of-way (ROW) grant for the TWE Project and related authorizations is an undertaking as defined at 36 Code of Federal Regulations (CFR) 800.16(y) that triggers the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA Section 106) on affected federal and non-federal lands during the planning, construction, operation, maintenance and decommissioning of the Undertaking. For purposes of the Undertaking, the BLM Wyoming State Office is lead federal agency for compliance with NHPA Section 106 on behalf of the involved federal agencies. Because the effects on historic properties are multi-state in scope and cannot be fully determined prior to approval of the Undertaking, the BLM, in consultation with the Consulting Parties has determined to use a phased process to identify historic properties (36 CFR 800.4(b)(2)) and assess the effects on those properties (36 CFR 800.5(a)(3)); such that completion of the identification and evaluation of historic properties, determinations of effect on historic properties, and consultation concerning measures to avoid, minimize, or mitigate any adverse effects will be carried out in phases as part of planning for and prior to any Notice to Proceed (NTP) and Undertaking implementation. Therefore, the BLM has determined that a PA documenting the terms and conditions for compliance with Section 106 will be entered into among Consulting Parties according to 36 CFR 800.14(b)(1)(ii).

Signatories to the PA include the BLM, Western Area Power Administration (Western), the United States Forest Service (USFS), the National Park Service (NPS), the Bureau of Reclamation (Reclamation), the Bureau of Indian Affairs (BIA), the U.S. Fish and Wildlife Service USFWS), the U.S. Army Corps of Engineers (USACE) - Sacramento District, the Advisory Council On Historic Preservation (ACHP), the Wyoming State Historic Preservation Officer, the Colorado State Historic Preservation Officer, the Utah State Historic Preservation Officer, and the Nevada State Historic Preservation Officer. TransWest is an Invited Signatory to the PA. Tribes and other interested parties may be Concurring Parties to the PA.

Execution and implementation of the PA satisfies the federal agencies' Section 106 responsibilities for the Project. As an Invited Signatory, TransWest has certain responsibilities under the PA and will comply with the terms and conditions of the PA.

# D3.0 PLAN UPDATES

This Plan will be updated for the NTP Plan of Development (POD) once the PA is signed and the selected Agency Preferred Alternative is identified. Other plans that may be developed related to the protection and management of cultural resources, such as a Historic Properties Treatment Plan, Monitoring Plan, or Unanticipated Discovery Plan, will be incorporated into the PA as they become available.

# D4.0 REGULATORY REQUIREMENTS

The TWE Project will require the issuance of ROW grants and special use authorizations; and therefore, qualifies as a federal Undertaking and must comply with Section 106 of the NHPA. Other federal and state laws concerning the protection of cultural resources that must be complied with include:

- American Indian Religious Freedom Act of 1978 (AIRFA) (42 United States Code [U.S.C.] §1996)
- Antiquities Act of 1906 (16 U.S.C. §431-433)
- Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. §470 aa-mm)
- Archeological and Historic Preservation Act of 1974 (AHPA) (16 U.S.C. §469)
- Federal Cave Resource Protection Act of 1988 (16 U.S.C. §4301)
- National Trails System Act of 1968, as amended (16 U.S.C. §§1241-1249)
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S.C. §3001)
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 13007, Indian Sacred Sites
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
- Executive Order 13287, Preserve America
- Wyoming Antiquities Act of 1935 (Wyoming Statutes [WS] 35-1-114 to 116)
- Wyoming State Archaeologist Statute, 1967 (WS 36-4-106)
- Colorado Historical, Prehistorical, and Archaeological Resources Act of 1973 (Colorado Revised Statutes [CRS] 24-80-401 to 410)
- Colorado Unmarked Human Graves (CRS 24-80-1301 to 1305)
- Utah State Antiquities Act (Utah Code Annotated [UCA] 9-8-301 to 308)
- Utah Native American Grave Protection and Repatriation Act (UCA R456-1-1 to 17)
- Utah Heritage and Arts, History (UCA Title R455)
- Utah Protection of Human Remains (UCA 76-9-704)
- Utah Ancient human remains on nonfederal lands that area not state lands (UCA 9-8-309)
- Utah Archaeological Vandalism Statutes 76-6-901, 76-6-902, 76-6-903
- Nevada Preservation of Prehistoric and Historic Sites (Nevada Revised Statutes [NRS] 381.195 to 381.227)
- Nevada Protection of Indian Burial Sites (NRS 383.150, NRS 383.190)
- Nevada Protection of Historic and Prehistoric Sites (NRS 383,400-440)

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## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CFR | Code of Federal Regulations |
| COM Plan | Construction, Operation, and Maintenance Plan |
| CWA | Clean Water Act |
| DEIS | Draft Environmental Impact Statement |
| EPA | United States Environmental Protection Agency |
| FLPMA | Federal Land Policy and Management Act of 1976 |
| mph | miles per hour |
| NDEP | Nevada Division of Environmental Protection |
| NPDES | National Pollutant Discharge Elimination System |
| NTP | Notice to Proceed |
| Plan | Dust Control and Air Quality Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| ROD | Record of Decision |
| ROW | right-of-way |
| SWPPP | Stormwater Pollution Prevention Plan |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| U.S.C. | United States Code |
| USACE | United States Army Corps of Engineers |
| WDEQ | Wyoming Department of Environmental Quality |

# E1.0 INTRODUCTION

This framework Dust Control and Air Quality Plan (Plan) to be implemented by TransWest Express LLC (TransWest or Applicant) and its Construction Contractor(s) addresses regulatory compliance, environmental concerns, mitigation recommendations, and monitoring. This Plan will be utilized for the construction of the TransWest Express Transmission Project (TWE Project or Project) to ensure impacts associated with construction activities are minimized as they relate to soil conservation and air quality.

# E2.0 PLAN PURPOSE

This Plan provides measures to be utilized by TransWest and its Construction Contractor(s) to ensure protection of the soils and air quality that will be affected by the Project. This Plan is to be implemented during the construction, operation, and maintenance phases of the Project. These measures are intended to: 1) address soil erosion and sedimentation; and 2) minimize dust and air emissions from construction-related activities. This document provides direction for the detailed final Dust Control and Air Quality Plan to be developed by the Construction Contractor(s).

# E3.0 PLAN UPDATES

This Plan will be updated for the Record of Decision (ROD) Plan of Development (POD) based on the selected Agency Preferred Alternative and preliminary engineering and design. Mitigation measures will also be updated if required. The Plan for the Notice to Proceed (NTP) POD will include updates as required based on final design and engineering. The Construction Contractor(s) will be responsible for preparing and implementing the final Plan in compliance with all local, state, and federal regulations pertaining to air quality.

# E4.0 REGULATORY

Construction, operation, and maintenance activities for the Project are subject to various regulations designed to protect environmental resources and the public from erosion, dust, and other possible effects to air quality. The following federal, state and local permits and documents are required for preventing accelerated erosion and minimizing dust and air emissions. These documents should be referred to along with this Plan, when assessing which mitigation measures are appropriate for a specific area. At a minimum, TransWest and the Construction Contractor(s) will need to adhere to or obtain the following permits, as applicable:

## E4.1 Federal Permits

- BLM – Right-of-way (ROW) grant and temporary use permit: Federal Land Policy and Management Act of 1976 (FLPMA) (Public Law 94-579); 43 United States Code (U.S.C.) §§1761-1771; 43 Code of Federal Regulations (CFR) Part 2800

- U.S. Army Corps of Engineers (USACE) – Clean Water Act (CWA), Section 401: CWA (33 U.S.C. §1344)

- U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit

## E4.2 State Permits

- Wyoming Department of Environmental Quality (WDEQ) – Air Quality Division Construction Permit to control fugitive dust emissions during construction.

- WDEQ – Sections 401, 402, and 404, CWA, Water Quality Certification (State implementation of the USACE permits for water quality and stormwater discharges).

- Colorado Department of Public Health and Environment, Water Quality Control Division- Stormwater Permit.

- Utah Department of Environmental Quality, Air Quality Board- Notice of Construction.

- Nevada Division of Environmental Protection (NDEP) - Stormwater Pollution Prevention Plan (SWPPP), Water Quality Certification.

- NDEP Bureau of Air Pollution Control - Authority to construct, permit to operate.

## E4.3 Local Permits

- Clark County, Department of Air Quality and Environmental Management - Dust Control Permit, Stationary Source Permit.

- County conditional use permits, temporary use permits for staging areas, road crossing permits and/or encroachment permits. May have erosion or air quality considerations. Requirements vary by county.

# E5.0 AIR QUALITY AND DUST CONTROL

Soil conservation for the Project includes minimizing impacts that will affect soils from the construction and operation of the Project, such as minimizing wind and water erosion, surface disturbance, and construction activities in highly erodible soils. Erosion potential is the result of several factors including slope, vegetation cover, climate, and the physical and chemical characteristics of the soil. Increased soil erosion may occur when vegetation is removed during construction, or in areas where the surface is disturbed by heavy equipment. Wind is also an erosion factor throughout portions of the Project area.

Where disturbance is anticipated in areas of steep terrain with high potential for erosion, vegetation clearing and grading will be conducted in a manner to minimize these effects. Soil stabilization and reclamation practices will also be implemented to reduce erosion. In areas of soil disturbance or compaction (e.g., temporary work areas) soil treatment and reclamation will be implemented as directed in Appendix Q –Framework Reclamation Plan.

Construction of the Project may cause a temporary and minimal increase in fugitive dust. Ambient levels of nitrogen oxides, hydrocarbons, and carbon monoxide near the construction zone may also be temporarily increased due to emissions from heavy construction equipment. Related facilities may cause a minimal increase in fugitive dust.

Air quality control measures are intended to minimize fugitive dust and air emissions, and to maintain conditions as free from air pollution where practical. All requirements of those entities having jurisdiction over air quality matters will be adhered to, and any permits needed for construction activities will be obtained. The Construction Contractor(s) will not proceed with any construction activities without taking reasonable precautions to prevent excessive particulate matter from becoming airborne and creating nuisance conditions.

Excessive exhaust emissions from vehicles and heavy equipment will be prevented by proper maintenance, and no open burning of construction trash or other open fires will be allowed.

Where necessary, water may be used as Bureau of Land Management (BLM) approved dust control methods during construction, including the grading of roads or the clearing of vegetation in the ROW, and will be applied on unpaved roads, material stockpiles, and other surfaces, which can create airborne dust. Where application of water is not possible, material stockpiles will be enclosed or covered. In addition, open bodied trucks transporting materials likely to become airborne will be covered. Soil tracks or other materials that may become airborne will promptly be removed from paved roads. Techniques to minimize and control dust during rock blasting operations can be found in Appendix C – Blasting Plan Framework.

# E6.0 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

In addition to applicable design and operational standards, regulations, laws and permit requirements, the following design features and Best Management Practices (BMPs) have been identified to avoid or minimize potential air quality related impacts. Note that the Construction, Operation and Maintenance Plan will be a part of the NTP POD.

**TWE-21**: The Applicant will obtain an NPDES from the USEPA prior to construction.

**TWE-47**: The Construction, Operation and Maintenance (COM) Plan will include a Dust Control and Air Quality Plan. Requirements of those entities having jurisdiction over air quality matters include ensuring the regulations are adhered to and dust control measures will be developed. Open burning of construction trash will not be allowed unless permitted by appropriate authorities.

**TWE-48**: The contractor and subcontractors will be required to have and use air emission control devices on construction machinery, as required by federal, state and local regulations or ordinances.

**TWE-53**: The COM Plan will include a Blasting Plan, which will identify methods and mitigation measures to minimize the effects of blasting, where applicable. The Blasting Plan will document the proposed methods to achieve the desired excavations; proposed methods for blasting warning; use of non-electrical blasting systems; and provisions for controlling fly rock, vibrations, and air blast damage.

Additional BMPs and Mitigation Measures identified in the Draft Environmental Impact Statement (DEIS) are listed below. The identified BMPs and Mitigation Measures have not been finalized at this time and may be updated, changed, or eliminated in future revisions of this Plan.

**SS-7:** The Dust Control and Air Quality Plan will include dust abatement measures to minimize impacts to special status plant species. This includes slower speed limits on unpaved roads, using gravel for roads in occupied habitat and avoidance areas, and the application of water for dust abatement.

**SSS-1:** (Water Use): No new surface water or groundwater withdrawals that are hydrologically connected to streams containing Colorado River cutthroat trout and Bonneville cutthroat trout would be allowed. Any water necessary for construction, operation, or maintenance (including dust abatement) would not be acquired from existing water sources.

**AIR-1**: The Applicant shall cover construction materials and stockpiled soils if these are sources of fugitive dust.

**AIR-2**: To minimize fugitive dust generation, the Applicant shall water land before and during surface clearing or excavation activities. Areas where blasting would occur should be covered with mats.

**AIR-3**: Dust abatement techniques (e.g., water spraying) shall be used by the Applicant on unpaved, unvegetated surfaces to minimize airborne dust. Water for dust abatement should be obtained and used by the Applicant under the appropriate state water use permitting system. Used oil will not be used for dust abatement.

**AQ-1**: In Region II, the Alternative B transmission line route passes within about 10 miles of Arches National Park. No concrete batch plants would be located within 30 miles of Arches National Park; therefore, concrete required for structure foundations should be acquired from local sources in the vicinity of Moab.

**AQ-2:** In Region III, the Proposed Action (Alternative A) passes within about 20 miles of Zion National Park. No concrete batch plants would be located within 30 miles of Zion National Park; therefore, concrete required for structure foundations should be acquired from local sources in the vicinity of Cedar City or St. George, Utah.

**AQ-3**: The Clark County nonattainment area is located in both Region III and Region IV. No new concrete batch plants are to be located within the nonattainment area; concrete required for structure foundations and other construction are to be acquired from existing local vendors.

**PHS-1**: The Applicant shall prepare an explosives use plan that specifies the times and meteorological conditions when explosives will be used and specifies minimum distances from sensitive vegetation and wildlife or streams and lakes.

The following dust and air control measures were identified in the main body of the DEIS.

- Predict future impacts from externally initiated actions prior to approval of those actions. Comply with all applicable local, state, and federal regulations to limit air quality degradation;
- Reduce vehicle speeds on native surfaced roads (e.g., 15 miles per hour [mph])
- Restrict surface disturbing activities to periods when wind speeds are less than 25 mph.
- To minimize fugitive dust, the Applicant shall cover, at all times when in motion, open bodied trucks, transporting materials likely to give rise to airborne dust; and

# APPENDIX F
# FRAMEWORK EMERGENCY PREPAREDNESS AND RESPONSE PLAN

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## ACRONYMS

| | |
|---|---|
| ACGIH | American Conference of Industrial Hygienists |
| AMA | American Medical Association |
| ANSI | American National Standards Institute |
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| CIC | Compliance Inspection Contractor |
| CSA | Council on Scientific Affairs |
| NESC | National Electrical Safety Code |
| NTP | Notice to Proceed |
| OSHA | Occupational Safety and Health Administration |
| Plan | Emergency Preparedness and Response Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| ROD | Record of Decision |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |

# F1.0 INTRODUCTION

This framework Emergency Preparedness and Response Plan (Plan) provides an overview of methods to be implemented by TransWest Express LLC (TransWest or Applicant) and it Construction Contractor(s) if the need for emergency management is necessary during the construction and operation and maintenance of the TransWest Express Transmission Project (TWE Project or Project). This document discusses the existing support structure, chain of command, and emergency communication protocols to be used as a guide for a Plan to be completed by TransWest, and its Construction Contractor(s) and approved by the Bureau of Land Management (BLM). More specific emergency procedures for blasting, fire, and hazardous materials are included in Appendices C – Blasting Plan Framework, H– Fire Protection Plan, and L – Hazardous Materials Management Plan.

Emergency response procedures will be implemented for the following potential or similar events:

- Downed transmission lines, structures, or equipment failure
- Fires
- Sudden loss of power
- Natural disasters
- Serious personal injury

# F2.0 PLAN PURPOSE

The purpose of the Emergency Preparedness and Response Plan is to provide clear procedures and information to enable TransWest, the Construction Contractor(s), the Compliance Inspection Contractor (CIC), and BLM Project Manager(s) to prepare for and effectively respond to emergency situations. The primary objective of this Plan is to prevent adverse impacts to human health and safety, property, and the environment that could potentially occur as a result of the construction, operation and maintenance of the TWE Project.

# F3.0 PLAN UPDATES

This Plan will be updated for the Record of Decision (ROD) Plan of Development (POD) and will include appropriate mitigation measures to ensure safety and regulation compliance. The updated Plan for the Notice to Proceed (NTP) POD will include a complete emergency contact list. The Construction Contractor(s) will be responsible for preparing and implementing this Plan in compliance with all local, state, and federal regulations pertaining to emergency response.

# F4.0 REGULATORY COMPLIANCE

Health and safety guidelines related to high-voltage transmission lines are provided by a number of sources, including the National Electric Safety Code (NESC), American National Standards Institute (ANSI), American Conference of Governmental Industrial Hygienists (ACGIH), American Medical Association (AMA), Council on Scientific Affairs (CSA), various state regulation and other organizations. In addition, the Occupational Safety and Health Administration (OSHA) provides regulations for construction activities.

# F5.0 RESPONSIBILITIES

TransWest and the Construction Contractor(s) are responsible for the effective response to any emergency situation or event related to the construction, operation and maintenance of the TWE Project. To ensure a coordinated and effective response, a chain of command will be developed as part of this Plan and followed in the event of an emergency.

In the establishment of a chain of command, considerations such as the level of activation and the participation necessary to respond to specific situations are to be taken into account. The following are factors for the establishment of a chain of command:

- Type of event (natural, environmental, electrical supply/outage, external forces)
- Severity and geographic area (multiple or combination of events)
- Anticipated duration
- Multi-division/discipline response required
- External agency coordination

# F6.0 RESPONSE COORDINATION

The amount of resources and coordination required for response to a specific hazard or emergency is determined by type, severity, location and duration of the event. Most events require managing at the field operations level and will require increasing resource requirements to match the severity and duration of the event. This emergency management organization will be included as part of this Plan and will provide increasing levels of resources and the coordination necessary to support immediate or escalating emergency events.

In the event of an emergency, crews will be dispatched quickly to repair or replace any damaged equipment. Public health and safety and the health and safety of workers will have priority under emergency conditions. Repair of the transmission line and restoration of electric service is a public health and safety concern and will proceed as rapidly as possible under the circumstances. All reasonable efforts will be made to protect plants, wildlife and other resources. Reclamation procedures following completion of repair work will be similar to those prescribed during construction.

# F7.0 EMERGENCY COMMUNICATIONS

Effective communication and exchange of information is essential in every emergency response. Misdirected, incorrect, or untimely information can be detrimental and can increase the threat to life or property. As an emergency event escalates, the rapid increase of information creates chaos and confusion. Simple communication diagrams can help alleviate this situation and will be developed as part of the final Plan.

## F7.1 Emergency Contact

IN CASE OF EMERGENCY, ON-SITE PERSONNEL WILL CALL 911 FIRST. Additional potential emergency contacts are listed in Table F1 and should be called as appropriate, depending on the situation (e.g., fire, personal injury). The emergency contacts in Table F1 will be populated for the NTP POD when the selected Agency Preferred Alternative is identified. Further guidance on

emergency response, notification and reporting protocols are included in Appendices C – Blasting Plan, H – Fire Protection Plan, and L – Hazardous Materials Management Plan.

This emergency contact list shall be verified at the beginning of construction and updated throughout the Project by the Construction Contractor(s) to ensure accurate contact information.

**TABLE F1 EMERGENCY CONTACT LIST**

| | | |
|---|---|---|
| IN CASE OF EMERGENCY, CALL 911 | | |
| Fire – Call 911 first | | |
| Counties:<br>Primary Contact: TBD<br>Secondary Contact: TBD | BLM Field Offices: TBD<br>USFS Ranger Districts: TBD | State Interagency Fire Centers: TBD |
| Law Enforcement | | |
| County Sheriffs: TBD | State Highway Patrol: TBD | |
| Poison Control | | |
| National/State Poison Control Centers: TBD | | |
| Hospitals and Clinics | | |
| County and Municipal as Applicable: TBD | | |
| Hazardous Spill Response and Notification – Call 911<br>After 911 notification, the following mandatory notifications will be made by the Compliance Inspection Contractor. Select and notify the appropriate government agencies based on geographic location of the spill site. Also see Appendix L – Hazardous Materials Management Plan | | |
| Counties: TBD | State Divisions of Emergency Services and Homeland Security: TBD | National Response Center: TBD |
| State Departments of Environmental Quality: TBD | | |
| Other Numbers | | |
| County Fire Dispatch: TBD | BLM Authorized Officer or Representative: TBD | Construction Contractor Manager: TBD |

## F7.2 Hazard Identifications and Key Response Criteria

Construction activities for the Project can pose potential hazards or threats. The most effective response to any situation is awareness of the hazard, its potential effects and consequences, and an understanding of the resources and actions necessary to respond. Listing all the potential hazards and a detailed each response is not appropriated for this Plan. Reponses to different events may vary as the event evolves, but reasonable response methods and responsibilities will be determined in future updates to this Plan. Scenarios that may be considered are electrocution, fatality, massive equipment failure, structure failure, weather, environmental, etc.

# APPENDIX G
# FRAMEWORK ENVIRONMENTAL COMPLIANCE AND MONITORING PLAN

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## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| CFR | Code of Federal Regulations |
| CIC | Compliance Inspection Contractor |
| ECMP | Environmental Compliance and Monitoring Plan, also Plan |
| EMM | Environmental Mitigation Measure |
| FEIS | Final Environmental Impact Statement |
| NTP | Notice to Proceed |
| Plan | Environmental Compliance and Monitoring Plan, also ECMP |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| Reclamation | Bureau of Reclamation |
| ROD | Record of Decision |
| ROW | right-of-way |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| USFS | United States Forest Service |
| Western | Western Area Power Administration |
| WSO | Work Stoppage Order |

# G1.0 INTRODUCTION

This framework Environmental Compliance and Monitoring Plan (ECMP or Plan) provides an overview of how TransWest Express LLC (TransWest or Applicant) will manage compliance with all laws, regulations and agreements related to the TransWest Express Transmission Project (TWE Project or Project). This Plan may be updated, revised and changed as roles and responsibilities are further refined during the Project development process. More specifically, this Plan may be revised and changed following the issuance of the Records of Decision (RODs) for the Project by the Bureau of Land Management (BLM) and Western Area Power Administration (Western).

The BLM, the U.S. Forest Service (USFS), the Bureau of Reclamation (Reclamation) and other federal agencies issuing right-of-way (ROW) grants or special use authorizations on federal lands will be responsible for enforcement of the terms and conditions of those grants and authorizations. As the lead federal land management agency during construction of the Project, the BLM will engage a third-party Compliance Inspection Contractor (CIC) to act on behalf of the federal land management agencies to provide construction oversight and monitor compliance with the terms and conditions of the federal grants and authorizations.

# G2.0 PLAN PURPOSE

The ECMP is the primary guide for documentation and management of compliance with the federal grants and authorizations for the Project. This ECMP contains information on the following items:

- Roles and responsibilities of the Compliance Team
- Procedures for assessing Project compliance and process for implementing corrective actions
- Procedures for submitting, evaluating, and approving/denying variance requests
- Communications
- Training
- Reporting and documentation
- Project closeout

Because there is the potential for the Project to affect sensitive environmental resources, environmental mitigation measures (EMMs) have been developed to minimize potential impacts on these resources. The ECMP is intended to be a guidance document to facilitate compliance and the effective implementation of EMMs. As needed, the ECMP will be updated and revised.

As mentioned above, a third party CIC will be engaged by the BLM to enforce terms and conditions of the federal grants and authorizations. The CIC will be responsible for assuring that the Notice to Proceed (NTP) Plan of Development (POD) and all associated permitting documents have been distributed to the Compliance Team for their review prior to construction being initiated. The CIC will also review all environmental requirements with key construction managers and environmental monitors at the initial construction kickoff meeting. At that time a document control system, which may be used to manage the submittal and distribution of Project compliance information and documentation, may be presented and demonstrated. Environmental inspectors and monitors will also be retained by TransWest and/or by the Construction Contractor(s) to implement EMMs, provide specific resource monitoring, and to prepare daily reports on those construction activities monitored.

# G3.0 PLAN UPDATES

This ECMP will be updated for the ROD POD to include more specifically defined roles, responsibilities and procedures. The NTP POD will be completed by TransWest and will include fully defined roles, responsibilities and procedures as agreed to by TransWest and the federal agencies.

# G4.0 ROLES AND RESPONSIBILITIES

The following section describes the roles and responsibilities of the Compliance Team in executing the ECMP and describes their reporting relationships (Figure 3-1 to be developed for ROD POD). The Compliance Team includes the BLM and other federal agencies, CIC, TransWest, Construction Contractor(s), and Environmental inspectors and monitors. Subject to the requirements of the site health and safety plan, the Compliance Monitoring Team shall have access to all Project work areas to inspect construction and reclamation activities in accordance with the terms and conditions of the federal grants and authorizations. Access to work areas will not be unreasonably withheld provided that the members of the Compliance Monitoring Team have received all required safety training necessary to enter the work area.

## G4.1 Bureau of Land Management and Other Federal Agencies

The role of the BLM and other federal agencies is to ensure that all stipulations and requirements of the federal grants and authorizations are implemented and complied with during the construction, operation, and maintenance of the Project. Oversight will be provided by both federal Authorized Officers and by Project Managers for each federal agency. Authorized Officers will have ultimate authority and be the decision makers for issues pertaining to ROW grants and authorizations. The Authorized Officers will supervise the federal Project Managers to verify that environmental compliance is meeting the requirements of all applicable laws, permits, regulations, and agreements. The Authorized Officers, in coordination with others, will determine if noncompliance events for which TransWest is accountable qualify as violations to the terms and conditions of any ROW grant or authorization. Only the Authorized Officers, in accordance with 43 Code of Federal Regulations (CFR) Part 2807 and 36 CFR Part 251.60, will have the authority to suspend or terminate a ROW grant or authorization if TransWest and/or its Construction Contractor(s) do not comply with their stipulations, conditions, or with other applicable laws and regulations. The Authorized Officers will be the primary federal agent to issue decisions unless otherwise delegated to a federal Project Manager.

Federal Project Managers will be primarily responsible for enforcing TransWest's day-to-day compliance with environmental laws and regulations, the POD, and all stipulations and conditions of the federal grants and authorizations. They will ensure that compliance during construction is done in a manner which facilitates timely and efficient construction while protecting the public interest and the environment. They will also be responsible for ensuring that environmental impacts do not exceed those analyzed in the Final EIS and will manage the third-party CIC. Federal Project Managers will coordinate with agency resource specialists for their technical expertise and input when needed. Federal Project Managers will be responsible for notifying TransWest of any grant or authorization violations due to noncompliance, issuing work stoppage orders (WSOs) if needed, issuing work continuation notices (or lifting work stoppage orders) and enforcing corrective actions as needed. Non-compliance will be reported to the appropriate Authorized Officer(s). Each federal Project Manager will be responsible for maintaining an accurate and complete administrative record for their respective agency.

All Level 2 or Level 3 variance requests described in Section G5.3 below, will require approval by either the appropriate federal Project Manager or Authorized Officer.

