FINDING OF NO SIGNIFICANT IMPACT:
Construction and Operation of a High Voltage Electrical Range
Fort Carson, CO

Fort Carson and the Air Force Space Command have prepared an Environmental Assessment (EA) that evaluates the potential environmental impacts of the Army's proposal to construct and operate a High Voltage Electrical (HVE) training range, on Fort Carson, Colorado to train DoD personnel to understand the inherent vulnerabilities in commercially provided utilities, recognize the indicators of utility intrusions, identify the actions necessary to mitigate the effects of the intrusions, and to restore utility functions if/when they are affected. The range would provide a realistic scenario-based understanding of electrical power substation operations and control system interfacing with higher level control and monitoring centers.

Description of the Proposed Action

The Proposed Action is to construct and operate a high voltage training range at Fort Carson to support training to protect DoD critical infrastructure. The HVE would be constructed in Training Area 50 near the intersection of Route 1 and Route 14 at Fort Carson. The construction of the HVE range would consist of the following major components:

- Interconnection of the 230kV transmission line (including the point of interconnection);
- A five acre fenced commercial electrical power substation yard;
- An electrical power distribution line of approximately 8 miles in length;
- Six high voltage electrical power transformers within the substation yard; and
- One metal sided building that will serve as the enclosed training and administrative area within the yard.

Alternatives

Alternatives to construct and operate the HVE range on other sites on Fort Carson were evaluated and screened based on criteria to meet mission as well as cost requirements. Criteria included:

- Minimization of effects on the other military missions at Fort Carson;
- Minimization of significant environmental effects;
- Minimization of safety, health, and nuisance issues;
- Close proximity (200 yards or less) to the 230kV transmission line and ability to construct 8-10 miles of distribution power line;
- Securing a reliable and cost-effective source of range power (<1 mile) and communication (<1 mile); and
- Access to serviceable hard-topped road for all weather access and movement of heavy equipment.

There were no other alternative sites that met all the above siting criteria. The proposed eight mile distribution loop for the HVE included a comprehensive analysis of options, however only two options would not negatively impact training or environmentally sensitive resources. Option B is the preferred option.

Other environmental issues (vegetation effects, potential erosion) will be reduced with minor mitigation which has been identified in the EA.

No Action Alternative

The No Action Alternative provides a basis of comparison for the Proposed Action and also addresses issues of concern by avoiding or minimizing effects associated with the Proposed Action. Under the No Action Alternative, there would be no construction or operation of the high voltage electrical range on Fort Carson. This alternative provides a baseline for environmental conditions.

Public Review

Public participation opportunities for this matter were guided by and implemented the requirements of 32 Code of Federal Regulations (CFR) Part 651. The views of pertinent agencies and interested organizations and members of the public were solicited and considered. The Army made the EA and Draft FNSI available to the public for review and comment for 30 days prior to a final decision. Copies of individual comment letters and the associated responses received during this period are included in the final documentation. Consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations 36 CFR Part 800 was accomplished with the Colorado State Historic Preservation Officer (SHPO), Native American Tribes, and other consulting parties.

Environmental Consequences

Potential direct, indirect, and cumulative impacts of the Proposed Action and No Action Alternative were identified in the analysis and public comment process during the development and finalization of the EA. Implementation of the Proposed Action (*i.e.*, construct and operate the HVE training range) would have no significant negative environmental or socioeconomic effects. Satisfaction of the Army's significant need to provide up-to-date and realistic training at Fort Carson is considered to outweigh the relatively minor environmental impacts, and identified mitigation would occur before and after range construction. Findings indicate that implementation of the Proposed Action and preferred Option B would result in no significant adverse environmental consequences. The environment would not be significantly or adversely affected by proceeding with the Proposed Action. No significant cumulative effects are expected.

Mitigation Measures

Fort Carson is committed to sustaining and preserving the range environment. In keeping with that commitment, the Installation has an active environmental management program that employs a full array of best management practices (BMPs) and environmental management programs to ensure environmental compliance, stewardship, and sustainability of those areas potentially impacted by this action. In this case, substantial mitigation has been incorporated into the design of the proposed courses and their supporting range infrastructure in order to achieve environmentally preferable outcomes. Site-specific mitigation includes:

- Ground-disturbing activities will be monitored by a qualified, professional archaeologist, and the Inadvertent Discovery of Archaeological, Cultural, or Paleontological Materials SOP will apply for construction activities.
- BMPs would be required such as reestablishing the area by reseeding with appropriate seed mixtures, the use of silt fences, and other rehabilitation efforts.
- A long-term vegetation management plan should be developed for the Right of Way, to include invasive species treatments and tree removals conducted as outlined in the plan and as necessary after the high voltage line is complete.
- To decrease the chance of avian electrocutions by substation equipment, install covers on equipment bushings, cutouts, jumpers, and lightning arresters. For jumper wires, use a bird jumper wire guard, cover-up hose or insulated power cable. (See pages 40 – 41 of the Avian Protection Plan (APP) Guidelines in Appendix F)
- Above-surface feeds should provide a 60-inch minimum horizontal separation between energized conductor and/or energized conductors and grounded hardware or insulate hardware or conductors against simultaneous contact if adequate spacing is not possible. On single phase structures, a minimum vertical separation of 36 inches from phase to ground is needed to safely accommodate eagles and most wading birds.

Additionally, the existing environmental staff and programs represent a current and foreseeable resource for stewardship and for implementation of existing plans and best practices, including implementation of fugitive dust controls measures, the Stormwater Pollution Prevention Plan (SWPPP), the Operational Noise Plan, the Programmatic Agreements for historic preservation, a prescribed burning program, and wildlife surveys and management. The Installation's land management and restoration staff also represent an in-place and funded resource for implementation and monitoring of the effects of land use and the effectiveness of restoration programs. They are a monitoring and enforcement capability which is currently funded and for which continued funding will be sought and for which the anticipated necessary funding is expected to be available.

Conclusion

The attached EA was prepared pursuant to Title 32 of the Code of Federal Regulations (CFR) Part 651 and U.S. Council on Environmental Quality (CEQ) regulations (Title 40 of the CFR, Parts 1500-1508) for implementing the procedural requirements of the National Environmental Policy Act (NEPA). The finding of this EA is that the Proposed Action, with minor mitigation, would have no significant direct, indirect or cumulative adverse effects on the human or natural environment. Therefore, based on review of the EA, I conclude that the Proposed Action, the preferred alternative, is not a major federal action that would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of NEPA. Accordingly, no Environmental Impact Statement (EIS) is required. With this finding, I approve selection of the Proposed Action.

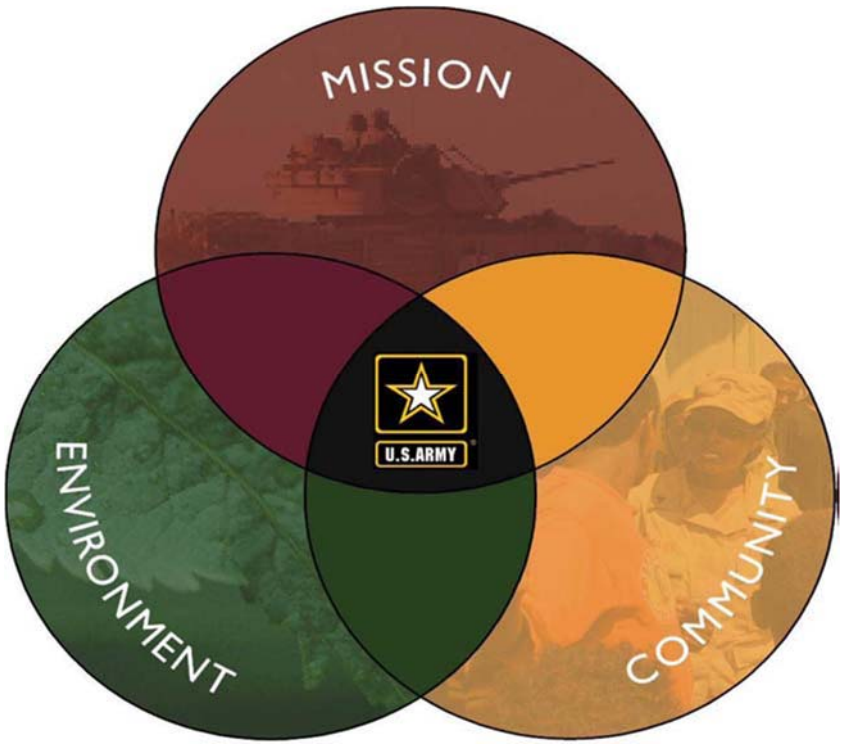
RONALD P. FITCH, JR.
COL, SF
Garrison Commander
Fort Carson, Colorado

13 Dec 17
Date

THOMAS A. MORRIS
Lt COL, USAF
Chief, Effects Division; Air Force Space Command
Reston, Virginia

1 Dec 2017
Date

Environmental Assessment for the Construction and Operation of a High Voltage Electrical Range Fort Carson, CO



October 2017

Fort Carson

Directorate of Public Works, Environmental Division

ENVIRONMENTAL ASSESSMENT
Construction and Operation of a High Voltage Electrical Training Range
Fort Carson, CO
October 2017

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HAL ALGUIRE
Director Public Works
Fort Carson, Colorado

5 Dec 2017
Date

Approved By:

RONALD P. FITCH, JR.
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Garrison Commander
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13 Dec 17
Date

THOMAS A. MORRIS
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Chief, Effects Division; Air Force Space Command
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1 Dec 2017
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ENVIRONMENTAL ASSESSMENT
Construction and Operation of a High Voltage Electrical Training Range
Fort Carson, CO

Contents

ENVIRONMENTAL ASSESSMENT
Construction and Operation of Range: High Voltage Electrical Training Range
Fort Carson, Colorado

1.0 PURPOSE, NEED, AND SCOPE

1.1 Introduction

This Environmental Assessment (EA) was prepared to evaluate the potential impacts of the proposal to construct and operate a High Voltage Electrical Training Range on Fort Carson, Colorado. The Proposed Action will serve to provide adequate training facilities for the Department of Defense (DoD) to conduct its mission to meet evolving DoD Critical Infrastructure Analysis and Protection. The proposed range will provide training opportunities to develop and improve both Military and Defense Department Civilian proficiency and competence in the understanding and protection of critical infrastructure that supports DoD installations, facilities, and bases world-wide.

This section presents the purpose and need for the Proposed Action, defines the scope of the environmental analysis and issues to be considered, identifies decisions to be made, and identifies other relevant documents and actions.

1.2 Purpose and Need for Proposed Action

The purpose for the Proposed Action is to provide a realistic high voltage electrical power range and training facility for DoD Military and Civilian Personnel charged with defending base critical infrastructure.

Public infrastructure today is becoming increasing vulnerable through the reliance on digital communications. This proposed range venue will train DoD personnel to understand the inherent vulnerabilities in commercially provided utilities, recognize the indicators of utility intrusions, identify the actions necessary to mitigate the effects of the intrusions, and to restore utility functions if/when they are affected. As the control and management of public and commercial utilities become more and more automated, thus relying less on personnel on site, actions by foreign nations, adversary groups and lone-wolf actors are becoming more possible as a means to disrupt military installations and DoD critical facilities in Continental United States (CONUS) and abroad. The need for the Proposed Action is to provide a high voltage electrical training range facility in a controlled field environment to provide realistic understanding of electrical power substation operations and control system interfacing with higher level control and monitoring centers. The training venue will provide realistic feedback for positive response to reinforce correct procedures and to foster operators' and analysts' confidence.

1.2.1 High Voltage Electrical Range

The proposed facility for a High Voltage Electrical (HVE) range would be used to orient and train DoD individuals and teams, on the skills necessary to conduct critical infrastructure protection and response actions to infrastructure disruption. The Proposed Action calls for the construction and operation of a power industry standard, electrical

power substation that will be connected to a Western Area Power Administration 230 kilovolt (kV) transmission line which provides the energy source. The 230kV transmission line power would be stepped down in voltage by transformers and connected through a series of circuit breakers and switches to approximately 16 miles of distribution loop and terminated at a load bank. This substation design is readily reconfigurable to represent various CONUS and overseas power grid scenarios. The Proposed Action will permit Defense Department Military and Civilian Personnel to learn basic electrical power substation operations and protection measures that are critical to safeguard base infrastructure from accidental and intentional disruptive actions. The expected duration and frequency of use would be a two week period each quarter. Actual operation would occur during normal work hours, Monday through Friday.

Training at the proposed high voltage range would include the following skills:

- Familiarization with commercial high voltage substation operations and equipment
- Substation protective control device operation and monitoring
- Remote and local control of switches and breakers
- Integration of control systems and communication links
- Monitoring of networks for outside intrusions and abnormal activities
- Operation of the substation in degraded modes
- Recovering and restoring functionality of the substation

Without proper full-scale training facilities, these essential skills for protecting critical infrastructure would not be optimally developed, practiced and evaluated for DoD personnel. Training on the proposed HVE range would prepare individuals and teams to recognize, deter and react to outside intrusions that attempt to disrupt DoD infrastructure.

1.3 Scope of Analysis

This EA analyzes effects of construction and operation of a high voltage electrical training range on Fort Carson.

This EA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President's Council on Environmental Quality (CEQ) published in 40 Code of Federal Regulations (CFR) Parts 1500-1508 and the Army's NEPA-implementing procedures published in 32 CFR Part 651, *Environmental Analysis of Army Actions (Army Regulation 200-2)*.
This EA This EA will facilitate the decision-making process by the DoD Air Force Space Command and Fort Carson regarding the Proposed Action and its considered alternatives, the potential extent of environmental impacts of the Proposed Action and alternatives, and whether those impacts (direct, indirect, and cumulative) are significant.

This EA analyzes the potential environmental consequences resulting from the Proposed Action and the Alternatives, including the No Action Alternative. Specific resource types were selected to address identified concerns and issues, focus the

discussion related to this Proposed Action, and allow comparison of the environmental consequences of each alternative. These resource types were identified based on federal laws, regulations, and executive orders (EOs), and public/agency scoping. Resource types considered for analyses include:
Air Quality, Biological Resources, Water Resources, Soils, Cultural Resources, Noise, Hazardous Materials/Waste, and Utilities. A brief description of issues eliminated from further analysis is in Section 3.1, *Valued Environmental Components (VECs) Not Addressed.*

1.4 Decision(s) to Be Made

The decision to be made is whether or not to implement the Proposed Action and if implementation would cause significant impacts to the human or natural environment. If no significant environmental impacts are determined, based on the evaluation of impacts in the EA, a Finding of No Significant Impact (FNSI) will be jointly signed by the Division Chief, Air Force Space Command and Fort Carson's Garrison Commander. If it is determined that the Proposed Action will have significant environmental impacts, either the action will not be undertaken, or a Notice of Intent
(NOI) to prepare an Environmental Impact Statement (EIS) will be published in the Federal Register.

1.5 Agency and Public Participation

Public participation opportunities with respect to this EA and decision-making on the Proposed Action are guided by 32 Code of Federal Regulations (CFR) Part 651, *Environmental Analysis of Army Actions (Army Regulation* [AR] *200-2)*. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and members of the public having an interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, were given the opportunity to comment on this EA, as described below.

The Proposed Action and the entire record will be reviewed and the Agency will determine the foreseeable impacts and the need for mitigation. If the Proposed Action remains within the assessment parameters described in this assessment, the EA along with a Draft FNSI, with mitigation measures if applicable, will be available to the public for 30 days, starting from the last day of publication of the Notice of Availability (NOA) in the local media. The documents will be available at:
http://www.carson.army.mil/DPW/nepa.html

Anyone wishing to comment on the Proposed Action or request additional information should contact the Fort Carson NEPA Coordinator, Directorate of Public Works; Environmental Division at: usarmy.carson.imcom-central.list.dpw-ed-nepa@mail.mil.

Pursuant to 651.14(b), Title 32 Code of Federal Regulations, the Army made the EA and Draft FNSI available to the public for review and comment for 30 days prior to a final decision. Copies of individual comment letters and the associated responses received during this period will be included in the final documentation in Appendix A.

Section 106 of the National Historic Preservation Act
With regards to the HVE, consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations 36 CFR Part 800 was initiated with the Colorado State Historic Preservation Officer (SHPO), Native American Tribes, and other consulting parties on 20 April 2015. Consultation also included thirteen federally recognized Native American Tribes, who are culturally affiliated with Fort Carson; the El Paso County Commissioners; Colorado Council of Professional Archaeologists; Colorado Preservation, Inc.; and the Tatanka Group, LLC. In a letter dated 30 April 2015, the SHPO concurred with Fort Carson's determination of "no adverse effect to historic properties" pursuant to 36 CFR 800.5(b). No other comments were received.

See Section 4.6 for more information on cultural resources. Copies of the response letters are included in Appendix F.