## G4.2 Compliance Inspection Contractor

TransWest and the federal agencies will agree to use of a third-party CIC to act on the BLM and other federal agencies' behalf to ensure adequate oversight during the construction and reclamation phases of the Project. The CIC will report directly to each federal Project Manager and will be authorized to enforce the stipulations of the federal grants and authorizations. It is not the role of the CIC to direct the work of either TransWest or its Construction Contractor(s). Rather the CIC's primary role is to observe work activities and bring non-compliant situations to the attention of the appropriate party and offer recommendations on how to prevent or rectify non-compliance. Additional responsibilities of the CIC include:

- Track all Project construction disturbance by type and jurisdiction, for inclusion in an End of Construction Project Report.
- Report if construction disturbance exceeds levels analyzed in the Final Environmental Impact Statement (FEIS).
- Prepare and maintain a project compliance contact list containing the names, titles, phone numbers and email addresses of all federal Authorized Officers and federal Project Managers, TransWest Project Managers, Construction Contractor(s) field supervisors and construction managers, environmental inspectors, monitors and any other individuals or agencies who will be involved with environmental compliance for the Project.
- Prepare and distribute weekly summary report.
- Review all applicable environmental documents and requirements, including the FEIS, ROD, PODs, ROW grants, and special use authorizations.
- Maintain a complete copy of the NTP POD and associated environmental documents while in the field.
- Verify that construction occurs as outlined in the NTP POD, FEIS, ROD, ROW grants, special use authorizations, and NTPs.
- Perform compliance monitoring in areas of active construction or reclamation.
- Maintain records that assure all required environmental training of construction personnel has been conducted.
- Respond to inquiries by TransWest or its Construction Contractor(s) concerning environmental compliance.
- Discuss any potential compliance issues with Construction Contractor(s), environmental inspectors, and environmental monitors.
- Provide recommendations to federal Project Managers on ways to resolve or prevent non-compliance.
- At a minimum, meet weekly with the federal Project Managers (or designees), in person or by telephone, to review status of construction and compliance.
- Meet with TransWest and Construction Contractor(s) project managers, construction managers, environmental inspectors, or environmental monitors as needed.
- Support and coordinate the preparation, submittal, and review of all variance requests.
- Approve or deny Level 1 variance requests described below.

- Participate in and support Project safety.
- Work with TransWest and Construction Contractor(s) to support the Project's safe, timely, and effective construction.
- If warranted, issue an immediate temporary suspension or WSOs for any construction activity determined to be in non-compliance.
- Conduct field reviews and inspections with agency personnel as needed.
- Conduct a final route review and prepare End of Construction Project Report documenting the status of the ROW and the final amount of construction disturbance.
- Document completion of all reclamation activities (excluding reclamation monitoring).
- Document instances of non-compliance through mapping and photography and complete non-compliance report.
- Review environmental inspector and environmental monitor daily logs.
- Prepare meeting notes that highlight any decisions made during key project meetings.

The CIC will deploy an adequate number of field personnel to sufficiently monitor construction activities and fulfill the responsibilities listed above. It is important to note that it is not the role of the CIC to direct work of either TransWest or the Construction Contractor(s).

## G4.3 TransWest

TransWest will be the holder of all ROW grants, authorizations, and easements, both public and private. As such, TransWest is ultimately accountable for adherence to the environmental permit requirements and is responsible for ensuring that environmental impacts do not exceed those analyzed in the FEIS and approved in the ROD. To facilitate this goal, TransWest will employ environmental inspectors and monitors who will work with the Construction Contractor(s) and will support the efforts of the CIC. TransWest will also maintain regular and consistent communication with the Construction Contractor(s) to track the success of environmental protection, mitigation, and compliance efforts before, during, and after construction. TransWest is responsible for assuring that all instances of non-compliance are corrected.

## G4.4 Construction Contractor(s)

As part of TransWest's commitment to environmental compliance, the Construction Contractor(s) will be contractually bound to comply with all relevant laws, regulations, and permits, including the ECMP, POD, EMMs, and other specific stipulations set forth in the federal grants and authorizations. All construction personnel and employees entering work areas will be required to participate in environmental training before starting work. Construction crews will also be required to cooperate and support the work of the Compliance Team to build the Project safely and in compliance with all terms and conditions; federal, state, and local laws and regulations; and all landowner agreements. If a non-compliance event occurs, it will be the responsibility of the Construction Contractor(s) to notify TransWest and the CIC and to cooperate fully in developing and implementing a solution as soon as possible to resolve the non-compliance. The Construction Contractor(s) will be expected to involve the CIC in key Project management meetings and the Project safety program.

## G4.5 Environmental Inspectors and Monitors

TransWest and its Construction Contractor(s) will employ a team of environmental inspectors and monitors to monitor compliance with the federal grants and authorizations. The duties and responsibilities of the environmental inspectors and monitors will include:

- Daily inspections and monitoring of construction activities as required.
- Coordinate and communicate with the CIC.
- Support and participate in field inspections by federal agency personnel as needed.
- Deliver environmental training and provide CIC with a current list of all personnel who have received training.
- Confirm on the ground the location of sensitive resources and areas of concern prior to construction activities commencing.
- Verify that construction work areas, access roads, and sensitive resources or areas of concern have been properly marked and flagged prior to work commencing in those areas.
- Communicate and coordinate with construction crews and act as a resource to explain environmental regulations and requirements.
- Attend safety meetings.
- Prepare daily logs/reports to be provided to the CIC.
- Support the preparation of variance requests and review by the federal agencies and CIC.
- Inform Construction Contractor(s) and CIC of all potential and existing compliance issues and support implementation of corrective actions.
- Stop-work authority when construction activities violate the environmental conditions of the federal grants and authorizations or when sensitive resources are threatened.
- Participate in and support the implementation of corrective actions for non-compliance violations.
- Monitor, inspect, and document reclamation and revegetation activities as needed.

# G5.0 PROCEDURES

This section describes the procedures that will be followed to assess compliance levels, responses to non-compliance, and for the submittal, review, and tracking of variance requests.

## G5.1 Compliance Levels

Each separate activity that is inspected and documented in a daily report will be assigned one of the following compliance levels:

- Acceptable
- Problem area
- Non-compliance

Environmental inspectors, monitors, and the CIC will assess potential non-compliant activities based on the extent and nature of actual impacts on a resource, the potential for additional impacts on a

resource, the intent behind the action, and the history of the occurrence. Failure by TransWest or the Construction Contractor(s) to disclose in a timely manner or accurately characterize an impact will result in an automatic non-compliance and temporary suspension of work in the area where the impact has occurred. Each compliance level is described below.

### *G5.1.1 Acceptable*

All activities that are in compliance with the Project's federal grants and authorizations will be documented as acceptable.

### *G5.1.2 Problem Area*

A problem area is a location or activity that does not meet the definition of acceptable but no impacts to sensitive resources have occurred. Examples include:

- An incident that is accidental or unforeseeable, where no sensitive resources were damaged, is reported in a timely manner, and is repaired quickly.
- A location where the CIC, environmental inspector, or monitor has determined that damage to a sensitive resource could occur if corrective actions are not taken.
- Implementation of mitigation measures is occurring too slowly to be fully effective.

The Construction Contractor(s) will be notified of the problem area and it will be documented in the daily report, as well as the corrective actions that will be applied. If a problem area is corrected in a timely manner it will not be considered non-compliance. If a problem area is found to be a repeat situation, or has happened in multiple locations, or is not corrected within an agreed upon timeframe, the CIC, environmental inspector, or monitor may document the situation as non-compliance.

### *G5.1.3 Non-Compliance*

Non-compliance occurs when one or more of the following take place:

- Requirements or stipulations contained within the Project's federal grants or authorizations are not followed or implemented properly.
- Damage to sensitive resources has occurred.
- Problem areas consistently reoccur and threaten sensitive resources.
- Corrective actions for problem areas are not implemented.
- Construction Contractor(s) display direct disregard for Project requirements.

## G5.2 Responses to Non-Compliance

Depending on the circumstances of the non-compliance and if sensitive resources are threatened, the CIC may orally issue a temporary suspension of construction activities within a localized area. All non-compliance will be documented in a non-compliance report (see Attachment A). The non-compliance report will be prepared by the CIC based on personal observations or information provided by the environmental inspectors, monitors or other parties. In all cases when non-compliance occur the CIC will be informed immediately.

Once prepared, the CIC will provide a copy of the non-compliance report to TransWest, the Construction Contractor(s), and the applicable federal Project Manager(s). Upon review, the

appropriate federal Project Manager(s), in consultation with the Authorized Officer as needed, will direct the CIC to take one or more of the following actions:

- Work with the Construction Contractor(s) and TransWest to develop a written plan to address the cause of the non-compliance and actions to avoid its reoccurrence.
- Work with the Construction Contractor and TransWest to develop a written plan to repair any impacts to resources.
- Issue a temporary suspension to halt specific activities or all activities within in a localized work area.
- Issuance of a WSO to temporarily suspend all activities within a given construction area of the Project (requires written authorization by either the federal Project Manager or the Authorized Officer).
- ROW grant or authorization suspension (requires written authorization by the Authorized Officer).
- ROW grant or authorization termination (requires written authorization by the Authorized Officer).

In cases where construction activities have been halted, TransWest, the Construction Contractor(s), appropriate federal Project Manager (s), and the CIC will meet to discuss the corrective actions that must be implemented before work will be allowed to resume. Prior to any ROW grant or authorization suspension or termination, TransWest will be notified in writing and allowed a reasonable opportunity to correct any non-compliance pursuant to 43 CFR Part 2807.18(a), and if applicable, provided a hearing pursuant to 43 CFR Part 2807.18(b) and 36 CFR Part 251.

## G5.3 Variances

It is expected that during the construction of the TWE Project circumstances will arise requiring a change, or variance, in how the Project will be constructed, or how mitigation measures or stipulations will be implemented. The first step in the variance process is the preparation of a variance request form (see Attachment B). It is important that the form is complete, accurate, and contains sufficient information for the CIC and agency to adequately assess the request and reach a decision on its approval or denial. The Construction Contractor(s) will be responsible for preparing the request with the prior approval of TransWest.

A completed variance request form, with any required attachments, will be submitted to the CIC in electronic format. The CIC will conduct an initial assessment of the request for completeness and will determine a variance level based on the following definitions:

- Level 1: minor field adjustment within an approved/granted area that was previously analyzed in the Project's environmental documents, does not result in greater impacts to resources, and does not result in an increase in the estimated acres of disturbance contained in the FEIS or NTP POD.
- Level 2: changes in procedures or adjustments located outside of an approved/granted work area but still within an area analyzed in the Project's environmental documents, do not result in greater impacts to resources, and does not result in an increase in the estimated acres of disturbance contained in the FEIS or NTP POD.

- Level 3: changes in procedures or adjustment located outside of an approved/granted work area and outside area analyzed in the Project's environmental documents, results in greater impacts to resources, and/or results in an increase in the estimated acres of disturbance contained in the FEIS or NTP POD.

Incomplete or inadequate submittals will be returned within 24 hours with an explanation. Level 1 variance requests will be approved, approved with conditions, or denied by the CIC within 48 hours. Level 2 variance requests will be forwarded on to the appropriate federal Project Manager and will be approved, approved with conditions, or denied within a specified time to be determined. If denied, the federal Project Manager will provide a written explanation for the denial. Level 3 variances will be forwarded to the appropriate federal Project Manager and Authorized Officer. The timeframe for approval or denial of a Level 3 variance will depend on the scope of any additional studies and consultations that may be required and will take place within a specified time to be determined. If denied the Authorized Officer or federal Project Manager will provide a written explanation for the denial.

The CIC will be responsible for tracking all variance requests and will provide a summary of these in the End of Construction Project Report.

## G6.0 COMMUNICATIONS

Effective communication and the sharing of information between the Compliance Team will be critical to achieving and maintaining environmental compliance throughout the construction of the Project. It is especially important for construction crews to communicate daily with environmental monitors concerning work schedules and locations. The Construction Contractor(s), CIC, environmental inspectors and monitors will maintain a communications network that consists of two-way radios and/or cellular phones. The Construction Contractors(s) will be responsible for assuring that field crews have the ability to communicate effectively and will implement solutions if communication problems arise.

Given the scope and complexity of the Project, it is critical that all communications involving key decisions, safety, approvals, non-compliance, or variances be documented in writing. Oral communication will not substitute for written approvals.

The CIC will be responsible for developing and maintaining a Project compliance contact list containing the names, titles, phone numbers and email addresses of all agency Authorized Officers, federal Project Managers, TransWest project managers, Construction Contractor(s) field supervisors and construction managers, environmental inspectors, monitors and any other individuals or agency personnel who will be involved with environmental compliance for the Project. The CIC will also be responsible for developing appropriate distribution lists for weekly compliance reports, non-compliance notifications, and variance requests.

The Construction Contractor(s) will hold daily morning meetings that will include environmental inspectors and monitors to review the day's construction activities, discuss safety, and if needed discuss any compliance problem areas. The Construction Contractor(s) will also schedule periodic meetings with the CIC, lead environmental staff, and construction managers to discuss such topics as safety, communication, compliance, schedule, staffing, or other issues related to keeping the Project safe, on schedule, and in compliance.

# G7.0 TRAINING

All personnel, including agency personnel, entering work areas are required to receive environmental and safety training prior to entering. Safety training will be provided by the Construction Contractor(s) following the requirements found in the Health and Safety Plan (Appendix M).

Environmental training will be provided by environmental inspectors and/or monitors. Training will emphasize compliance with all Project-wide environmental requirements including stipulations in the ROW grant, special use authorizations, NTP POD, and NTP(s). Requirements pertaining to a particular construction spread, such as requirements for the protection of threatened and endangered species or cultural resources, will be addressed as necessary. Roles and responsibilities will be reviewed and the authority of the CIC, environmental inspectors, and monitors will be emphasized.

The CIC will be provided with a list of all personnel who successfully completed the environmental training. Each trainee will receive proof of certification that must be carried at all times. At the discretion of the CIC, they may ask any personnel on the ROW to produce their training certification card. Any personnel present in work area that is found to have not gone through the training will result in non-compliance. The individual will be required to leave the work area immediately and will not be allowed back onto the Project until training has been completed.

# G8.0 REPORTING AND DOCUMENTATION

Effective management of the Project will require the completion of multiple forms and reports to be submitted on a regular basis during the course of construction. These will include:

- Daily inspection reports
- Weekly compliance reports
- End of Construction Project Report
- Non-compliance report
- Variance request forms
- Environmental training list

The CIC will be responsible for compiling and distributing these reports to the appropriate federal Project Managers. The federal Project Managers will be responsible for assuring that documents are incorporated into the official administrative record for the Project.

# G9.0 PROJECT CLOSEOUT

Once all construction has been completed, the Project energized, and reclamation activities completed, the CIC will coordinate final on-the-ground inspections with the federal Project Managers. The purpose of these final inspections will be to document compliance with the requirements contained within the ROW Preparation and Vegetation Management Plan (Appendix R) and the Reclamation Plan (Appendix Q). After the inspections are completed, the federal Project Managers will determine if any further work is required. If no further work is required, the CIC will prepare the End of Construction Project Report.

The End of Construction Project Report will contain the following information:

- Number of days of construction.

- Number of CIC monitors employed.
- Number of environmental inspectors and monitors employed.
- Number of personnel who received environmental training.
- Number of safety incidents that occurred during construction.
- Final acres of permanent and temporary disturbance compared to amounts contained in the FEIS and POD.
- Number of non-compliance reports issued.
- A summary of causes for non-compliance.
- A summary of corrective actions taken for non-compliance.
- Number and duration of temporary suspensions of construction activities.
- Number and duration of WSOs.
- Number of variances submitted, approved, and denied.
- A summary of special status animals or plants taken (including number of captures, displacements, mortalities, injuries, or harassment).
- Overall assessment of Construction Contractor(s) support of and compliance with requirements.
- A summary of lessons learned that could be applied to future projects.

Once the report is drafted, the CIC will coordinate a construction closeout meeting with the Compliance Team. At this meeting the End of Construction Project Report will be reviewed to ensure that all requirements have been met and any issues have been satisfactorily resolved. If no further actions are needed the work of the CIC will be deemed complete and the post-construction reclamation monitoring period will begin, as described in the Reclamation Plan (Appendix Q).

# ATTACHMENT A
# NON-COMPLIANCE REPORT

To be determined.

# ATTACHMENT B
# VARIANCE REQUEST FORM

To be determined.

# APPENDIX H
# FRAMEWORK FIRE PROTECTION PLAN

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## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CFR | Code of Federal Regulations |
| CIC | Compliance Inspection Contractor |
| COM Plan | Construction, Operation, and Maintenance Plan |
| DEIS | Draft Environmental Impact Statement |
| EMF | Electromagnetic Field |
| NESC | National Electrical Stately Code |
| NIFC | National Interagency Fire Center |
| NTP | Notice to Proceed |
| OSHA | Occupational Safety and Health Administration |
| Plan | Fire Protection Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| ROW | right-of-way |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| USFS | United Stated Forest Service |
| WSFD | Wyoming State Forestry Division |

# H1.0 INTRODUCTION

This framework Fire Protection Plan (Plan) describes the measures to be taken by TransWest Express LLC's (TransWest or Applicant) and its Construction Contractor(s) to ensure fire prevention and suppression measures are carried out in accordance with federal, state, and local regulations for the TransWest Express Transmission Project (TWE Project or Project). Measures identified in this Plan apply to work within the Project area defined as the right-of-way (ROW); access roads; temporary work and storage areas; and other areas used during construction and operation of the TWE Project. This document provides direction for the detailed final Plan to be developed by the Construction Contractor(s).

# H2.0 PLAN PURPOSE

The purpose of the Fire Protection Plan is to provide safe procedural practices, environmental protection measures, and other specific stipulations and methods to prevent and respond to fires during construction and operation of the Project. The final Plan will provide construction crews, environmental monitors, and the Compliance Inspection Contractor (CIC) with Project-specific information concerning fire protection procedures. The detailed final Plan will define fire prevention practices, establish fire protection requirements, control of combustible materials and flammable liquids and establish communication for agency responses in the event of a fire.

# H3.0 PLAN UPDATES

This framework Plan will be updated for the Notice to Proceed (NTP) Plan of Development (POD) and will include a restricted operations section, complete notifications section, and updated relevant mitigation measures to ensure regulation compliance and safety. The Plan will include updates as needed based on final design and engineering and per agency requirements. The Construction Contractor(s) will be responsible for preparing and implementing the final Plan in compliance with all local, state, and federal regulations pertaining to fires.

# H4.0 REGULATORY

## H4.1 Wyoming's Wildfire Protection System

The prevention and suppression of wildfires in southern Wyoming is carried out by the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and local fire districts and agencies. The agencies' activities are closely coordinated, primarily through the National Interagency Fire Center (NIFC) in Boise, Idaho, and Regional Interagency Dispatch Centers in Casper and Rawlins, Wyoming. Individual fire crews from BLM Field Offices and Forest Service Ranger Districts coordinate fire suppression activities on federal land within their jurisdictions. The Wyoming State Forestry Division (WSFD) is responsible for fire suppression on Wyoming state lands. Local fire districts and agencies provide fire prevention and suppression activities on private land, and may assist with fires on state or federal lands as requested by those agencies.

## H4.2 Colorado's Wildfire Protection System

The prevention and suppression of wildfires in northwest Colorado is carried out by the BLM, USFS, Colorado Division of Fire Prevention and Control, and local fire districts and agencies. The agencies' activities are closely coordinated, primarily through NIFC in Boise, Idaho, and Regional Interagency Dispatch Center in Craig, Colorado. Individual fire crews from BLM Field Offices and Forest Service Ranger Districts coordinate fire suppression activities on federal land within their jurisdictions. Local fire districts and agencies provide fire prevention and suppression activities on private land, and may

assist with fires on state or federal lands as requested by those agencies. County Sherriff offices coordinate fire suppression activities in the counties as well as un-incorporated portions of counties.

## H4.3 Utah's Wildfire Protection System

The prevention and suppression of wildfires in Utah is carried out by the BLM, USFS, Utah Division of Forestry, Fire and State Lands, and local fire districts and agencies. The agencies' activities are closely coordinated, primarily through NIFC in Boise, Idaho, and the Eastern Great Basin Geographic Area Coordination Center in Salt Lake City, Utah. Individual fire crews from BLM Field Offices and Forest Service Ranger Districts coordinate fire suppression activities on federal land within their jurisdictions. The Utah Division of Forestry, Fire and State Lands provide fire suppression activities on state and private lands. Local fire districts and agencies provide fire prevention and suppression activities on private land, and may assist with fires on state or federal lands as requested by those agencies.

## H4.4 Nevada's Wildfire Protection System

The prevention and suppression of wildfires in southern Nevada is carried out by the BLM, USFS, Nevada Division of Forestry, and local fire districts and agencies. The agencies' activities are closely coordinated, primarily through NIFC in Boise, Idaho, and Western Great Basin Geographic Area Coordination Center in Reno, Nevada. Individual fire crews from BLM Field Offices and Forest Service Ranger Districts coordinate fire suppression activities on federal land within their jurisdictions. The Nevada Division of Forestry provides fire suppression activities on state and private lands and may assist with fires on state or federal lands as requested by those agencies. Local fire districts and agencies provide fire prevention and suppression activities on private land, and may assist with fires on state or federal lands as requested by those agencies.

# H5.0 FIRE PROTECTION PLAN CONTENTS

The Fire Protection Plan will include information on the following topics:

1. Worker Training
2. Smoking Restrictions
3. Spark Arresters
4. Parking, Vehicle operation, and Storage Areas
5. Equipment
6. Road Closures
7. Refueling
8. Burning
9. Flammable Liquids and Explosives
10. Communications
11. Welding
12. Fire Suppression
13. Restricted operations
14. Monitoring

# H6.0 FIRE PREVENTION PLAN GUIDANCE

Components of this Plan will include, but are not limited to: requiring work vehicles to carry shovels, water, and fire extinguishers; operating all vehicles on designated roads; parking in designated areas or areas free of vegetation; and operating welding, grinding, or cutting activities in areas cleared of vegetation. To minimize the occurrence of fire from the power line, safety measures would be taken that include brush-clearing within the corridor prior to work, enforcing red flag warnings, providing appropriate training to all pertinent personnel, and keeping vehicles on or within designated roads or work areas.

The presence of explosive materials on the Project site could potentially increase the risk of fire during construction. Special precautions will be taken to minimize this risk in conjunction with the Appendix C - Blasting Plan Framework, including but not limited to:

- Prohibiting ignition devices within 50 feet of explosives storage areas;
- Properly maintaining magazine sites so they are clear of fuels and combustible materials, well ventilated, and fire-resistant;
- Protecting magazines from wildfires that could occur in the immediate area;
- Posting fire suppression personnel at the blast site during high fire danger periods; and
- Prohibiting blasting during extreme fire danger periods.

# H7.0 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

In addition to applicable design and operational standards, regulations, laws and permit requirements, the following design features and best management practices (BMPs) have been developed to avoid or minimize potential fire related impacts. Note that the Construction, Operation and Maintenance Plan will be a part of the NTP POD.

**TWE-51:** The TWE Project will be designed, constructed, and operated to meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) standards, and the Applicant's requirements for safety and protection of landowners and their property.

**TWE-53:** The Construction, Operation and Maintenance (COM) Plan will include a Blasting Plan, which will identify methods and mitigation measures to minimize the effects of blasting, where applicable. The Blasting Plan will document the proposed methods to achieve the desired excavations, proposed methods for blasting warning, use of non-electrical blasting systems, and provisions for controlling fly rock, vibrations, and air blast damage.

**TWE-56:** As part of the COM Plan, the Applicant will provide a Health and Safety Plan, which will outline measures to protect workers and the general public during construction, operation, and decommissioning of the TWE Project. The Health and Safety Plan will identify applicable federal and state occupational safety standards, establish safe work practices, and define safety performance standards.

**TWE-64:** The COM Plan will include a Fire Protection Plan. The Applicant or its Contractor(s) will notify the BLM of any fires and comply with all rules and regulations administered by the BLM and USFS concerning the use, prevention, and suppression of fires on federal lands, including any fire

prevention orders that may be in effect at the time of the permitted activity. The Applicant or its Contractor(s) may be held liable for the cost of fire suppression, stabilization, and rehabilitation. In the event of a fire, personal safety will be the first priority of the Applicant or its Contractor(s). The Applicant or its Contractor(s) will:

- Operate all internal and external combustion engines on federally-managed lands per 36 Code of Federal Regulations (CFR) Part 261.52(j), which requires all such engines to be equipped with a qualified spark arrester that is maintained and not modified;

- Carry shovels, water, and fire extinguishers that are rated at a minimum as ABC-10 pound on all equipment and vehicles. If a fire spreads beyond the suppression capability of workers with these tools, all workers will cease fire suppression action and leave the area immediately via pre-identified escape routes;

- Initiate fire suppression actions in the work area to prevent fire spread to or on federally-administered lands. If fire ignitions cannot be prevented or contained immediately, or it may be foreseeable that a fire would exceed the immediate capability of workers, the operation must be modified or discontinued. If the operation area is evacuated there will be no risk of ignition or re-ignition upon leaving.

- Notify the appropriate fire center immediately of the location and status of any escaped fire;

- Review weather forecasts and the potential fire danger prior to any operation involving potential sources of fire ignition from vehicles, equipment, or other means. Prevention measures to be taken each work day will be included in the specific job briefing. Consideration will be given to additional mitigation measures or temporary discontinuance of the operation during periods of extreme winds or dryness;

- Operate all vehicles on designated roads and park in designated areas or areas free of vegetation;

- Operate welding, grinding, or cutting activities in areas cleared of vegetation within range of the sparks for that particular action. A spotter will be required to watch for ignitions; and

- Use only diesel-powered vehicles in areas where excessive heat from vehicle exhaust systems could start brush or grass fires.

Additional BMPs and Mitigation Measures identified in the Draft Environmental Impact Statement (DEIS) are listed below. The identified BMPs and Mitigation Measures have not been finalized at this time and may be updated, changed, or eliminated in future revisions of this Plan.

**PHS-1:** The Applicant shall prepare an explosives use plan that specifies the times and meteorological conditions when explosives will be used and specifies minimum distances from sensitive vegetation and wildlife or streams and lakes.

**PHS-4:** A health and safety program shall be developed by the Applicant to protect both workers and the general public during construction, operation, and decommissioning of an energy transport project. The program should identify all applicable federal and state occupational safety standards, establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses, OSHA standard practices for safe use of explosives and blasting agents, measures

for reducing occupational electromagnetic field [EMF] exposures), and define safety performance standards (e.g., electrical system standards). The program should include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies should be established.

**FIRE-1:** The Applicant shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire during Project construction, operation, and decommissioning. The strategy should consider the need to reduce hazardous fuels (e.g., native and non-native annual grasses and shrubs) and to prevent the spread of fires started outside or inside a corridor, and clarify who has responsibility for fire suppression and hazardous fuels reduction for the corridor.

**FIRE-2:** The Applicant must work with the local land management agency to identify Project areas that may incur heavy fuel buildups, and develop a long-term strategy on vegetation management of these areas. The strategy may include land treatment during Project construction, which may extend outside the planned ROW clearing limits.

**FIRE-3:** The Applicant must ensure that all construction equipment used is adequately muffled and maintained and that spark arrestors are used with construction equipment in areas with, and during periods of, high fire danger.