1.6 Legal Framework

A decision on whether to proceed with the Proposed Action rests on numerous factors such as mission requirements, schedule, funding availability, safety, and environmental considerations. In addressing environmental considerations, Fort Carson is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning. These include, but are not limited to, the following:

- Clean Air Act;
- Clean Water Act;
- Noise Control Act;
- Endangered Species Act;
- Migratory Bird Treaty Act;
- National Historic Preservation Act;
- Archaeological Resources Protection Act;
- Resource Conservation and Recovery Act;
- Toxic Substances Control Act;
- EO 11988, Floodplain Management, as amended;
- EO 11990, Protection of Wetlands;
- EO 12088, Federal Compliance with Pollution Control Standards;
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks;
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management;
- EO 13175, Consultation and Coordination with Indian Tribal Governments;
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds; and
- EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

2.0 DESCRIPTION OF THE PROPOSED ACTION

This section describes the Proposed Action. 32 CFR 651 (AR 200-2) and Council on Environmental Quality regulations (40 CFR 1500) require the identification of reasonable alternatives to the Proposed Action, including the No Action Alternative, (described in Section 3.0). Alternatives sites on Fort Carson were evaluated and screened based on criteria detailed in section 3.3, below. There were no other alternative sites on Fort Carson that met all the siting criteria.

The Proposed Action is identified as the preferred alternative.

2.1 High Voltage Electrical (HVE) Range

2.1.1 Construction and Operation of a HVE Range

The Proposed Action is to construct and operate a high voltage training range at Fort Carson to support training to protect DoD critical infrastructure. The HVE would be constructed in Training Area 50 near the intersection of Route 1 and Route 14 at Fort Carson (Figure 2.1.1). The proposed range is adjacent to the Western Area Power Administration 230kV electrical power transmission line and towers which bisect the very southern edge of the training area from east to west.

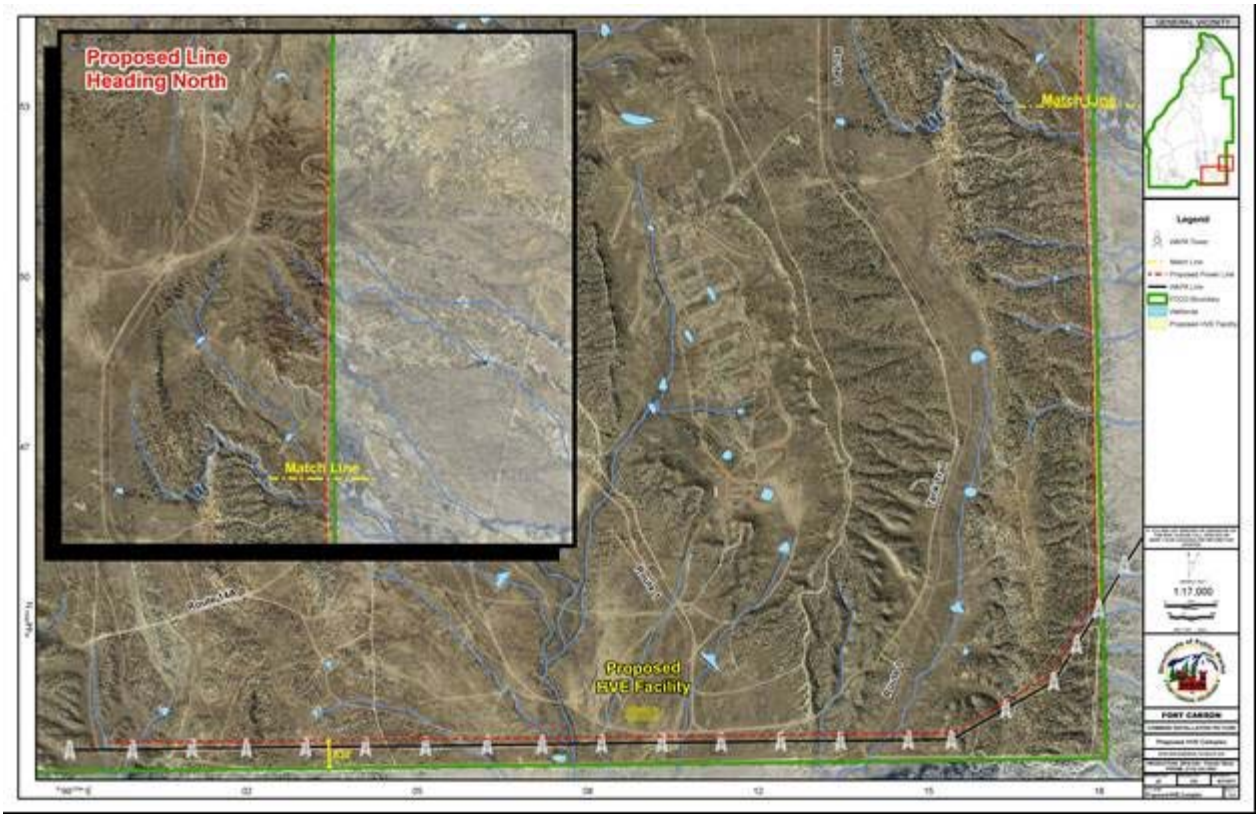

Figure 2.1.1 Location of Proposed Range on Fort Carson, CO

2.1.1.1 The Range

The construction of the HVE range would consist of the following major components:

- Interconnection of the 230kV transmission line (including the point of interconnection)
- A 5 acre-sized fenced commercial electrical power substation yard/site
- An electrical power distribution line of approximately 8 miles in length
- Six high voltage electrical power transformers within the substation yard
- One metal sided building that will serve as the enclosed training and administrative area within the yard

2.1.1.2 Interconnection

The HVE Range will be connected to the 230kV transmission line that is operated by the Western Area Power Administration (WAPA). The Rocky Mountain Regional Office has evaluated and approved the connection of the proposed substation training range to their transmission line. The Proposed Action includes the footprint of the interconnection and consisting of a simple transmission line tap supported by dead-end glued-laminated pole structures. The interconnection will be engineered, designed and constructed in accordance with all federal and state electrical power codes and regulations. The 230kV transmission line has sufficient electrical power reserve capacity to easily accommodate the proposed training range.

2.1.1.3 The Electrical Power Substation Yard

The construction of the substation yard will support the siting of the following main features. The substation yard will be enclosed by high security fencing with access gates for entry control and to prevent unauthorized personnel and wildlife access. The yard will be approximately 5 acres in size.

- High voltage electrical power transformers (quantity 6)
- High voltage electrical power switches and circuit breakers (quantity 11)
- High voltage overhead busbar structures
- Metal sided training and administrative building (22,500 square feet)
- Resistive electrical power load banks (quantity 2)
- Security and night-time lighting structures
- Vehicle parking area
- Lightning arrestment structures
- High security chain-link fencing with associated vehicle and personnel access gates

The substation yard will be the central feature for the training range. The yard will be sited in close proximity to the 230 kV transmission line as well as to the paved range road network. The yard will consist of compacted stone gravel with concrete pads for the transformers, circuit breakers and training/administrative building. The high voltage electrical power transformers contain mineral oil for cooling and insulation effects. All oil-filled transformers will be provided with secondary spill containment structures. The substation yard will include both communications and electrical service from nearby

range utilities. The substation yard as well as entire range complex will be in compliance with Fort Carson Physical Security requirements. Figure 2.1.1.3a provides a sketch of the substation yard and major features. Figure 2.1.1.3b provides representative images for the high voltage transformers, circuit breakers, load banks and the administrative building. Locations of range utilities are indicated in the sketch.

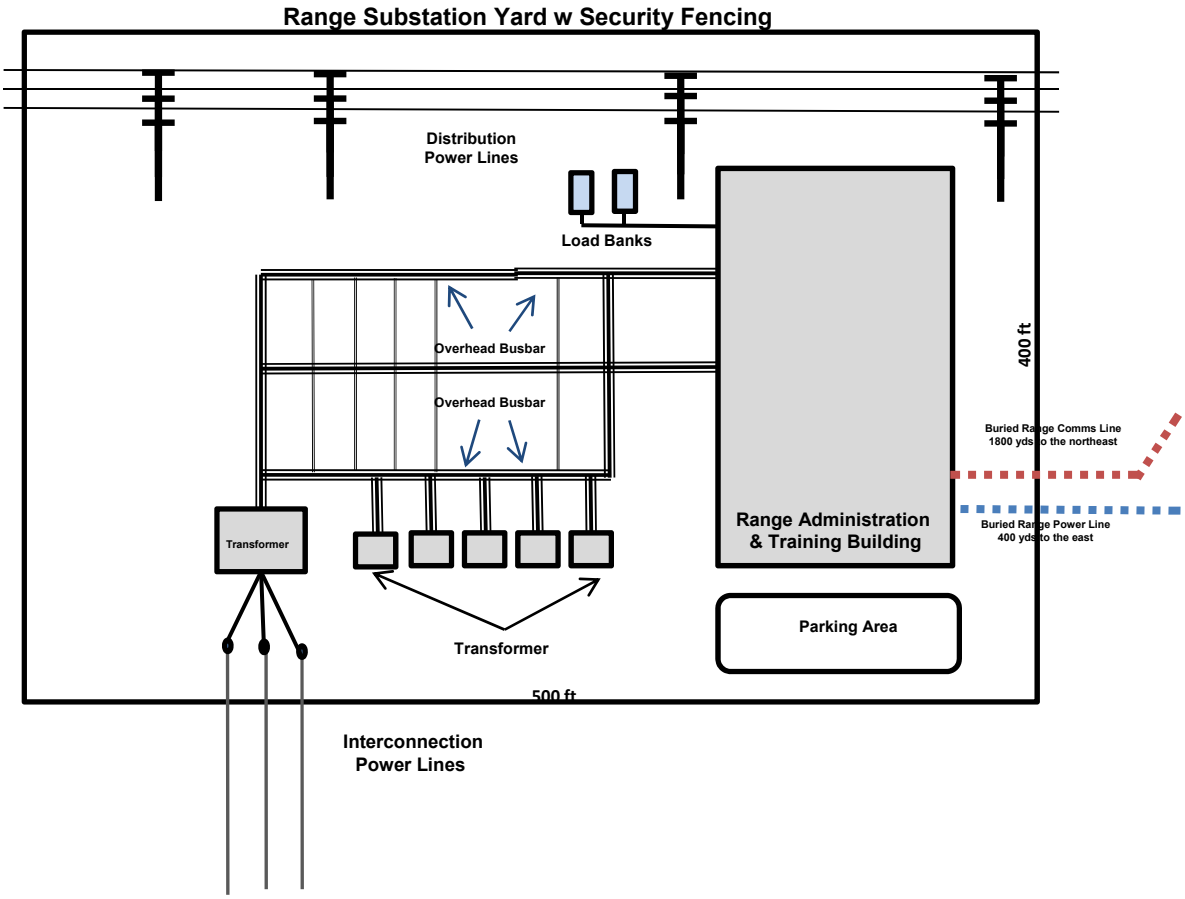

Figure 2.1.1.3a Substation Yard Sketch

Administrative and Training Building

Resistive Load Banks

High Voltage Transformer

High Voltage Circuit Breaker

Figure 2.1.1.3b Substation Yard Features

2.1.1.4 Electrical Power Distribution Line

A key component to the high voltage electrical power substation training range is an electrical power distribution line that represents on-base distribution infrastructure normally present on most DoD installations. The approximately 8 mile line will be looped back on itself to produce nearly 16 miles of line length to evaluate the effects of circuit breaker actions and switching activities over-distance. The distribution line towers will be approximately eighty feet tall and placed roughly parallel to the existing transmission line right-of-way or other existing road or right-of-way, so as to provide access for construction and maintenance as needed. The towers and lines would be equipped with the required aircraft hazard warning devices as specified by the Range Officials. At the turn around point for the distribution line, a small graveled area for parking would be prepared for maintenance vehicle placement. Figure 2.1.1.4 is a representative image of the distribution power line structures.

Figure 2.1.1.4 Distribution Power Line Structures

3.0 ALTERNATIVES CONSIDERED

This section describes alternatives to the Proposed Action. 32 CFR Part 651 (AR 200-2) and the Council on Environmental Quality regulations (40 CFR 1500) require the identification of reasonable alternatives to the Proposed Action, including the No Action Alternative. Alternative sites on Fort Carson were evaluated and screened based on criteria detailed in Section 3.3, below. There were no other alternative sites on Fort Carson that met all the siting criteria.

3.1 Valued Environmental Components (VECs) Not Addressed

Initial analyses resulted in the elimination of some resource types or valued environmental components (VECs) because potential issues were not of concern or

were not relevant to the Proposed Action and alternatives. Brief discussions of the rationale for these decisions are below.

Environmental Health and Safety Risks for Children
Neither the Proposed Action nor its alternatives would change environmental health or safety risks to children since the area is well within the boundaries of Fort Carson in an area designated for training. Neither the Proposed Action nor its alternatives would have significant or disproportionate adverse effects on children or pose health or safety risks.

Environmental Justice
Neither the Proposed Action nor its alternative would change any existing impacts with regard to minority and low-income populations as the area is well within the boundaries of Fort Carson in an area that has been and continues to be designated for training.

Geology and Topography
Neither the Proposed Action nor its alternatives would have any measurable effects on geologic resources or topography.

Land Use
The Proposed Action would not change existing land use on any lands. Lands affected by the Proposed Action on Fort Carson would continue to be used primarily for military training.

Noise
There may be the potential for noise during construction of the Proposed Action; however this would be short-term and temporary. Rural residences in the surrounding area are over one and one half miles from the proposed construction activities.

Hazardous Waste/Materials
Neither the Proposed Action nor its alternatives would generate additional hazardous wastes or use additional hazardous materials. The high voltage transformers contain quantities of mineral oil, but secondary containment structures would be designed and constructed prior to setting the transformers. The secondary containment capacity would correspond to the oil capacity of the transformer. The likelihood of contamination on proposed action site is remote. If any contamination is encountered, appropriate measures would be taken to remediate the site.

Transportation
Neither the Proposed Action nor alternatives would impact traffic patterns on Fort Carson or surrounding communities. Range construction traffic and movement of heavy electrical power transformers would be de-conflicted with Fort Carson and the surrounding communities and would be temporary and short-term.

Socioeconomics
There may be a slight beneficial economic impact resulting from the construction of the Proposed Action; however this would be short-term and temporary.

Visual and Aesthetic Resources
Neither the Proposed Action nor alternatives would impact visual or aesthetic resources as the construction of the facility and towers is over one and one half miles from the nearest residence.

Sustainability
Neither the Proposed Action nor alternatives would impact sustainability as the area is already a range/training area.

3.2 No Action Alternative

While the No Action Alternative would not satisfy the purpose or need for the Proposed Action, this alternative was retained to provide a comparative baseline against which to analyze the effects of the Proposed Action, as required under the CEQ Regulations: Alternatives including the Proposed Action (40 CFR Part 1502.14 Alternatives Including the Proposed Action). The No Action Alternative reflects the status quo and serves as a benchmark against which the effects of the Proposed Action can be evaluated. Under the No Action Alternative there would be no construction or operation of the high voltage electrical range on Fort Carson. Implementing the No Action Alternative would deny DoD units and individuals the opportunity to conduct critical infrastructure protection familiarization and training activities on a full-up commercial grade electrical power substation at Fort Carson, CO. Under this scenario the Proposed Action would be withdrawn from consideration.

3.3 Alternative Sites Eliminated from Further Consideration

Other sites on Fort Carson were evaluated and screened based on specific criteria. These criteria must be achieved to meet mission as well as cost requirements for the Proposed Action:

- minimization of effects on the other military missions at Fort Carson (*e.g.*, other small arms training, large weapon systems training, maneuver training, helicopter / flight training);
- minimization of significant environmental effects (*e.g.*, avoidance of National Register of Historic Places-eligible cultural resources sites and Native American sacred sites; avoidance of federally-listed species, and wetlands);
- minimization of safety, health, and nuisance issues, particularly with the general public (*i.e.*, avoiding areas with existing or likely future housing and minimizing noise consideration);
- close proximity (200 yards or less) to the 230kV transmission line.
- Ability to construct 8-10 miles of distribution power line;
- securing a reliable and cost-effective source of range power (<1 mile) and communication (<1 mile);
- access to serviceable hard-topped road for all weather access and movement of heavy equipment.

An available site was identified in Training Area 50 that met these requirements for the Proposed Action. There were no other alternatives for construction of the training facility on Fort Carson that met all the above siting criteria. The proposed eight mile

distribution loop for the HVE included a comprehensive analysis of options, however only two options would not negatively impact training or environmentally sensitive resources.

Option A would involve placement of the distribution line from the proposed HVE facility to the west returning to the facility. The eight-mile distribution line would be constructed adjacent to the existing 230kV power line west for approximately three miles, then veer away from the 230kV power line to remain on Fort Carson property. The proposed power lines would continue following the southern boundary of Fort Carson to the west for a total of eight miles. The return would be on the same poles.

Option B would involve placement of the distribution line adjacent to the existing 230kV power line. The eight-mile distribution line from the proposed HVE facility would extend to the west approximately three miles returning on the same poles and to the east about two miles, shifting north along the east side of an existing fire break road for about five miles. The return would be on the same poles. Option B is the preferred option. Both options (Appendix C) are considered in this analysis.

4.0 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION

This section discloses potential environmental effects of each alternative and provides a basis for evaluating these effects in context relative to effects of other actions. Effects can be direct, indirect, or cumulative. Direct effects occur at the same place and time as the actions that cause them, while indirect effects may be geographically removed or delayed in time. Council on Environmental Quality (CEQ) guidance states that a cumulative impact is an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place locally or regionally over a period of time. For the purposes of the cumulative impacts analysis, the Proposed Action Region of Influence (ROI) is defined to include Fort Carson and adjacent lands (including communities around the Installation). Appendix D lists the past, present, and reasonably foreseeable future Army actions (defined as those projects that are well-developed, in mature planning stages, and/or have funding secured), and other actions within the ROI, that were reviewed in conducting the cumulative effects analysis. Conceptual projects, broad goals, objectives, or ideas listed in planning documents that do not meet the above criteria are not considered reasonably foreseeable for the purposes of this analysis.

This EA focuses on resources and issues of concern in the following resource areas:
Air Space
Air Quality
Soils
Water Resources
Biological Resources
Cultural Resources

Hazardous Waste/Materials
Utilities

Areas with no discernible concerns or known effects, as identified in the issue elimination process (Section 3.1, *Valued Environmental Components (VECs) Not Addressed*), are not included in this analysis.
For ease in comparing environmental effects with existing conditions and mitigation specific to each environmental area of concern, each below section will describe existing conditions, describe the effects of each alternative, identify any cumulative effects on that area of concern, and describe site-specific mitigation. A summary of environmental consequences and general mitigation is provided in Chapter 5.

4.1 General Information – Location and Surrounding Land Uses

Fort Carson is located in central Colorado at the foot of the Rocky Mountains in El Paso, Fremont, and Pueblo counties (Figure 4.1a). To the north is Colorado Springs, to the east is Interstate-25 and mixed development, to the south are privately-owned ranches, and to the west is State Highway 115 (Figure 4.1b). Downtown Colorado Springs and Denver lie approximately 8 miles and 75 miles, respectively, to the north, while the City of Pueblo is located approximately 35 miles south of the main post area.

Fort Carson covers approximately 137,000 acres, and extends between 2 and 15 miles east to west and approximately 24 miles north to south. The main post area, which consists of developed land and a high density of urban uses, is located in the northern portion of the installation and covers approximately 6,000 acres. The downrange area, which is used for large caliber and small-arms live-fire individual and collective training; aircraft, UAS, wheeled and tracked vehicle maneuver operations; and mission readiness exercises, covers approximately 131,000 acres of unimproved or open lands.

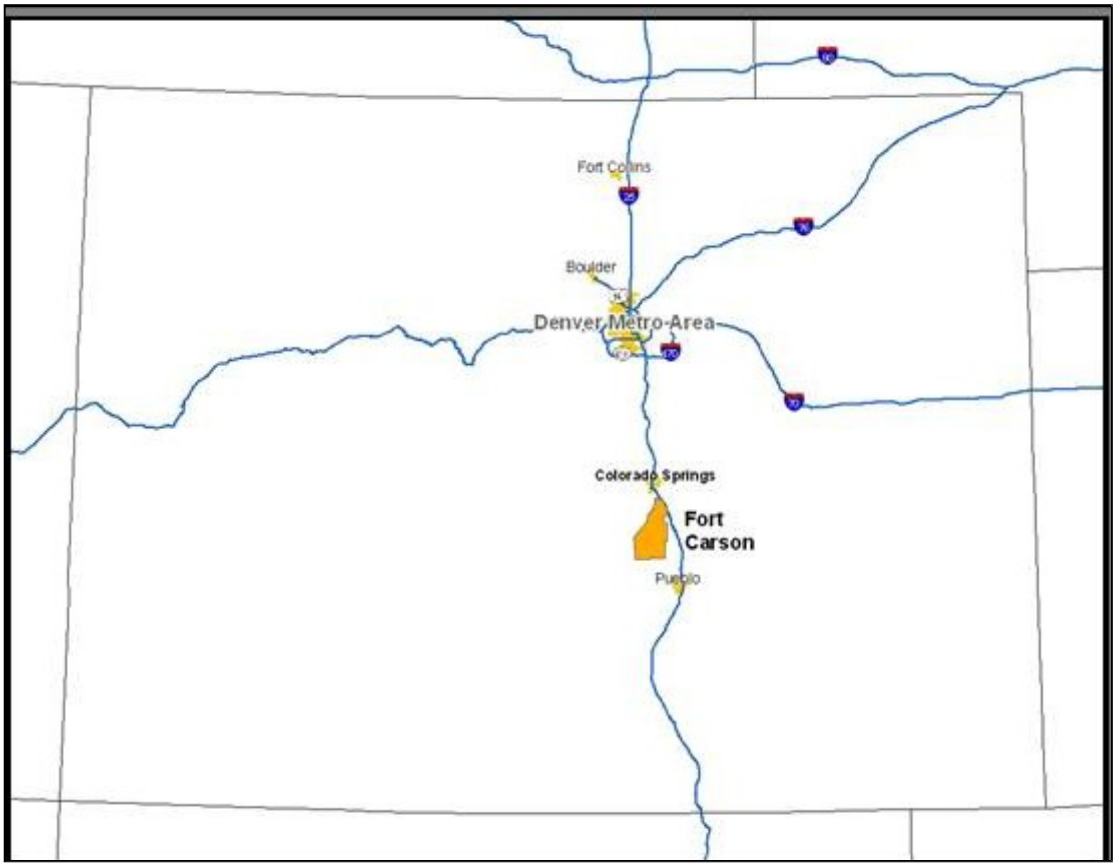

Figure 4.1a. Location of Fort Carson, Colorado

Additionally, there are approximately 25,600 acres of Army Compatible Use Buffer (ACUB) lands along the eastern and southern boundaries of the installation. These lands buffer military training activities from neighboring communities and protects the unique local short grass prairie open spaces from future development. The Army reaches out to partners to identify mutual objectives of land conservation and to prevent development of critical open areas to preserve high-value habitat and limit incompatible development in the vicinity of military installations. For more information on the ACUB program visit the U.S. Army Environmental Command's website: http://aec.army.mil/Services/Conserve/ArmyCompatibleUseBufferProgram.aspx

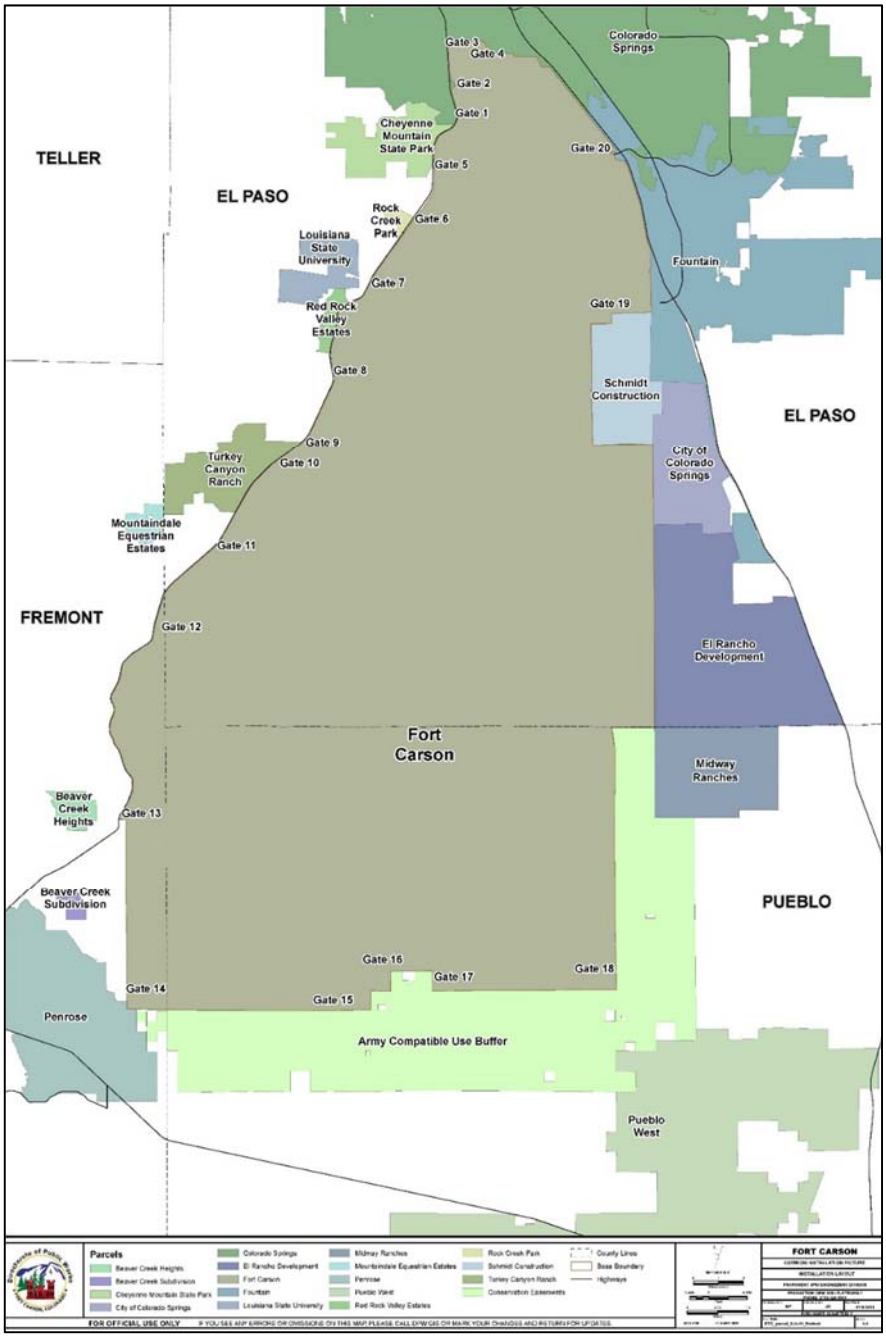

Figure 4.1b Lands Neighboring Fort Carson, Colorado

Butts Army Airfield is located in the northeast quadrant of the downrange area and is used for command and control of flight operations as well as maintenance and repair of aircraft.

4.1.1 Climate

The region including Fort Carson is classified as mid-latitude semi-arid, characterized by hot summers, cold winters, and relatively light rainfall. July is the warmest month with the average daily maximum temperature of 84.4° Fahrenheit, and January is the coldest

with an average daily minimum temperature of 14.5° Fahrenheit.

Mean annual precipitation at Fort Carson increases toward the northwest. Colorado Springs averages 17.5 inches of precipitation annually, with about 80 percent falling between April and September. Average annual snowfall in the region is 42.4 inches. Snow and sleet usually occur from September to May with the heaviest snowfall in March and possible trace accumulations as late as June.

4.2 Air Space

4.2.1 Existing Conditions

Army aviation assets are stationed at and flight operations are conducted out of BAAF. The Fort Carson airspace conditions are generally described in the 2011 *CAB Stationing Programmatic EIS (PEIS)* (HQDA, 2011). The types of aircraft that use the airspace are helicopters, fixed-wing aircraft, UASs, and transient aircraft.

As described in the 2011 *CAB Stationing PEIS,* Fort Carson implements all applicable regulations and policies on flying to maximize safety and minimize noise complaints. This EA incorporates the 2011 *CAB Stationing PEIS* by reference, including the general description of airspace that appears in Appendix A of that document.

Fort Carson has 152 square miles (394 square km) of Federal Aviation Administration (FAA) designated permanent restricted use and special use airspace (SUA), with no limit in altitude. The airspace is controlled by the FAA of Denver, Colorado. Military operations areas (MOAs) (a type of SUA) are located around Fort Carson and are higher altitude MOAs.

Further airspace details may be obtained from the 2011 CAB Stationing PEIS and from the 2012 Environmental Assessment for Fort Carson Combat Aviation Brigade Stationing Implementation (Additional information regarding flora and fauna on Fort Carson is in *Fort Carson's Integrated Natural Resource Management Plan* (INRMP) (Fort Carson 2013). Unless stated otherwise, below information is from those sources).

4.2.2 Environmental Consequences

4.2.2.1 Proposed Action

The potential to impact airspace due to construction of the proposed facility on Training Area 50 would be minimal as the facility would be sited so as to ensure it appropriately does not negatively impact training/flight operations.

Option A

Pole placement would remain within the Fort Carson boundaries. There is minimal impact to airspace as the lines would be placed south of the flight corridor.

Option B

Pole placement would remain within the Fort Carson boundaries, but would not be within the flight corridor, therefore impacts to airspace would be minimal.

4.2.2.3 No Action Alternative
No impacts on airspace operations would occur.

4.2.3 Cumulative Effects
The installation already experiences airspace congestion, however the Proposed Action would not contribute to this congestion or increase competition for this airspace. Neither Option would contribute to airspace congestion or cause a change in existing flight patterns.

4.2.4 Site-Specific Mitigation
No site-specific mitigation was identified for the Proposed Action or either Option.

4.3 Air Quality
4.3.1 Existing Conditions
Fort Carson is within the air quality control areas of El Paso, Fremont, and Pueblo counties, including the City of Colorado Springs. Both Fremont and Pueblo counties are in attainment for all criteria pollutants. The Colorado Springs Urbanized Area in El Paso County is in attainment (meeting air quality standards) for all National Ambient Air Quality Standards (NAAQS) criteria pollutants. However, it was classified as a maintenance area for carbon monoxide (CO) in 1999 due to a 1988 violation of the 8-hour CO standard. This CO maintenance area includes the majority of Fort Carson's main post area (north of Titus Boulevard and Specker Avenue). This designation is currently set to run through 2019 (CDPHE, 2009).

The Proposed Action is outside of the attainment/maintenance area.

4.3.2 Environmental Consequences

4.3.2.1 Proposed Action – Options A & B
The Proposed Action would not change regional air quality conditions. The impacts on air quality from the implementation of the Proposed Action would be minor. Construction would have short-term minor adverse impacts on air quality due to minor increases in fugitive dust (i.e., airborne dust caused by vehicles, equipment, and wind) and vehicle emissions caused by the operation of heavy equipment. Operations under the Proposed Action would have negligible long-term adverse impacts on air quality due to this is not a traditional military maneuver range, but rather a static, hands on utility classroom training environment. The effect on air quality is not significant.

Fort Carson is a major stationary source because the potential to emit for nitrogen oxides is greater than 250 tons per year (tpy). Additionally, Fort Carson contains one of the special categories identified in the Prevention of Significant Deterioration (PSD) provisions subject to a 100 tpy major source threshold. Any modifications that result in a significant net emissions increase for any regulated pollutant may result in the application of the PSD review requirements. The project pollutant of concern is particulate matter (PM). Estimated PM emissions from the construction and operations under the Proposed Action would be below the threshold for PSD (less than 25 tpy

total, 15 tpy PM_{10} or 10 tpy $PM_{2.5}$) and not expected to require changes in air permits for existing stationary emission sources

The HVE doesn't include any new air emissions sources (e.g. Fuel storage tanks, generator power or boilers), therefore there would be no impact on air quality due to operation. The construction proposed for the HVE could minor increases in air pollution from the use of construction equipment (combustion emissions) and the disturbance of soils (fugitive dust) during construction, however this would be temporary and short-term.

The Proposed Action is outside of the carbon monoxide maintenance area and is not subject to the General Conformity Requirements of 40 CFR Part 93, subpart B. The Proposed Action is not anticipated to result in violations of NAAQS.

4.3.3.2 No Action Alternative

Under the No Action Alternative, there would be no impacts on air quality.

4.3.3 Cumulative Effects

Environmental effects from past and current Army actions, when added to the anticipated environmental effects of the Proposed Action, would not result in any significant long-term effects to air quality because operations will be required to comply with construction activity/fugitive dust permit requirements. These requirements are designed to ensure that emissions do not significantly affect air quality. Therefore, there would be no significant cumulative effect from the combined environmental effects of the Proposed Action and those of past, present and reasonable foreseeable future actions. Temporary and minor increases in air pollution would occur from the use of construction equipment (combustion emissions) and the disturbance of soils (fugitive dust) during construction. The air emissions from the proposed operational activities do not exceed Federal *de minimis* thresholds. The impacts on air quality from the implementation of this alternative would be minor.

4.3.4 Site-specific Mitigation

A Colorado Department of Public Health and Environment Air Pollutant Emissions Notice (APEN) would be required to be submitted for a Construction Activity Permit for any activities that disturb more than 1 acre of land for a period extending over 6 months. All equipment that has the possibility to emit air emissions would be reviewed for compliance and permit requirements with Fort Carson's Title V Air Permit. If the air pollutant emissions are not a significant amount to require a permit to construct, the air pollutant emissions would be added to Fort Carson's Title V Air Permit's Yearly Inventory. Applications would include a fugitive dust control plan and would include all land disturbance associated with this project. Short-term air quality degradation would occur during the construction phase, but would be mitigated by a variety of fugitive dust control measures.

Appropriate emission control devices on vehicles and equipment used for construction would minimize effects to air quality. Heating and air conditioning equipment would be regularly maintained to minimize the risk of above-normal emissions from these units

4.4 Soils

The soil compositions and soil descriptions of the proposed construction of the HVE were collected from the Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA) (NRCS 2014). The soil compositions, soil descriptions, and Area of Interest (AOI) maps of the Proposed Action and both Options are included in Appendix E.