**FIRE-4:** Flammable materials (including fuels) will be stored in appropriate containers.

# APPENDIX I
# FRAMEWORK FLAGGING, FENCING, AND SIGNAGE PLAN

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TABLE I1 SIGNAGE STANDARDS ..... 2

## ACRONYMS

| | |
|---|---|
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| CIC | Compliance Inspection Contractor |
| DEIS | Draft Environmental Impact Statement |
| NTP | Notice to Proceed |
| Plan | Flagging, Fencing, and Signage Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| ROD | Record of Decision |
| ROW | right-of-way |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| USFS | United States Forest Service |

# I1.0 INTRODUCTION

This framework Flagging, Fencing, and Signage Plan (Plan) describes the methods that will be used in the field by TransWest Express LLC (TransWest or Applicant) and its Construction Contractor(s) to delineate the TransWest Express Transmission Project (TWE Project or Project) limits of disturbance and protect sensitive environmental and cultural resources during Project construction. These methods are intended to ensure TransWest personnel, Construction Contractor(s), Bureau of Land Management (BLM), U.S. Forest Service (USFS), Compliance Inspection Contractor (CIC), and environmental investigators and monitors on the Project construction sites stay on approved access routes and within approved work areas. The measures described in this Plan are an integral part of the environmental compliance program for avoiding and minimizing impacts on sensitive resources.

# I2.0 PLAN PURPOSE

The purpose of this Plan is to describe the methods that will be used in the field to delineate the Project limits of disturbance and protect sensitive environmental and cultural resources during Project construction. The objective of this Plan is to provide information on the field markings (i.e., flagging, fencing, and signage) that will be used to identify approved Project travel and work areas, as well as environmentally sensitive areas where construction or travel is to be excluded.

# I3.0 PLAN UPDATES

This Plan will be updated for the Record of Decision (ROD) Plan of Development (POD) and will include updated signage standards (Table I1) based on the selected Agency Preferred Alternative. The Plan for the Notice to Proceed (NTP) POD will be updated as needed based on final design and engineering. The Construction Contractor(s) will be responsible for preparing and implementing the final Plan.

# I4.0 REGULATORY REQUIREMENTS

No federal, state or local laws, rules or regulations specifically address flagging, fencing, and signage protocols for construction projects. However, some of the mitigation measures identified in the Draft Environmental Impact Statement (DEIS) for the Project are dependent on adequate field marking of work areas and/or of sensitive resource areas to avoid and minimize impacts to environmental resources. These mitigation measures include flagging or fencing requirements to help protect vegetative cover, water quality, cultural resources, and special status species and minimize the spread of noxious weeds.

# I5.0 METHODS

## I5.1 Demarcating Project Facilities

Standard survey flags and stakes will be installed before the start of Project construction. Structure sites (e.g., transmission structure locations, anchor points and reference points) will be marked by the Construction Contractor(s). Designated Project access roads, parking areas and pullout areas will be marked to facilitate travel to and from the right-of-way (ROW). Temporary work areas at structure sites, wire pulling/tensioning/splicing sites, material storage yards, fly yards/staging areas, and batch plants will be demarcated as necessary to indicate the limits of approved work areas. The Construction Contractor(s) will stake the boundaries of the maximum area needed for work areas and will provide the dimensions to the CIC. If the delineated work areas exceed the approved dimensions for the Project facilities, the Construction Contractor(s) will coordinate with the CIC for approval and consultation with the BLM and other agencies may be required.

## I5.2 Environmental Exclusion Areas

Signs, flags and/or fencing will be used to establish exclusion areas to protect sensitive environmental resources (e.g., biological, cultural, wetland, and paleontological resources) in the vicinity of construction activities. A system of standardized and simplified exclusion markings will be used to reduce potential confusion during construction and minimize the risk of highlighting types of sensitive resources that could be targeted by vandals (e.g., if exclusion areas protecting archaeological sites were marked differently than those protecting sensitive natural resource areas, the sties would be at a higher risk of unauthorized artifact collecting or other disturbances).

### *I5.2.1 Signage*

Signs will be used to help identify TWE Project facilities such as approved access roads and temporary work areas. Signs will be a minimum of 8.5 inches by 11 inches on laminated color paper. Signs will be installed on metal posts and wooden stakes or attached to exclusion fencing/roping as appropriate. Background colors will vary to enhance sign recognition from a distance.

Table I1 provides standards for marking Project features that will be needed during construction. The attachments at the end of this Plan framework show the size and configuration of typical sign layouts. Signs for sensitive resource areas will be oriented for visibility from both directions of likely travel. Table I1 may be updated, changed, or revised in future revisions of this Plan.

**TABLE I1 SIGNAGE STANDARDS**

| FEATURE | FLAGGING OR SIGN COLOR | SIGN TEXT | WHAT TO DO |
|---|---|---|---|
| Project access roads | To be determined by Construction Contractor(s) | Project Access Road – Road No. (e.g., Road 3) – TransWest Express Transmission Project | To be located at points of intersection, additional intermittent flagging may be required. Construction Contractor(s) to verify that right-of-entry has been obtained before marking these areas. |
| Temporary work areas (structure sites, material yards, etc.) | To be determined by Construction Contractor(s) | Not applicable | Construction Contractor(s) to verify that right-of-entry has been obtained before marking these areas. |
| Protected animals/plants or sensitive environmental areas. | Yellow | Sensitive Resource Area Keep Out | Avoid these items/areas – do not drive vehicles or equipment near flagging or within flagged areas. |
| Reclamation project areas | Brown | Restoration in Progress – No Vehicle Traffic Allowed | Avoid these items/areas – do not drive vehicles or equipment near flagging or within flagged areas. |
| Noxious weed cleaning stations | Blue | Weed Cleaning Station | Signs will be posted at entry points into weed cleaning stations. |
| Proposed structure locations | To be determined by Construction Contractor(s) | Not applicable | Do not disturb survey stakes. |
| Structure offsets | To be determined by Construction Contractor(s) | Not applicable | Do not disturb survey stakes. |
| Outside edge of permitted ROW or centerline | To be determined by Construction Contractor(s) | Not applicable | Do not drive vehicles or equipment outside of designated corridor. |
| Cadastral survey monument | To be determined by Construction Contractor(s) | Not applicable | Protect in place |

| FEATURE | FLAGGING OR SIGN COLOR | SIGN TEXT | WHAT TO DO |
|---|---|---|---|
| Non-authorized access roads | To be determined by Construction Contractor(s) | Do Not Enter Not An Authorized Access Road | Do not drive vehicles or equipment on unauthorized roads. |

NOTES:

- Staking, flagging and signage will be conducted by the Construction Contractor(s) and verified by the CIC, including sensitive resource areas and exclusion areas.
- Construction Contractor(s) shall stake all proposed tower center hub and footer locations, structure locations and associated reference points and mark the centerline with inter-visible stakes not to exceed 500 feet and at all road crossings.
- Construction Contractor(s) shall use staking intervals appropriate to the conditions observed in the field. For example, areas of rough terrain or dense vegetation may require staking intervals less than 500 feet. In all cases, field staking intervals shall be done at a frequency such that each adjacent stake can be easily discernable.
- Maintain, refurbish and replace staking as necessary over time as conditions require.

### *I5.2.2 Flagging*

Survey flagging (i.e., surveyor's ribbon tied to wooden stakes, metal posts or appropriate vegetation) will be used to delineate the disturbance limits of temporary work areas, access roads, etc., unless existing fencing or other features clearly indicate the limits of the area. Survey flagging may be used to demarcate sensitive resource locations situated a safe distance from planned construction activities but generally will not be used to define resource exclusion areas close to planned construction activities due to concerns about the visibility and stability of flagging during construction.

The BLM and USFS Authorized Officers or CIC, as needed, will determine whether flagging or fencing is the appropriate marking and protection device for a given location. Flagging color will conform to the requirements of Table I1.

### *I5.2.3 Fencing*

To delineate the limits of construction near sensitive resources requiring a high level of protection from Project disturbance, a combination of one or more of the following fencing materials will be installed by the Construction Contractor(s):

- Rope (0.25 inch in diameter colored yellow or orange),
- Plastic or fabric tape; and/or
- Safety fencing (plastic orange or red mesh at least 24 inches wide and at least 18 inches off the ground to facilitate travel by small animals).

Rope with periodic marking by exclusionary signs or lengths of tape is a highly visible and effective exclusion device. Rope, tape, and safety fence will be installed using metal posts for increased durability and in areas with compact or rocky soils. If construction within a wetland is necessary, the boundaries of the approved disturbance areas will be demarcated so impacts are limited to the area authorized. In most cases, it is anticipated the exclusion device will be installed at the boundaries of the sensitive resource (including any required buffers), rather than at the edge of the work area. If a buffer zone encroaches into the work area, only the portions that overlap with the work area will be delineated and signed as an exclusion zone.

## I6.0 INSTALLATION, MONITORING, AND MAINTENANCE

The objectives of this Plan are dependent on the proper installation, monitoring, and maintenance of protective devices. The Construction Contractor(s) will be responsible for the installation and

maintenance of the field marking of Project features as described above. These markings will be installed in advance of construction activities in the area, maintained during the course of construction (as necessary), and removed after Project cleanup and reclamation activities. Environmental exclusion signs, flags and fencing will be installed by the Construction Contractor(s) in coordination with the CIC and with the assistance of appropriate environmental inspectors and monitors (e.g., botanists, biologists, archaeologists). These environmental exclusions will be installed prior to the start of construction within a Project work area. The CIC will be consulted if there is uncertainty as to the type or location of needed exclusion devices for botanical, wildlife, wetlands, streams or archaeological sites.

Routine Project monitoring by the CIC and Construction Contractor's environmental inspectors and monitors will include an on-going assessment of the need for replacement or repair of exclusionary signs, flagging or fencing. Maintenance needs related to exclusionary devices will either be corrected at the time of observation by the CIC or will be documented as a future maintenance need. If maintenance of an exclusionary device is needed within an active construction area, corrective action will be taken within one workday. Maintenance of signs, flagging and fencing within inactive work areas will be implemented as necessary.

# I7.0 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

In addition to applicable design and operational standards and designation of sensitive ecological areas, the following design features and Best Management Practices (BMPs) have been identified. Note that the Construction, Operation and Maintenance Plan will be a part of the NTP POD.

**TWE-10:** The area of limits of construction activities will normally be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate survey or construction activity limits.

**TWE-15:** The NTP POD Plan will include a Clean-up Work Management Plan and a Flagging, Fencing, and Signage Plan. Except for permanent survey markers and material that locate proposed facilities, stakes, pins, rebar, spikes, and other material will be removed from the surface and within the top 15 inches of topsoil as a part of final clean-up. Fences on ROW will be removed where necessary and replaced to the original condition or better when the work is finished. Where existing fences are removed to facilitate the work, temporary fence protection for lands adjacent to the ROW will be provided at all times during the continuation of the Contract. Such temporary fence protection will be adequate to prevent public access to restricted areas. Temporary fencing constructed on the ROW will be removed by the Contractor as part of the clean-up operations prior to final acceptance of the completed work.

**TWE-33:** Prior to the start of construction, the Applicant will provide training to all Contractor and Subcontractor personnel and others involved in construction activities where/if there is a known occurrence of protected species or habitat in the construction area. Sensitive areas will be considered avoidance areas. Prior to any construction activity, avoidance areas will be marked on the ground and maintained through the duration of the Contract. The Applicant will remove markings during or following final inspection of the Project.

**TWE-43:** The NTP POD Plan will include a Flagging, Fencing, and Signage Plan. Fences and gates will be repaired or replaced to their original pre-disturbed condition as required by the landowner or the land management agency if they are damaged or destroyed by construction activities. Temporary gates will be installed only with the permission of the landowner or the land management agency, and will be restored to their original pre-disturbed condition following construction. Cattle guards will be installed where new permanent access roads cut through fences, at the request of the land management agency.

# Project Access Road

# Road No.

Sensitive
Resource Area

Keep Out

Restoration In Progress – No Vehicle Traffic Allowed

No Refueling Within 100 Feet of Wetlands and Streambanks

Do Not Enter
Not an
Authorized
Access Road

# Weed Cleaning Station No.

# APPENDIX J
# FRAMEWORK GEOTECHNICAL PLAN

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## ACRONYMS

| | |
|---|---|
| 4WD | four-wheel drive |
| Applicant | TransWest Express LLC, also TransWest |
| BLM | Bureau of Land Management |
| DEIS | Draft Environmental Impact Statement |
| gvm | gross vehicle mass |
| Plan | Geotechnical Plan |
| POD | Plan of Development |
| Project | TransWest Express Transmission Project, also TWE Project |
| psi | pounds per square inch |
| ROD | Record of Decision |
| ROW | right-of-way |
| TransWest | TransWest Express LLC, also Applicant |
| TWE Project | TransWest Express Transmission Project, also Project |
| USCS | Unified Soil Classification System |

# J1.0 INTRODUCTION

This framework Geotechnical Plan (Plan) generally describes the procedures required by TransWest Express LLC (TransWest or Applicant) and its Construction and Geotechnical Contractors to gather geotechnical information to allow for design and construction of the TransWest Express Transmission Project (TWE Project or Project).

# J2.0 PLAN PURPOSE

This Plan provides a sequence of events to be utilized by TransWest and its Construction and Geotechnical Contractors to accomplish the necessary geotechnical exploration and sampling to facilitate design of the Project. This Plan is to be implemented after the receipt of the Record of Decision (ROD) and during the final engineering phase of the Project. These measures are intended to provide the required engineering parameters for design while staying within the disturbance limits as defined by the ROD Plan of Development (POD).

The mitigation measure which relates to this Plan is identified in the Draft Environmental Impact Statement (DEIS) as mitigation measure GE-1 which states: in areas with geologic hazards and active mining; placement of Project structures and other Project related disturbance would be avoided to the extent practical. Where avoidance is not possible a site specific geotechnical investigation and engineering design would be implemented during construction and operation of the Project. Depending on the type of potential geologic hazard, the designs may vary and should address specific needs for enhanced structural supports. Site specific assessment of geologic hazards shall include review of available information concerning areas of hazards, and consultation with appropriate government agency personnel who are knowledgeable about the hazards. Assessment also shall include, if necessary, field surveys and gathering of geotechnical information to determine what engineering design methods would mitigate or lessen potential risks. If active mines cannot be avoided, Applicant will conduct similar due diligence in regard to hazards from underground and historic mining to ensure that Project facilities will not hinder access to mineral resources or create dangers to mining activities. The Geotechnical Plan will address this measure as it is further developed.

# J3.0 PLAN UPDATES

This Plan will be updated for the ROD POD based on preliminary engineering and design for the selected Agency Preferred Alternative and will include results from the geotechnical desktop study to be completed during the summer of 2014. All geotechnical field activities will be performed following the ROD and all ground disturbing activities associated with geotechnical studies will be contained within the disturbance limits as described in the ROD POD. The final Geotechnical Plan will be prepared by TransWest and its Geotechnical Contractor(s) and approved by the Bureau of Land Management (BLM) or the land management agency as appropriate prior to initiation of any surface disturbing activities. Field surveys for sensitive plant species, Class III cultural resource inventories, and other required resource surveys will be conducted as necessary for the final Geotechnical Plan.

# J4.0 TYPICAL PROCEDURES

A geotechnical exploration program may be prepared for the Project. This program will describe specific boring locations, access, landowner/agency notifications, schedule, in-field testing and boring depth requirements. The program may consider borings at every point of interest and at 3 mile maximum spacing along tangents. Points of interest are defined as structures with a line angle greater than 5 degrees, exceptionally long spans, line crossings, potential landslide areas or other areas of

geologic instability, or a change in geologic setting. All boring locations will be located within the Project right-of-way (ROW). Access to each of the drill sites will be considered in selecting geotechnical exploration locations. Locations that can be accessed with existing roads will be chosen when available to avoid even elementary road construction. Some locations will require overland travel (i.e. "drive and crush") from existing access roads.

The drilling equipment needed to perform the drilling and sampling activities will include truck mounted, track mounted or all-terrain drill rigs, water truck, four-wheel drive (4WD) support vehicle including an air compressor, and a 4WD vehicle for the field engineer. The type of rig used will depend on accessibility of boring locations, and practicality of using continuous flight hollow-stem auger, mud rotary, or ODEX drilling techniques to advance the borings. Possible types of drilling equipment are listed below:

- Conventional two-ton or larger truck with a drill rig mounted on the chassis.
- A 30,000 gross vehicle mass (gvm) 6-wheeled truck, about 30 feet long, with or without 4WD capabilities.
- All-terrain vehicle consisting of a similar drilling rig mounted on a lighter framed, shorter vehicle equipped with oversized low-pressure tires. Track mounted drilling rigs use a wide variety of drilling machinery on tracked vehicles with low (about 10 pounds per square inch [psi]) ground pressure.

Soil samples will be collected by driving a sampling device into the undisturbed soils just below the augers. Where necessary, rock core samples will also be taken using a rock coring barrel. Laboratory testing will be conducted on soil/rock samples to define the Unified Soil Classification System (USCS) soil type, strength parameters and corrosion characteristics. Upon completion and before leaving each site, soil borings will be backfilled, securely covered and all cuttings will be removed from the site. No open holes will be left unattended, and all holes will be backfilled to near the ground surface before moving to the next boring.

Boring depth requirements will vary based on structure type and foundation loading. However, an average soil boring depth is anticipated to be 40 feet unless bedrock is encountered, in which case, up to 15 feet of rock core will be accomplished.

# APPENDIX K
# GREATER SAGE-GROUSE HABITAT EQUIVALENCY ANALYSIS, MITIGATION, AND MONITORING PLAN

# DRAFT REPORT:
# TransWest Express Transmission Line Project:
# Greater Sage-grouse Mitigation Plan

**All numbers in this draft report are provisional and may be subject to change pending agency review and additional quality checks.**

*Prepared by:*

TRANSWEST EXPRESS LLC

May 2014

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**Draft Report: Greater Sage-grouse Habitat Equivalency Analysis for the TransWest Express Project, dated May 2014**

# 1. Introduction

This document presents the results of TransWest Express LLC's (TransWest) Habitat Equivalency Analysis (HEA) modeling and a framework for compensatory mitigation for greater sage-grouse (*Centrocercus urophasianus*) potentially impacted by the TransWest Express Transmission Project (TWE Project or Project). Changes to greater sage-grouse policies and guidance, analyses of effects and final TWE Project alignments continue to be developed and refined as the TWE Project is reviewed by the Bureau of Land Management (BLM) and Western Area Power Administration (Western) pursuant to requirements of the National Environmental Policy Act (NEPA). TransWest will consider new information as it becomes available and revise this Mitigation Plan as appropriate.

## 1.1. TransWest Express Project Overview

The TWE Project is a proposed extra high voltage, direct current (DC) transmission system extending from south-central Wyoming to southern Nevada. The proposed transmission line would cross four states (Wyoming, Colorado, Utah, and Nevada) on lands owned or administered by the BLM, United States Forest Service (USFS), National Park Service (NPS), Bureau of Reclamation (BOR), Utah Reclamation Mitigation and Conservation Commission (URMCC), various state agencies, Native American tribes, municipalities, and private parties. The TWE Project would provide the transmission infrastructure and capacity necessary to deliver cost-effective renewable energy produced in Wyoming to the Desert Southwest region (California, Nevada, Arizona), ultimately helping contribute to a cleaner world, strengthen the electric grid, and provide much-needed electricity to millions of homes and businesses every year. The TWE Project will deliver enough clean, sustainable energy to power nearly 2 million homes and reduce greenhouse-gas emissions equivalent to taking 1.5 million cars from the road.

The ±600 kilovolt (kV) DC transmission line would be approximately 725 to 750 miles in length (depending upon the alternative selected), located within a 250-foot wide right-of-way (ROW). The TWE Project includes ground-disturbing activities associated with the construction of above-ground transmission lines and includes transmission tower locations, access roads, a ground electrode line, a ground electrode site, fly yards, material yards, two AC/DC converter stations (a northern terminal and a southern terminal), pulling/tensioning areas, and work areas. The TWE Project has been sited to avoid and minimize greater sage-grouse (*Centrocercus urophasianus*) lek buffers and occupied habitat. However, complete avoidance is unachievable and portions of the TWE Project cross designated habitat for greater sage-grouse (BLM's Preliminary General Habitat [PGH]) in Wyoming, Colorado, and Utah. As a result, TransWest has coordinated with the BLM, Western Area Power Administration (Western), U.S. Fish and Wildlife Service (USFWS), Wyoming Game and Fish Department (WGFD), and Colorado Parks and Wildlife (CPW), and Utah Division of Wildlife Resources (UDWR) to develop a mitigation strategy to compensate for the unavoidable loss of greater sage-grouse habitat that would potentially occur as a result of the TWE Project construction, operation and maintenance in areas of greater sage-grouse habitat.

## 1.2. Greater Sage-grouse Habitat

As described in the draft EIS (BLM 2013), greater sage-grouse use a variety of habitats throughout their life cycle. Breeding occurs on strutting grounds, or leks, that are located in flat, sparsely vegetated areas within large tracts of sagebrush (Connelly et al. 2004). Nesting habitat is typically located near active leks in medium to tall sagebrush with a perennial grass understory (Connelly et al. 2000). Studies have shown that taller sagebrush with larger canopies and more understory cover can lead to higher nesting success (Connelly et al. 2004, 2000). Hens and their broods are found in more lush habitats consisting of a high diversity of grasses and forbs that attract insects, such as wet meadows, riparian areas, and irrigated farmland within or near sagebrush. In winter, greater sage-grouse move to south- and west-facing slopes that maintain exposed sagebrush at least 10 to 12 inches above the snow. The quality and quantity of habitat and location within the landscape is key to the long-term survival and success of the greater sage-grouse.

## 1.3. Greater Sage-grouse Conservation Strategies

In March 2010, the USFWS completed a status review for greater sage-grouse. After reviewing the five listing factors (habitat destruction, overutilization, disease and predation, inadequate regulatory mechanisms, and other natural or manmade factors) under section 4(a)(1) of the Endangered Species Act (ESA), the USFWS concluded that the greater sage-grouse warrants protection under the ESA. However, the USFWS determined that proposing the species for protection was precluded by the need to take action on other species facing more immediate and severe extinction threats. As a result, the greater sage-grouse was added to the list of species that are candidates for ESA protection.

In an effort to prevent federal listing of the greater sage-grouse, Wyoming, Colorado, Utah, and Nevada have developed greater sage-grouse management/conservation plans that outline goals and objectives for managing the species. In addition, the BLM and the State of Wyoming have issued several policies regarding management of the greater sage-grouse in Wyoming. BLM Instruction Memoranda IM) 2010-012, 2012-043, 2012-044, 2012-019, and State of Wyoming Executive Order 2011-5 include specific protection measures guiding development in greater sage-grouse habitat. The BLM is also currently completing resource management plan amendments in Wyoming, Colorado, Utah and Nevada specifically to address management of greater sage-grouse and their habitats on public lands.

### 1.3.1. BLM Sensitive Species

The principal greater sage-grouse regulatory mechanism for the BLM is conservation measures in Resource Management Plans (RMPs). In 2011, the BLM established the National Greater Sage-Grouse Planning Strategy to evaluate the adequacy of the RMPs and address revisions and amendments throughout the range of the greater sage-grouse. IM 2012-044 provides direction to the BLM for considering conservation measures identified in the Sage-Grouse National Technical Team's *A Report on National Greater Sage-Grouse Conservation Measures* during the RMP revisions that are now underway in accordance with the 2011 National Greater Sage-Grouse Planning Strategy.

### 1.3.2. Wyoming Greater Sage-grouse Strategy

Wyoming Executive Order 2011-5 (preceded by Executive Orders 2008-8 and 2010-4) designated certain portions of Wyoming where viable greater sage-grouse populations are to be maintained at current levels, as core greater sage-grouse areas. The WGFD has developed a map of greater sage-grouse core population areas in Wyoming. The core areas contain important seasonal habitats and more than 80% of the state's greater sage-grouse population. Executive Order 2011-5 also identified corridors through several of Wyoming's core areas where large energy transmission projects were directed to be sited to minimize impacts to greater sage-grouse. Generally, these transmission corridors were identified adjacent to previous disturbed corridors (highways, railroads, pipelines, transmission lines, etc.). The TWE Project is located in one such corridor that follows Interstate Highway 80.

The Wyoming Greater Sage-grouse Conservation Plan (Wyoming Sage-Grouse Working Group 2003) established the framework for local working groups to guide management efforts directed at halting long-term population declines and maintaining and improving greater sage-grouse habitats in Wyoming. The TWE Project falls within the South Central Wyoming Sage-grouse Conservation Plan (SC Working Group 2007) and Southwest Wyoming Local Sage-grouse Working Group.

### 1.3.3. Colorado Greater Sage-grouse Strategy

CPW developed a comprehensive Colorado Greater Sage-Grouse Conservation Plan (2008) with a conservation strategy that identifies key issues facing greater sage-grouse conservation. For each issue, objectives were developed to help mitigate the issue; for each of these objectives, a number of specific strategies are described. The plan provides a statewide perspective to help ensure the long-term survival of greater sage-grouse and supplements local working groups. The TWE Project crosses land within the Northwest Colorado Greater Sage-grouse Conservation Plan (NWCGSGWG 2008).

### 1.3.4. Utah Greater Sage-grouse Strategy

The Conservation Plan for Greater Sage-grouse in Utah (UDWR 2013) is designed to eliminate the threats facing greater sage-grouse while balancing the economic and social needs of the residents of Utah through coordination with local, state, and federal agencies, and local area working groups. The Plan states that transmission lines should be sited in existing corridors, or at a minimum, in concert with existing linear features in greater sage-grouse habitat and the direct effects of construction should be mitigated.

### 1.3.5. Nevada Greater Sage-grouse Strategy

The TWE Project does not cross any greater sage-grouse habitat in Nevada.

## 1.4. Mitigation Purpose

The Draft Environmental Impact Statement for the TWE Project prepared by the BLM and Western (DEIS) (BLM 2013) analyzed potential impacts to greater sage-grouse from construction, operation and maintenance of the TWE Project. Known impacts would include direct mortality, permanent and temporary habitat loss, habitat fragmentation, and temporary displacement due to noise and human activity. The purpose of the TransWest mitigation strategy is to compensate for known and quantifiable

direct and indirect impacts to greater sage-grouse habitat that may occur as a result of the TWE Project construction, operation and maintenance.

Mitigation includes (a) avoiding the impact altogether; (b) minimizing impacts by limiting the degree or magnitude of the action; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments. This definition is consistent with National Environmental Policy Act (NEPA) regulations (40 CFR Part 1508.20(a-e)), USFWS Mitigation Policy (January 23, 1981 Federal Register, pp 7644-7663), and Wyoming Game and Fish Commission Mitigation Policy No. VII H.

In response to Secretarial Order Number 3330 entitled "Improving Mitigation Policies and Practices of the Department of the Interior," issued by the Secretary of the Interior Sally Jewel in October 2013, *"A Strategy for Improving Mitigation Policies and Practices of The Department of the Interior"* was released in April 2014 (Strategy). The Strategy highlights the challenges and opportunities associated with developing and implementing an effective mitigation policy, and describes the key principles and actions necessary to successfully shift from project-by-project management to consistent, landscape-scale, science-based management of the land and resources for which the Department is responsible. The Strategy concludes that taking a landscape-scale approach to mitigation can meet the Department's needs of accommodating both infrastructure development and conservation while improving permitting efficiencies, reducing conflicts, and better achieving development and conservation goals.

TransWest's greater sage-grouse mitigation plan is consistent with the Strategy by utilizing a landscape-scale, science-based approach to avoid, minimize and compensate for potential impacts to greater sage-grouse that may result from development of the TWE Project.

## 2. Mitigation Strategy

The mitigation strategy will generally adhere to the following principles:

- BLM-identified spatial and temporal mitigation measures will be used to lessen the impacts to extent practicable.
- Greater sage-grouse habitat quality and quantity varies across the landscape. To ensure that habitat variability is fully captured, a quantitative habitat metric (i.e., the HEA) will be used to measure the potential loss of habitat that would result from construction, operation and maintenance of the TWE Project within currently occupied greater sage-grouse habitat.
- When possible, greater sage-grouse habitat that is directly lost or impacted during construction would be compensated for by replacing or enhancing habitats of similar quality and size. Mitigation siting would occur in the nearest suitable location in an effort to provide the greatest benefit to the local greater sage-grouse population being impacted by TWE Project construction, operation and maintenance.
- When possible, multiple mitigation measures will be coupled to maximize the benefit to greater sage-grouse populations.

- A maintenance and monitoring approach will be identified for each mitigation measure type.

## 2.1. Mitigation Guidance

### 2.1.1. BLM Mitigation Policy

The mitigation approach TransWest will implement for the TWE Project will follow the guidance provided by BLM IMs IM 2013-142, 2012-043, and 2012-044 and Department of Interior Secretarial Order 3330 (Order 3330). Collectively, these provide guidance for greater sage-grouse habitat management and mitigation for pending transmission rights-of-way in Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). These policies state that transmission rights-of-ways having disturbances greater than 1 linear mile or 2 acres require cooperation between the BLM, project proponents, and other appropriate agencies to develop and consider implementation of appropriate regional mitigation to avoid or minimize habitat and population-level effects to greater sage-grouse.

Under these policies, offsite and onsite mitigation can include in-kind or out-of-kind mitigation. In-kind is defined as the replacement or substitution of resources that are of the same type and kind of those being impacted. Out-of-kind is defined as replacement or substitutions of resources that while related are of equal or greater overall value to public lands. IM 2013-142 also identifies that the BLM may accept monetary contributions, how they may be used, and that mitigation may be conducted on non-Federal lands.

### 2.1.2. Framework for Sage-grouse Impacts Analysis for Interstate Transmission Lines

The BLM, working in concert with the USFWS, has developed a *Framework for Sage-grouse Impacts Analysis for the TransWest Express Transmission Project* (Framework). The Framework addresses TWE Project-related impacts to greater sage-grouse habitat that bear directly on listing factors considered by the USFWS when evaluating the need to provide full listing protection under the ESA. The Framework specifies the use of HEA to scale mitigation and compensate for the loss of habitat services over the life of the TWE Project. HEA is a science-based, peer-reviewed method of scaling compensatory mitigation requirements to potential TWE Project-related effects, measured as a loss of habitat services from pre-disturbance conditions (Allen et al. 2005; Dunford et al. 2004; King 1997; Kohler and Dodge 2006; National Oceanic and Atmospheric Administration 2006, 2009). Habitat services include those ecosystem features (i.e., physical site-specific characteristics of an ecosystem) and ecosystem functions (i.e., biophysical processes that occur within an ecosystem) that support wildlife and human populations (King 1997).

In compliance with IM 2012-43, IM 2013-142, Order 3330, and the Framework, TransWest has completed an HEA to determine the amount of compensatory mitigation necessary to offset potential impacts to greater sage-grouse resulting from the construction, operation, and maintenance of the TWE Project. The HEA produced an estimate of the permanent and interim potential loss of greater sage-grouse habitat services as a result of vegetation loss, noise, and human presence anticipated with TWE Project construction and operation. The HEA also modeled mitigation measures that may be implemented to offset the potential lost habitat services.

### 2.1.3. U.S. Fish and Wildlife Service Mitigation Recommendations

The USFWS Wyoming Ecological Services Office has provided recommendations regarding the development and implementation of a mitigation plan to address TWE Project impacts on greater sage-grouse and its habitat. Per these recommendations, TransWest will:

- Using results of the HEA, TransWest will allocate how much will be spent on mitigation in terms of specific actions or mitigation projects proposed for implementation. The selected mitigation project mix will be described providing a general breakdown regarding the amount of money going toward conservation easements, habitat enhancement projects, fence marking, etc.
- Focus the majority of mitigation on conservation of habitat, specifically on mitigation projects that protect habitat, enhance or maintain quality of habitat, and reduce fragmentation. Components of habitat conservation include preservation through easements, enhancements (such as juniper removal), and reclamation/restoration. These habitat conservation projects may then be supplemented by a smaller portion of mitigation projects such as fence-marking, focused research in designated areas following specific guidelines, improvement of mesic habitats important for brood-rearing and summer use, or others.
- Implement mitigation in a collaborative manner by working with members of an "Oversight Committee" composed of biologists working for BLM, Western, USFWS, WGFD, CPW, and UDWR. The role of this team is to provide guidance and biological advice concerning the accomplishment of successful mitigation on the ground.

Additionally, the USFWS provided specific recommendations to ensure successful completion of mitigation projects that contribute to greater sage-grouse habitat conservation. Within these recommendations, the USFWS emphasizes the need to consider each mitigation site individually and provide a clear justification regarding the value of the mitigation measure at that site.

## 2.2. Mitigation Siting Prioritization

Mitigation projects will be sited in the same state where the impact occurred and in a manner consistent with the priorities identified in the BLM's IM 2013-142 and Order 3330. As a baseline, mitigation project location will be prioritized according to following hierarchy to the extent practicable:

1. Mitigation will be located in Core Areas/Preliminary Priority Habitats that are intersected by the TWE Project or areas where habitat connectivity may be restored (i.e., local offsite mitigation),
2. Mitigation will be located within 18 kilometer (km) (11.2 mile [mi]) of the transmission line (i.e., onsite as defined in the DEIS) to benefit the impacted greater sage-grouse populations and their habitat.
3. Mitigation will be located within the region (e.g., Western Association of Fish and Wildlife Agencies' management zones) to benefit greater sage-grouse (i.e., regional offsite mitigation), particularly when onsite or nearby offsite mitigation is deemed to offer less benefit to impacted greater sage-grouse populations or their habitat than regional mitigation.

TransWest shall consider the above hierarchy and emphasize mitigation that benefits the populations that are impacted within each state; however, mitigation projects may be located elsewhere if the

Oversight Committee (see Section 2.4) identifies specific opportunities that will provide a greater benefit to greater sage-grouse than those in the impacted area.

## 2.3. Mitigation Schedule

Mitigation for the TWE Project is tied to the issuance of the BLM right-of-way grant or a specific notice-to-proceed. Mitigation funds would not be available for implementation until the right-of-way grant is issued or a specific notice-to-proceed for construction is issued although planning activities may take place earlier.

## 2.4. Oversight Committee

As described in the USFWS recommendations, an Oversight Committee consisting of agency biologists and other stakeholders/advisors, would be created to provide guidance on the mitigation approach for the TWE Project. As necessary, both local and landscape level perspectives would be represented on the Oversight Committee by involving local greater sage-grouse working groups, or other experts in the fields of mitigation, greater sage-grouse ecology, or other needed discipline. Committee member should have familiarity with the TWE Project area so that they can provide guidance on selection of mitigation locations. Committee participation may also be dependent upon the state in which the impact and mitigation occurs.

Primary objectives of the Oversight Committee would include recommendations for selection of mitigation projects, validation of the success of mitigation projects and their effectiveness at the local or landscape level, oversight of mitigation implementation, identification of alternate mitigation projects and strategies, and review of mitigation monitoring results. A selected committee member/entity would be responsible for facilitating communications among Oversight Committee members and would schedule necessary review meetings to discuss mitigation projects and monitoring results. The roles and responsibilities of Oversight Committee members will vary by mitigation project type and location. Once final mitigation projects are identified, participants, roles and responsibilities within the Oversight Committee will be determined and assigned.

## 2.5. Changes to the Plan

Changes to greater sage-grouse policies and guidance may be issued during the TWE Project ROW application review process. TransWest will consider new information as it becomes available and revise the Mitigation Plan as appropriate.

# 3. Types of Impacts to Greater Sage-grouse

TransWest's mitigation strategy is to compensate for known impacts to greater sage-grouse habitat that may occur as a result of TWE Project construction, operation and maintenance. Known and quantifiable impacts were modeled with a HEA.

## 3.1. HEA Modeled Impacts

The HEA for the TWE Project was completed using best-available scientific information regarding the primary indicators of quality greater sage-grouse habitat and the known anthropogenic impacts to that

habitat. The Draft Report for the HEA completed for the TWE Project is attached to this mitigation plan. Regulatory and resource agency staff, Non-Governmental Organizations (NGOs), and researchers generally agree on the potential direct impacts to greater sage-grouse and its habitat, and how to quantify these known impacts for the TWE Project. Direct loss of habitat resulting from ground-disturbing activities, construction related traffic and noise, and habitat loss associated with the footprint of the physical structures are the known potential impacts that can be accounted for in the HEA model. Compensatory mitigation, which may include mitigation projects undertaken by TransWest or in-lieu fees, will be applied to these potential direct impacts to ensure that there is no net loss of modeled habitat services as a result of TWE Project construction, operation and maintenance.

The total habitat service losses anticipated with the TWE Project construction, operation, and maintenance are provided in Table 1. Discounted service-acre-years (DSAYs) is the currency used by HEAs. The anticipated habitat service gains to be created with mitigation projects are also measured in DSAYs. Within the, the modeled impacts of the TWE project are considered to be fully offset when the DSAYs produced by the proposed mitigation project mix equal or exceed 3,733,029 DSAYs (the Total Habitat Services Lost from Table 1).

**Table 1.** Habitat Services Lost in the Analysis Area Over the Lifetime of the TWE Project (Modeled Years 1–104*).

| State | Permanent Disturbances Modeled | Habitat Services in the Assessment Area at Baseline Condition (DSAYs over lifetime of the TWE Project assuming no development) | Habitat Services Lost in the Assessment Area (DSAYs lost over lifetime of the TWE Project) |
|---|---|---|---|
| Wyoming | AC/DC converter station and transmission tower pads | 102,603,325 | 1,101,889 |
| Colorado | transmission tower pads | 71,739,071 | 1,374,208 |
| Utah | transmission tower pads | 73,696,032 | 1,256,932 |
| Total | AC/DC converter station and transmission tower pads | 248,038,428 | 3,733,029 |

* For the purposes of this analysis, the TWE Project lifetime is defined as the period between the TWE Project initiation and full recovery of vegetation. There are three years of construction and a year of reclamation, which is followed by a period of vegetation recovery. To be conservative, it was assumed that sagebrush will take 100 years to recover its full habitat service level after reclamation.

## 3.2. Other Potential Impacts

The HEA captures direct disturbances from the TWE Project construction, operation, and maintenance, and the indirect disturbance from noise and human presence during the years of construction. The effects of operating transmission lines on greater sage-grouse have not been established, are poorly understood, and require more research (Utah Wildlife in Need Cooperative [UWIN] 2010a, 2010b).

Literature, agency personnel, and the USFWS have identified the following potential impacts of transmission lines:

- Introduction and spread of invasive plant species in habitat;
- Collision and electrocution hazards;
- Decreased lek attendance near transmission corridors;
- Habitat fragmentation and habitat loss caused by behavioral avoidance of transmission corridors;
- Increased public access and associated impacts (e.g., noise, trash); and
- Increased predation by raptors and corvids due to the presence of transmission structures.

The HEA does not model indirect disturbance caused by the transmission line after construction is complete because insufficient information is available to characterize and quantify these effects. No "peer-reviewed" manuscripts have reported results from experimental studies that document greater sage-grouse avoidance of tall structures, increased predation related to avian predators using tall structures as perches, increased mortality attributed to collisions, or habitat degradation and/or fragmentation attributed to tall structures (UWIN 2010). Steenhof et al. 1993 and Lammers and Collopy 2007 provide substantial evidence on the use of transmission lines for nesting raptors and the effectiveness (or lack thereof) of perch deterrents, respectively; however, they provide very little insight on effects of transmission lines on greater sage-grouse. Lammers and Collopy (2007) discuss that perch deterrents did not have an effect on the observed number of greater sage-grouse predators and sagebrush conservation may better serve greater sage-grouse populations. Furthermore, ongoing research performed by Dr. James Sedinger of the University of Nevada – Reno and his colleagues, studying the Falcon to Gondor transmission line in eastern Nevada, has resulted in over ten years of data indicating that impacts to greater sage-grouse are more attributed to natural predation, wildfire impacts-habitat impacts from cheatgrass invasion, habitat fragmentation, and fitness of females (Nonne et al. 2013). The presence of the power line itself does not directly or indirectly result in increased mortality or a reduction in overall breeding success (Nonne et al 2013).

TransWest has addressed these potential impacts through adherence to the BLM spatial and timing stipulations identified in the DEIS as well as the development of effective reclamation and maintenance procedures, efficient and timely construction, environmental protection measures, traffic and access management, and avoidance of leks as discussed in Section 4.3.

# 4. Mitigation Measures

## 4.1. Avoidance and Minimization

TransWest has avoided and minimized both direct and indirect potential impacts to greater sage-grouse to the maximum extent practicable through the routing and siting process, adhering to buffers, and utilizing existing corridors and establishing environmental protection measures (EPMs) for construction, operation and maintenance activities. During the routing and siting process, TransWest has identified and will adhere to the appropriate spatial and timing stipulations surrounding leks and other greater

sage-grouse habitat to the extent practicable. TransWest has also worked with state and federal agencies, local governments, and local working groups and NGOs to avoid and minimize impacts to greater sage-grouse habitats.

To minimize potential direct and indirect impacts, the transmission line and ancillary facilities were located following existing linear corridors (e.g., other transmission lines, pipelines, roads, designated west-wide energy corridor) where possible. For instance, in Colorado TransWest's proposed action is to co-locate with the existing Craig-Bonanza 345 kV transmission line. In Utah, TransWest's proposed action is to co-locate with the existing Mona-Bonanza 345 kV transmission line. Co-location with existing transmission lines would minimize potential incremental impacts.

### 4.1.1. Environmental protection measures

The TWE Project includes EPMs to maintain environmental quality during construction, operation, and maintenance activities. Implementation of the EPMs will help TransWest to avoid and/or minimize impacts to greater sage-grouse and its habitat. The EPMs are listed the following appendices to the Preliminary Plan of Development (May 2014):

**Avian Protection Plan,** addresses measures to minimize risk to avian species, including greater sage-grouse, during construction and operation of the TWE Project. The Avian Protection Plan follows the guidance of the Avian Power Line Interaction Committee (APLIC).

**Traffic and Transportation Plan,** includes measures that limit roads to the minimum distance and width necessary for construction and operation of the transmission line, limit non-approved use and introduction of weeds by unauthorized vehicles, and control dust from roads and other surface disturbances. These measures minimize the potential for direct mortality of greater sage-grouse by vehicles, substantially reduce the potential for degradation of greater sage-grouse habitat from weeds and dust.

**Fire Prevention Plan,** addresses fire preventative measures to minimize fire risk during construction of the TWE Project.

**Reclamation Plan,** includes measures to reduce the impact of construction on greater sage-grouse habitat by re-establishing vegetation and reducing habitat degradation, including the use of seed mixes compatible with greater sage-grouse habitat and monitoring to ensure successful reclamation.

**Noxious Weed Plan,** includes measures to prevent the introduction or transport of noxious or invasive weeds and control thereof, thus reducing potential habitat degradation.

**Stormwater Pollution Prevention Plan,** includes measures to reduce erosion and sedimentation, thus reducing potential habitat degradation both on and off-site.

**Spill Prevention, Containment, and Countermeasures Plan,** includes measures that reduce the chance of contamination from spills affecting habitat adjacent to the construction area.

**Dust Control and Air Quality Plan,** includes measures to minimize fugitive dust and air quality impacts that could affect greater sage-grouse habitat.

**Operation and Maintenance Plan**, includes measures to avoid and minimize potential impacts during operation and maintenance.

## 4.2. HEA Modeled Mitigation

The avoidance and minimization measures discussed above substantially avoid known impacts to greater sage-grouse and minimize impact to their habitat. However, even with these measures in place, there are unavoidable potential impacts to habitat from the construction and operation of the TWE Project.

The HEA quantified the long-term and interim loss of habitat services (measured in DSAYs) resulting from unavoidable potential impacts (Table 1). The HEA used the same habitat services metric to quantify the habitat services to be gained by implementing habitat improvement measures selected by the interagency HEA Technical Advisory Team (See Table 2 in the Draft HEA Report, Attached). These measures include fence marking and removal, sagebrush restoration and enhancement, juniper removal, and purchase of conservation easements. The estimated DSAYs returned per one acre or one mile of each mitigation measure is provided in Table 2. The analysis also produced a cost per DSAY gained for each habitat improvement measure based on the average cost of mitigation project implementation (See Tables 6 and 8 in the Draft HEA Report, Attached).

**Table 2.** Mean Discounted Service-Acre-Years Gained for Each Mitigation Measure Modeled in the HEA.

| Conservation Measure | General Method | Mean Habitat Services Gained (present value service-acre-years per unit) |
|---|---|---|
| Fence removal and marking with flight diverters* | Fence marking within 3 km of leks and in other high risk areas (e.g., winter concentration areas, movement corridors) | 3,597 per mile of fence marked |
| | Fence removal within 3 km of leks and in other high risk areas | 3,597 per mile of fence removed |
| Sagebrush restoration and improvement projects | Seeding sagebrush and bunchgrass understory | 1,751 per acre of disturbance treated |
| | Transplanting containerized sagebrush stems and seeding bunchgrass understory | 4,556 per acre of disturbance treated |
| | Planting seedlings and seeding bunchgrass understory | 1,935 per acre of disturbance treated |
| Juniper/conifer removal | Lop and scatter Phase I† juniper | 480 per acre treated |
| | Cut-pile-cover or mastication of Phase II[2] juniper | 328 per acre treated |
| | Mastication of Phase III† juniper and seeding bunchgrass understory | 197 per acre treated |
| Conservation easements | Land purchase (baseline value service credit) applying the annual maintenance and monitoring fee to every 5,000 acres of easement. | 650 per acre purchased§ |

* Although fence removal is more effective at removing the threat of sage-grouse collision than fence marking, both measures were modeled as having the same benefit due to a limitation in the model.

† Phases of juniper describe the dominance of this vegetation on the landscape. Phase I is a sagebrush-dominated landscape with scattered juniper, Phase II is a landscape comprising a 50:50 mixture of sagebrush and juniper, and Phase III is a landscape dominated by juniper.

§Estimated using the average habitat services value per acre in the Assessment Area, because no specific easements have been proposed.

A mitigation package will be developed that describes a mitigation project mix that will produce a net balance of habitat services over the lifetime of the TWE Project. The mitigation package will consist of conservation easements (at 100% baseline habitat service level credit), sagebrush restoration and enhancement (including juniper removal), fence marking and removal, and other mitigation projects not modeled in the HEA where justified (e.g., understory seeding and enhancement of mesic habitats).

### 4.2.1. Mitigation Project Types

Descriptions of the mitigation project types modeled in the HEA are provided below. These mitigation projects are consistent with recommendations provided by the USFWS. TransWest is not limited to these mitigation project types for mitigation credit.

#### *Fence Marking and Removal*

Based on Christiansen (2009) it has been demonstrated that each mile of fence within 2 miles of leks kills up to 53 greater sage-grouse per year. This threat can be eliminated by removing fences or significantly reduced by increasing the visibility of fences. Christiansen (2009) estimated a 70% reduction

in mortalities could be expected along marked sections of fence. Stevens (2011) similarly predicted that marking fences with vinyl reflectors (flight diverters) reduced collision rates by up to 74%.

To eliminate the threat of collisions, fences would be removed or marked with flight diverters similar to those used in the Christiansen (2009), Wolfe (2007), and Stevens (2011) studies to increase fence visibility to greater sage-grouse. Fences will be removed where possible. Where removal is not possible, two flight diverters would be installed between each fence span (4 m post-to-post). Priority areas for fence removal and marking would be:

- Sections of fence known to cause greater sage-grouse collisions,
- Fences within 2 km (1.2 mi) of leks (Braun 2006; Stevens 2011) or other high risk area,
- Fences in areas with low slope and terrain ruggedness (Stevens 2011), and
- Fence segments bounded by steel t-posts with spans greater than 4 m (Stevens 2011).

Once fences have been removed or marked, local annual mortality due to fence collisions will be substantially reduced. This mitigation project type will be used on a limited site-specific basis per recommendations from the USFWS. As described in Section 2.2, all mitigation projects will be sited in the same state where the impact occurred and in a manner consistent with the priorities identified in the BLM's IM 2013-142 and Order 3330.

The HEA calculated that 3,597 service-acre-years would be created for every mile of fence marked (with annual maintenance) or fence removed over the lifetime of the TWE Project.

### *Sagebrush Restoration and Enhancement*

Sagebrush restoration and enhancement creates new habitat for greater sage-grouse and can be used to create corridors between existing sagebrush patches to produce contiguous habitat. Habitat for greater sage-grouse consists of a mosaic of plant communities dominated by sagebrush and a diverse grass and forb understory. This conservation measure increases the quality and quantity of habitat within the landscape, contributing to the long-term survival and success of the greater sage-grouse.

New habitat for greater sage-grouse will be created by establishing sagebrush and understory grasses and forbs in disturbed areas (e.g., roads, unreclaimed pipeline corridors, well pads, burned areas). These mitigation areas are in pre-existing areas of surface disturbance, not areas disturbed by the TWE Project. Vegetation disturbance from the TWE Project will be restored as described in the Plan of Development. All mitigation projects will be sited in the same state where the impact occurred and in a manner consistent with the priorities identified in the BLM's IM 2013-142 and Order 3330. Where possible, mitigation projects will be placed strategically to decrease habitat fragmentation by connecting existing habitats. All treatments will have monitoring plans and funding to conduct monitoring until the treatment is determined to be successful.

Sagebrush can be seeded, planted as seedlings, or transplanted (i.e., containerized stems). Because seeded sagebrush can take several decades to grow to a size that provides habitat for greater sage-grouse, the HEA determined that planting containerized stems can be the most economical and

successful option in many cases. Sagebrush restoration and enhancement projects will include understory (grass and forb) treatments.

The value of sagebrush restoration depends on the method used; methods that result in faster plant establishment have higher value. For every acre of disturbance planted with sagebrush seedlings and seeded with bunchgrass, 1,935 service-acre-years would be created. For every acre of disturbance planted with containerized sagebrush stems and seeded with bunchgrass, 4,556 service-acre-years would be created.

### *Juniper Removal*

Fire suppression and other post-settlement conditions have allowed western juniper to spread into areas previously dominated by grasses, forbs, and shrubs. Many areas have experienced an estimated 10-fold increase in juniper over the last 130 years (Miller et al. 2005). The expansion of juniper and other conifer species reduces habitat for greater sage-grouse and other sagebrush obligate species that depend on large patches of sagebrush-dominated vegetation. Sagebrush cover decreases with juniper encroachment as the vegetation transitions into woodland.

Most juniper communities are still in a state of transition. Miller et al. (2005) characterized three stages of woodland succession:

- Phase I (early) – trees are present but shrubs and herbs are the dominant vegetation that influence ecological processes (hydrologic, nutrient, and energy cycles) on the site;
- Phase II (mid) – trees are codominant with shrubs and herbs and all three vegetation layers influence ecological processes on the site;
- Phase III (late) – trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

Sites in Phase I or II successional stages often retain a significant understory of grasses and forbs, so removal of Phase I or II can produce immediate habitat benefits for greater sage-grouse (NRCS 2010; USFWS recommendations). Therefore juniper/conifer removal projects used for mitigation will focus primarily on areas in the early to mid stages of succession (i.e., Phase I or Phase II) with no cheatgrass component. Removal of juniper/conifer will be done by mechanical means without the use of fire or chemicals. Phase I juniper/conifer will be treated by having a field crew walk from tree-to-tree, cutting them into pieces and scattering them on-site (lop and scatter). Phase II juniper/conifer will be treated by using a masticator, a large mechanical device that goes from tree-to-tree and demolishes the tree with whirling blades; debris is then left on site (mastication).

All juniper/conifer removal projects will include understory treatment, where needed, and vegetation monitoring until the understory vegetation is established. Locations of removal projects will be selected with guidance from the Oversight Committee so that each treatment site provides value to the local greater sage-grouse population. Mitigation projects will be located in the same state where the impact occurred and in a manner consistent with the priorities identified in the BLM's IM 2013-142 and Order 3330 (Section 2.2).

The value of juniper/conifer removal in the HEA depended on the density of juniper removed (i.e., Phase I, Phase II, or Phase III juniper). The HEA calculated that 480 service-acre-years are created for every acre of Phase I juniper removed, 328 service-acre-years for every acre of Phase II juniper removed, and 197 service-acre-years for every acre of Phase III juniper removed with understory seeding over the lifetime of the TWE Project.

### *Bunchgrass and Forb Seeding*

Bunchgrasses, as opposed to rhizomatous grasses, are recognized as an important component of greater sage-grouse nesting and brood-rearing habitats (Connelly et al. 2000; Crawford et al. 2004). The structure and abundance of bunchgrasses influence the quality of a site for nesting greater sage-grouse. Tall, dense, residual grass in nesting habitat improves hatching success by providing cover for incubating females (Cagney et al. 2010). Herbaceous cover may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995, as cited in Connelly et al. 2000). In addition to providing cover from predators, forbs are an important food source for greater sage-grouse broods.

Greater sage-grouse nesting and brood-rearing habitat will be improved by seeding native bunchgrasses and forbs into existing sagebrush stands or into adjacent disturbance. Understory seeding project sites will be selected in coordination with the Oversight Committee to maximize the benefit of these mitigation projects for greater sage-grouse. Objectives for these mitigation projects and criteria for success will be developed in coordination with the Oversight Committee.

While not captured in the TransWest HEA because of lack of available data, using results from other similar HEA models that contained bunchgrass variables, including the model for the Energy Gateway West transmission project, overseeding bunchgrass in 1-acre of sagebrush habitat is approximately 5% of the services returned by removing 1-acre of Phase I juniper. As a result, it is estimated 24 service-acre-years would be returned for each acre of overseeding. A greater number of service-acre-years are created when areas of disturbance (i.e., no vegetation) are seeded with bunchgrass. Using results from other similar HEA models indicates that overseeding bunchgrass in 1-acre of disturbed habitat is equivalent to approximately 25% of the services returned by removing 1-acre of Phase I juniper. As a result, it is estimated 120 service-acre-years would be returned for each acre of seeding in disturbed areas over the life of the TWE Project.

### *Conservation Easements*

Conservation easements may be purchased and managed to remove or reduce threats to greater sage-grouse. The purchase of easements can prevent future greater sage-grouse habitat destruction or degradation near urban areas or other industrial developments.

Conservation easements purchased for mitigation would focus on areas or locations that demonstrate the highest need for protection and potential for reducing habitat fragmentation. Conservation easements would be purchased and managed in coordination with the Oversight Committee. Specific locations of conservation easements would depend on availability of easements for purchase, but would generally follow the priorities identified in the BLM's IM 2013-142 and Order 3330.

The HEA calculated that, on average, 650 service-acre-years would be created per acre of conservation easement purchased, assuming the easement is maintained over the life of the TWE Project. Greater credit could be possible if the easement was maintained in perpetuity. This total does not include the value of any subsequent habitat improvements to the property and assumes the proponent receives 100% credit for the baseline habitat-service level of the property.

### 4.2.2. Specific Mitigation Projects

In the final mitigation plan, TransWest will include viable mitigation projects/opportunities which meet mitigation goals and strategy. Specific mitigation projects will be selected in coordination with the Oversight Committee following the recommendations and guidelines provided by the states, BLM, Western, and USFWS. Mitigation projects may be located on either public or private land. Although only five mitigation measures are modeled, TransWest is not bound to only those project types. If other project types are recognized by the Oversight Committee as providing greater sage-grouse population or habitat benefits similar to those modeled in the HEA, then these mitigation projects may be included in future updates of this Plan.