4.4.1 Existing Conditions

There is one soil type within the Proposed Action HVE area (facility only) and is described below.

Manvel silt loam.

Manvel silt loam is a well-drained soil with 2 to 6 percent slopes. A typical profile is 0 to 7 inches silt loam, 7 to 25 inches silt loam, 25 to 49 inches silt loam, and 49 to 79 inches silt loam. Its depth to restrictive feature is greater than 80 inches. The available water storage in the profile is moderate at about 8.6 inches.

4.4.1.1 Option A

There are twelve soil types within the proposed power line placement area for Option A. Four of these soil types make up approximately 83 percent of the AOI (see Appendix E) and are described below.

Manvel silt loam

Manvel silt loam is a well-drained soil with 2 to 6 percent slopes. A typical profile is 0 to 7 inches silt loam, 7 to 25 inches silt loam, 25 to 49 inches silt loam, and 49 to 79 inches silt loam. Its depth to restrictive feature is greater than 80 inches. The available water storage in the profile is moderate at about 8.6 inches.

Penrose-Minnequa complex

Penrose-Minnequa complex is a well-drained soil with 1 to 15 percent slopes. A typical profile is 0 to 4 channery loam, 4 to 15 inches channery loam, and 15 to 79 inches bedrock. Its depth to restrictive feature is 10 to 20 inches to lithic bedrock. The available water storage in the profile is very low at about 1.8 inches.

Minnequa-Manvel silt loam

Manvel silt loam is a well-drained soil with 1 to 6 percent slopes. A typical profile is 0 to 6 inches silt loam, 6 to 17 inches silt loam, 17 to 35 inches silty clay loam, and 35 to 60 inches bedrock. Its depth to restrictive feature is 20 to 39 inches to paralithic bedrock. The available water storage in the profile is low at about 5.9 inches.

Penrose-Rock outcrop complex

Penrose-Minnequa complex is a well-drained soil with 25 to 65 percent slopes. A typical profile is 0 to 6 channery loam, 6 to 12 inches channery loam, and 12 to 16 inches unweathered bedrock. Its depth to restrictive feature is 10 to 20 inches to lithic bedrock. The available water storage in the profile is very low at about 1.4 inches.

4.4.1.2 Option B

There are eleven soil types within the proposed power line placement area for Option B. Six of these soil types make up approximately 92 percent of the AOI (see Appendix E) and are described below.

Manvel silt loam

Manvel silt loam is a well-drained soil with 2 to 6 percent slopes. A typical profile is 0 to 7 inches silt loam, 7 to 25 inches silt loam, 25 to 49 inches silt loam, and 49 to 79 inches silt loam. Its depth to restrictive feature is greater than 80 inches. The available water storage in the profile is moderate at about 8.6 inches.

Penrose-Minnequa complex

Penrose-Minnequa complex is a well-drained soil with 1 to 15 percent slopes. A typical profile is 0 to 4 channery loam, 4 to 15 inches channery loam, and 15 to 79 inches bedrock. Its depth to restrictive feature is 10 to 20 inches to lithic bedrock. The available water storage in the profile is very low at about 1.8 inches.

Midway-Shale outcrop complex

Midway-Shale outcrop complex is a well-drained soil with 1 to 9 percent slopes. A typical profile is 0 to 2 inches silty clay, 2 to 9 inches silty clay, and 9 to 13 inches weathered bedrock. Its depth to restrictive feature is 5 to 20 inches to paralithic bedrock. The available water storage in the profile is very low at about 1.4 inches.

Penrose-Rock outcrop complex

Penrose-Minnequa complex is a well-drained soil with 25 to 65 percent slopes. A typical profile is 0 to 6 channery loam, 6 to 12 inches channery loam, and 12 to 16 inches unweathered bedrock. Its depth to restrictive feature is 10 to 20 inches to lithic bedrock. The available water storage in the profile is very low at about 1.4 inches.

Shingle silty clay loam

Shingle silty clay loam is a well-drained soil with 1 to 9 percent slopes. A typical profile is 0 to 7 silty clay loam, 7 to 13 inches silty clay loam, and 13 to 17 inches weathered bedrock. Its depth to restrictive feature is 10 to 20 inches to paralithic bedrock. The available water storage in the profile is very low at about 2.3 inches.

Wiley-Kim loams

Wiley-Kim loam is a well-drained soil with 1 to 5 percent slopes. A typical profile is 0 to 6 loam, 6 to 15 inches silty clay loam, 15 to 50 inches loam, and 50 to 54 inches weathered bedrock. Its depth to restrictive feature is 40 to 60 inches to paralithic bedrock. The available water storage in the profile is moderate at about 9.0 inches.

4.4.2 Environmental Consequences

4.4.2.1 Proposed Action

Both Option A and Option B will cause soil disturbance during construction activity. Disturbance of soils increases the potential for erosion, incursion of invasive species, and fugitive dust if left unrepaired.

4.4.2.2 No Action Alternative
Under the No Action Alternative, there would be no additional impacts to soil as a result of the Proposed Action.

4.4.3 Cumulative Effects
Cumulative, long term effects on soils resulting in sedimentation and/or fugitive dust, could be potentially significant if left unrepaired; however, Fort Carson's policy is to eliminate or minimize dust and the degradation of all water resources on Fort Carson and ensure compliance with all applicable federal, state and local quality standards (see Sections 4.1 and 4.5). Any impacts from the Proposed Action would be mitigated by use of BMPs to catch potential sediment, such as reestablishing the area by reseeding, the use of silt fences, and other rehabilitation efforts.

4.4.4 Site-specific Mitigation
For either Option, BMPs would be required such as reestablishing the area by reseeding with appropriate seed mixtures, the use of silt fences, and other rehabilitation efforts. To assist in soil stabilization, a long-term vegetation management plan should be developed for the Right of Way, to include invasive species treatments and tree removals conducted as outlined in the plan and as necessary after the high voltage line is complete. Any disturbance of slopes greater than 30%, should be re-seeded after construction is complete to minimize erosion to the slopes.

4.5 Water Resources

4.5.1 Existing Conditions
Fort Carson policy is to eliminate or minimize the degradation of all water resources on Fort Carson and ensure compliance with all applicable federal, state and local water quality standards (Fort Carson Regulation 200-1). Water resources are managed in coordination with U.S. Geological Survey (USGS), NRCS, U.S. Fish and Wildlife Service (USFWS), and many other external agencies. The Water Resources Management Program on Fort Carson includes watershed/sedimentation monitoring and management and project reviews to address erosion and sediment control issues. In addition, the Stormwater Management Plan (Fort Carson 2016) is designed to reduce the discharge of pollutants from Fort Carson to drainage ways, to protect water quality, and to satisfy Colorado's water quality standards.

Surface Water and Watersheds
The primarily undeveloped southern and western portions of Fort Carson drain into the Arkansas River to the south. The main document that currently guides surface water and watershed management at Fort Carson is the Fort Carson Stormwater Management Plan (SWMP) (Fort Carson, 2016). This SWMP is designed to reduce the discharge of pollutants from Fort Carson to the maximum extent practicable and to protect water quality.
The proposed HVE facility is within the Wildhorse Watershed. Option A would include South Gate Flats, Stone City, Teller, Horse Creek, and Wildhorse Watersheds. Option B includes County Line, Dry Creek, and Wildhorse Watersheds.

Hydrogeology and Groundwater

Groundwater at Fort Carson exists in both alluvial and bedrock aquifers. The primary aquifer at Fort Carson is the Dakota-Purgatoire bedrock aquifer. In general, the quality of the groundwater on Fort Carson is good with the exception of localized areas of high dissolved solids and sulfates exceeding secondary drinking water standards and elevated nitrates and Selenium (Se) exceeding primary drinking water standards.

A site wide Se study looking at the occurrence and distribution of Se in groundwater at Fort Carson was conducted in August 2011 (Summit Technical Resources, 2011), with results coordinated with and concurred on by the CDPHE (CDPHE, 2011). Se has been detected at concentrations greater than the Colorado Ground Water Standard (0.05 milligrams per liter [mg/L] (0.05 parts per million [ppm])) and the Fort Carson background concentration (0.27 mg/L [0.27 ppm]) in samples collected from groundwater monitoring wells located primarily within Fort Carson's main post area. Analysis of qualitative and quantitative data from this study indicates a naturally occurring source (Pierre Shale) for relatively high Se concentrations in Fort Carson's compliance monitoring wells (Summit Technical Resources, 2011).

Floodplains

EO 11988, *Floodplain Management*, as amended in 2015 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative and to use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration. To accomplish this objective, the Army is required to take actions to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains for certain federal actions. The acquisition, management, and disposal of federal lands and facilities are specific qualifying federal actions addressed within the EO. Subsequently, the EO requires the application of accepted flood-proofing and other flood protection measures for new construction of structures or facilities within a floodplain. Agencies are required to achieve flood protection, wherever practicable, through elevation of structures above the elevation of the floodplain rather than filling in land.

4.5.2 Environmental Consequences

4.5.2.1 Proposed Action

The proposed HVE facility site is adjacent to a drainage that eventually connects to Wildhorse Creek which is a US jurisdictional water. There is a potential for negative impacts due to construction.

Option A

The distribution line would cross jurisdictional waters (see Section 4.6.1 Wetlands) and has the potential to impact these waters during power line pole placement. However, the disturbance from equipment would be temporary during construction and the

placement of power line poles can be adjusted to avoid waterways.

Option B
The transmission line would cross jurisdictional waters (see Section 4.6.1 Wetlands) and has the potential to impact these waters during power line pole placement. However, the disturbance from equipment would be temporary during construction and the placement of power line poles can be adjusted to avoid waterways.

Also, construction and operation of the Proposed Action must meet the regulatory requirements of the Clean Water Act (CWA) Section 404 for wetlands and Section 402 under the National Pollutant Discharge Elimination System (NPDES) as it applies to Fort Carson's Municipal Separate Storm Sewer System (MS4), the Multi-Sector General Permit (MSGP) for Industrial Discharges, and the Construction General Permit (CGP); therefore impacts would be minimized in order to remain in compliance.

4.5.2.2 No Action
Under the No Action Alternative, there would be no change to water quality from lack of construction or operation of the Proposed Action.

4.5.3 Cumulative Effects
Cumulative impacts are expected to be minimal. Standard use of BMPs during construction and revegetation would ensure that permit conditions would be met.

4.5.4 Site-specific Mitigation
Ensure BMPs are implemented and revegetate areas of disturbance cause by construction and heavy equipment use.

4.6 Biological Resources

4.6.1 Existing Conditions
Additional information regarding flora and fauna on Fort Carson is in *Fort Carson's Integrated Natural Resource Management Plan* (INRMP) (Fort Carson 2013). Unless stated otherwise, below information is from those sources.

Vegetation
The Fort Carson INRMP (Fort Carson, 2013) contains detailed descriptions of the vegetative communities on Fort Carson and a listing of common and scientific names of plant species known to occur. Integrated Pest Management is used to manage invasive plant populations, such as the exotic invasive tamarisk (*Tamarix ramosissima*), as mandated by DoD. Integrated Pest Management includes biological, chemical, mechanical, and cultural management techniques.

There are four plant species on Fort Carson that are former federal Endangered Species Act (ESA) candidate species and are currently on the Army Species at Risk (SAR) list. The plant species Arkansas river feverfew (*Bolophyta tetraneuris*), golden blazing star (*Mentzelia chrysantha*), round leaf four o'clock (*Oxybaphus rotundifolius*), and dwarf milkweed (*Asclepius uncialis*) are localized endemics to the Shale "barrens".

Fort Carson biologists, in cooperation with the Colorado Natural Heritage, surveyed for the species on Fort Carson, and determined these species were widely distributed on the installation with many areas not likely to be impacted by maneuvers. Fort Carson has over 40% of the States known population for Arkansas feverfew and Round leaf four o'clock.

These four plant species are not in the HVE or Option A proposed areas, but do exist within the proposed area for Option B.

The proposed HVE facility site is heavily disturbed and vegetation sparse. Both Options A and B consists of grasses, forbs, shrubs and trees. The following is a list of the dominant species in the proposed power line areas in Options A and B.

- Grasses include: alkali sacaton, western wheatgrass, blue grama, Indian rice grass, green needlegrass, and squirreltail.
- Forbs: scarlet globemallow, gumweed sp.,sunflower spp., penstemon spp., mustard spp., aster spp., Indian paintbrush, crested prickly poppy, prickly pear cactus, western wallflower, milkvetch spp., and vervain spp.
- Shrubs: broom snakeweed, yucca spp., fourwing saltbush, frankenia jamesii, winterfat, shadscale, and cholla cactus
- Trees: predominantly oneseed juniper and some pinyon pine.

There were a few areas of invasives in the Option areas. Option A site has small patches of kochia, Canada thistle, tamarisk, Russian thistle, and cheatgrass spp. Option B site has small patches of Russian thistle and cheatgrass spp.

Wildlife, including Threatened and Endangered (T&E) Species Federally Listed Species

The Endangered Species Act defines an endangered species as any species in danger of extinction throughout all or a major portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.
Candidate species are those for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened, but listing is precluded by other higher priority species. Table 4.6-1 presents federally-listed endangered, threatened, and candidate species found on Fort Carson. No critical habitat for these species has been designated on Fort Carson.

Table 4.6-1 Federally-Listed Endangered, Threatened, and Candidate Species Known to occur at Fort Carson.

Species	Scientific Name	Species Type	Status	Distribution on Fort Carson
Mexican spotted owl	*Strix occidentalis*	Bird	T	Rare winter resident
Black-footed ferret	*Mustela nigripes*	Mammal	E	Migrated onto Fort Carson from reintroduction area

Source: Fort Carson, 2013
C- Candidate T- Threatened E- Endangered

Mexican Spotted Owl –Threatened Species

The Mexican Spotted Owl occasionally winters in rugged forested canyons west of Fort Carson. It is a rare winter resident on Fort Carson and known to have occurred only on and adjacent to Booth Mountain. It is not known if the species is present annually. A radio tagged owl present on Fort Carson in the winter of 1995-1996 did not return in subsequent years. The species is not known to breed on Fort Carson.

Black-footed ferret – Endangered Species

The Black-footed ferret was reintroduced on adjacent private landowner property in October of 2013. Fort Carson obtained a Programmatic Safe Harbor Agreement as well as the associated Biological Opinion, from the USFWS, to ensure no land use restrictions would occur as result of the ferret reintroduction action. The only area the ferret is known to occur on Fort Carson is in close proximity to the southern boundary.

There are several species that are Federal Candidates, Federal Birds of Conservation Concern, State threatened, endangered, or Species of Special Concern, and Army SAR species that may occur on Fort Carson. An exhaustive list and detailed accounts of all species that occur on Fort Carson can be found in the INRMP (Fort Carson, 2013). Those species that could occur in the proposed project site are discussed in the following paragraphs.

Black-tailed Prairie Dog

Proposed HVE Range has three black-tailed prairie dog towns that are adjacent to but not within the proposed HVE facility construction area. No prairie dog towns exist in the proposed HVE facility construction area. The black-tailed prairie dog, a former candidate for federal listing, is common on Fort Carson, but numbers are decreasing. In 2009, there were 65 colonies totaling 6,513 acres and in 2015, 66 colonies were mapped, totaling 4,222 acres. It is listed as a Species of Special Concern in Colorado by the CPW and the CNHP. Frequently referred to as a keystone species of the shortgrass prairie ecosystem, the prairie dog plays a significant role in life cycles of several Species of Special Concern on Fort Carson: the ferruginous hawk, bald and golden eagles, mountain plover, and the state-listed burrowing owl. Prairie dogs are managed on Fort Carson according to prescriptions detailed in the installation's management plan for the black-tailed prairie dog. The plan balances conservation with human health and property loss and details circumstances for lethal control of the species on Fort Carson.

The high voltage power lines for both Options would be erected through a prairie dog colony (approximately 6 acres in size) that is about one-quarter mile west of the HVE. Power lines would be erected in five more prairie dog towns/colonies as they extend west from the HVE. The five prairie dog towns are approximately 945 acres in size, combined.

Colorado Checkered Whiptail

The Colorado checkered whiptail species is only found in areas of southeastern Colorado (Walker *et. al.* 1997) was evaluated by the USFWS for listing as a Candidate species under ESA. In July 2015 the USFWS determined that the whiptail species

petition did not provide substantial scientific or commercial information indicating that the petitioned action be warranted, but there is a high probability of being re-petitioned in the near future. It is currently listed by CPW and USFWS as a species of special concern and by the Army as a SAR species. The Colorado checkered whiptail habitat occurs in valleys, arroyos (dry creeks), canyons, and on hillsides, in areas dominated by plains grassland or juniper woodland, including areas such as parks with frequent human use and habitat disturbance (Walker et. al. 1997). Little is known about the whiptail on Fort Carson, except occurrence has been documented.

The proposed HVE site and power line towers to erect power lines for both Options occurs in potential whiptail habitat.