Potential mitigation sites would be evaluated to determine their current state, the type of mitigation that would be most beneficial, and the potential for that mitigation project to meet the success criteria defined by the Oversight Committee. Mitigation projects that confer the greatest potential benefit to greater sage-grouse and have a high probability of success will be given priority.

### 4.2.3. In-lieu fees

For all or a portion of the compensatory mitigation, TransWest may employ an in-lieu fee approach that considers the cost of purchasing or implementing a mitigation project and monitoring and managing that project over the life of the TWE Project. TransWest may pay mitigation fees into accounts that will fund mitigation projects that benefit greater sage-grouse and their habitats. Refer to Section 2.2 for general/minimum criteria for selection of mitigation projects that would utilize in-lieu fees. TransWest will work with the Oversight Committee to identify the appropriate organizations to receive and manage in-lieu fees in each state, as well as to set standards for the mitigation projects funded by those fees.

Mitigation may include programs that are currently being pursued by other entities where there is opportunity for TransWest to provide financial support. Support of such identified mitigation projects would be in the form of direct funding or in-lieu fees to assist the entity proposing the mitigation project with implementation. The balance of the mitigation dollars owed (the total dollar cost estimated by the HEA minus the costs of the specific mitigation projects) may be provided through in-lieu fees.

In Wyoming, the Wyoming Wildlife and Natural Resource Trust (WWNRT) has been identified as a potential organization that could receive and manage in-lieu fees for the TWE Project. The WWNRT is an independent state agency governed by a nine-member citizen board appointed by the Governor and works closely with the WGFD and Wyoming state government.

### 4.2.4. Monitoring and maintenance

Monitoring the success of mitigation measures and maintaining each measure to ensure continued success are important elements the mitigation strategy. TransWest and the Oversight Committee will identify a monitoring and maintenance approach for each mitigation project or project type in the mitigation package. Each mitigation project will require a monitoring and mitigation facilitator role that could be filled by agencies, private landowners, NGOs, environmental or reclamation contractors, or TransWest.

The final monitoring and maintenance approach for each mitigation project will be formalized in a monitoring and maintenance strategy that will be reviewed by the Oversight Committee annually, or as necessary. The duration of monitoring may vary for each mitigation project type. The strategy will also include success criteria for each mitigation project, such as:

- Measurable increase in desired vegetation structure and composition in a restoration area when compared to a suitable control area
- Adherence to conservation easement contract terms
- Removal of stated acreage of encroaching juniper stands

## 5. Conclusion

Reliable, cost-effective electricity is a basic necessity for Americans' quality of life and for the health and prosperity of American industry. The TWE Project not only will ensure delivery of a vital renewable wind-energy resource for a growing America but also will create jobs, support environmental protection, enhance tax revenues, and further strengthen the nation's energy foundation for the future. TransWest is committed to developing the TWE Project in an environmentally responsible manner using best available science and best management practices from the electric transmission industry. TransWest's greater sage-grouse mitigation plan is consistent with Order 3330 and *"A Strategy for Improving Mitigation Policies and Practices of The Department of the Interior"* by utilizing a landscape-scale, science-based approach to avoid, minimize and compensate for potential impacts to greater sage-grouse that may result from development of the TWE Project.

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# ATTACHMENT

## DRAFT REPORT: Greater Sage-grouse Habitat Equivalency Analysis for the TransWest Express Project

**All numbers in this draft report are provisional and may be subject to change pending agency review and additional quality checks.**

*Prepared by:*

TRANSWEST EXPRESS LLC

May 2014

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**D**: Quantification of Habitat Service Gains Produced by Habitat Restoration and Mitigation Measures

**E**: Assignment of National Gap Analysis Program (GAP) Vegetation Classifications to Categories for HEA Modeling

TransWest Express LLC's (TransWest) **TransWest Express Project** (TWE Project) is a proposed extra high voltage, direct current (DC) transmission system extending from south-central Wyoming to southern Nevada. The proposed transmission line would cross four states (Wyoming, Colorado, Utah, and Nevada) on lands owned or administered by the BLM, United States Forest Service (USFS), National Park Service (NPS), Bureau of Reclamation (BOR), Utah Reclamation Mitigation and Conservation Commission (URMCC), various state agencies, Native American tribes, municipalities, and private parties. The TWE Project would provide the transmission infrastructure and capacity necessary to deliver cost-effective renewable energy produced in Wyoming to the Desert Southwest region (California, Nevada, Arizona), ultimately helping contribute to a cleaner world, strengthen the electric grid, and provide much-needed electricity to millions of homes and businesses every year. The TWE Project will deliver enough clean, sustainable energy to power nearly 2 million homes and reduce greenhouse-gas emissions equivalent to taking 1.5 million cars from the road.

The ±600 kilovolt (kV) DC transmission line would be approximately 725 to 750 miles in length (depending upon the alternative selected), located within a 250-foot wide right-of-way (ROW). The TWE Project includes ground-disturbing activities associated with the construction of above-ground transmission lines and includes transmission tower locations, access roads, a ground electrode line, a ground electrode site, fly yards, material yards, two AC/DC converter stations (a northern terminal and a southern terminal), pulling/tensioning areas, and work areas. The TWE Project has been sited to avoid and minimize greater sage-grouse (*Centrocercus urophasianus*) lek buffers and occupied habitat. However, complete avoidance is unachievable and portions of the TWE Project cross designated habitat for greater sage-grouse (BLM's Preliminary General Habitat [PGH]) in Wyoming, Colorado, and Utah. As a result, TransWest has coordinated with the BLM, Western Area Power Administration (Western), U.S. Fish and Wildlife Service (USFWS), Wyoming Game and Fish Department (WGFD), and Colorado Parks and Wildlife (CPW), and Utah Division of Wildlife Resources (UDWR) to develop a mitigation strategy to compensate for the unavoidable loss of greater sage-grouse habitat that would potentially occur as a result of the TWE Project construction, operation and maintenance in areas of greater sage-grouse habitat.

The mitigation approach TransWest will implement for the TWE Project will follow the guidance provided by BLM IMs IM 2013-142, 2012-043, and 2012-044 and Department of Interior Secretarial Order 3330 (Order 3330). Collectively, these provide guidance for greater sage-grouse habitat management and mitigation for pending transmission rights-of-way in Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). These policies state that transmission rights-of-ways having disturbances greater than 1 linear mile or 2 acres require cooperation between the BLM, project proponents, and other appropriate agencies to develop and consider implementation of appropriate regional mitigation to avoid or minimize habitat and population-level effects to greater sage-grouse.

Under these policies, offsite and onsite mitigation can include in-kind or out-of-kind mitigation. In-kind is defined as the replacement or substitution of resources that are of the same type and kind of those

being impacted. Out-of-kind is defined as replacement or substitutions of resources that while related are of equal or greater overall value to public lands. IM 2013-142 also identifies that the BLM may accept monetary contributions, how they may be used, and that mitigation may be conducted on non-Federal lands.

The BLM, working in concert with the USFWS, has developed a *Framework for Sage-grouse Impacts Analysis for the TransWest Express Transmission Project* (Framework). The Framework addresses TWE Project-related impacts to greater sage-grouse habitat that bear directly on listing factors considered by the USFWS when evaluating the need to provide full listing protection under the ESA. The Framework specifies the use of HEA to scale mitigation and compensate for the loss of habitat services over the life of the TWE Project. HEA is a science-based, peer-reviewed method of scaling compensatory mitigation requirements to potential TWE Project-related effects, measured as a loss of habitat services from pre-disturbance conditions (Allen et al. 2005; Dunford et al. 2004; King 1997; Kohler and Dodge 2006; National Oceanic and Atmospheric Administration 2006, 2009). Habitat services include those ecosystem features (i.e., physical site-specific characteristics of an ecosystem) and ecosystem functions (i.e., biophysical processes that occur within an ecosystem) that support wildlife and human populations (King 1997).

In compliance with IM 2012-43, IM 2013-142, Order 3330, and the Framework, TransWest has completed an HEA to determine the amount of compensatory mitigation necessary to offset potential impacts to greater sage-grouse resulting from the construction, operation, and maintenance of the TWE Project. The HEA produced an estimate of the permanent and interim potential loss of greater sage-grouse habitat services as a result of vegetation loss, noise, and human presence anticipated with TWE Project construction and operation. The HEA also modeled mitigation measures that may be implemented to offset the potential lost habitat services.

The following sections provide overviews of HEA, the HEA process for the TWE Project, the methods used for the HEA, the results of the HEA, and potential types of mitigation measures that could be used to compensate for habitat loss. Detailed methods excerpt from the TWE Project's HEA Plan are provided in the appendices to this report.

**Overview of Habitat Equivalency Analysis**

HEA is a science-based, peer-reviewed method of quantifying interim and permanent habitat injuries, measured as a loss of habitat services from pre-disturbance conditions, and scaling compensatory habitat requirements to those injuries (King 1997; Dunford et al. 2004; Allen et al. 2005; Kohler and Dodge 2006; National Oceanic and Atmospheric Administration [NOAA] 2006, 2009). Habitat services include those ecosystem features (i.e., physical site-specific characteristics of an ecosystem) and ecosystem functions (i.e., biophysical processes that occur within an ecosystem) that support wildlife and human populations (King 1997).

Habitat services are generally quantified using a metric that represents the functionality or quality of habitat (i.e., the ability of that habitat to provide wildlife "services" such as nest sites, forage, cover from predators, etc.). When wildlife habitat is the primary service of interest, areas with the highest habitat service levels are those areas with highest habitat quality. Interim (or short-term) habitat injuries are those services that are absent during certain phases of the project that would have been available if that disturbance had not occurred (e.g., temporary vegetation losses, temporary soil partitioning, temporary displacement of wildlife populations). Permanent habitat injuries are those habitat injuries remaining after project completion and interim reclamation and recovery are complete (e.g., permanent vegetation loss, permanent loss of wildlife or fisheries populations, irrecoverable impacts to soils or water as a result of contamination).

HEA uses a service-to-service approach to scaling. HEA does not assume a one-to-one trade-off in resources (e.g., number of acres). Rather, HEA balances the number of services lost with those that are gained as a result of conservation activities (NOAA 2006). For example, one acre of land with a diverse vegetative structure and abundant tree canopy can support higher numbers of nesting songbirds (the habitat service of interest) than one acre of land with few trees and little vegetative diversity. The two land parcels, although equal in size, provide unequal habitat services.

**What Does Habitat Equivalency Analysis Do?**

HEA is an economics model that:

- Quantifies current habitat services provided in a project area or landscape (commonly referred to as the baseline habitat service level)
- Quantifies the interim and permanent injuries to the baseline habitat service level
- Determines appropriately scaled restoration and conservation activities to offset habitat services lost as a result of project impacts

**Benefits of Habitat Equivalency Analysis**

The benefits of HEA include:

- High credibility – the approach has been evaluated and documented in scientific peer-reviewed literature and has held up in numerous court cases
- Quantitative rather than qualitative in nature
- Equations are straightforward, but have enough input variables to allow flexibility in project design

- Provides a replicable method for negotiation of mitigation ratios, acceptable compensatory restoration, and/or fines
- Valuable planning tool; can be used to evaluate the cost of multiple compensatory mitigation measures
- Applicable to any ecosystem type where an appropriate habitat services metric can be defined
- Currently the most commonly used method by natural resource trustees to assess damages to ecosystems
- Used by federal regulatory agencies, such as the U.S. Fish and Wildlife Service, NOAA, BLM, Environmental Protection Agency, Department of Interior, U.S. Army Corps of Engineers

**When Habitat Equivalency Analysis Should Be Used (Chapman 2004)**

HEA is an appropriate tool for scaling mitigation:

- When habitat services can be defined or modeled
- When quantification of project impacts is possible
- When replacement of services lost is feasible
- When conservation methods are sufficiently known

**Compensation Components**

Compensation for impacts includes two components: (1) recovery of the injured area (primary restoration; Figure 1), and (2) compensation for the interim loss of habitat services occurring prior to full recovery (compensatory restoration; Figure 2).

HEA quantifies the habitat services lost during the lifetime of a project compared to baseline (Area X in Figure 1) and scales the compensatory project (mitigation project) so that it provides services that are equal to that loss (Area Y in Figure 2). Baseline refers to the condition of the resources and quantity of habitat services that would have existed had the disturbance not occurred. The quantity of services lost (Area X) depends on the extent of the injury and the time required for restoration; actions taken to accelerate the rate of primary restoration would decrease the interim loss of habitat services, requiring less compensatory restoration. In some cases, full restoration of the lost services may not be feasible, in which case the area required for compensation (Area Y) would be larger. Compensatory restoration may occur off-site (e.g., the purchase of additional habitat), or on-site through habitat improvements

that increase habitat services above baseline (e.g., non-native vegetation removal, shrub thinning, or understory planting).

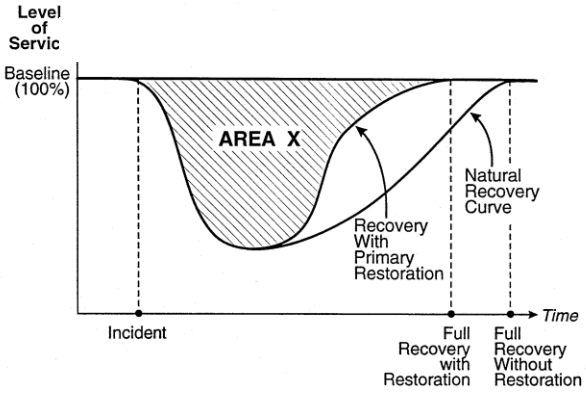


**Figure 1.** Changes in habitat service level compared to the baseline service level during construction and restoration (copied from King 1997). Area X represents the services lost at an injury site with Primary Restoration expressed as percent of baseline.

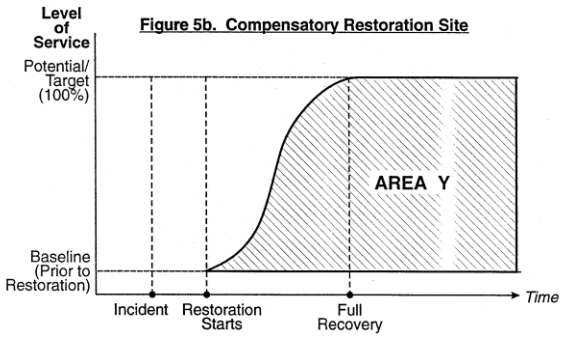


**Figure 2.** Changes in habitat service level with compensatory restoration (copied from King 1997). Area Y represents the services gained at the compensatory restoration site expressed as percent of potential/target level less baseline (pre-restoration) percent.

**Measuring Habitat Services (Ecological Economics)**

Quantifying the services provided by an ecosystem is a complex task. This complexity can be reduced through the use of an attribute, or metric, that provides a measure of the services of interest. The metric must be able to capture the relative differences in the quality and quantity of services being provided before and after restoration and between primary and compensatory sites (NOAA 2009).

Measurements of habitat services over the lifetime and area of a project are used in the HEA. These measurements have three components: land area, service level, and time. The relative service level can be quantified using a metric that measures or scores one or more key habitat elements for a species or wildlife community of interest (e.g., vegetation stem density, vegetation type, nest density, percentage of canopy cover, proximity to critical habitat, etc.). Habitat services are commonly expressed in service-acres (one year) or service-acre-years (multiple years).

**Overview of the Habitat Equivalency Analysis Process for the TWE Project**

Completion of the HEA process for the TWE Project Agency Preferred Alternative required close coordination with the BLM, Western, and other appropriate agencies and stakeholders (the HEA Technical Advisory Team, hereafter). Such coordination ensures that the best available scientific data were used, the habitat service metric was appropriate for resources in the TWE Project area, the results of the HEA are understood, and the compensation offsets the interim and permanent loss of habitat services modeled. The following steps will be completed as part of the development of the HEA for the TWE Project:

1. **Establishing baseline habitat services prior to disturbance.**

   TransWest has worked closely with the HEA Technical Advisory Team to finalize a habitat services metric that will quantified the baseline greater sage-grouse habitat services available prior to TWE Project construction. Appendix A provides information related to the development of the habitat services metric that served as the basis for quantifying baseline habitat services and determining TWE Project impacts and appropriate mitigation. Appendix B presents information related to how this metric was applied to establish baselines habitat services for the TWE Project area. Development of the baseline habitat service metric presented in Appendix A considered the best available scientific information regarding greater sage-grouse habitat and response to disturbance.

2. **Quantifying the permanent and interim losses to the baseline service level that result from the TWE Project disturbance.**

   Permanent and interim losses of habitat services caused by the construction and operation of the TWE Project were subtracted from the baseline habitat services. Direct and indirect losses that remain following reclamation efforts and vegetation recovery in the ROW over the life of the TWE Project will provide the basis for assessing the adequacy of mitigation proffered by TransWest. Appendix C describes the approach that was used to assess the direct and indirect losses that will occur as a result of TWE Project construction and operations.

3. **Identifying appropriate mitigation measures that may be used to compensate for lost services.**

TransWest worked the HEA Technical Advisory Team to identify mitigation measures that may be used to compensate for the permanent and interim losses of habitat services. All mitigation measures would be subject to appropriate land management agency or landowner approval, permits, and planning. Appendix D describes the methods that were used to quantify habitat service gains resulting from mitigation measures.

In the HEA process, the benefits of mitigation measures must be quantifiable using the habitat services metric. Additional mitigation measures with benefits that cannot be quantified in the HEA (e.g., brood rearing habitat improvement and understory improvement measures) will be considered separately in TransWest's Mitigation Plan and their compensatory value determined in coordination with the lead agencies and other stakeholders.

4. **Quantifying the amount of mitigation necessary to compensate for the losses to baseline services that remain after the TWE Project implementation.**

   Once final mitigation measures have been identified and approved by TransWest, the lead agencies and involved stakeholders, the average habitat service gain and cost per service returned were quantified for each mitigation measure. The resulting values will be balanced with the services lost to determine the compensatory mitigation appropriate to offset the permanent and interim loss of greater sage-grouse habitat services resulting from development of the TWE Project. This balancing will occur in TransWest's Mitigation Plan with a proposed mitigation project mix. TransWest's Mitigation Plan that documents the scaled compensatory mitigation will be provided to BLM and Western as a voluntary applicant-committed mitigation measure for greater sage-grouse.

# Overview of the Habitat Equivalency Analysis Methods Used

The following sections provide an overview of methods used to develop the HEA models that were applied to assess the loss of greater sage-grouse habitat services associated with the TWE Project development and the benefits of various conservation project types that may be proposed for mitigation.

## Development of Habitat Service Metric

To quantify the habitat services (e.g., greater sage-grouse habitat functionality) provided by an ecosystem, a habitat service metric is developed that scores key habitat elements for the species. Scoring habitat services is a critical step in the HEA process because it provides a way to quantitatively measure the quality of specific habitat functions in a specific area. The habitat metrics used in the HEA must be able to capture the relative differences in the quantity of services provided before and after construction and conservation-focused activities. Habitat services often have three components—land

area, service level, and time—and are commonly expressed in service-acres (one year) or service-acre-years (service-acres summed over multiple years).

The greater sage-grouse habitat services metric for the TWE Project was developed collaboratively by the HEA Technical Advisory Team. The focus of the metric was to capture changes in greater sage-grouse habitat services over time with vegetation removal and recovery. Using this approach, lost habitat services (decreases in habitat quality) must be replaced with like services. The HEA does not assume a one-to-one trade-off in resources (e.g., number of acres of greater sage-grouse habitat affected), but instead determines compensation based on the habitat services those acres provide (e.g., development in high-quality greater sage-grouse habitat would have higher compensation levels than development in lower-quality habitat that provides fewer services).

The habitat service metric developed for the TWE Project included variables identified by the peer-reviewed literature as having influence on the quality of greater sage-grouse habitat, including dominant vegetative components and anthropogenic influences (Table 1). The variables included were limited to those for which reliable and consistent data were available across the TWE Project area. For each of the variables, a habitat service score ranging from 0 to 3 (zero to high services) was assigned for categories like those defined in the Sage-Grouse Habitat Assessment Framework Multi-scale Habitat Assessment Tool (Stiver et al. 2010). Categorical variables were more appropriate than continuous variables due to the resolution of the remotely sensed vegetation data available for the length of the TWE Project. The breaks between scores were primarily based on information contained in the literature regarding greater sage-grouse habitat use and selection. When literature did not allow for direct quantification of the HEA scores, professional judgments of the HEA Technical Advisory Team informed by the available peer-reviewed literature were used. When a particular variable matched literature-based optimal conditions, that variable was given a service score of 3.

The metric for greater sage-grouse habitat services used in this HEA is an additive model (Table 1) with a score adjustment for the presence of fences posing a high collision risk to greater sage-grouse during the lekking season. Each cell in the analysis area is scored separately by summing the scores of Variables 01 through 08. The summed score is then multiplied by a factor that reduces the score where high risk fences are present. Each of the variables and the fence collision score adjustment is described in detail in Appendix A.

The metric is only applied to areas that contain occupied greater sage-grouse habitat. The assessment area was first clipped to the BLM's Priority General Habitat (PGH). Then, land cover types typically avoided by greater sage-grouse are assigned a metric score of 0 (provides no habitat services) before the metric was applied to the remaining areas. Disturbances of these lands require no mitigation in the HEA. These avoided land cover types include all forest types, urban areas, open water, some introduced vegetation types, roadways, well pads, mine footprints, areas <100 meters (m) from roadways with >6,000 annual average daily traffic (AADT), and <25 m of paved roads with <6,000 AADT and heavily

traveled gravel roads (multiple sources per U.S. Fish and Wildlife listing decision in Federal Register; Johnson et al. 2011). The specific GAP vegetation classifications that were included in these avoided land cover types are listed in Appendix E.

All variables were weighted evenly. Weights were not applied because there was not adequate information in the literature to support the use of one specific weight over another. The importance of sagebrush was already intrinsically weighted higher than other vegetation types due to the number of variables that measured an aspect of sagebrush vegetation (for which non-sagebrush vegetation types would score low). Comparisons of the final baseline maps to maps of known greater sage-grouse use indicated that the metric performed well to distinguish between high-quality and low-quality greater sage-grouse habitat across the length of the TWE Project without adjusting the variable weights.

Greater sage-grouse habitat suitability publications vary in their baseline environmental conditions affecting a particular study site. Even studies within a single state may describe different suitable habitat conditions depending on elevation, precipitation zone, and other geographic or climatic factors affecting each study site. The habitat metric relied on generalizations presented in BLM et al. (2000), Cagney et al. (2009), Connelly et al. (2011), Connelly et al. (2000), Stiver et al. (2010), and other summary publications. Specific citations are given to support these generalizations when applicable. The same metric of habitat services was applied to the entire TWE Project area.

The HEA metric was used to score habitat service level for all areas on and within 2 kilometers (km) of the TWE Project footprint, including access roads and other infrastructure (Assessment Area). None of the habitat service losses modeled (vegetation loss, noise, and human presence) extended outside the Assessment Area. The Assessment Area was clipped to the greater sage-grouse PGH and partitioned by state (Wyoming, Colorado, and Utah). The final Assessment Area centerline length varied by state.

**Table 1.** Anthropogenic and Habitat Variables Used as a Metric of Greater Sage-grouse Habitat Services.

| Variable Number | Variables | 3 | 2 | 1 | 0 | Primary Citations |
|---|---|---|---|---|---|---|
| VAR01 | Distance to high-traffic (>6,000 AADT) road, such as an interstate, federal, or state highway (meters) | >1,000 | 650–1,000 | 100–650 | N/A* | Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009) |
| VAR02 | Distance to low-traffic (<6,000 AADT) paved roads, heavily travelled gravel roads, well pads, mine footprints, transmission substations (meters) | >200 | 50–200 | 25–50 | N/A* | Connelly et al. (2004); Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009) |
| VAR03 | Percent slope | <10 | 10–30 | 30–40 | >40 | Beck (1977); Lincoln County Sage Grouse Technical Review Team (2004) |
| VAR04 | Distance to occupied lek† (kilometers) | 0–6.4 | 6.4–8.5 | >8.5 | N/A | Cagney et al. (2009); Connelly et al. (2000); Connelly et al. (2011); Holloran and Anderson (2005) |
| VAR05 | Sagebrush abundance index (% of vegetation that is sagebrush within a 1 $km^2$ moving window) | 50–95 | 30–50 or >95 | 10–30 | 0–10 | Carpenter et al. (2010); Walker et al. (2007); Aldridge and Boyce (2007); Aldridge et al. 2008; Wisdom et al. (2011) |
| VAR06 | Percent sagebrush canopy cover | 15–35 | 5–15 or >35 | 1–5 | <1 | Cagney et al. (2009); Connelly et al. (2000); Stiver et al. (2010) |
| VAR07 | Sagebrush canopy height (centimeters) | 30–80 | 20 to <30 or >80 | 5–20 | <5 | Crawford et al. (2004); Connelly et al. (2000); Stiver et al. (2010) |
| VAR08 | Distance of habitat to sage or shrub dominant (meters) | <90 | 90–275 | 275–1,000 | >1,000 | BLM et al. (2000); Connelly et al. (2000); Lincoln County Sage Grouse Technical Review Team (2004) |

* Lands less than 100 m from a high traffic road and less than 25 m from a low traffic paved road or high traffic gravel road were given a total metric score of 0 (provides no habitat services), not just a score of 0 for these individual variables.
† Leks were classified as active if their 10-year attendance average was greater than 0.

## Quantification of Habitat Service Losses

The following sections describe the losses of habitat services that would likely occur as a result of the TWE Project construction and operation. These changes in the habitat service level were simulated in a GIS platform to produce data inputs for the HEA.

The HEA model calculates the present value of future changes to the baseline habitat service level with time caused by losses of habitat services with TWE Project development and gains of habitat services with mitigation projects. Economists call this process *discounting* and it is a standard part of the HEA model. Discounting converts services being provided in different time periods into current time period equivalents (Allen et al. 2005). Discounting results in a gradual increase in the service-acres provided by injured habitats over time, and the same rate of decrease in service-acres gained by habitat conservation over time. Consequently, credit for mitigation in the form of habitat conservation (increase in discounted service-acre-years) is greater when implemented early in the lifetime of the TWE Project than when implemented late in the lifetime of the TWE Project. This encourages early mitigation to offset habitat service losses, to ensure that long-term adverse effects to the resource are minimal. Likewise, the injury (i.e., loss of discounted service-acre-years) due to construction and operation of the TWE Project is greater when it occurs early in the project lifetime than when it occurs later in the project lifetime.

Ideally, the baseline habitat service level would account for all habitat service losses associated with existing environmental disturbances. This was done to the extent possible with the existing data for the Assessment Area. In some cases, existing habitat disturbances were not mapped in the baseline service level because they were not detected by the chosen habitat services metric, or because the data were unavailable for use in the baseline analysis. Omission of these disturbances is a conservative approach to the analysis of the TWE Project-related habitat service losses. When baseline disturbances are omitted, the analysis assumes that the habitats affected by the TWE Project are of higher-quality than they actually are, and thus require a greater amount of mitigation to offset the TWE Project-related habitat service losses.

### Description of Changing Habitat Service Level by Project Milestone

The habitat services provided by the Assessment Area were calculated at TWE Project milestones that reflected varying levels of disturbance. The TWE Project milestones modeled with GIS data for the HEA are listed below.