Birds on Fort Carson have the potential for impacts during nesting season, which for most bird species on Fort Carson occurs 15 April-15 September.

Birds of Conservation Concern, State threatened, endangered, or Species of Special Concern:

Mountain Plover

The mountain plover is listed as a Species of Special Concern by the USFWS. Mountain plovers are rare on Fort Carson, and only a small percent of available habitat is occupied; Surveys for this species are conducted annually. Mountain plover have historically occurred in areas associated with the five prairie dog colonies that occur in the area of Option A proposed power lines. The last recorded account of plovers in these prairie dog towns was in 2010.

Burrowing Owl

The burrowing owl is listed as state threatened by CPW. The burrowing owl is a small, burrow-dwelling owl nesting underground in unoccupied prairie dog burrows. The burrowing owl is not abundant on Fort Carson and the number of prairie dog colonies annually occupied by this species is low (Fort Carson, 2013). Although sylvatic plague does not directly influence nesting burrowing owls, they generally do not nest in colonies where all prairie dogs have been killed by plague. A burrowing owl was located at the prairie dog colony in 2015 that is approximately one-quarter mile west of the HVE. Five prairie dog colonies that would occur in the area of Option A proposed power lines has many historical burrowing owl nesting locations throughout the towns/colonies.

Bald and Golden Eagle

Bald and golden eagle are protected under the Bald and Golden Eagle Protection Act (BGEPA) of 1940. There is one known Golden Eagle eyrie in the vicinity of Teller dam. The Teller reservoir golden eagle nest/eyrie is located on a high south-facing cliff, which faces the Teller dam and reservoir and is located approximately one-quarter mile from the center point of the crest of the Teller dam. From 1995 to 2017, the Teller reservoir eagle nest has been active every year, with the exception of two years. In Colorado, golden eagles nesting period usually occurs 1 January-21 August. The Teller reservoir eyrie is approximately one-quarter mile from Option A proposed power line.

Other Birds of Conservation Concern

Great horned owl nesting period usually occurs from 1 December-31 September and red-tailed hawks occurs 15 March-15 August. Many species of raptors that occur in the area could potentially roost on the proposed power lines and towers.

Wetlands
Wetlands and activities within them are regulated by Section 404 of the CWA administered by the US Army Corps of Engineers (USACE). There are no wetlands associated with the proposed HVE facility site.

Option A
There are a few jurisdictional drainages on the southern edge of Fort Carson that would be crossed by the power lines. Option A would cross three jurisdictional drainages; Wild Horse Creek, Turkey Creek, and Booth Gulch. Turkey Creek drainage is the only wet area. It is approximately sixty feet wide consisting of open shallow water, rushes, cattails, other grass-like wetland species, and wetland shrubs.

Option B
There is a jurisdictional drainage on the southern edge of Fort Carson that would be crossed by the power lines. Option B would cross Wild Horse Creek jurisdictional drainage.

4.6.2 Environmental Consequences

4.6.2.1 Proposed Action

Vegetation
Both Options A and B have the potential to increase the density of invasive species within the footprint of the disturbance activities. Cheatgrass spp. and Russian thistle were observed within the footprints of both Options A and B. Kochia, Canada thistle, and tamarisk were also observed within the footprint of Option A. Invasive species tend to invade areas in which soils have been disturbed, and vehicular traffic, construction activities related to pole placement, and the possible removal of trees within the footprint of either option area will all likely increase the density of invasive species already present, as well as possibly contribute to the incursion of new invasive species.

Wildlife

<u>HVE facility</u>
Because the HVE facility will be located on a heavily disturbed site with frequent training, the environmental consequences of construction will likely be minimal. If work is completed during the nesting season (approximately 15 April – 15 September), and any trees, shrubs, or previously undisturbed grasslands are removed, there is a potential for disturbing migratory bird nests.

After construction of the substation and yard, the structures (e.g., transformers, bushing, insulator, and/or administrative building) could provide habitat for birds, small mammals, and reptiles. Larger wildlife will not be impacted because the high-security fencing will

eliminate entry to the substation. Birds may be attracted to the structures within the HVE facility because the surrounding landscape does not provide or has limited availability of natural structures for nesting, perching, hunting, protective cover, and/or roosting. Small mammals like rodents may use the substation area and attract predators. Reptiles may use the structures or open area to prey, nest, and/or thermoregulate in the sun. Birds and small terrestrial wildlife that occur in the area of the facility will experience long-term minimal direct impacts due to electrocution and disturbance from human activity. Also, wildlife may cause problems with the operation of the substation due to falling on or into structures after electrocution, build-up of feces droppings and nesting material, or chewing of parts like wires and/or insulation. Protective coverings over exposed wires would mitigate electrocution of wildlife.

Lighting and noise generated by the facility and substation yard may cause indirect minimal to moderate impacts, but should be short-term in nature as wildlife would likely habituate to these incidental persistent changes in the environment over time.

The construction and operation of the facility and yard will have negligible impacts to the Colorado checkered whiptail and associated habitat.

Power lines

Black-footed Ferret
Fort Carson's Programmatic Safe Harbor Agreement and associated Biological Opinion from the USFWS states, "Any incidental take of ferrets through otherwise lawful activities such as routine military operations, including artillery, live fire exercises, mechanized maneuver, low level aviation, and use of heavy equipment in occupied black tailed prairie dog habitats…would not be a violation of the Endangered Species Act." (USDI/USFWS 2014). The construction and operation of the substation facility and yard and the construction and operation of the associated power lines and poles were not evaluated for impacts to the black-footed ferret or their habitat. The USFWS does request reporting of any dead, injured, or sick black-footed ferrets.

Black-tailed Prairie Dog
Under both Options, power lines will be constructed through a small (~6 acre) prairie dog colony approximately one-quarter mile west of the HVE facility. The existing WAPA lines also cross over this colony. At its widest point the colony is less than 200 meters wide, so it is possible that no power line structure would need to be placed within the colony. Power poles and/or work trucks and equipment that do disturb the colony would cause minimal short-term direct and indirect impacts to this colony.

Under Option A, five additional prairie dog colonies, totaling approximately 945 acres, would be disturbed as the line continues west. Because of the size of at least one of these colonies, power line structures may have to be placed within the colony. Power line construction within any of the five colonies will cause short-term direct and indirect impacts to these colonies. Power line structures would provide perching locations for raptors, potentially increasing predation of prairie dogs within the affected colonies

causing minimal to moderate long-term direct and indirect impacts to the colonies unless mitigated to prevent preying species from perching on the lines and power poles.

Under Option B, no additional prairie dog colonies would fall within the proposed route.

Colorado Checkered Whiptail
Ground disturbance at both the HVE site and along the power line route could result in a loss of habitat for the Colorado checkered whiptail. The impacts would be negligible to Colorado checkered whiptail.

Burrowing Owl
In 2015, two adult burrowing owls were observed in the small prairie dog town that would be affected by both Options. However, there was no evidence of nesting owls within the colony, and no owls were observed in the colony in 2017. Impacts from the construction and long term operation of the facility and yard would have negligible impacts to burrowing owls.

Under Option A, the power line would pass through portions of TA 53 and 54 that have many historical burrowing owl nesting locations, including multiple juveniles observed in 2015. The installation of power poles and lines through these prairie dog colonies would increase the availability of predator hunting perches to prey on burrowing owls that use this location. Impacts of Option A would be minimal to moderate direct and indirect impacts.

Under Option B, the power line would not pass through any additional known burrowing owl nesting locations.

Bald and Golden Eagle
Under Option A, the power line would pass approximately one-quarter mile from the Golden Eagle eyrie near Teller Reservoir. This is within the one-half mile no-activity buffer zone required during the golden eagle nesting season (approx. 1 January – 31 August). The Teller Reservoir golden eagle incidental take permit, issued April 2017, does not apply to this action. Construction of the power lines during active eagle nesting could cause significant impacts to the Teller Reservoir eyrie.

Under Option B, no portion of the power line would fall within one-half mile of a golden eagle eyrie.

Mountain Plover and Other Birds of Conservation Concern
Mountain plovers have used the prairie dog colonies that would be impacted by Option A power line construction. Birds of prey hunting from the power lines could impact mountain plovers that use the prairie dog colonies impacted by Option A power line construction. Many species of raptors and other large birds (such as turkey vultures, American crows, and common ravens) may use the power line structures for perching, roosting, and/or nesting. This presents a risk of electrocution if structures are not properly designed. The existing 230kV line that will run parallel to portions of both routes has had multiple known raptor nests in the past. Construction done during the

nesting season would potentially disturb these nests.

Any tree or shrub removal, mowing of grass, or other ground disturbance that takes place along the power line route will potentially disturb nesting migratory birds if done between 15 April and 15 September. Preconstruction MBTA clearing surveys would ameliorate impacts to nesting birds.

Wetlands
There are no wetlands in the proposed facility construction site. Both Options for wetland impacts are expected to be minimal. Due to the overhead and aerial placement of transmission lines, generally drainages will be expected to be spanned from anchor points above the Ordinary High Water Mark (OHWM), usually on high embankments on both sides of the narrow drainages.

4.6.2.2 No Action
Vegetation
Under the No Action Alternative, there would be no change to vegetation from the Proposed Action.

Wildlife
Under the No Action Alternative, there would be no change to wildlife from The Proposed Action.

Wetlands
Under the No Action Alternative, there would be no change to wetlands from the Proposed Action.

4.6.3 Cumulative Effects
Vegetation
Cumulative impacts are expected to be negligible. The proposed HVE facility is heavily disturbed already and frequently used for military training. The equipment used to install power line poles would have a temporary impact on vegetation, and the disturbance from pole placement would be localized. The addition of this proposed action is unlikely, in combination with other actions, to create significant impacts to vegetation.

Wildlife
Cumulative effects resulting from a loss of nesting habitat may occur if a significant number of trees and shrubs are removed along the power line route. If the prairie dog colony approximately one-quarter mile west of the HVE site is extensively disturbed, it may cause a loss of habitat for the burrowing owl. If Option A is chosen, disturbance of multiple prairie dog towns with frequent records of nesting burrowing owls (3 – 4 per year) could have a long-term effect on burrowing owls if disturbance occurs during the breeding season without any mitigation.

Power line structures placed in or adjacent to prairie dog towns will provide permanent structures for perching and nesting raptors, potentially increasing predation on prairie dogs and the myriad of wildlife that utilize the prairie dog colonies (e.g., burrowing owls,

mountain plovers, and black-footed ferrets).

If the substation and power line structures are not designed to minimize electrocutions, multiple mortalities of raptors and other migratory birds could result.

Wetlands

Cumulative impacts for the Proposed Action in combination with other present and planned future actions do and would continue to occur at Fort Carson and in the region. Fort Carson will continue to play a key role in sustaining wetlands through its land management and natural resources programs to minimize these impacts. Fort Carson must comply with the CWA and Section 404, so any potential impacts would be minimal and/or mitigated. The overhead and aerial placement of transmission lines would be expected to be spanned from anchor points above the Ordinary High Water Mark, usually on high embankments on both sides of the narrow drainages. The anchor points (poles) would be placed to avoid wetlands.

4.6.4 Site-specific Mitigation

Vegetation

Under Executive Order 13751 (2016), Fort Carson is dedicated to prevention of introduction of invasive species and strives to control populations and prevent spread. If the drainage way is to be disturbed during construction, prior coordination with the Invasive Plant Manager would assist in the prevention of potential weed spread.

For either Option, BMPs would be required such as reestablishing the area by reseeding with appropriate seed mixtures, the use of silt fences, and other rehabilitation efforts. A long-term vegetation management plan should be developed for the Right of Way, to include invasive species treatments and tree removals conducted as outlined in the plan and as necessary after the high voltage line is complete.

Permitted access when no training is scheduled, would allow for treatment and control of the spread of weeds.

Wildlife

Prior to ground disturbance due to construction of the HVE facility and power line structures, wildlife surveys will be conducted to ensure no active nests are within the construction footprint. If any prairie dog colony falls within the construction area then prior coordination with DPW-ED Wildlife Office is necessary to conduct 3 days of burrowing owl clearing surveys IAW State protocols.

If the ground-disturbing activity will be started during MBTA nesting season (15 Apr to 15 Sept annually) then prior coordination with DPW-ED Wildlife Office is necessary to conduct clearing surveys for ground/shrub nesting birds to minimize potential MBTA violations. If active MBTA nests are found, a 50ft buffer around each nest would be needed, or the proponent will need to coordinate with DPW-Wildlife to obtain a US Fish & Wildlife Service (USFWS) permit authorizing removal. If inadvertent active nest(s) are discovered during project work activities, contact DPW-Wildlife immediately to avoid MBTA violation(s). If the scope or location changes, the proponent needs to coordinate

with DPW Wildlife prior to beginning any work. The DPW Wildlife Biologist will conduct all surveys for wildlife.

To reduce bird mortality at the substation facility and yard, vegetation should be excluded within the yard to make the area less attractive to rodents, reptiles, and other wildlife.

To decrease the chance of avian electrocutions by substation equipment, install covers on equipment bushings, cutouts, jumpers, and lightning arresters. For jumper wires, use a bird jumper wire guard, cover-up hose or insulated power cable. (See pages 40 – 41 of the Avian Protection Plan (APP) Guidelines in Appendix F)

Above-surface feeds should provide a 60-inch minimum horizontal separation between energized conductor and/or energized conductors and grounded hardware or insulate hardware or conductors against simultaneous contact if adequate spacing is not possible. On single phase structures, a minimum vertical separation of 36 inches from phase to ground is needed to safely accommodate eagles and most wading birds.

On three phase structures, a vertical clearance of at least 43 inches between un-insulated conductors, ground wires and grounded hardware on poles with 8-foot crossarms will provide the 60-inch required clearance. If this design is not possible, installing visibility enhancement devices can reduce the risk of collision on new or existing lines (see pages 41-42 of the APP in Appendix F). These devices include marker balls, bird diverters, or other line visibility devices placed in varying configurations, depending on the line design and location.

Coordination with DPW Wildlife is required for avian protection measures. See Appendix F for additional details on both retrofitting existing infrastructure and regulations for new construction in order to abate avian electrocution risks.

Option A power lines and poles will need additional perch/roosting guards or exclusion devices within prairie dog colonies and for a distance beyond the colonies to minimize predation by raptors within the colonies.

We recommend that the Admin and Training Facility be constructed in a manner that reduces the likelihood that birds will utilize the building for nesting. The building should not have an overhanging roof if possible as swallows will build nests under the roof edge. Recommend sealing all spaces larger than one-half inch on outside of building to prevent cavity nesting birds from using them. Recommend all external light fixtures have bird spikes on top of them if a shelf is formed to prevent bird nest development.

Wetlands

Continued compliance with the CWA and Section 404. No wetlands are anticipated to be impacted, however if disturbance becomes unavoidable during construction, prior coordination with the Section 404 Program Coordinator would be necessary to assist in obtaining proper CWA permits.

4.7 Cultural Resources

4.7.1 Existing Conditions

Cultural resources are the non-renewable remnants of past human activities that have cultural or historical value and meaning to a group of people or a society. The term "cultural resources" includes *historic properties*, as defined by the National Historic Preservation Act (NHPA); *cultural items*, as defined by the Native American Graves and Repatriation Act (NAGPRA); *archaeological resources*, as defined by the Archaeological Resources Protection Act; *sacred sites*, as defined in EO 13007, to which access is afforded under American Indian Religious Freedom Act (AIRFA); and *collections*, as defined in 36 CFR Part 79, *Curation of Federally-owned and Administered Archaeological Collections*.

As of May 2017, approximately 99,296 acres of Fort Carson's 137,404 acres have been inventoried, resulting in the recordation of approximately 2,371 cultural resources, representing every period of human occupation from the Paleoindian stage to the present.

Through consultation with the Colorado State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), Native American Tribes, other consulting parties, and the public, Fort Carson has implemented two programmatic agreements (PAs) for compliance with Section 106 of the NHPA: 1) Regarding Construction, Maintenance, and Operational Activities for Select Areas on Fort Carson (Built Environment PA), executed on 27 March 2013; and 2*)* Regarding Military Training and Operational Activities Occurring Down Range Fort Carson (FC Downrange PA), executed on 31 March 2014.

Fort Carson consults with 13 federally-recognized Tribes, who have a cultural affiliation with Fort Carson lands. A comprehensive agreement between Fort Carson and 10 Tribes for tribal access, privacy, and inadvertent discovery of human remains and other cultural items was executed in 2004, and a second comprehensive agreement with the Jicarilla Apache Nation was signed in 2005.

4.7.2 Environmental Consequences

4.7.2.1 Proposed Action – Option A

A cultural resources inventory was completed within and in the vicinity of the HVE Range Area of Potential Effects (APE) by Fort Carson CRMP personnel in 1999 (Korgel 2000). No cultural resources are located within this APE.

Cultural resources inventories have been conducted within and in the vicinity of the fiber optic line APE. Surveys were completed by Centennial Archaeology, Inc. between 1991 and 1993 (Zier et al 1996) and by Fort Carson CRMP personnel during the late 1990s (Chomko 1999b and Korgel 2000). Two cultural resources have been identified within the fiber optic line APE. Site 5PE01569 consists of a single stone structure foundation with an associated trash scatter composed of glass fragments and metal cans. It was determined to be ineligible for inclusion in NRHP in 1996 (James E. Hartmann to

Thomas L. Warren, letter, 10 June 1966, Colorado History Museum, Colorado). The second cultural resource, 5PE03135, is an isolated find consisting of isolated glass fragments. It was determined to be ineligible for inclusion in the NRHP in 2016 (Steve Turner to James Lessard, letter, 17 November 2016, CHS#70981, History Colorado, Colorado).

Cultural resources inventories have been completed within and in the vicinity the Option A transmission line APE. Surveys were conducted by Grand River Consultants, Inc., in the late 1970s to early 1980s (Alexander et al. 1982), Centennial Archaeology, Inc., in the early 1990s (Zier et al. 1996); Foothill Engineering Consultants, Inc. in 1997 (Taylor and Hoefer 1998) Fort Lewis College in the late 1990s (Charles 2000); and Fort Carson CRMP personnel (Chomko 1999a and 1999b; Cowen 2006, Korgel 2000, Miller 2009 and 2010). Table 4.7.2.1 lists the six cultural resources located within the proposed transmission line APE for Option A. All have been evaluated and determined to be ineligible for inclusion in the National Register of Historic Places (NRHP).

Table 4.7.2.1 Cultural Resources within the APE for Option A transmission line.

Smithsonian Trinomial	Site Type / Site Theme	Determination of Eligibility
5PE1571	Prehistoric Site Open Architectural	Not Eligible (06/10/1996)
5PE1572	Multi-Component Site Prehistoric Isolate (Core); Historical Homestead with Rock Art	Not Eligible (06/10/1996)
5PE1575	Historic Site Mining/Quarry	Not Eligible (06/10/1996)
5PE2943	Historic Site Historical Trash Scatter	Not Eligible (02/26/1999)
5PE3133	Multi-Component Isolated Find Isolated Debitage and Bottle	Not Eligible (HC #70981, 11/17/2016)
5PE3322	Prehistoric Site Open Lithic	Not Eligible (CHS #57260, 07/12/2010

In accordance with Section 106 of the NHPA, the USAG Fort Carson has determined “no historic properties” will be affected by the Proposed Action – Option A. However, construction outside an existing range footprint is not an exempted undertaking as defined by the Fort Carson Downrange PA; therefore Section 106 consultation with the SHPO, Tribes, Consulting Parties, and other interested parties was required. Consultation was completed in September 2017. The SHPO concurred with the recommended finding of “no historic properties affected” [36 CFR 800.4(d)(1)]. Concurrences with the recommended finding were also received from the Cheyenne and Arapaho Tribes of Oklahoma, the Comanche Nation, the Ute Mountain Ute Tribe, the Colorado Council of Professional Archaeologists (CCPA), and the Tatanka Group.

4.7.2.2 Proposed Action – Option B

Cultural resource inventories have also been conducted within and in the vicinity of the Option B transmission line APE. Surveys were completed by Grand River Consultants in the late 1970s to early 1980s (Alexander et al.1982); Centennial Archaeology, Inc., in the late 1980s to early 1990s (Jepson 1987 and 1992); Fort Carson CRMP personnel (Chomko 1999b, Cowen 2006, Flowers and Korgel 2002, Korgel 2000, Miller 2010, Mueller 1995a, Mueller 1995b); Foothill Engineering Consultants, Inc. in 1997 (Taylor and Hoefer 1998); and Stell Environmental from 2014 to 2016 (Swan and Schriever 2017). Table 4.7.2.2 lists the six cultural resources located within the proposed transmission line APE for Option B. All have been evaluated and determined to be ineligible inclusion in the NRHP.

Table 4.7.2.2 Cultural Resources within the APE for Option B transmission line.

Smithsonian Trinomial	Site Type / Site Theme	Determination of Eligibility
5PE1432	Prehistoric Site Open Lithic	Not Eligible (CHS #64034, 07/02/2013)
5PE1765	Historic Site Historical Trash Scatter	Not Eligible (CHS #63620, 04/15/2013)
5PE3133	Multi-Component Isolated Find Isolated Debitage and Bottle	Not Eligible (HC #70981, 11/172016)
5PE3309	Prehistoric Isolated Find Isolated Projectile Point	Not Eligible (HC #70981, 11/172016)
5PE8056	Prehistoric Site Open Camp	Not Eligible (HC #63877, 06/28/2017)
5PE8154	Multi-Component Site Open Lithic; Historical Homestead	Not Eligible (HC #63877, 06/28/2017)

In accordance with Section 106 of the NHPA, the USAG Fort Carson has determined "no historic properties" will be affected by the Proposed Action – Option B. However, construction outside an existing range footprint is not an exempted undertaking as defined by the Fort Carson Downrange PA; therefore Section 106 consultation with the SHPO, Tribes, Consulting Parties, and other interested parties was required. Consultation was completed in September 2017. The SHPO concurred with the recommended finding of "no historic properties affected" [36 CFR 800.4(d)(1)]. Concurrences with the recommended finding were also received from the Cheyenne and Arapaho Tribes of Oklahoma, the Comanche Nation, the Ute Mountain Ute Tribe, the Colorado Council of Professional Archaeologists (CCPA), and the Tatanka Group.

4.7.2.4 No Action Alternative

There would be no change in the existing conditions of cultural resources under the No Action Alternative.

4.7.3 Cumulative Effects
The construction associated with the Proposed Action could cause damage to cultural resources. By following the stipulations in the FC Downrange PA, it is anticipated that no significant adverse cumulative impacts to cultural resources would be caused as a result of this Proposed Action. However Fort Carson's Inadvertent Discovery of Archaeological, Cultural, or Paleontological Materials Standard Operating Procedure (SOP) will apply for construction activities.

4.7.4 Site-specific Mitigation
Ground-disturbing activities will be monitored by a qualified, professional archaeologist, and the Inadvertent Discovery of Archaeological, Cultural, or Paleontological Materials SOP will apply for construction activities.

4.8 Utilities
Fort Carson has long been at the forefront of implementing sustainability practices within the Army. In 2012, Fort Carson began planning and implementing "Net Zero" waste, water, and energy. Addition information regarding this and utilities on Fort Carson is in the 2012 *Fort Carson* Net Zero Waste, Water, and Energy Implementation EA (USAEC 2012b).

4.8.1 Existing Conditions
The Installation's DPW Environmental Division manages both surface and subsurface water rights at Fort Carson. Water management includes wells that provide downrange industrial use water, and surface water that provides military training, downrange fire protection, recreational waters, wildlife habitat, and irrigation. The Installation recognizes water is a scarce resource in the Fort Carson region and, due to cyclic drought conditions, should always be used wisely and not wastefully.

4.8.1.1 Potable Water
Fort Carson purchases its drinking water from Colorado Springs Utilities. Even with all the growth on Fort Carson, water use since 2001 has been reduced by more than 20 percent through proactive garrison and housing watering policies and initiatives such as rain sensors on irrigation systems. Water storage tanks serve downrange training areas and ranges.

4.8.1.2 Wastewater
Fort Carson operates and maintains a wastewater collection and treatment system for both sanitary and industrial wastewater components. Portable toilets, dry vault, and self-composting latrines are used in the downrange area when septic tanks/leach fields are not available (e.g., during training activities on the downrange area).

4.8.1.3 Stormwater
As a requirement of AR 200-1, it is the policy of the Installation to comply with applicable Federal, state, and local regulations regarding water resources management and permitting. As described in the SWMP (Fort Carson, 2011e) all work performed at Fort Carson is subject to stoppage by Installation environmental officials for failure to comply with Federal, state, county, local, or Fort Carson stormwater requirements.

Three stormwater permits are utilized at Fort Carson as part of the stormwater program: the NPDES General Permit for Stormwater Discharges for Construction Activity in Colorado (COR12000F), MS4 Permit (COR042001), and the EPA's Multi-Sector General Permit (MSGP 2000). The SWMP is designed to reduce the discharge of pollutants from Fort Carson to the maximum extent practicable and to protect water quality. Included in the document are management practices, control techniques, system design, engineering methods, and other provisions appropriate for the control of pollutants in discharges from Fort Carson.

4.8.1.4 Solid Waste

The *Integrated Solid Waste Management Plan* (ISWMP) (Fort Carson, 2011) contains details of the Solid Waste Management Program at Fort Carson. The ISWMP complies with AR 200-1 and is consistent with AR 420-49 and other applicable guidance on solid waste management. Refuse, construction-related solid waste, and recyclable materials are all managed by DPW. Currently, all solid waste from Fort Carson, including waste from the housing units, is shipped 15 miles to offsite landfills, including the Midway Landfill in Fountain, Colorado by a licensed contractor. Midway Landfill and other landfills are permitted Subtitle D landfills.

4.8.1.5 Energy

Fort Carson has long been at the forefront of implementing sustainability practices within the Army. In April, 2011, Fort Carson's proposal to begin planning and to implement "Net Zero" waste, water, and energy was approved by the Assistant Secretary of the Army for Installations, Energy and Environment.

Fort Carson has an energy goal of 100 percent renewable energy (gas and electric) by 2027, and currently obtains 8 percent of its energy needs from solar panels. The Installation is considering other sources of renewable energy for future use as part of its sustainable assessment. Fort Carson purchases electricity and natural gas from CSU.

4.8.2 Environmental Consequences

4.8.2.1 Proposed Action – Both Options

The HVE Range APE would not interconnect Fort Carson utility lines, thus having no impact on Fort Carson energy, water or wastewater. The interconnection of 2 MW of load on the Midway-Cañon West 230 kV line would result in no additional issues to the area (WAPA, 2016). There are no identified concerns from this action.

4.8.3 No Action Alternative

There would be no change in the existing conditions under the No Action Alternative.

4.8.4 Cumulative Effects

The construction and operations associated with the Proposed Action would have negligible impacts to energy or water consumption.

4.8.5 Site-specific Mitigation

None identified.

5.0 SUMMARY OF EFFECTS AND CONCLUSIONS

5.1 Unavoidable Adverse Effects Should the Proposed Action Be Implemented

Some adverse effects due to construction cannot be avoided if the Proposed Action is implemented. Disturbance of soils and vegetation would occur, and these effects would be cumulative and long-term. There is a potential to impact US jurisdictional waters and/or wetlands, however Section 404 of the CWA is required to minimize the potential impacts. There would be no effects to federal- or state-listed species. Noise effects of the range operation would be negligible both on and off the installation. There is a minimal potential for the generation or discovery of hazardous waste or materials; such waste or materials would be disposed of or remediated according to compliance requirements.

Table 5.1 summarizes potential effects for each alternative, after mitigation. Environmental effects would not be significant within the larger geographic and temporal context in which they would take place.

Table 5.1. Summary of Potential Environmental Consequences

Resource Area	Environmental Consequence"	
	No Action Alternative	Proposed Action
Air Quality	No effect	Negative during construction, undetectable effects during operation
Soils	No effect	negative, but mitigatable
Water Resources	No effect	Slightly negative, but mitigatable
Biological Resources	No effect	negative, but mitigatable
Wetlands	No effect	Slightly negative, but mitigatable
Cultural Resources	No effect	Slightly negative, but mitigatable
Noise	No effect	Slightly negative

* No effect: Actions have no known demonstrated or perceptible effects Negative: Actions have apparent negative effects

5.2 Irreversible and Irretrievable Commitments of Resources

The Proposed Action would involve no irreversible or irretrievable commitment of resources other than the consumption of various expendable materials, supplies, and equipment associated with construction and operations and implementation of environmental mitigation measures.

5.3 General Mitigation

Fort Carson is committed to sustaining and preserving the range environment. In keeping with that commitment, the Installation has an active environmental management program that employs a full array of best management practices (BMPs) and environmental management programs to ensure environmental compliance, stewardship, and sustainability of those areas potentially impacted by this action. In this case, substantial mitigation has been incorporated into the design of the proposed

courses and their supporting range infrastructure in order to achieve environmentally preferable outcomes, as described in the site-specific mitigation sections, above.

Additionally, the existing environmental staff and programs represent a current and foreseeable resource for stewardship and for implementation of existing plans and best practices, including implementation of fugitive dust controls measures, the Stormwater Pollution Prevention Plan (SWPPP), the Operational Noise Plan, the Programmatic Agreements for historic preservation, a prescribed burning program, and wildlife surveys and management. Additionally, the Installation's land management and restoration staff represent an in-place and funded resource for implementation and monitoring of the effects of land use and the effectiveness of restoration programs. They are a monitoring and enforcement capability which is currently funded and for which continued funding will be sought and for which the anticipated necessary funding is expected to be available.

5.4 Conclusions

The Proposed Action to construct and operate a High Voltage Electrical Training Range on Fort Carson was analyzed by comparing potential environmental consequences against existing conditions. Findings indicate that implementation of the Proposed Action would result in no significant adverse environmental consequences. The affected environment would not be significantly or adversely effected by proceeding with the Proposed Action. No significant cumulative effects would be expected with implementation of mitigation.

Based on this environmental assessment, implementation of the Proposed Action (*i.e.*, construct and operate the HVE, including the WAPA interconnection and point of connection, and distribution line) would have no significant negative environmental or socioeconomic effects. Satisfaction of the Army's significant need to provide up-to-date and realistic training at Fort Carson is considered to outweigh the relatively minor environmental impacts, and significant damage mitigation would occur before and during range operation. The Proposed Action does not constitute a major federal action significantly affecting the quality of the human environment. Therefore, preparation of an environmental impact statement is not required, and preparation of a Finding of No Significant Impact is appropriate.

6.0 PERSONS CONTACTED

Name	Installation/ Affiliation	Role
Benford, James	Fort Carson/ DPTMS	Plans, Training, Mobilization, and Security (PTMS), Director
Buccambuso, Emma	Fort Carson/DPW-ENV	Air Program Manager (PM)
Camp, Mike	Fort Carson/DPTMS	Range Control Deputy

Clark, Scott	Fort Carson/DPW	Energy PM
Davis, Bert	Fort Carson/DPTMS	Range Control Officer
Dunker, Eric	Fort Carson/DPW-ENV	IRP Assistant
Eberle, Terry	Fort Carson/DPW-ENV	AST/UST PM
Frischkorn, Cheryl	Fort Carson/DPW-ENV	RCRA PM
Gallegos, Joseph	Fort Carson/DPW-ENV	Environmental Protection Specialist
Gray, Danny	Fort Carson/DPW-ENV	Installation Arborist
Guthrie, Vincent	Fort Carson/DPW	Utility PM
Haflett, Jack	Fort Carson/DPW-ENV	Environmental Protection Specialist
Hahn, Chip	Fort Carson/DPW-ENV	Stormwater PM
Hennessy, William	Fort Carson/SJA	Environmental Law Specialist
Hooper, William	Fort Carson/ DPTMS	Chief of Training
Kolise, Jennifer	Fort Carson/DPW-ENV	Cultural Resources PM
Kulbeth, James	Fort Carson/DPW-ENV	Sec 404/Watershed PM
Lehmicke, Anna Joy	Fort Carson/DPW-ENV	Wildlife Biologist
Martin, David	Fort Carson/DPW-ENV	Asbestos/Lead/Radon PM
Noonan, Harold	Fort Carson/DPW-ENV	Drinking Water-Wastewater PM
Peyton, Roger	Fort Carson/DPW-ENV	Natural Resources Branch Chief
Rohrs, Suzanne	Fort Carson/DPW-ENV	Environmental Protection Specialist
Smith-Froese, Stephanie	Fort Carson/DPW-ENV	Wildlife Biologist
Thomas, Wayne	Fort Carson/DPW-ENV	NEPA/Cultural Branch Chief
Wachter, John	Fort Carson/DPW-ENV	Compliance Branch Chief

Whiting, Betty	Fort Carson/DPW-ENV	Archaeologist
Wiersma, Thomas	Fort Carson/DPW	Community Planner
Zayatz, Jason	Fort Carson/DPW-ENV	Installation Forester

7.0 REFERENCES

5 Code of Colorado Regulations (CCR) 1002-93, Colorado Regulation #93 32 CFR Part 651, *Environmental Analysis of Army Actions* (AR 200-2).
40 CFR Part 761. Protection of Environment

40 CFR Parts 1500-1508. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. Council on Environmental Quality. 1997.

50 CFR Part 21. Final Rule, Migratory Bird Permits; Take of Migratory Birds by the Armed Forces. 2007

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8.0 ACRONYMS

Acronym	Definition
AAR	After Action Report
ADNL	A-weighted Day Night Average Noise Level
AOI	Areas of Interest
APE	Area of Potential Effects
AR	Army Regulation
AST	Aboveground Storage Tank
BMPs	Best Management Practices
CAA	Clean Air Act
CDPHE	Colorado Department of Public Health and Environment
CDNL	C-weighted day-night average level
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CO	Carbon Monoxide
CO2	Carbon Dioxide
CWA	Clean Water Act
dB	Decibel
EA	Environmental Assessment
EC	Erosion Control
EIS	Environmental Impact Statement
EO	Executive Order
FNSI	Finding of No Significant Impact

Ft^2	Square Feet
GHG	Green House Gas
IFS	Isolated Finds
IHFS	Infantry Hostile Fire Simulator
IPBC	Infantry Platoon Battle Course
ITAM	Integrated Training Area Management
LEDs	Light-Emitting Diodes
LUPZ	Land Use Planning Zone
LZ	Landing Zone
MAT	Moving Armor Target
METL	Mission Essential Task List
MGB	Machine Gun Bunker
MILES	Multiple Integrated Laser Engagement System
MIT	Moving Infantry Target
NAAQS	National Ambient Air Quality Standard
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	Night Muzzle Flash Simulator
NOA	Notice of Availability
NOI	Notice of Intent
NOx	Nitrogen oxide
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSR	New Source Review
PCMS	Piñon Canyon Maneuver Site
PEA	Programmatic Environmental Assessment
PM	Particulate Matter

PRTCI	Properties of Religious, Traditional, and Cultural Importance
ROCA	Range Operation Control Area
SAT	Stationary Armor Target
SDZ	Surface Danger Zone
SIT	Stationary Infantry Target
SO2	Sulfur Dioxide
SOP	Standard Operating Procedure
SWMP	Stormwater Management Plan
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Places
USACE	US Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded Ordnance
µm	Micrometers
VEC	Valued Environmental Component
WWTP	Wastewater Treatment Plant

APPENDIX A – Comments Received and Responses

No comments were received.