1. **Baseline**—the baseline milestone quantifies habitat services available to greater sage-grouse before disturbance. The calculation of Baseline is described above and in Appendix B.
2. **Construction—**the construction milestone quantifies habitat services available to greater sage-grouse during the construction or operation of the AC/DC converter station proposed as part of the TWE Project and the construction of the transmission line and electrode grid. Magnitude of the loss of habitat services during construction is dependent on proximity to the TWE Project and the amount of new surface disturbance.
3. **Restoration**—the restoration milestone quantifies habitat services available to greater sage-grouse after substation and transmission line construction is complete and some services return with the reduction in noise and human presence.
4. **Recovery**—the recovery milestone quantifies habitat services available to greater sage-grouse after a vegetation type has recovered to the greatest extent expected after the TWE Project restoration is complete. Habitat services return to baseline conditions in restored areas with the time to recovery being dependent on the vegetation type.

## Quantifying Habitat Service Losses during Construction

Snapshots of the changing habitat services over time are modeled using GIS-based tools for each of the milestones identified above for incorporation into the HEA. The HEA calculates the total interim and permanent habitat injuries associated with the TWE Project. Specifics of the GIS and HEA methods are provided in Appendix C.

### *Timing*

A conceptual substation, transmission structure, and infrastructure layout was provided by TransWest from which all habitat service losses were calculated (Table 2). The transmission line is planned to be constructed over a period of 3 years in each state, which is concurrent for all states.

### *Direct Disturbance*

The footprint of the TWE Project was provided electronically by TransWest. The footprint files specified the anticipated locations of and direct disturbance associated with access roads, the ground electrode grid and line, transmission towers, pulling/tensioning areas, an AC/DC converter station (the northern terminal), mid spans, material yards, and fly yards.

During the three Construction years, direct disturbance was defined as the loss of all habitat services within the entire construction footprint for the segment modeled (Table 3). Access roads were assumed to have a width of 10 m. The model did not capture temporal restrictions on the TWE Project construction required by the BLM, which may have resulted in high estimates of service losses in the three Construction years. In the Restoration year following construction, direct disturbance was still

defined as the loss of all habitat services in the construction footprint, because the vegetation had not regrown sufficiently to provide habitat. In the Recovery years, direct disturbance was defined as the loss of all habitat services in the footprint of permanent facilities (i.e., the AC/DC converter station and transmission structure pads). The direct disturbance in restored areas was returned at different rates depending on baseline vegetation type. There were four vegetation-based recovery endpoints: 1) agriculture and wetland (1 year after Restoration); 2) grassland and riparian (5 years after Restoration), 3) shrubs other than sagebrush (20 years after restoration); and 4) sagebrush (100 years after Restoration). The assignment of the GAP vegetation types to these four recovery endpoints is described in Appendix E.

**Table 2.** TWE Project Milestone Years

| Project Year | Project Milestone |
|---|---|
| 0 | Baseline |
| 1 | Construction |
| 2 | Construction |
| 3 | Construction |
| 4 | Restoration |
| 5 | Recovery 1 |
| 6 | -- |
| 7 | -- |
| 8 | -- |
| 9 | Recovery 2 |
| 10 | -- |
| 11 | -- |
| 12 | -- |
| 13–23 | -- |
| 24 | Recovery 3 |
| 25 | -- |
| 26 | -- |
| 27 | -- |
| 28–103 | -- |
| 104 | Recovery 4;<br>End of Analysis |

**Table 3.** Direct Disturbance Levels Modeled by TWE Project Year and Disturbance Type

| Project Milestones | Project Year Applied | Percent Baseline Services Present at each Milestone by Direct Disturbance Type | | |
|---|---|---|---|---|
| | | AC/DC Converter Station | Transmission Towers* | Access Roads, Transmission Lines, Ground Electrode Line, Ground Electrode Grid, and Temporary Infrastructure |
| Baseline | 0 | 100% | 100% | 100% |
| Construction | 1, 2, 3 | 0% | 0% | 0% |
| Restoration | 4 | 0% | 0% | 0% |
| Progressive Vegetation Recovery | 5 (Recovery 1) | 0% | • 0% in tower pad† (500 ft²)<br>Elsewhere‡:<br>• 100% of agricultural and wetland baseline services<br>• 20% of grassland and riparian baseline services<br>• 5% shrub baseline services<br>• 1% of sagebrush baseline services | • 100% of agricultural and wetland baseline services<br>• 20% of grassland and riparian baseline services<br>• 5% shrub baseline services<br>• 1% of sagebrush baseline services |
| | 9 (Recovery 2) | 0% | • 0% in tower pad (0.06 acre)<br>Elsewhere:<br>• 100% of agricultural, wetland, grassland, and riparian baseline services<br>• 25% shrub baseline services<br>• 5% of sagebrush baseline services | • 100% of agricultural, wetland, grassland, and riparian baseline services<br>• 25% shrub baseline services<br>• 5% of sagebrush baseline services |
| | 24 (Recovery 3) | 0% | • 0% in tower pad (0.06 acre)<br>Elsewhere:<br>• 100% of agricultural, wetland, grassland, riparian, and shrub baseline services<br>• 20% of sagebrush baseline services | • 100% of agricultural, wetland, grassland, riparian, and shrub baseline services<br>• 20% of sagebrush baseline services |
| | 104 (Recovery 4) | 0% | • 0% in tower pad (0.06 acre)<br>Elsewhere:<br>• 100% of agricultural, wetland, grassland, riparian, shrub, and sagebrush baseline services | • 100% of agricultural, wetland, grassland, riparian, shrub, and sagebrush baseline services |

* The guide lattice tower type is assumed for this analysis.
† Tower pad in this table refers to the permanent tower footprint.
‡ Elsewhere refers to construction roads that were reduced to two-track roads, or any areas where vegetation was cleared for Project construction that were subsequently revegetated during Restoration (e.g., staging areas).

### *Indirect Disturbance*

In addition to the actual surface disturbance, indirect disturbance buffers were applied to reduce habitat services around the Project Footprint during active construction (Table 4). Within these buffers (>200 meters [m], 50–200 m, 25–50 m, or <25 m), the habitat services were scored by the metric as if they were in the same proximity to a secondary road (a paved road with <6,000 AADT or heavily travelled gravel road) to account for the disturbance associated with noise and human presence (see Appendix C,

Quantifying Loss of Habitat Services Due to Indirect Disturbances During Construction for additional detail).

After construction, the indirect disturbance buffers were dropped from everything except the AC/DC converter station. The noise associated with the operation of this station was characterized as a permanent indirect disturbance in the model. Little information has been published on greater sage-grouse habitat use near transmission lines. TransWest decided not to model disturbance due to transmission lines after construction is complete, because insufficient information was available to characterize and quantify these effects. Potential indirect impacts associated with transmission lines are discussed in detail in the TWE Project's DEIS.

**Table 4.** Indirect Disturbance Levels Modeled by TWE Project Year and Disturbance Type

| Project Milestones | Project Year Applied | Indirect Disturbance Buffers* Applied by Disturbance Type | | |
|---|---|---|---|---|
| | | AC/DC Converter Station | Transmission Towers | Access Roads, Transmission Lines, Ground Electrode Line, Ground Electrode Grid, and Temporary Infrastructure |
| Baseline | 0 | None | None | None |
| Construction | 1, 2, 3 | Secondary Road | Secondary Road | Secondary Road† |
| Restoration | 4 | Secondary Road | None | None |
| Progressive Vegetation Recovery | 5 | Secondary Road | None | None |
| | 9 | Secondary Road | None | None |
| | 24 | Secondary Road | None | None |
| | 104 | Secondary Road | None | None |

* "Secondary Road" indicates that the footprint of the disturbance was classified as having the same indirect disturbance as a secondary road in the GIS model and the scores of the surrounding vegetation decreased as defined by the habitat services metric.

† Construction of the ground electrode grid will be completed in the first year. No indirect disturbances were modeled for the ground electrode grid after Construction Year 1.

## Quantification of conservation Benefit to Habitat Services

Habitat conservation measures (Table 5) were selected by the HEA Technical Advisory Team to be modeled in the HEA. These measures have been identified to improve greater sage-grouse habitat services and produced a benefit that could be measured by the habitat service metric used in this HEA. These conservation measures serve as a "toolbox" from which mitigation options may be selected by

TransWest for inclusion in a mitigation package.[1] The benefit (in service-acres) for each habitat conservation measure was calculated with GIS technology, using the same habitat service metric as was used to calculate habitat service losses.

The same conservative vegetation growth rates that were used to model vegetation recovery in the TWE Project footprint were applied to the habitat conservation measures proposed for mitigation. Conservative growth rates offset the potential for mitigation project failure in the model.

Three to five hypothetical mitigation project areas were selected to model each conservation measure. The variable scores were manipulated using GIS technology to approximate the change expected with implementation of the measure. The benefit of the measure was the difference in the service score before and after implementation. The mean benefit among the hypothetical mitigation project areas was entered into the HEA, where estimated time until full benefit and discount rate was applied to estimate the discounted service-acre-years gained per mitigation project area. The HEA assumed that the mitigation projects would be funded in the first year of the TWE Project construction.

The cost of the modeled habitat conservation measures was estimated by averaging the known cost of similar conservation projects previously implemented in Idaho and Wyoming—cost estimates from the Gateway West HEA (BLM 2013) were adjusted using a 3% annual inflation rate (equal to the discount rate used in this HEA) to bring the costs up to 2014 dollars. These cost estimates were used to calculate the price per service-acre-year. An HEA scales the mitigation package (i.e., funding to create habitat services) to offset the loss of habitat services over the lifetime of the TWE Project. Appendix D describes the calculation used to quantify the benefit of the mitigation projects compared to baseline.

[1] Proposed mitigation may not be limited to the modeled conservation measures. The benefit of some measures could not be measured using the habitat service metric (e.g., improvement of brood rearing habitat, improvement of understory vegetation).

**Table 5.** Potential Mitigation Projects Modeled in the HEA

| Mitigation Project Type | Brief Project Description | Anticipated Benefits | Average Cost of Implementation*,§ |
|---|---|---|---|
| Fence removal and marking with flight diverters | Fences would be removed or marked in: 1) Sections of fence known to cause greater sage-grouse collisions, 2) Within 3 km (1.2 mi) of leks (Stevens et al. 2013) or other high risk areas, 3) In areas with low slope and terrain ruggedness (Stevens 2011), and 4) Where segments are bounded by steel t-posts with spans greater than 4 m (Stevens 2011). | • Reduce mortality due to greater sage-grouse collisions<br>• Increase visibility of fences, where diverters are used<br>• Increase contiguous patches of shrub-steppe habitat<br>• Remove localized grazing pressure where fences are removed, thereby increasing local habitat quality (e.g., bunchgrass cover) | • $1,485 per mile ($920 per km) for fence removal or initial installation of flight diverters, and $320 per mile per year ($200 per km per year) for maintenance on flight diverters† |
| Sagebrush restoration and improvement projects | Seeding, planting seedlings, or transplanting containerized sagebrush plants (one plant per 5 $m^2$) and seeding a bunchgrass understory | • Create contiguous patches of shrub-steppe habitat with optimal sagebrush cover and height and a bunchgrass understory<br>• Increase availability of high-quality nesting, brood rearing, and winter habitats | • $3,975 to $7,320 per acre ($9,820 to $18,090 per hectare), depending on method used |
| Juniper/conifer removal | Mechanical removal (lop and scatter, cut-pile-cover, or mastication) of juniper/confer adjacent to areas with optimal sagebrush cover and height | • Reverse juniper/conifer encroachment on shrub-steppe habitat to increase contiguous patches of greater sage-grouse habitat<br>• Increase light penetration to support a forb and grass understory | • $180 to $2,120 per acre ($445 to $5,240 per hectare), depending on density of vegetation removed.‡ |
| Conservation easements | Removes threat of specific land uses to sensitive wildlife populations | • Prevent greater sage-grouse habitat destruction or degradation near urban areas and oil and gas development<br>• Reduce future fragmentation of shrub-steppe habitat | • $615 per acre ($1,515 per hectare) average purchase price<br>• $2650 per year for each easement for maintenance and monitoring |

* Cost of implementation includes a 50% markup for indirect costs, which include contract writing, supervision, clearances, monitoring, inspections, and vehicle costs.
† The cost of maintenance for the lifetime of the project is included in the HEA model and the resulting estimated cost per service-acre-year in Table 7.
‡ The cost of this treatment varies widely depending on the baseline vegetation. The lower end cost includes lop and scatter of Phase I juniper with no understory treatment. The upper end cost includes mastication of Phase III juniper and seeding a bunchgrass understory.
§ Costs were estimated for the Gateway West Transmission Line HEA (BLM 2013) and then adjusted using a 3% inflation rate to bring them up to 2012 to 2014 dollars. Mitigation funds provided in years after 2014 should be further adjusted for inflation.

# HABITAT EQUIVALENCY ANALYSIS RESULTS

The following sections describe the results of the HEA for habitat service losses over the lifetime of the TWE Project and the results of the HEA for conservation measure benefits. These results are expressed as the discounted service-acre-years (DSAYs) lost or gained, which is the sum of the permanent and interim losses gains over the lifetime of the TWE Project with the economic discount rate applied. These results may be used to scale mitigation.

## HEA Habitat Service loss Results

A separate HEA was run for each state where the TWE Project intersected greater sage-grouse habitat (Wyoming, Colorado, and Utah). The modeled habitat service level at each of the TWE Project milestones was entered into the HEA to calculate the present value of the habitat services lost over the lifetime of the TWE Project. A linear change in service level was assumed between modeled milestones. A summary of the estimated habitat service losses due to the TWE Project's construction, operation, and maintenance are provided in Table 6 for the full Analysis Area (i.e., 2-km buffer around Project footprint). These are the habitat service totals that need to be offset with mitigation. Service losses varied among states with differences in the buffered TWE Project centerline that intersected greater sage-grouse PGH, differences in baseline habitat quality, and the type of development.

**Table 6.** Habitat Services Lost in the Analysis Area Over the Lifetime of the TWE Project (Modeled Years 1–104).

| State | Permanent Disturbances Modeled | Habitat Services in the Assessment Area at Baseline Condition (DSAYs over lifetime of the TWE Project assuming no development) | Habitat Services Lost in the Assessment Area (DSAYs lost over lifetime of the TWE Project) |
|---|---|---|---|
| Wyoming | AC/DC converter station and transmission tower pads | 102,603,325 | 1,101,889 |
| Colorado | transmission tower pads | 71,739,071 | 1,374,208 |
| Utah | transmission tower pads | 73,696,032 | 1,256,932 |
| Total | AC/DC converter station and transmission tower pads | 248,038,428 | 3,733,029 |

## HEA Conservation Benefit Results

A separate HEA was run for each habitat conservation measure. The habitat service increases modeled using GIS-based tools were entered into the HEA, along with estimates of time between receipt of funding and implementation of the measure, and time between implementation of the measure and full service benefit from the measure. The habitat service gains per unit area treated summed over the lifetime of the TWE Project are provided for each conservation measure in Table 7.

New habitat services (measured in DSAYs) and cost per services gained varied among conservation measures (Table 7). Conservation easements preserve existing habitat services in areas of potential development and can create new habitat services if existing land practices that are damaging to greater sage-grouse habitat are restricted.

## Application of Results to a Mitigation Package

TransWest, BLM, and agencies will evaluate the services returned per habitat conservation measure, compare those services gained to the services lost as a result of the TWE Project, and develop an appropriate mitigation plan to compensate for services lost. This analysis is a decision-making support tool for the development of the mitigation plan.

To accomplish a 1:1 trade-off in habitat service-acre-years over the lifetime of the TWE Project per a traditional HEA, habitat conservation measures from Table 7 should be selected to offset 100% of the habitat service losses quantified for each segment in Table 6. The recommended approach to this process is outlined in the steps below.

1. Select the habitat conservation measures most appropriate for each segment from Table 5 and define the proportion of each measure to be used as mitigation (e.g., mitigation in Segment A will be composed of w% fence modification, x% sagebrush restoration, y% juniper removal, and z% conservation easements).
2. Calculate the habitat services to be replaced using each habitat conservation measure. The total of the habitat services replaced using each measure should equal the total services lost in Table 6.
3. Calculate the cost to implement each habitat conservation measure in each segment. Multiply the habitat services to be replaced using a measure by the cost per habitat services gained for that measure from Table 7.
4. Sum the costs of the habitat conservation projects separately for each segment. The total would be the mitigation for the modeled habitat service losses in that segment.

**Table 7.** Mean Present Value Habitat-Service-Acre Gained and Average Cost for Each Habitat Conservation Measure

| Conservation Measure | General Method | Mean Habitat Services Gained (DSAYs per unit) | Cost per Services Gained (U.S. dollars per DSAY)[‡] |
|---|---|---|---|
| Fence removal and marking with flight diverters* | Fence marking within 3 km of leks and in other high risk areas (e.g., winter concentration areas, movement corridors) | 3,597 per mile of fence marked | $9.57 |
| | Fence removal within 2 km of leks and in other high risk areas | 3,597 per mile of fence removed | $0.41 |
| Sagebrush restoration and improvement projects | Seeding sagebrush and bunchgrass understory | 1,751 per acre of disturbance treated | $2.27 |
| | Transplanting containerized sagebrush stems and seeding bunchgrass understory | 4,556 per acre of disturbance treated | $1.61 |
| | Planting seedlings and seeding bunchgrass understory | 1,935 per acre of disturbance treated | $2.30 |
| Juniper/conifer removal | Lop and scatter Phase I[†] juniper | 480 per acre treated | $0.38 |
| | Cut-pile-cover or mastication of Phase II[†] juniper | 328 per acre treated | $2.11 |
| | Mastication of Phase III[†] juniper and seeding bunchgrass understory | 197 per acre treated | $10.76 |
| Conservation easements | Land purchase (baseline value service credit) applying the annual maintenance and monitoring fee to every 5,000 acres of easement. | 650 per acre purchased[§] | $1.03 |

* Although fence removal is more effective at removing the threat of greater sage-grouse collision than fence marking, both measures were modeled as having the same benefit due to a limitation in the model. The cost of fence removal is much lower than marking because no ongoing maintenance is required.

[†] Phases of juniper describe the dominance of this vegetation on the landscape. Phase I is a sagebrush-dominated landscape with scattered juniper, Phase II is a landscape comprising a 50:50 mixture of sagebrush and juniper, and Phase III is a landscape dominated by juniper.

[‡] Cost estimates include permitting and maintenance as described in Table 5.

[§] Estimated using the average habitat services value per acre in the Assessment Area excluding scores of 0, because no specific easements have been proposed.

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# APPENDIX A

## Greater Sage-Grouse Habitat Service Metric for the TransWest Express Project

Text is excerpt from the TWE Project HEA Plan.

# DEVELOPMENT OF HABITAT SERVICE METRIC FOR HABITAT EQUIVALENCY ANALYSIS

A habitat service metric was developed for the greater sage-grouse (*Centrocercus urophasianus*) using variables identified in the peer-reviewed literature as representative of greater sage-grouse habitat. Habitat service levels are intended to reflect both the quality of the habitat and the ability of the birds to use the habitat. For each of the metric variables, a habitat service score ranging from 0 to 3 (no services [contributing no value to habitat] to high services [optimal habitat]) was assigned, similar to the greater sage-grouse habitat assessment framework developed by Stiver et al. (2010) and the greater sage-grouse habitat suitability index developed by LaGory et al. (2012). Scoring habitat services is a critical step in the HEA process, because it provides a way to measure the relative quality of specific habitat functions in a specific area.

The scores for this HEA are primarily based on information contained in the literature regarding greater sage-grouse habitat use and selection. When literature did not allow for direct assignment of value ranges for HEA scores, professional judgments, which were based on peer-reviewed literature, were used. Professional judgments are associated with specific literature references when possible and/or confirmed with academic and agency biologists.

When a basic life requisite of greater sage-grouse is absent (vegetation is absent, the area is forested, or high levels of disturbance are present), the cell being scored is assigned a total service value of 0. When a measurements for particular variable within the metric (e.g., % sagebrush cover) matches literature-based descriptions of sub-optimal conditions, that variable is given a service score of 0 (contributing no value to habitat), 1 (poor habitat), or 2 (moderate habitat). For example, sagebrush cover <1% would score a 0, cover of 1%–5% would score a 1, and cover of 5%–15% or >35% would score a 2 for that variable. When measurements for a particular variable match literature-based recommended conditions, that variable is given a service score of 3 (optimal habitat). For example, sagebrush cover of 15%–35% would score a 3 for that variable.

Scoring of the variables is categorical and each variable is given the same weight in the model. This approach is based on the best available data and is consistent with the general approach of LaGory et al. (2012). LaGory et al. (2012) describe their approach as follows:

> In general, there was insufficient information in existing studies to determine relationships among variables and habitat suitability or relative contributions between variables/components. Therefore, for simplicity, we developed piecewise linear functions of suitability based on the assumption that all variables are of equal weight and applied these functions to geospatial layers to generate indices ranging from 0 (poor) to 100 (optimal). This approach is similar to that used for many of the U.S. Fish and Wildlife Service (USFWS) Habitat Suitability Index models in their Habitat Evaluation Procedure, (available at http://www.fws.gov/policy/ESMindex.html).

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While the individual variables are not weighted, the number of variables relating to a habitat attribute (e.g., six for vegetation vs. one for slope) and the size of the buffers (e.g., 1,000 m for high traffic roads vs. 200 m for low traffic roads) give some attribute categories more influence than others. In the metric, there are three variables that score sagebrush characteristics (sagebrush abundance index, sagebrush % cover, and sagebrush canopy height), so areas that are not dominated by sagebrush will score low for these three variables, resulting in a lower overall score.

Greater sage-grouse habitat suitability publications vary in their baseline environmental conditions affecting a particular study site. Even studies within the same state may describe different suitable habitat conditions depending on elevation, precipitation zone, and other geographic or climatic factors affecting each study site.

No specific habitat studies have been conducted on the TWE Project's transmission line corridor alternatives, therefore the habitat metrics described below mostly rely on information presented in BLM et al. (2000), Cagney et al. (2009), Connelly et al. (2000), Connelly et al. (2011), and other summary publications. Specific citations are given to support the habitat model framework when applicable.

A single habitat service metric is applied to the entire TWE Project corridor in order to standardize results. This approach assumes that optimal habitat or poor habitat for greater sage-grouse looks the same (that is, measures the same for the variables in the metric) regardless of its location, despite regional differences in habitat features and availability.

As a result, the best available habitat at the edge of the species' range may not score as high as the best available habitat in the center of the species' range, unless they have the same measurements for the variables in the metric. The following sections describe the development of the habitat service model variables.

## METRIC OF GREATER SAGE-GROUSE HABITAT SERVICES

The metric is only applied to areas that contain greater sage-grouse habitat. The assessment area was first clipped to the BLM's Priority General Habitat (PGH). Then, land cover types typically avoided by greater sage-grouse are assigned a metric score of 0 before the metric is applied to the remaining areas. Disturbances of these lands require no mitigation in the HEA. These land cover types include all forest types, urban areas, open water, some introduced vegetation types, roadways, well pads, mine footprints, areas <100 meters (m) from roadways with >6,000 annual average daily traffic (AADT), and <25 m of paved roads with <6,000 AADT and heavily traveled gravel roads (multiple sources per U.S. Fish and Wildlife listing decision in Federal Register; Johnson et al. 2011).

The metric for greater sage-grouse habitat services used in this HEA is an additive model (Table A1) with a score adjustment for the presence of fences posing a high collision risk to greater sage-grouse during the lekking season. Each cell in the analysis area is scored separately by summing the

scores of Variables 01 through 08. The summed score is then multiplied by a factor that reduces the score where high risk fences are present. Each of the variables and the fence score adjustment is described in detail below.

## Descriptions of Additive Metric Variables

After areas of non-habitat (i.e., areas not suitable for greater sage-grouse or areas located outside the BLM's PGH boundaries) are assigned a metric score of 0, the remaining habitats are scored by adding the individual scores for the eight following variables.

### VAR01 and VAR02 Distance to Roads and Highways

Research into the effects of roads on greater sage-grouse is varied. For instance in Colorado, Rogers (1964) mapped 120 leks with regard to distance from roads and found that 42% of leks were over 1.6 km (1 mile) from the nearest improved road, but that 26% of leks were within about 90 m (about 100 yards) of a county or state highway, and two leks were on a road. Connelly et al. (2004) also note the use of roads for lek sites. In contrast, Craighead Beringia South (2008) reported results from a 2007 to 2009 study of greater sage-grouse seasonal habitat use in Jackson Hole, Wyoming. Results indicate that greater sage-grouse avoid areas within approximately 100 m of paved roads. Similarly, Pruett et al. (2009) found that lesser prairie-chickens avoided one of the two highways in the study by 100 m; however, some prairie-chickens crossed roads and had home ranges that overlapped the highways, thus roads did not completely exclude them from neighboring habitat. Johnson et al. (2011) examined the correlation between trends in lek attendance and the environmental and anthropogenic features within 5- and 18-km buffers around leks. They found that lek attendance declined over time with length of interstate highway within 5 km, although the authors note that this trend was based on relatively few data points and no pre-highway data were available for comparison. Interstate highways >5 km away and smaller state and federal highways had little or no effect on trends in lek attendance. Thresholds less than 5 km were not examined.

In the habitat services metric, those habitats located within 100 m of a high-traffic (>6,000 AADT) paved road (an interstate highway or high-traffic federal or state highway, for example), or within 25 m of a low-traffic (<6,000 AADT) paved road (a low-traffic federal or state highway, for example) were considered to provide no services to greater sage-grouse due to traffic and associated noise/human disturbance and were given a full metric score of 0 (no services). Unpaved roads with high traffic loads (for example, oil and gas service roads, mine service roads, etc.) provide similar disturbance levels as paved roads with similar traffic loads (e.g., low-traffic state highway). To characterize this disturbance in the model, mine footprints and well pad footprints were classified and scored as if they were low-traffic roads, so that there are no habitat services within 25 m of these disturbances. The AC/DC converter station will also classified and scored as if it is a low-traffic road in the model to account for the noise and human presence associated with this facility.

Those habitats located farther than 200 m and 1,000 m, respectively, of a low-traffic road or high-traffic road were considered the most serviceable to greater sage-grouse (that is, exhibited no decrease in lek attendance) and given a score of 3. A logarithmic curve was fit between the highest

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and lowest categories so that score increased with distance from the road to estimate the distance breaks associated with scores 1 and 2. A logarithmic rate of change simulates sound attenuation rates better than a linear rate of change (Crocker 2007). Conflicting research results regarding greater sage-grouse use near and on unpaved resource/collector roads (e.g., two-track roads) did not allow for quantification of the disturbance caused by these roads in the model.

While the application of distances to all scores (0–3) is not perfectly supported in the peer-reviewed literature, our approach places a penalty upon habitats that are bisected by all types of large roadways. Penalties are higher for roads that typically have higher traffic levels and risk to greater sage-grouse (e.g., mortality from collision, noise disturbance) than less-utilized secondary roads that generally have less traffic and implied risk.

## VAR03 Slope

Slope was used to refine greater sage-grouse habitat potential. Greater sage-grouse generally use flat or gently sloping terrain (Connelly et al. 2011; Eng and Schladweiler 1972; Nisbet et al. 1983; Rogers 1964). Beck (1977) plotted the distribution of 199 greater sage-grouse flocks in Colorado and found that 66% of flocks were on slopes less than 5% and only 13% of flocks were on slopes greater than 10%. Areas with slopes greater than 40% are unsuitable for nesting habitat (Lincoln County Sage Grouse Technical Review Team 2004), but still have some value to greater sage-grouse and should be retained in the model (professional judgment of the agency biologists). Therefore, areas with less than 5% slope were assigned a habitat service score of 3, and those exceeding 10% subjectively received incrementally lower habitat service scores. Slopes >40% did not add value to the habitat and received a score of 0 for this variable, but these areas may provide habitat services depending on the scores for the other variables.