James A. Lessard
Chief, Environmental Division
Department of the Army
US Army Installation Management Command
Directorate of Public Works
1626 Evans Street, Bldg 1219
Fort Carson, CO 80913-4143

SEP 13 2017

Re: Construction, Operation, and Maintenance of a High Voltage Electrical Power Substation Range in Training Area 50, Fort Carson, Colorado (HC #72798)

Dear Mr. Lessard:

Thank you for your correspondence dated August 14, 2017, received on August 28, 2017, initiating consultation on the above referenced undertaking submitted pursuant to Section 106 of the National Historic Preservation Act (36 CFR 800).

After review of the provided information, we do not object with the proposed area of potential effects for the proposed undertaking.

After review of the scope of work and assessment of adverse effect, we concur with the recommended finding of no historic properties affected [36 CFR 800.4(d)(1)] under Section 106.

Should unidentified archaeological resources be discovered in the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register eligibility criteria (36 CFR 60.4) in consultation with our office pursuant to 36 CFR 800.13. Also, should the consulted-upon scope of the work change please contact our office for continued consultation under 36 CFR 800.

We request being involved in the consultation process with the local government, which as stipulated in 36 CFR 800.3 is required to be notified of the undertaking, and with other consulting parties. Additional information provided by the local government or consulting parties might cause our office to re-evaluate our eligibility and potential effect findings. Please note that our compliance letter does not end the 30-day review period provided to other consulting parties.

We thank you for the opportunity to comment. If we may be of further assistance, please contact Bob Cronk, Section 106 Compliance Manager, at (303) 866-4608 or robert.cronk@state.co.us.

Sincerely,

for Steve Turner, AIA
State Historic Preservation Officer
1200 Broadway
Denver, CO 80233

CHEYENNE & ARAPAHO TRIBES
TRIBAL HISTORIC PRESERVATION
P.O. BOX 167
CONCHO, OKLAHOMA 73022

1-800-247-4612 Toll Free
405-422-7484 Telephone

August 16, 2017
THPO ID # 965-2

Department of Army
C/O Jennifer Kolise– Public Works
1626 Evans St. Bldg. 1219
Fort Carson, CO. 80913-4143

RE: Section 106 Consultation Request for Project ID: High Voltage Substation

Dear Consultant:

On behalf of the Tribal Historic Preservation Office of the Cheyenne and Arapaho Tribes, thank you for the notice of the referenced project. I have reviewed your Consultation request under Section 106 of the National Historic Preservation Act regarding the project proposal and commented as follows:

At this time, it is determined to be categorized as **No Properties**; however, if at any time during the project implementation inadvertent discoveries are made that reflect evidence of human remains, ceremonial or cultural objects, historic sites such as stone rings, burial mounds, village or battlefield artifacts, please cease work in area of discovery and notify the THPO Office within 72 hours.

In addition, if inadvertent discoveries are made; pursuant to Title 36 Code of Federal Regulation Part 800.13, as amended; you will also be required to make arrangements for a professional archaeologist to visit the site of discovery and assess the potential significance of any artifacts or features that were unearth. If needed, we will contact the Tribes NAGPRA representatives.

Please contact me at (405) 422-7484 or vrichey@c-a-tribes.org, if you have any questions or concerns. Alternate contact is Micah Demery; she can be reached directly at (405) 422-7416 or mdemery@c-a-tribes.org. Thank you again for your notification!

Best Regards,

Virginia Richey
Tribal Historic Preservation Office/THPO

COLORADO COUNCIL OF PROFESSIONAL ARCHAEOLOGISTS

To: Ms. Jennifer Kolise, Date: August 22, 2017
Acting Cultural Resources Manager (CRM)
Department of the Army
Us Army Installation Management Command
Directorate of Public Works
1626 Evans Street, Bldg 1219
Fort Carson, Co 80913-4143

CC: Mark Tobias, History Colorado
Jason La Belle, President, Colorado Council of Professional Archaeologists

RE: Construction, Operation, and Maintenance of a High Voltage Electrical Power Substation Range in Training Area 50, Fort Carson, Colorado (REC 2017-253)

Dear Ms. Kolise

The CCPA has reviewed the referenced undertaking and effects determination as documented in your letter dated August 14, 2017, and has the following comments:

The CCPA agrees with the determinations of *"no historic properties affected"* in accordance with Section 106 [36 CFR 800.4(1)(d)] of the NHPA for the actions proposed your letter.

The CCPA thanks you for the opportunity to comment on the effects determination for this undertaking. If you have any questions or wish to discuss, I am available.

Sincerely,

Kimball M. Banks, PhD
Director of Strategic Development
Metcalf Archaeological Consultants, Inc.
651 Corporate Circle, Suite 200
Golden CO 80401

Phone: 303.425.4507
kbanks@metcalfarchaeology.com

COMANCHE NATION

Department of the Army
ATT: Jennifer Kolise
Directorate of the Public Works
1626 Evan Street Building 1219
Fort Carson, CO 80913-4143

September 18, 2017

RE: Construction, Operation, and Maintenance of a High Voltage Electrical Power Substation Range in Training Area 50, Fort Carson, Colorado (REC 2017-253)

Dear Ms. Kolise,

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of ***"No Properties"*** have been identified. (IAW 36 CFR 800.4(d)(1)).

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office. Please contact the Comanche Nation Tribal Historical Preservation Office at (580) 595-9618, if you require additional information on this project.

Best Regards,

Martina Callahan

Comanche Nation Historic Preservation Office
Martina Callahan, Tribal Historic Preservation Officer
#6 SW "D" Avenue, Suite C
Lawton, OK. 73501
martinac@comanchnation.com
(580) 595-9618/Fax (580) 595-9733

"To preserve historic and sacred landmarks of the Comanche Nation"

Whiting, Betty A CTR USARMY (US)

From: Tom Warren <grizzley06@gmail.com>
Sent: Thursday, August 24, 2017 11:07 AM
To: Whiting, Betty A CTR USARMY (US)
Subject: [Non-DoD Source] Re: Section 106 Consultation - High Voltage Electrical Power Substation Range, Fort Carson, CO

Betty: Thanks much for providing this information. I have no concerns or suggested comments to offer. Good luck with the proposed action. tom

On Tue, Aug 15, 2017 at 12:48 PM, Whiting, Betty A CTR USARMY (US) <betty.a.whiting.ctr@mail.mil < Caution-mailto:betty.a.whiting.ctr@mail.mil > > wrote:

> All,
>
> Please find attached a letter initiating consultation under Section 106 of the National Historic Preservation Act. The project will occur down range at Fort Carson, specifically the construction and operation of a High Voltage Electrical Power Substation Range in Training Area 50. A hard copy will be mailed to the Colorado State Historic Preservation Officer.
>
> Betty Whiting
> Archaeologist/Historic Preservation Specialist
> Whitetail Environmental, LLC . 1626 Evans Street. Bldg 1219 .
> Fort Carson, CO 80913-4362 . Office: (719) 526-9249 < tel:%28719%29%20526-9249 >

UTE MOUNTAIN UTE TRIBE
TRIBAL HISTORIC PRESERVATION OFFICE

Mr. Terry Knight
Ute Mountain Ute Tribal Historic Preservation Officer
P.O Box 468
Towaoc, CO, 81334
August 21, 2017

Jennifer Kolise
Directorate of Public Works - Environmental Division
1626 Evans Street, Bldg 1219
Fort Carson, CO 80913-4143

RE: Construction, Operation and Maintenance of a High Voltage Electrical Power Substation Range in Training Area 50, Fort Carson, Colorado (REC 2017-253)

Dear Jennifer Kolise:

On behalf of the Ute Mountain Ute Tribe, thank you for the notice of the referenced project. I have reviewed you consultation request under Section 106 of the National Historic Preservation Act (NHPA) regarding the project proposal and commented as follows:

At this time, it is determined to be categorized as "***no historic properties affected***"; however, should potential impacts to any historic properties be identified in the future due to a change in the submitted scope of work, proposed location, or due to activities proposed beyond the scope of this undertaking, additional Section 106 consultation will be initiated as required. In the event that cultural materials are encountered during the undertaking, Fort Carson's Inadvertent Discovery of Archaeological, Cultural, or Paleontological Materials Standard Operating Procedure will be implemented and Section 106 consultation initiated.

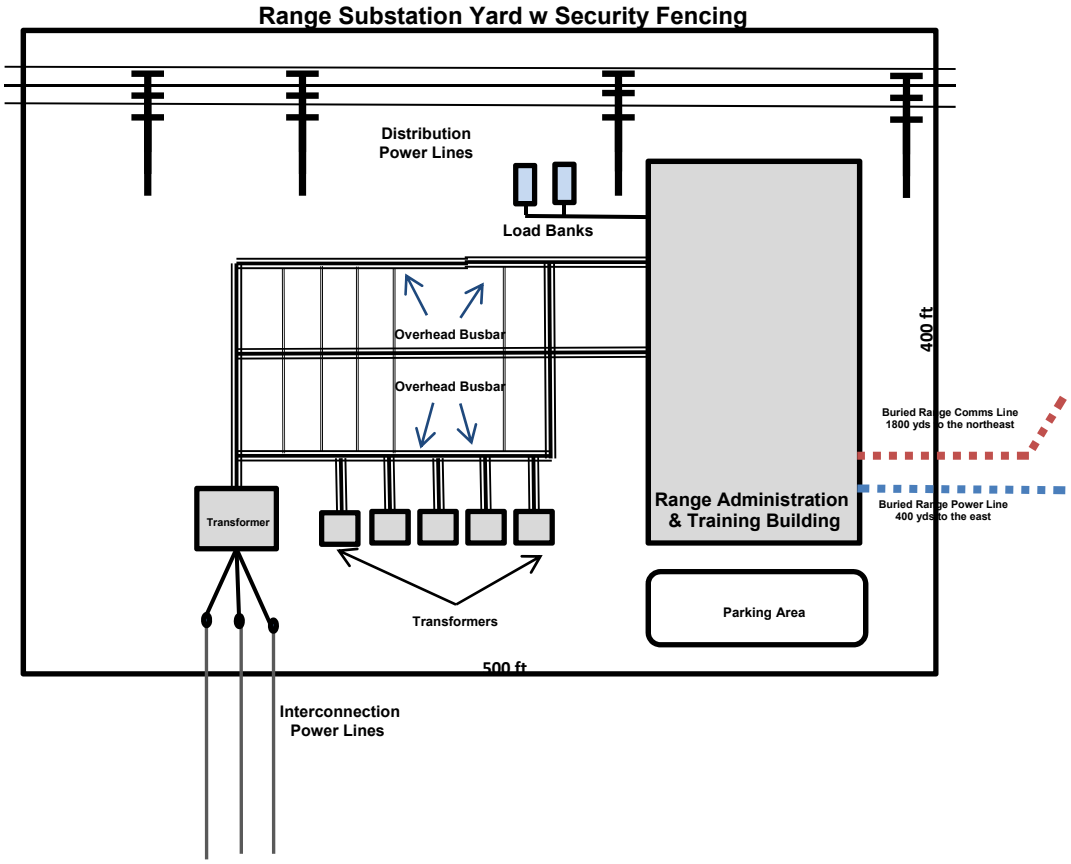
Sincerely,

Terry Knight

Mr. Terry Knight

APPENDIX B – HVE Layout Details

HIGH VOLTAGE ELECTRICAL RANGE FACILITIES



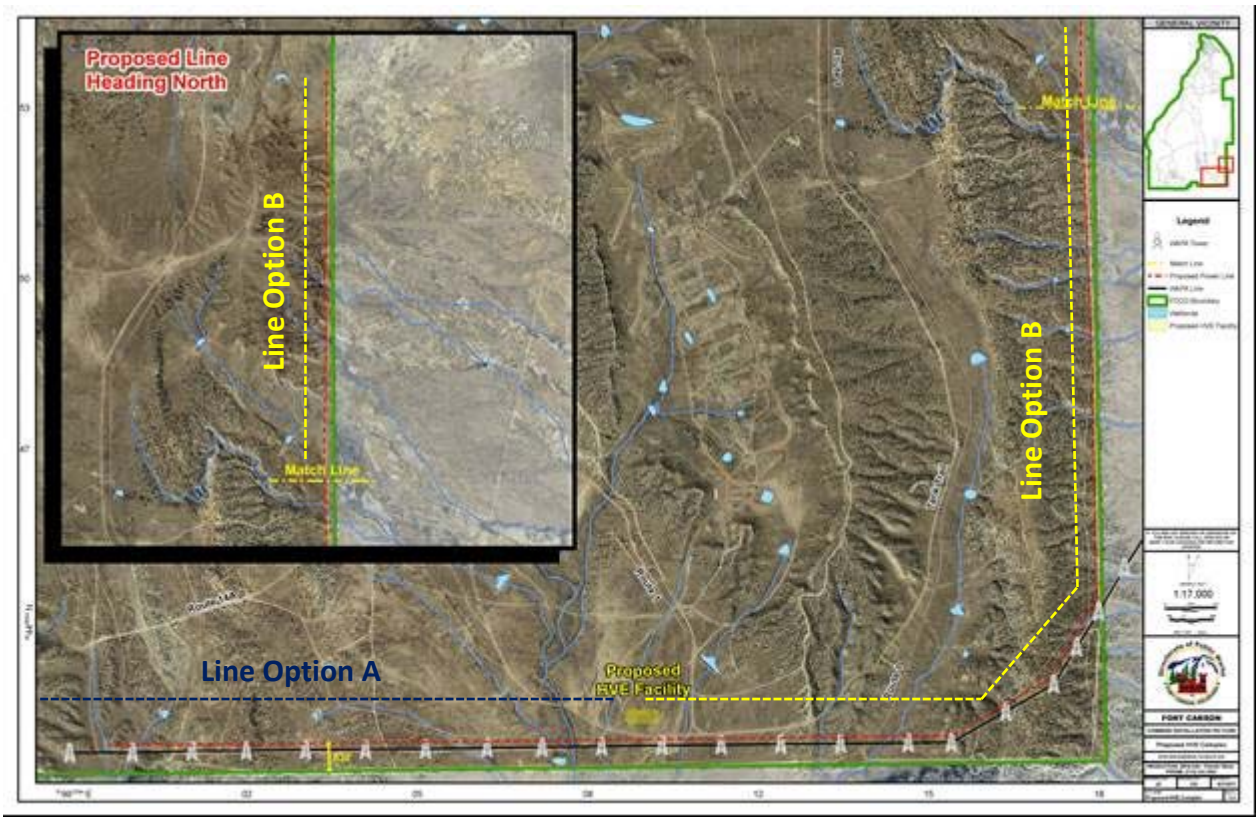
The Substation Yard is the center piece to the Range Complex. The Range Administrative and Training Building is used for both classroom and hands on activities. The remaining structures are to support the training.

Range Administration and Training Building
High Voltage Transformers
High Voltage Circuit Breakers
Resistive Load Banks
Transmission Line Interconnection
Distribution Power Line Structures
Parking Area

APPENDIX C – Distribution Line Options

Option A would involve placement of the distribution line from the proposed HVE facility to the west returning to the facility. The eight-mile distribution line would be constructed adjacent to the existing 230kV power line west for approximately three miles, then veer away from the 230kV power line to remain on Fort Carson property. The proposed power lines would continue following the southern boundary of Fort Carson to the west for a total of eight miles. The return would be on the same poles.

Option B would involve placement of the distribution line adjacent to the existing 230kV power line. The eight-mile distribution line from the proposed HVE facility would extend to the west approximately three miles returning on the same poles and to the east about two miles, shifting north along the east side of an existing fire break road for about five miles. The return would be on the same poles. Option B is the preferred option. Both options are considered in this analysis.