A terrain roughness index (TRI) was evaluated for use in place of the slope variable, as some studies have shown that it is a better indicator of greater sage-grouse use (Carpenter et al. 2010; Doherty et al. 2008; Doherty et al. 2010; Dzialak et al. 2011). However, there was substantial variation in the methods used to calculate TRI (e.g., measure of roughness used and analysis window size) and region evaluated (e.g., Alberta, Canada, vs. Powder River Basin, Wyoming) by these studies. Given this variation, it was not possible to identify literature-supported cutoffs between scores for use in the model.

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**Table A1. Additive Variables in the Metric of Greater Sage-grouse Habitat Services**

| Variable Number | Variables | 3 | 2 | 1 | 0 | Primary Citations |
|---|---|---|---|---|---|---|
| VAR01 | Distance to high-traffic (>6,000 AADT) road, such as an interstate, federal, or state highway (meters) | >1,000 | 650–1,000 | 100–650 | N/A* | Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009) |
| VAR02 | Distance to low-traffic (<6,000 AADT) paved roads, heavily travelled gravel roads, well pads, mine footprints, transmission substations (meters) | >200 | 50–200 | 25–50 | N/A* | Connelly et al. (2004); Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009) |
| VAR03 | Percent slope | <10 | 10–30 | 30–40 | >40 | Beck (1977); Lincoln County Sage Grouse Technical Review Team (2004) |
| VAR04 | Distance to occupied lek† (kilometers) | 0–6.4 | 6.4–8.5 | >8.5 | N/A | Cagney et al. (2009); Connelly et al. (2000); Connelly et al. (2011); Holloran and Anderson (2005) |
| VAR05 | Sagebrush abundance index (% of vegetation that is sagebrush within a 1 $km^2$ moving window) | 50–95 | 30–50 or >95 | 10–30 | 0–10 | Carpenter et al. (2010); Walker et al. (2007); Aldridge and Boyce (2007); Aldridge et al. 2008; Wisdom et al. (2011) |
| VAR06 | Percent sagebrush canopy cover | 15–35 | 5–15 or >35 | 1–5 | <1 | Cagney et al. (2009); Connelly et al. (2000); Stiver et al. (2010) |
| VAR07 | Sagebrush canopy height (centimeters) | 30–80 | 20 to <30 or >80 | 5–20 | <5 | Crawford et al. (2004); Connelly et al. (2000); Stiver et al. (2010) |
| VAR08 | Distance of habitat to sage or shrub dominant (meters) | <90 | 90–275 | 275–1,000 | >1,000 | BLM et al. (2000); Connelly et al. (2000); Lincoln County Sage Grouse Technical Review Team (2004) |

* Lands less than 100 m from a high traffic road and less than 25 m from a low traffic paved road or high traffic gravel road were given a total metric score of 0 (provides no habitat services), not just a score of 0 for these individual variables.
† Leks were classified as active if their 10-year attendance average was greater than 0.

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## VAR04 Distance to Lek (10-year Average Count >0 Males)

Current greater sage-grouse habitat management guidance uses occupied leks as focal points for nesting habitat management (Connelly et al. 2000; Connelly et al. 2011); therefore, distance to lek was used as a variable in the habitat services metric. These guidelines recommend protecting sagebrush communities within 3.2 km of a lek in uniformly distributed habitats and 5.0 km in non-uniformly distributed habitats. Holloran and Anderson (2005) studied nesting greater sage-grouse at 30 leks in central and western Wyoming and determined that 45% and 64% of female greater sage-grouse nested within 3.2 km and 5.0 km, respectively, of the lek where the hen was radio-collared. Moreover, statistical analyses suggested that the area of interest for nesting greater sage-grouse should be truncated at 8.5 km from a lek. Similar frequencies are reported in Cagney et al. (2009)—66% within 5.0 km and 75% within 6.4 km of a lek where the female bred.

Female greater sage-grouse do nest at distances greater than 8.5 km (farthest distance reported in Holloran and Anderson [2005] was 27.4 km), so all distances >8.5 km from occupied leks were given a service score of 1 to reflect some potential use by nesting greater sage-grouse. Areas within 6.4 km of a lek provide the highest service level, because they provide female grouse with forage, roost sites, and cover from predators or inclement weather during the lekking season, in addition to containing lekking habitat and nesting habitat (Cagney et al. 2009). Therefore, areas within 6.4 km of an occupied lek were assigned a service score of 3 for this variable. Between these distances (6.4–8.5 km), areas were assigned a score of 2 for this variable.

## VAR05 Sagebrush Abundance Index

Walker et al. (2007) found that the proportion of habitat that was sagebrush within a 6.4-km moving window was a strong predictor of lek persistence in the Powder River Basin of Wyoming. The moving window is an analysis area that is larger than and centered on the cell being scored; in this case, the window is a 6.4-km buffer that moves as the cell being scored is changed. Areas with less than 30% of sagebrush within 6.4 km of the lek center had a lower probability of lek persistence. Aldridge and Boyce (2007) also used a moving window (1 $km^2$) to measure sagebrush cover and abundance. Their resource selection function found that greater sage-grouse selected nesting habitat that contained large patches (1 km2) of sagebrush with moderate canopy cover and moderate sagebrush abundance (i.e., heterogeneous distribution of sagebrush). Carpenter et al. (2010) found similar results in Alberta, Canada. Their top resource selection functions included a quadratic function for sagebrush abundance, which indicates that areas of moderate sagebrush abundance were selected more frequently than areas of homogenous sagebrush.

Aldridge et al. (2008) [per Wisdom et al. (2011)] found that at least 25% of the landscape in a 30.77-km analysis area needed to be dominated by sagebrush for greater sage-grouse persistence, with 65% being preferred. Wisdom et al. (2011) found that landscapes with less than 27% sagebrush were not different from landscapes from which greater sage-grouse have been extirpated. Similar to Aldridge et al. (2008), Wisdom et al. (2011) found that 50% sagebrush across a landscape was a good indicator of greater sage-grouse persistence.

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The agency biologists indicated that greater sage-grouse prefer higher sagebrush abundance in the southern part of their range than is indicated by these studies. For example, the Colorado Parks and Wildlife Avian Research Center has generally found a positive linear relationship between sagebrush abundance and measures of habitat selection (Brian Holmes, Colorado Parks and Wildlife, personal communication with Jon Kehmeier, SWCA, on February 13, 2013). Colorado Parks and Wildlife has not observed an upper inflection point in the proportion of the landscape covered in sagebrush where use or selection begins to drop, and suggest that the difference may be due to the structure and composition of the sagebrush community (that is, silver sagebrush mixed grassland rangelands of Alberta [Aldridge and Boyce 2007; Carpenter et al. 2010] vs. big sagebrush steppe [TWE Project Area]).

Sagebrush covering 50% to 95% of the landscape scored a 3 for this variable (Aldridge et al. 2008; Wisdom et al. 2011; professional judgment of the agency biologists). Sagebrush covering 30% to 50% or >95% scored a 2 for this variable (Aldridge et al. 2008). Sagebrush covering 10% to 30% scored a 1 (Walker et al. 2007; Wisdom et al. 2011) and sagebrush covering less than 10% scored a 0 for this variable.

## VAR06 Sagebrush Canopy Cover

Recommended sagebrush canopy cover for greater sage-grouse habitat varies seasonally. Seasonal habitats were not modeled, but seasonal differences in the selection for sagebrush cover was considered when developing habitat services metrics. The seasonal habitat needs of greater sage-grouse are described below, followed by scoring of percent sagebrush cover in the habitat services metric.

### *Seasonal Habitat Use*

#### Nesting

Connelly et al. (2000) cite 13 references to sagebrush coverage that range from 15% to 38% mean canopy cover surrounding the nest. Citations contained within Crawford et al. (2004) reported 12% to 20% cover and 41% cover in nesting habitat. In their species assessment, Connelly et al. (2000) conclude that 15% to 25% canopy cover is the recommended range for productive greater sage-grouse nesting habitat. This is also the range identified in the greater sage-grouse habitat assessment framework (Stiver et al. 2010) as providing the highest service level for greater sage-grouse based on a review of the available literature. Wallestad and Pyrah (1974) reported that successful nests were in stands where sagebrush cover approximated 27%. This cover range is used as a goal in some greater sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). Cagney et al. (2009) guidelines for grazing in grouse habitat, which use information synthesized from over 300 sources, state that hens tend to select an average 23% live sagebrush canopy cover when selecting nesting sites.

Greater sage-grouse in Utah use habitats with higher sagebrush canopy cover than is observed in the northern and eastern portions of the species range, possibly due to the relative scarcity of understory grasses in Utah (Renee Chi, BLM, personal communication with Ann Widmer, SWCA, on March 22, 2013). Nest sites in Wildcat Knoll (part of the Emery-Sanpete population of Utah) were located in areas

with an average of 33% shrub canopy cover for successful nests and 22% for unsuccessful nests (Perkins 2010). Nests (n = 50) in Parker Mountain were located at sites with an average canopy cover of 35.5% for big sagebrush and 32% for big sagebrush mixed with black sagebrush (Chi 2004; Renee Chi, BLM, personal communication with Ann Widmer, SWCA, on March 22, 2013). In the Sheeprock greater sage-grouse population, nest site shrub canopy cover measured an average of 62% in 2005 and 83.5% in 2006 (Robinson 2007).

#### Brood Rearing

Connelly et al. (2000) found that productive brood-rearing habitat should include 10% to 25% cover of sagebrush. This is the range used as a goal in greater sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). While sagebrush is a vital component of greater sage-grouse habitat, very thick shrub cover may inhibit understory vegetation growth and reduce the birds' ability to detect predators (Wiebe and Martin 1998).

Again, greater sage-grouse in Utah may use areas with higher canopy cover than is typical throughout the northern and eastern parts of their range. Grouse in the Sheeprock population were documented using areas with an average shrub canopy cover of 73% during brood rearing in 2005 and 2006 (Robinson 2007).

#### Winter

Connelly et al. (2000) cite 10 references to sagebrush coverage in winter-use areas that range from 15% to 43% mean canopy cover (Crawford et al. [2004] also cite two of these references in their assessment); however, they considered a canopy of 10% to 30% cover (above the snow) as a characteristic of sagebrush needed for productive greater sage-grouse winter habitat. This is the cover range used as a goal in greater sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). Greater sage-grouse in Utah may prefer higher cover in winter. In Emma Park, areas of high sagebrush cover were used disproportionally to their availability on the landscape, with an average of 38.3% sagebrush canopy cover in winter-use areas (Crompton and Mitchell 2005).

### *Scoring in Habitat Services Metric*

In general, the recommended sagebrush cover for nesting habitats was intermediate to, and overlapped that of, brood-rearing and winter habitats. Thus, favorable conditions for nesting were given the highest scores for percent sagebrush cover in the greater sage-grouse habitat services metric.

This variable used the scores assigned by Stiver et al. (2010) for sagebrush cover categories in greater sage-grouse nesting habitat, with a slight adjustment to account for use of higher canopy cover in Utah. This adjustment is also consistent with the Colorado Greater Sage-Grouse Conservation Plan (Colorado Division of Wildlife et al. 2008). Sagebrush percent canopy cover of 15% to 35% was assumed to provide the highest level of services (score of 3) to nesting greater sage-grouse. This includes canopy covers that are 10% higher than the average ranges provided in Connelly et al. (2000) and Cagney et al. (2009). Areas with slightly less or more cover than this (55–15 or >35) were given a habitat services score of 2. Habitats with <5% cover received a score of 1.

## VAR07 Sagebrush Canopy Height

Sagebrush canopy height is an important aspect of all greater sage-grouse seasonal habitats. As described above, seasonal habitat models will not be developed for the TWE Project. However, seasonal habitat requirements were considered when developing habitat metric values. The seasonal habitat needs of greater sage-grouse are described below, followed by scoring of percent sagebrush cover in the habitat services metric.

### *Seasonal Habitat Use*

#### Nesting

Gregg et al. (1994, cited in Crawford et al. 2004) found that the area surrounding successful nests in Oregon consisted of medium-height (40 to 80 centimeters [cm]) sagebrush. Connelly et al. (2000) cite 11 references to sagebrush height that range from 29 to 79 cm mean height. In their assessment, Connelly et al. (2000) conclude that sagebrush with a height of 30 to 80 cm is needed for productive greater sage-grouse nesting habitat in arid sites and 40 to 80 cm in mesic sites. These ranges are supported by Stiver et al. (2010), who recommend a range of 30 to 80 cm, and BLM et al. (2000), which state that optimum greater sage-grouse nesting habitat consists of sagebrush stands containing plants 40 to 80 cm tall.

#### Winter

Important structural components in winter habitat include medium to tall (25–80 cm) sagebrush stands (Crawford et al. 2004). Connelly et al. (2000) cite 10 references to sagebrush height in winter habitat that range from 20 to 46 cm above the snow. Two studies measured the entire plant height and provided a range from 41 to 56 cm. In their assessment, Connelly et al. (2000) conclude that characteristics of productive winter habitat include sagebrush that is 25 to 35 cm in height above the snow. This is the height range used as a goal in greater sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000).

### *Scoring in Habitat Services Metric*

Sagebrush canopy heights that provided high-quality nesting habitat generally also provided high-quality winter habitat for greater sage-grouse. Thus, favorable conditions for nesting were given the highest scores for sagebrush canopy height in the greater sage-grouse habitat services metric.

The sagebrush cover scores assigned for nesting habitat in the greater sage-grouse habitat assessment framework by Stiver et al. (2010) to different sagebrush cover categories were assigned to this variable. Areas of sagebrush with a height of 30 to 80 cm were assigned a habitat services score of 3. As sagebrush canopy height decreases, the value of a sagebrush plant to provide cover for nesting females and their nests is diminished. Additionally, low-lying sagebrush is less available to greater sage-grouse during the winter due to snow cover. Areas with canopy heights greater than 80 cm provided intermediate levels of services because they may provide relatively poor cover for nesting greater sage-grouse and have foliage that is difficult for greater sage-grouse to access during mild and moderate winters. Sites with lower and higher sagebrush canopy heights were scored lower (sagebrush 12 to <30 cm or >80 cm in height received a score of 2). Areas with minimal sagebrush

canopy heights were considered to have the lowest habitat service value (sagebrush <20 cm received a score of 1).

### VAR08 Distance to Vegetation Dominated by Sagebrush or Shrub

Greater sage-grouse use shrubby habitats including sagebrush during the brood-rearing season (Connelly et al. 2000) and for grouse movement and dispersal (Stiver et al. 2010). Close proximity to shrubby vegetation increases the service value of all vegetation types modeled because shrubby vegetation provides cover from predators, facilitates grouse movement, and supports population connectivity.

The Lincoln County Sage Grouse Technical Review Team (2004) identified proximity to sagebrush cover as an important component in habitat suitability of non-sagebrush, brood-rearing habitats (e.g., mesic lowland habitats, hay meadows). The Team considered brood-rearing areas within <100 yards, 100 to 300 yards, and >300 yards of sagebrush cover as suitable, marginal, and unsuitable habitat, respectively. Similarly, Stiver et al. (2010) considered mesic habitats <90 m, 90 to 275 m, and >275 m of sagebrush to be suitable, marginal, and unsuitable late brood-rearing/summer habitat, respectively. These categorizations support the concept of increasing service level with proximity to shrubs, particularly sagebrush.

The distance to vegetation dominated by sagebrush or shrub variable (VAR09) measured the distance of the cell being scored (regardless of its vegetation type) to the next nearest cell that was dominated by sagebrush or a shrub species, including willows. For this variable, cells <90 m, 20 to 275 m, and >275 m to a cell dominated by a shrub species were assigned scores of 3, 2, and 1, respectively. The scoring was applied to all vegetation types, because this variable is relevant to bird movement and dispersal from all habitat types.

## Score Adjustment for Fences that Pose a High Risk for Collision

Habitat within and surrounding the TWE Project transmission line corridor is currently influenced by fences used for livestock management. These fences are typically constructed from barbed wire and are used to control livestock movements and vegetation use within grazing allotments and pastures, to delineate or protect private property and agricultural croplands, and to restrict livestock from improved and unimproved roadways.

Fence collisions have been reported as a cause of significant injury and mortality to grouse species (greater sage-grouse [Braun 2006; Call and Maser 1985; Connelly et al. 2004; Christiansen 2009; Danvir 2002; Stevens et al. 2012]; lesser prairie-chicken [Wolfe et al. 2007]; ptarmigan [Bevanger and Broseth 2000]; and red grouse, black grouse, and capercaillie [Baines and Summers 1997; Catt et al. 1994; Petty 1995]). In addition to direct mortality, fences provide corridors for mammalian predators increasing the opportunity for predation of hens and broods (Braun 1998). Unlike the additive variables in the metric, which are primarily meant to characterize use and avoidance of habitat by greater sage-grouse, the distance to high risk fences was added to account for the potential direct loss of greater sage-grouse (not greater sage-grouse avoidance of fences).

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In Wyoming, Christiansen (2009) reported preliminary results of a multiple-year study (2005–ongoing) near Farson on greater sage-grouse fence strikes and mortalities and the utility of fence markers on reducing collisions. After installation of fence markers on portions of high-risk fences, grouse mortality decreased by 70%. Although the study did not compare the number of strikes with regard to distance to lek, the author recommends that fences should not be located within 0.25 mile (0.4 km) of leks.

In Idaho, Stevens (2011) and Stevens et al. (2012a; 2012b) evaluated the environmental features associated with greater sage-grouse fence collision risk, and tested the efficacy of reflective vinyl fence markers to reduce collision rates at eight study sites. Modeling of these data predicted marking reduced collision rates by 74% to 83% at the mean lek size and fence distance from the lek during the breeding season. Collision probability varied by region, topography, fence type, fence density, and lek proximity. Areas with high slope or terrain ruggedness generally showed lower collision risk than flat areas. Collisions were more common on fence segments bound by steel t-posts with spans between posts exceeding 4 m. Collision probability increased with fence length per $km^2$ and proximity to nearest active lek.

For this variable, fences segments having a high risk for collision were identified using the model by Stevens et al. (2013), which is determines the fence-collision risk from proximity to lek and a terrain roughness index (Equation 1).

Equation 1: $$\hat{y} = 78 * \exp(\beta_0 + \beta_1 * TRI + \beta_2 * distance)$$

Where:

$\hat{y}$ is an estimate of the total number of greater sage-grouse collisions over a 78-day lekking season for each 30-m pixel if a fence is present;

$\beta_0$ = -3.325 (per Bryan Stevens, personal communication with Ann Widmer, SWCA, on February 14, 2014);

$\beta_1$= -0.25;

$\beta_2$ = -0.0006;

$TRI$ is a terrain roughness index calculated using ArcInfo; and

$distance$ is the distance from each 30-m pixel to the nearest greater sage-grouse lek in GIS using the Euclidean distance function (up to 3 km).

The additive metric score (the sum of VAR01 through VAR08) for a cell was multiplied by an adjustment factor that reduced the score if the cell was located within 3 km of a greater sage-grouse lek (i.e., it was scored by the Stevens et al. 2013 model) and there was a fence present in that cell. The adjustment factor for each probability of collision is provided in Table A2. Allotment boundaries were used as a surrogate for fence lines. Following the convention established by Stevens et al. 2013, the arbitrary threshold of 1 grouse collision per lekking season was used as the breaking point between our

score adjustment categories. The other category break was established based on a natural break in the data distribution.

**Table A2. Cell score adjustment for the presence of fences posing a high collision risk.**

| $\hat{y}$ (prediction of the total number of greater sage-grouse collisions per lekking season) | Score adjustment factor |
|---|---|
| 0.00-0.40 | 0.75 |
| 0.40-1.00 | 0.50 |
| ≥1.00 | 0 |

Here are three examples of the application of the fence score adjustment factor. In the first, there is a cell with an additive score of 10 (the sum of VAR01-VAR08) that is located within 3 km of a lek and has a fence running through it. The Stevens et al. 2013 model predicts 0.2 collisions per lekking season for a fence in that cell, so the additive score of 10 is multiplied by 0.75 for a final metric score of 7.5 for that cell. In the second example, there is another cell with an additive score of 10 that is located within 3 km of a lek and has a fence running through it. The Stevens et al. 2013 model predicts 1.4 collisions per year a fence in this cell, so the additive score of 10 is multiplied by 0 to produce a final metric score of 0 (no habitat services). In the third example, there is a cell with an additive score of 10 that has a fence running through it, but the cell is located >3 km from a lek. Stevens et al. 2013 model does not produce an estimated number of collisions for this cell, because it is located more than 3 km from a lek. This fence is considered to have a relatively low collision risk during the lekking season, so the cell retains its full value (no adjustment).

Collisions with fences may occur outside of the lekking season. Marking of fences located more than 3 km of a fence may be considered for mitigation. If so, they will be treated as if they have the lowest fence risk collision (0.00-0.39 collisions/year) for the purposes of modeling.

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# APPENDIX B

## Quantification of Baseline Habitat Service Level

Text is excerpt from the TWE Project HEA Plan.

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# QUANTIFICATION OF BASELINE HABITAT SERVICE LEVEL

The pre-construction baseline of the habitat services will be based on existing datasets to the extent possible. It is not anticipated that additional data collection will be necessary to complete the HEA. The baseline service level will be determined by applying the habitat service metrics described in Appendix A to the Assessment Area that is identified for the TWE Project. The Assessment Area will include the footprint of the project and a buffer around the footprint, because greater sage-grouse (*Centrocercus urophasianus*) habitat service losses are expected to extend beyond the area of direct disturbance. For the TWE Project, this buffer will be clipped to the Bureau of Land Management's (BLM) Priority General Habitat (PGH) boundaries.

ESRI ArcGIS ArcInfo 10.X, Spatial Analyst, and ModelBuilder software and tools will be used to conduct analyses. To facilitate calculations across the entire assessment area, it is anticipated that all data will be converted to a raster/grid format. Raster or grid algebra processing is significantly faster for an analysis of this size.

## PREPARATION OF GIS MODEL INPUT LAYERS

Habitats within and surrounding the corridor for the preferred alternative will be summarized in a series of representative raster layers for the eight additive metric variables (see Appendix A). These eight variables consist of data representations within the TWE Project Area for human disturbance, landscape characteristics, proximity to greater sage-grouse lek locations, and vegetation characteristics that may influence the use of habitat by greater sage-grouse. A spatial resolution of 30-meters is anticipated to be sufficient to capture a 'landscape level' perspective of habitat across the Assessment Area.

Representative raster data will be created for each additive variable in the HEA metric (Appendix A). Scores for each cell in each raster will be assigned per the variable scores listed in Table A1 of Appendix A. In addition, a raster layer will be developed that locates fences and their relative collision risk during the lekking season. The following sections describe the datasets anticipated to be necessary to describe each of these variables:

### Lands Assigned No Habitat Value

As described in Appendix A, land cover types and terrain features that do not provide suitable habitat for greater sage-grouse will be removed from the HEA model. All vegetation types and landforms that potentially provide habitat for greater sage-grouse will remain in the model.

### Distance to Roads (VAR01 and VAR02)

Road layers used in developing the baseline HEA model are available from the BLM, Forest Service, state agencies, or from readily available standard road and infrastructure layers (e.g., TIGER data from the U.S. Census Bureau). Road layers will be compared between states to ensure consistency in classification

prior to using them in the HEA model development. HEA model scores will be applied to 30-meter raster cells according to the process described in Table A1, Appendix A. For example, all cells that are more than 1,000 meters from interstate highways or high traffic volume state and federal highways (>6,000 AADT) will be given a score of 3, those between 650 and 1,000 meters will be given a score of 2, those between 100 and 650 meters will be given a score of 1, and those cells within 100 meters will be assigned a value of 0 habitat services (no habitat value) in the model per the description provided Appendix A (Metric of Greater Sage-grouse Habitat Services).

## Percent Slope (VAR03)

Slope will be calculated using 30-meter digital elevation models and scored according to the process described in Appendix A.

## Distance to Lek (10-year Average Count >0 Males) (VAR04)

Lek data will be obtained from the wildlife management agencies in each state. Lek status will be determined for all leks. Leks that have been active in the past 10 years or that have an unknown status will be included in the HEA model. Those that are labeled as unoccupied or inactive will not be included. Cells surrounding leks will be scored according to the methods described in Appendix A with cells closest to leks receiving the highest scores.

## Sagebrush Abundance Index (VAR05)

A sagebrush abundance index will be determined from available vegetation layers by calculating the proportion of sagebrush in a 1-$km^2$ area surrounding each 30-meter cell in the assessment area. Scores will be applied using the methods described in Appendix A. Areas with a high proportion of sagebrush in the landscape and some habitat heterogeneity will be score higher than areas with little habitat heterogeneity or areas with little or no sagebrush.

## Sagebrush Cover, Sagebrush Canopy Height (VAR06 and VAR07)

When possible, percent cover and height will be determined directly from the vegetation attribute data included in the GAP and Landfire vegetation datasets. Where data are not available, attributes for percent cover and height will be determined using other data sources. Sampling data from GAP/Landfire datasets as well as datasets obtained from BLM and the state agencies will be used to attribute vegetation percent cover and height for segments of the landscape with the most similar characteristics. Once vegetation values have been applied to the 30-meter grid, HEA scores will be applied using the methods described in Appendix A.

## Distance to Vegetation Dominated by Sagebrush or Shrub (VAR08)

The distance from each cell to the nearest sagebrush or shrub dominated cell will be calculated. Cells within or closest to sagebrush or shrub landscapes will be scored higher than those that are distant from shrub-dominated cells.

### Fences that Pose a High Risk for Collision (Adjustment Factor)

A raster file will be produced by running the Stevens et al. 2013 model as described in Appendix A to estimate the greater sage-grouse collision risk during the lekking season within 3 km of leks. The Stevens et al. 2013 model does not consider actual fence locations, so a separate fence location dataset will be intersected with the results of the model to identify actual locations of high collision risk.

Fence locations will be used if the data are available for the entire assessment area. In the event that fence data are not available, grazing allotment boundaries will be used as surrogates for fence layers in the HEA baseline model development.

After the model results and fence layer are intersected, cells in the resulting raster file will be assigned to different score adjustment factors as described in Appendix A. Every cell with a fence running through it that is located within 3 km of a lek will have an estimated number of collisions per lekking seasons. If the estimate is between 0 and 0.39, the adjustment factor will be 0.75. If the estimate is between 0.40 and 0.99, the adjustment factor will be 0.50. If the estimate is 1.0 or above, the adjustment factor will be 0 (i.e., cells containing the highest risk fences have no habitat value).

## SUMMATION OF BASELINE SERVICES IN THE HEA MODEL

Spatial grids representing the above HEA variables will be combined through additive and multiplicative raster calculations to create a final raster layer. A simple additive overlay process will be used to calculate the HEA metric value for each cell. The value of each cell will be the sum of VAR01 through VAR08. The resulting value will be multiplied by 0 or 1 to remove all vegetation types that do not provide habitat for greater sage-grouse (e.g., urban areas, roadways, forests) and to retain those habitats that do provide value for greater sage-grouse. This value will be multiplied by the Fence Collision Adjustment Factor if it is located within 3 km of a lek. The final numeric value for each cell is the habitat services provided to greater sage-grouse by that cell.

The resulting habitat service values and the number of acres associated with each of the habitat service values will be multiplied together and summed across the assessment area to calculate the total habitat services (expressed in service acres) (Equation 1). The total habitat services provided by the Assessment Area will be calculated and will serve as the pre-construction baseline for the TWE Project.

Equation 1. $$VJ = \sum_{1}^{i} (V_i * J_{V_i})$$

where:

*VJ* is the habitat services (service-acres) provided by the Assessment Area,

*V* is the habitat service score (i.e., the sum of the variable scores in the habitat service metric),

$i$ is the number of possible unique values for *V*, and

$J_{V_i}$ is the number of acres for each value of $V_i$ , where $\sum_1^i J_{V_i}$ would equal the total acreage of the Assessment Area (*J*).

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# APPENDIX C

## Quantification of Habitat Service Losses

Text is excerpt from the TWE Project HEA Plan.

# QUANTIFICATION OF HABITAT SERVICE LOSSES

Habitat service losses caused by the TWE Project will be modeled using geographic information system (GIS) technology for important TWE Project milestones by decreasing the variable scores for the habitat services metric below the Baseline level in the footprint of the TWE Project (direct disturbances) and in buffers around the footprint (indirect disturbances). The habitat service scores for each milestone will be summed across the Assessment Area to calculate the estimated interim and permanent habitat service losses associated with the TWE Project.

## DESCRIPTION OF DISTURBANCES BY TWE PROJECT MILESTONE

The habitat services provided by the Assessment Area will be measured at several different TWE Project milestones that reflected varying levels of disturbance.

The TWE Project milestones modeled for the HEA will be:

1. **Baseline**—the baseline milestone quantifies habitat services available to greater sage-grouse before disturbance. The calculation of the habitat services available to greater sage-grouse at Baseline is described in Appendix B.
2. **Construction—**the transmission line construction milestone quantifies habitat services available to greater sage-grouse during the construction of the TWE Project.
3. **Restoration**—the restoration milestone quantifies habitat services available to greater sage-grouse after TWE Project construction is complete and some services return with the reduction in noise and human presence.
4. **Recovery**—the recovery milestone quantifies habitat services available to greater sage-grouse after a vegetation type has recovered to the greatest extent expected after TWE Project restoration is complete. Habitat services return to baseline conditions in restored areas with the time to recovery being dependent on the vegetation type. It is anticipated that there will be multiple vegetation-based recovery endpoints. Vegetation recovery endpoints will be determined upon identification of the vegetation communities impacted by the TWE Project.

## QUANTIFYING LOSS OF HABITAT SERVICES DUE TO SURFACE DISTURBANCE DURING CONSTRUCTION

For the Construction milestone, direct disturbances will be defined as the loss of habitat services associated with vegetation removal and ground disturbing activities within the construction footprint (Table C1). The habitat service scores for all 30-$m^2$ raster cells in the TWE Project footprint where vegetation removal or ground disturbance occur will be changed from the Baseline service scores to 0 in the GIS model for this milestone. Recovery from the disturbed state will be applied per the vegetation-specific recovery curves for the TWE Project.

**Table C1.** Direct Disturbance Levels Modeled by TWE Project Milestone and Disturbance Type

| Project Milestones | Percent Baseline Services Present by Direct Disturbance Type | | |
|---|---|---|---|
| | **AC/DC Converter Station** | **Transmission Towers** | **Access Roads, Transmission Lines, and Temporary Infrastructure** |
| Baseline | 100% | 100% | 100% |
| Construction | 0% | 0% | 0% |
| Restoration | 0% | 0% | 0% |
| Progressive Vegetation Recovery | 0% | 0% within permanent tower footprint (500 $ft^2$ for a guide lattice tower, which is 5.2% of a 30-m cell)<br><br>Elsewhere baseline services will be retuned per the vegetation-specific recovery curves developed for the Project. | Baseline services will be retuned per the vegetation-specific recovery curves developed for the Project. |

## QUANTIFYING LOSS OF HABITAT SERVICES DUE TO INDIRECT DISTURBANCES DURING CONSTRUCTION

Indirect disturbances will be simulated by applying buffers to the construction footprint and decreasing the habitat service scores below the Baseline habitat service scores within the buffers. Because of uncertainties in the indirect impacts of transmission on greater sage-grouse, at this time, noise and human presence will be the only indirect disturbance modeled in the HEA.

Use of construction equipment such as backhoes, cranes, front-end loaders, bulldozers, graders, excavators, compressors, generators, and various trucks would be needed for mobilizing crew, transportation and use of materials, line work, site clearing, and preparation during the construction phase of the TWE Project. Construction of and improvements to access roads would require use of earthmoving equipment such as bulldozers and graders. Table C2 provides the typical noise levels for the construction equipment that could potentially be used during the construction phase of the TWE Project (ranging 80 to 90 A-weighted decibels [dBA] at 50 feet [15 meters (m)] from any work site).[2]

**Table C2.** Typical Noise Levels from Construction Equipment

| Equipment Type | Noise Level at 50 feet (dBA) |
|---|---|
| Crane | 88 |
| Backhoe | 85 |
| Pan loader | 87 |
| Bulldozer | 89 |

[2] Construction noise values taken from Energy Gateway West HEA report.

| | |
|---|---|
| Fuel truck | 88 |
| Water truck | 88 |
| Grader | 85 |
| Roller | 80 |
| Mechanic truck | 88 |
| Flatbed truck | 88 |
| Dump truck | 88 |
| Tractor | 80 |
| Concrete truck | 86 |
| Concrete pump | 82 |
| Front end loader | 83 |
| Scraper | 87 |
| Air compressor | 82 |
| Average construction site | 85 |

Noise during the construction phase of the TWE Project would be similar in magnitude to noise produced by vehicles using secondary roads (county highways, state highways, and heavily travelled gravel roads [e.g., access roads for oil and gas development, mining, etc.]). Passenger vehicles, medium trucks, and heavy trucks going 55 miles per hour (mph) produce typical noise levels of 72 to 74 dBA, 80 to 82 dBA, and 84 to 86 dBA, respectively, from a distance of 50 feet. Therefore, the noise disturbance associated with construction will be modeled as if the construction area was a secondary road (Table C3).

In the model, buffers will be placed around active construction areas in a manner that is identical to the methods used for secondary roads. The cells that fall within these buffers will be scored in a manner identical to a secondary road (i.e., the score for VAR02 decreased).

**Table C3.** Indirect Disturbance Levels Modeled by TWE Project Year and Disturbance Type

| Project Milestones | Indirect Disturbance Buffers Applied by Disturbance Type | | |
|---|---|---|---|
| | **AC/DC Converter Station** | **Transmission Towers** | **Access Roads, Transmission Lines, and Temporary Infrastructure** |
| Baseline | None | None | None |
| Construction | Secondary Road | Secondary Road | Secondary Road |
| Restoration | Secondary Road | None | None |
| Progressive Vegetation Recovery | Secondary Road | None | None |
| | Secondary Road | None | None |
| | Secondary Road | None | None |
| | Secondary Road | None | None |

## QUANTIFYING HABITAT SERVICES LOSSES DURING RESTORATION AND RECOVERY

TWE Project-related habitat service losses are anticipated to decrease once construction is complete. Although still below baseline levels, the habitat service scores rise during restoration and recovery with vegetation regrowth (direct disturbances) and decreased levels of noise and human presence (indirect disturbances).

### Restoration Milestone

For the Restoration milestone, direct disturbances will be defined as the loss of all habitat services in the construction footprint where vegetation clearing and ground disturbance occurs because the vegetation has not regrown sufficiently to provide habitat (see Table C1).

The indirect disturbance buffers that are applied to the power conversion terminal during construction will remain during the restoration milestone and for the life of the TWE Project because of the noise human activity associated with operation of the facility. No indirect disturbances will be modeled for the rest of the TWE Project because little vehicle traffic or human presence is anticipated in these areas after construction of the line is complete.

### Progressive Recovery Milestone

For the Recovery milestone, direct disturbances will be defined as the loss of all habitat services in the footprint of the transmission structure pads and the partial loss of services in areas of vegetation regrowth (see Table C1). Indirect disturbances will be applied in a manner identical to the Construction milestone (see Table C3).

Habitat services in areas where the vegetation is reclaimed (i.e., outside the footprint of permanent facilities) will gradually return to baseline conditions at a rate dependent on the vegetation type. Services will return more rapidly for vegetation having rapid recovery rates (e.g., agriculture, wetland, grassland, or riparian) than for those with slower recovery times (e.g., shrub-dominated including sagebrush). Vegetation recovery curves will be developed for the vegetation communities that are impacted by TWE Project activities.

To calculate the progressive return of services, the percentage of the baseline service value for a cell will be calculated based on the appropriate vegetation recovery curve. For example, in those vegetation types with rapid restoration potential (agricultural areas, some grasslands, etc.), habitat services could be returned to 100% of Baseline in the first year following construction. Those with longer recovery times may only achieve partial service returns per year until achieving their maximum value. For example, a vegetation community with a 50 year recovery period might achieve 10% value in year 5 after restoration, 20% in year 10, 30% in year 15, etc. until all services are returned in year 50.

## HEA TO QUANTIFY INTERIM AND PERMANENT HABITAT INJURIES

The approach described above will produce a measure of habitat services (in service-acres) for each of the TWE Project milestones for each of the modeled project segments. The HEA is a stepwise model which quantifies the habitat injury separately in each year (Figure C1) and each of the milestones will be assigned to a calendar year per the schedule provided by TransWest after the preferred alternative is identified. It is likely that a linear change in habitat services will be used to estimate annual service-acre increases between restoration and recovery and between the vegetation-specific recovery times. The total number of service-acres lost per year will be summed across the analysis period and expressed as service-acre-years. This value is the estimated sum of the interim and permanent losses to greater sage-grouse habitat that would occur as a result of the TWE project construction, operation, and maintenance.

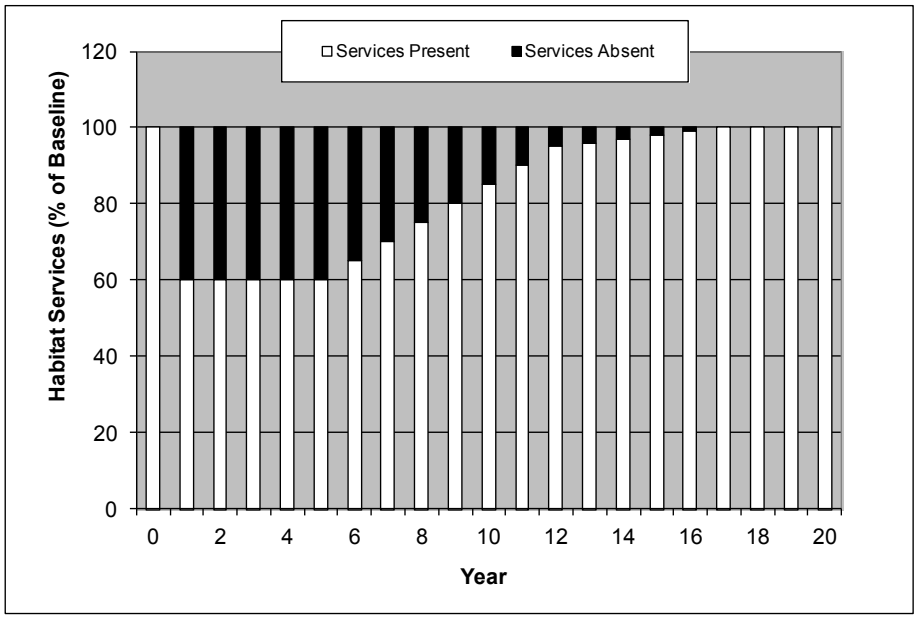


**Figure C1.** Hypothetical example of how the HEA model considers habitat services absent and habitat services present in each year to calculate the total services lost over the Project period (i.e., sum of the black bars).

The HEA model balances the cumulative injury (*I*, service-acre-years) over the lifetime of the TWE Project with the cumulative benefit of habitat restoration and mitigation (*R*, service-acre-years), so that the services returned by habitat restoration and mitigation are greater than or equal to the cumulative injury ($R \geq I$). The habitat injury (*I*, service-acre-years) will be quantified for the life of the TWE Project using Equation 2. Equation 2 was adapted from Equation 8.1 in Allen et al. (2005). The discount rate (*r*) is anticipated to be set to 3%, which is standard for this type of analysis. The discount rate converts services being provided in different time periods into current time period equivalents (Allen et al. 2005). The discount rate effectively weighs the habitat service losses so that losses occurring early in the TWE Project result in a greater overall injury than losses occurring later

in the project. Likewise, habitat restoration and mitigation occurring early in the TWE Project would result in a greater benefit than habitat restoration and mitigation occurring late in the project.

Equation 2. $$I = \sum_{t=0}^{y} JV^{j} * \rho_{t} * \left[ (b^{j} - x_{t}^{j}) / b^{j} \right]$$

where:

*I* is the present value of the service-acre-years lost over *y* due to interim and permanent injury,

*t* = 0 is the year the TWE Project begins,

*y* is the analysis period, in years (e.g., 107),

$JV^j$ is the value of the habitat services provided by the injured habitat (service-acres) before injury (i.e., at the Baseline milestone),

$b^j$ is the mean service score provided by the Assessment Area ($JV^j$/J, where J is the injury Assessment Area in acres) at the Baseline milestone (time [*t*] = 0),

$\rho_t$ is the discount factor, where $\rho_t = 1/(1+r)^{t-C}$, where *r* is the discount rate for the time period and *C* is the time the claim is presented (*C* = Project Year 1), and

$x_t^j$ is the mean service score provided by the Assessment Area at the end of year *t* if TWE Project disturbances are applied.

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# APPENDIX D

## Quantification of Habitat Service Gains Produced by Habitat Restoration and Mitigation Measures

Text is excerpt from the TWE Project HEA Plan.

# MODELING MITIGATION PROJECT HABITAT SERVICE GAINS

Habitat restoration and conservation measures are intended to create new, or protect existing, greater greater sage-grouse habitat services (Table D1). These measures serve as a "toolbox" from which mitigation projects may be selected by TransWest for inclusion in a mitigation package once the BLM has identified the preferred alternative and final HEA results are available for that alternative. The purpose of the mitigation projects is to offset the cumulative greater sage-grouse habitat service losses in the Assessment Area over the TWE Project lifetime (i.e., *I* in Equation 2 from Appendix C). The HEA will used to evaluate the benefit of a sample of conservation measures in the Assessment Area.

**Table D1.** Potential Habitat Restoration and Conservation Measures for Inclusion in the HEA.

| Measure | Brief Conservation Measure Description | Anticipated Benefits |
|---|---|---|
| Fence removal and marking with flight diverters | Fences would be removed or marked in: 1) Sections of fence known to cause greater sage-grouse collisions, 2) Fences within 2 km (1.2 mi) of leks (Braun 2006; Stevens 2011) or other high risk area, 3) Fences in areas with low slope and terrain ruggedness (Stevens 2011), and 4) Fence segments bounded by steel t-posts with spans greater than 4 m (Stevens 2011). | • Reduce mortality due to greater sage-grouse collisions<br>• Increase visibility of fences<br>• Increase contiguous patches of shrub-steppe habitat<br>• Remove localized grazing pressure and increase habitat |
| Sagebrush restoration and improvement projects | Seeding, planting seedlings, or transplanting containerized sagebrush plants (one plant per 5 $m^2$) and seeding a bunchgrass understory. | • Create contiguous patches of shrub-steppe habitat with optimal sagebrush cover and height and a bunchgrass understory<br>• Increase availability of high quality nesting, brood rearing, and winter habitats |
| Juniper/conifer removal | Mechanical removal (lop and scatter, cut-pile-cover, or mastication) of juniper/confer adjacent to areas with optimal sagebrush cover and height | • Reverse juniper/conifer encroachment on shrub-steppe habitat to increase contiguous patches of greater sage-grouse habitat<br>• Increase light penetration to support a forb and grass understory |
| Conservation easements | Removes threat of specific land uses to sensitive wildlife populations | • Prevent greater sage-grouse habitat destruction or degradation near urban areas and oil and gas development<br>• Reduce future fragmentation of shrub-steppe habitat |

## GIS MODELING OF CONSERVATION BENEFITS

The analysis of habitat service benefits produced by each habitat restoration or mitigation measure in Table D1 will be completed using an approach similar to that described or quantifying habitat losses. It is necessary that both analyses (i.e., quantification of habitat service losses and habitat service gains) use the same habitat services metric (see Appendix A), the same unit of measure (service-acres and service-acre-years), the same analysis period, and the same discount rate. Figure D1 illustrates a hypothetical example of how mitigation would be added to the baseline service metric over time to derive an estimate of the service-acre-years provided by the mitigation measures that will be modeled for the TWE Project.

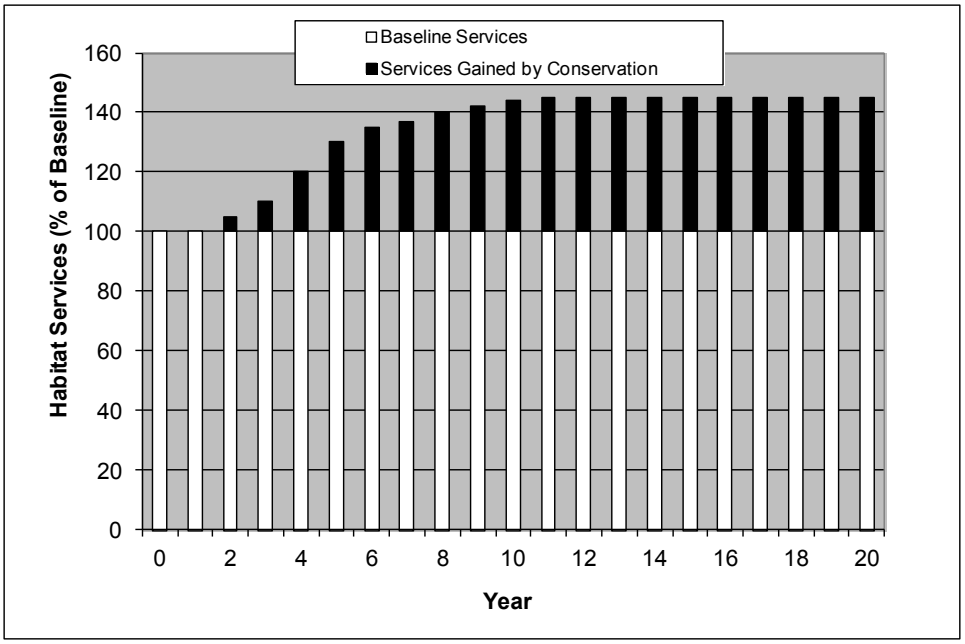


Figure D1. Hypothetical example of how the HEA model considers habitat services gained by habitat restoration and mitigation to calculate the total services gained over the project period (i.e., sum of the black bars).

## Modeling Habitat Restoration and Mitigation Measures

Ideally, locations of possible habitat restoration and mitigation projects will be identified prior to finalization of the HEA process. In the event that these locations are not known, hypothetical habitat restoration and mitigation project areas will be used to estimate average habitat service gain.

Once actual or hypothetical habitat restoration and mitigation project locations are identified, variable scores in the HEA model will be changed to approximate the change in habitat services expected with implementation of the measure. The new habitat service score will be calculated for each cell in the Assessment Area using the same habitat services metric used to quantify baseline and impacts (see Appendix A). The habitat service benefit of a modeled mitigation project will be calculated by determining the difference in the habitat services provided at baseline and after implementation of the habitat restoration or mitigation measure.

For each habitat restoration/mitigation project, the time to full benefit and project initiation timing will be determined and accounted for in the HEA model to estimate of the present value habitat service gain that would be created. The present value habitat service gain (*R*, service-acre-years) will be quantified for the life of the TWE Project using Equation 3 (adapted from Equation 8.1 in Allen et al. 2005).

Equation 3. $$R = \sum_{t=0}^{y} PV^{p} * \rho_{t} * \left[ (x_{t}^{p} - b^{p}) / b^{p} \right]$$

where:

*R* is the present value of the service-acre-years gained by the habitat restoration or mitigation measure,

*t* = 0 is the year the transmission line TWE Project begins,

*y* is the analysis period, in years (i.e., 107),

$PV^p$ is the value of the habitat services provided by the improved habitat (service-acres) before habitat restoration or mitigation measure (i.e., at the Baseline milestone),

$b^p$ is the mean service score provided by the Assessment Area ($PV^p/P$, where *P* is the injury Assessment Area in acres) at the Baseline milestone (time [*t*] = 0),

$\rho_t$ is the discount factor, where $\rho_t = 1/(1+r)^{t-C}$, where *r* is the discount rate for the time period and *C* is the time the claim is presented (*C* = Project Year 1), and

$x_t^p$ is the mean service score provided by the Assessment Area at the end of year *t* if habitat restoration or mitigation measure benefits are applied.

The present value habitat service gain (*R*) will be standardized among mitigation project types by dividing by size of mitigation project (units in acres or linear mile depending on the conservation measure modeled) and averaged among hypothetical projects applying the same conservation measure to produce the service-years gained per unit of treatment ($\overline{R}^m$). This value will be used in mitigation calculations.

## ESTIMATING COST TO IMPLEMENT MODELED HABITAT RESTORATION AND MITIGATION MEASURES

The cost of the modeled habitat conservation measures will be estimated by averaging the known cost of similar mitigation projects previously implemented (in current year U.S. dollars). The cost per unit treated will be divided by the average service-acre-years per unit area treated (calculated in the previous section), to estimate the price per service-acre-year gained for each of the habitat restoration and mitigation measures. This is the currency that will be used to offset the permanent and interim habitat service losses associated with the TWE Project's construction, operation, and maintenance for the lifetime of the TWE Project.

## APPROACH TO OFFSET HABITAT SERVICE LOSSES WITH HABITAT SERVICE GAINS

An HEA scales the mitigation package (i.e., funding to create habitat services) to offset the loss of habitat services over the lifetime of the TWE Project. The injury is offset by planned habitat restoration and mitigation projects in Equation 4, where the mitigation project size ($P^m$) can be solved for each habitat restoration or mitigation measure type (*m*).

Equation 4

$$I = \sum_{m1}^{i} P^m * \overline{R}^m$$

where:

I is the present value of the service-acre-years lost over y due to interim and permanent injury,

$i$ is the number of habitat restoration and mitigation measures modeled,

Pm is the size of the habitat restoration or mitigation project of type m (in units of acres or miles), and

$\overline{R}^m$ is mean service-years gained per unit (acres or miles) of treatment.

Once the $P^m$ is defined for each habitat improvement and mitigation measure, the costs per unit can be applied. Mitigation due is the sum of the costs to implement each of the habitat improvement and mitigation projects needed to offset the TWE Project

# APPENDIX E

## Assignment of National Gap Analysis Program (GAP) Vegetation Classifications to Categories for HEA Modeling

# VEGETATION CATEGORIZATION FOR HEA MODELING

Vegetation and other landcover types in the USGS GAP Land Cover Dataset were classified as providing habitat for greater sage-grouse or not providing habitat for greater sage-grouse. Vegetation types providing no habitat services to greater sage-grouse (Non-Habitat in Table E1) were assumed to require no mitigation in the HEA. Those vegetation types that are used by greater sage-grouse (Habitat in Table E1) were assigned to one of four modeled vegetation categories. Each of the modeled vegetation categories had a different vegetation recovery time in the HEA model.

## Table E1. Vegetation categorization based on GAP landcover types

| **Vegetation Categories** | **GAP Vegetation: ECOLSYS_LU** |
|---|---|
| Non-Habitat: Anthropogenic Disturbance and Open Water | Developed, High Intensity |
| | Developed, Low Intensity |
| | Developed, Medium Intensity |
| | Developed, Open Space |
| | Disturbed/Successional - Recently Chained Pinyon-Juniper |
| | Open Water (Fresh) |
| | Quarries, Mines, Gravel Pits and Oil Wells |
| Non-Habitat: Natural Vegetation | Colorado Plateau Mixed Bedrock Canyon and Tableland |
| | Colorado Plateau Pinyon-Juniper Shrubland |
| | Colorado Plateau Pinyon-Juniper Woodland |
| | Great Basin Pinyon-Juniper Woodland |
| | Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland |
| | Inter-Mountain Basins Cliff and Canyon |
| | Inter-Mountain Basins Juniper Savanna |
| | Inter-Mountain Basins Shale Badland |
| | Introduced Riparian and Wetland Vegetation |
| | Introduced Upland Vegetation - Annual Grassland |
| | Introduced Upland Vegetation - Perennial Grassland and Forbland |
| | Introduced Upland Vegetation - Treed |
| | North American Warm Desert Bedrock Cliff and Outcrop |
| | North American Warm Desert Lower Montane Riparian Woodland and Shrubland |
| | Recently Burned |
| | Rocky Mountain Alpine Bedrock and Scree |
| | Rocky Mountain Aspen Forest and Woodland |
| | Rocky Mountain Bigtooth Maple Ravine Woodland |
| | Rocky Mountain Cliff, Canyon and Massive Bedrock |
| | Rocky Mountain Foothill Limber Pine-Juniper Woodland |
| | Rocky Mountain Gambel Oak-Mixed Montane Shrubland |

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| | Rocky Mountain Lodgepole Pine Forest |
| | Rocky Mountain Lower Montane Riparian Woodland and Shrubland |
| | Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland |
| | Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland |
| | Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland |
| | Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland |
| | Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland |
| | Western Great Plains Cliff and Outcrop |
| Habitat: Agriculture and Wetland<br><br>(HEA assumed 1 year recovery time) | Cultivated Cropland |
| | Inter-Mountain Basins Playa |
| | North American Arid West Emergent Marsh |
| | North American Warm Desert Playa |
| | Pasture/Hay |
| | Rocky Mountain Alpine-Montane Wet Meadow |
| | Rocky Mountain Subalpine-Montane Mesic Meadow |
| | Western Great Plains Closed Depression Wetland |
| | Western Great Plains Open Freshwater Depression Wetland |
| | Western Great Plains Saline Depression Wetland |
| Habitat: Grassland and Riparian<br><br>(HEA assumed 5 years recovery time) | Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland |
| | Inter-Mountain Basins Semi-Desert Grassland |
| | North American Warm Desert Riparian Mesquite Bosque |
| | North American Warm Desert Wash |
| | Northwestern Great Plains Mixedgrass Prairie |
| | Rocky Mountain Subalpine-Montane Riparian Shrubland |
| | Southern Rocky Mountain Montane-Subalpine Grassland |
| | Western Great Plains Riparian Woodland and Shrubland |
| Habitat: Sagebrush<br><br>(HEA assumed 20 years recovery time) | Colorado Plateau Mixed Low Sagebrush Shrubland |
| | Great Basin Xeric Mixed Sagebrush Shrubland |
| | Inter-Mountain Basins Big Sagebrush Shrubland |
| | Inter-Mountain Basins Big Sagebrush Steppe |
| | Inter-Mountain Basins Montane Sagebrush Steppe |
| Habitat: Shrub Steppe<br><br>(HEA assumed 100 years recovery time) | Great Basin Semi-Desert Chaparral |
| | Inter-Mountain Basins Active and Stabilized Dune |
| | Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland |
| | Inter-Mountain Basins Greasewood Flat |

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| | Inter-Mountain Basins Mat Saltbush Shrubland |
| | Inter-Mountain Basins Mixed Salt Desert Scrub |
| | Inter-Mountain Basins Semi-Desert Shrub Steppe |
| | Mogollon Chaparral |
| | Mojave Mid-Elevation Mixed Desert Scrub |
| | Rocky Mountain Lower Montane-Foothill Shrubland |
| | Sonora-Mojave Creosotebush-White Bursage Desert Scrub |
| | Sonora-Mojave Mixed Salt Desert Scrub |
| | Wyoming Basins Dwarf Sagebrush Shrubland and Steppe |