APPENDIX D – Actions/Projects Considered - Cumulative Impacts Assessment
Fort Carson, CO, 2015

No longer foreseeable or valid projects

- Additional IBCT that would train at Fort Carson and PCMS (part of the GTA EIS Proposed Action)
- 1st Space Brigade Operations Complex

Recently Completed or In Progress Projects at Fort Carson

Completed

- Battle Command Training Center
- Warriors in Transition Unit Complex (Barracks/Admin)
- Special Forces Tactical Unmanned Aerial Vehicle hangar, battalion operations facility complex, building renovations, and climbing/rappelling tower
- Combat Aviation Brigade (CAB) air control tower, ASB hangar, and barracks
- Range 111 Digital Multi-Purpose Training Range
- Unheated Storage building
- Verizon Wireless tower construction

In Progress

- CAB associated construction including infrastructure – Ongoing through FY18
- Central Energy Plant
- AMCOM Aircraft Maintenance Hangar
- Athletic Field, Tank Trail and Site Improvements
- National Institute Center of Excellence
- Special Forces Language Training Lab
- Air Support Operations Squadron Facility Expansion
- Iron Horse Park Area Development
- Family Housing deconstruction and rebuild in Cherokee Village
- Unmanned Aerial System Hangar
- Cheyenne Mountain Trap/Skeet range addition

In Progress or Recently Completed – Off Post

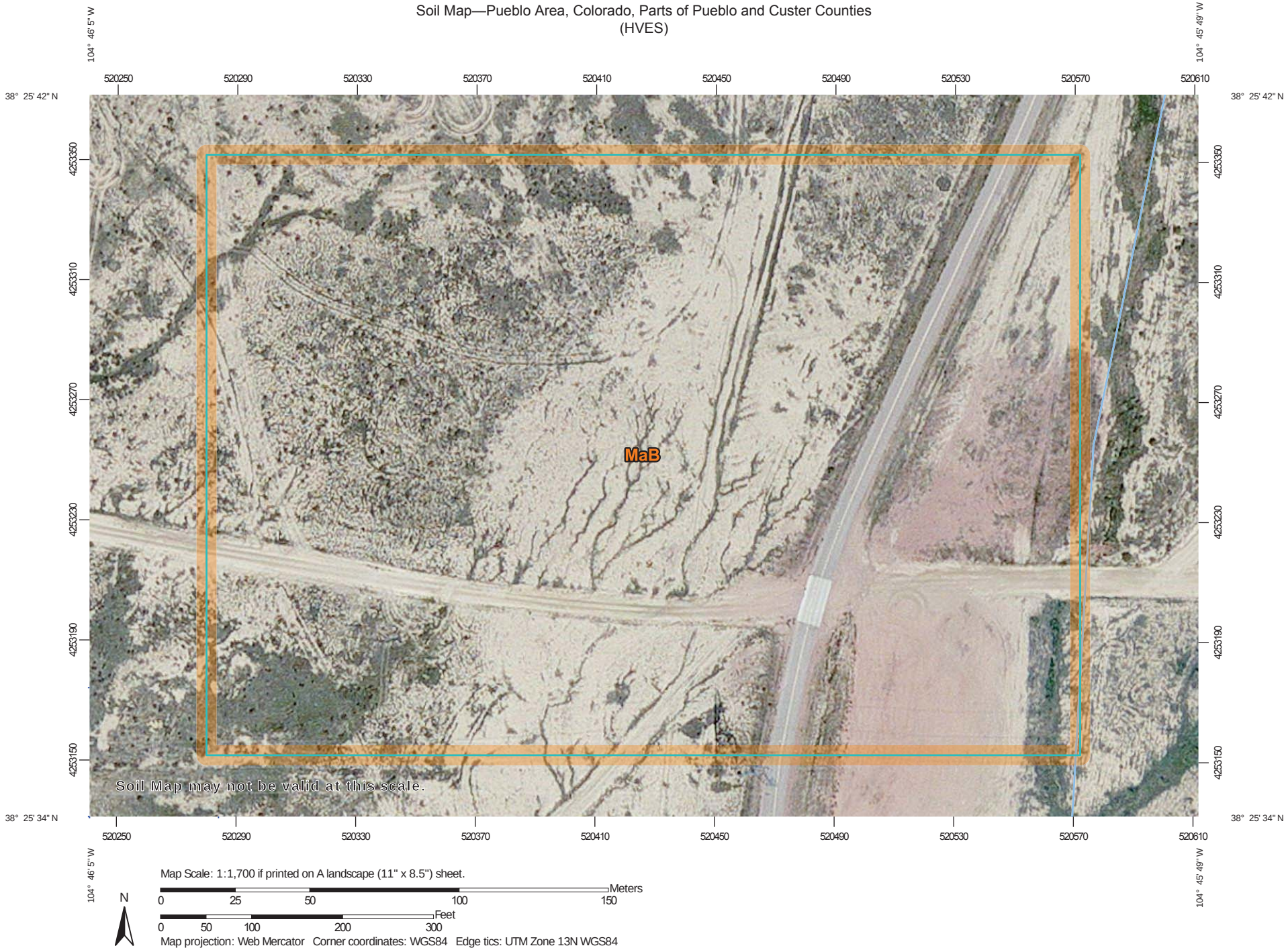
- Sam's Club / Walmart Academy Boulevard South construction
- Southern Delivery System

Foreseeable Future

- Special Forces Mountaineering Facility, Headquarters, and THOR3 facility
- Ammo Supply Point Expansion
- Physical Fitness Facility
- Army National Guard Readiness Center
- 1st Space Brigade Operations Building Improvements
- Charter Oak Ranch road improvement
- Gate 20 Access Control Facility

APPENDIX E – Fort Carson Proposed HVE Range Soils Data
USDA NRCS Web Soil Survey

Soil Map—Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
(HVES)



Map Scale: 1:1,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters
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Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
Survey Area Data: Version 15, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

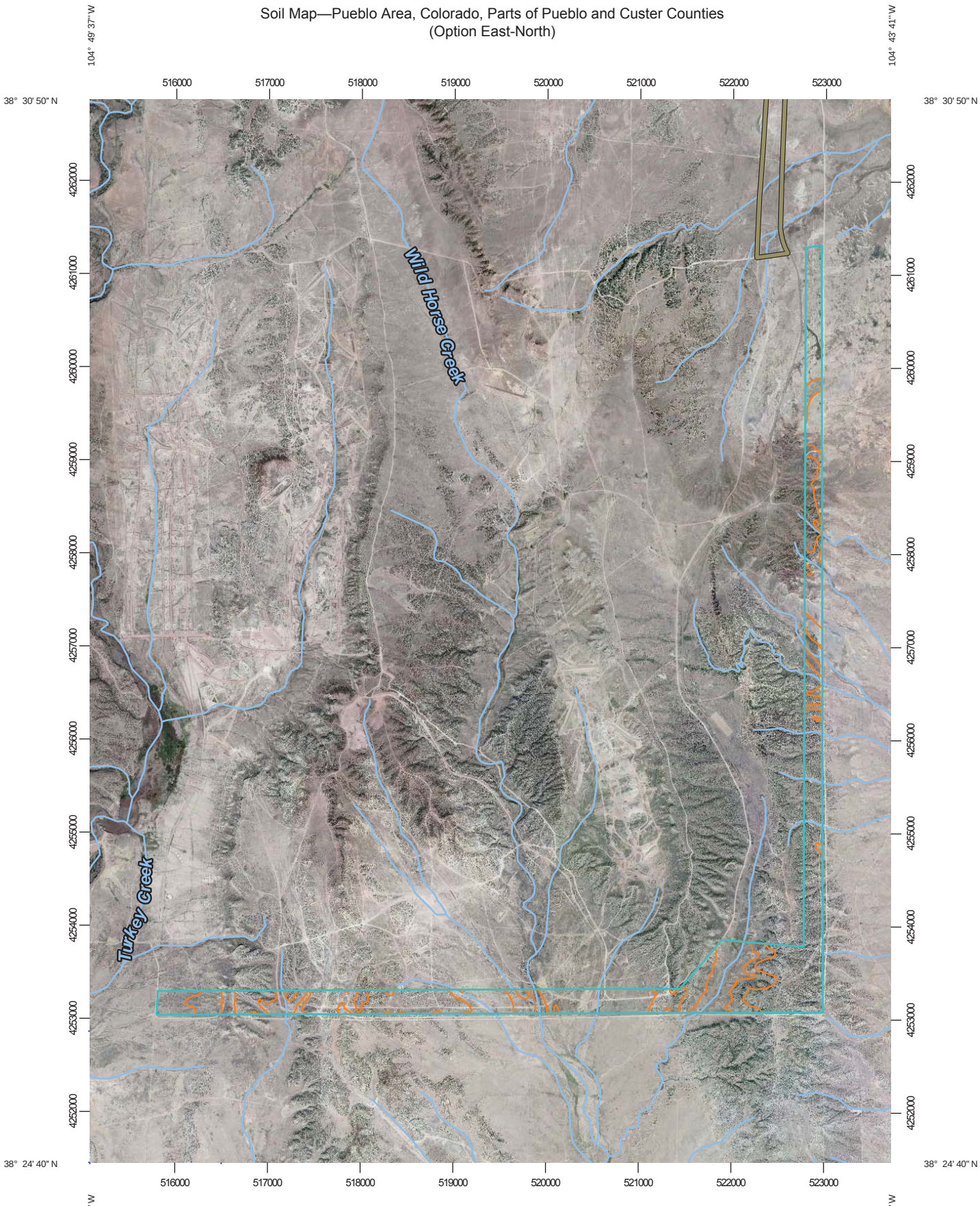
Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Pueblo Area, Colorado, Parts of Pueblo and Custer Counties (CO626)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MaB	Manvel silt loam, 2 to 6 percent slopes, dry	14.5	100.0%
Totals for Area of Interest		**14.5**	**100.0%**

Soil Map—Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
(Option East-North)



Map Scale: 1:55,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters
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Feet
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Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
Survey Area Data: Version 15, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

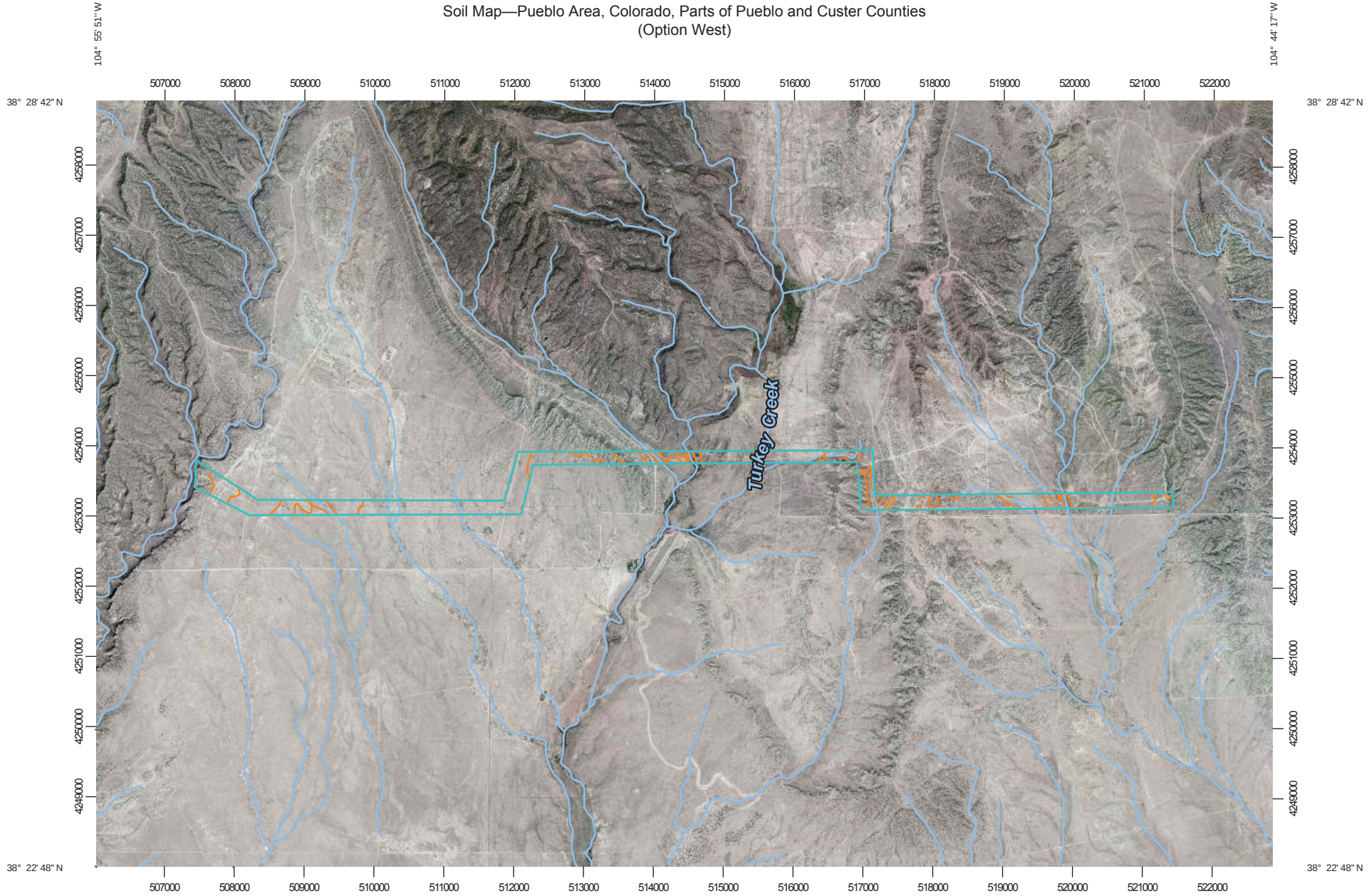
Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Pueblo Area, Colorado, Parts of Pueblo and Custer Counties (CO626)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CaE	Cascajo very gravelly sandy loam, 5 to 25 percent slopes	5.7	0.6%
Ha	Haversid silt loam, 0 to 2 percent slopes, frequently flooded	8.2	0.8%
LvB	Limon silty clay, 0 to 5 percent slopes,gullied	9.0	0.9%
MaB	Manvel silt loam, 2 to 6 percent slopes, dry	136.1	14.0%
MsD	Midway-Shale outcrop complex, 1 to 9 percent slopes	61.2	6.3%
Mv	Minnequa-Manvel silt loams, 1 to 6 percent slopes, dry	18.2	1.9%
PM	Penrose-Minnequa complex, 1 to 15 percent slopes, dry	433.2	44.6%
PrF	Penrose-Rock outcrop complex, 25 to 65 percent slopes	82.5	8.5%
SaE	Schamber gravelly sandy loam, 5 to 25 percent slopes	31.9	3.3%
SgD	Shingle silty clay loam, 1 to 9 percent slopes	96.4	9.9%
Wk	Wiley-Kim loams	88.8	9.1%
Totals for Area of Interest		**971.0**	**100.0%**

Soil Map—Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
(Option West)



Map Scale: 1:77,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
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Feet
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Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pueblo Area, Colorado, Parts of Pueblo and Custer Counties
Survey Area Data: Version 15, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

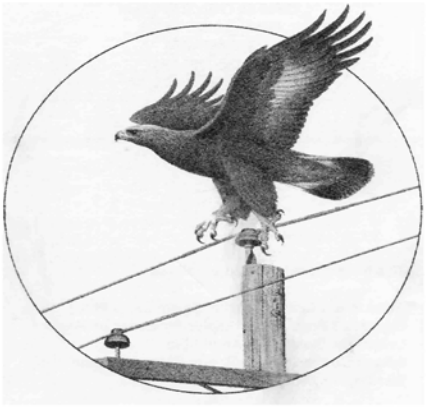
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Pueblo Area, Colorado, Parts of Pueblo and Custer Counties (CO626)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CaE	Cascajo very gravelly sandy loam, 5 to 25 percent slopes	10.5	1.3%
Ha	Haversid silt loam, 0 to 2 percent slopes, frequently flooded	5.7	0.7%
MaB	Manvel silt loam, 2 to 6 percent slopes, dry	272.1	34.5%
MpA	Manzanola silty clay loam, dry, saline, 0 to 2 percent slopes	13.8	1.7%
Mv	Minnequa-Manvel silt loams, 1 to 6 percent slopes, dry	115.5	14.6%
MzC	Manzanola silty clay loam, 3 to 9 percent slopes	37.7	4.8%
PM	Penrose-Minnequa complex, 1 to 15 percent slopes, dry	202.3	25.6%
PrF	Penrose-Rock outcrop complex, 25 to 65 percent slopes	61.7	7.8%
TM	Table Mountain association	3.9	0.5%
TrG	Travessilla-Rock outcrop complex, 30 to 90 percent slopes	1.8	0.2%
TsD	Travessilla sandy loam, 1 to 9 percent slopes	32.9	4.2%
Wk	Wiley-Kim loams	31.5	4.0%
Totals for Area of Interest		**789.6**	**100.0%**

APPENDIX F – 2005 Avian Protection Plan (APP) Guidelines
APLIC and USFWS

AVIAN PROTECTION PLAN (APP) GUIDELINES



A Joint Document Prepared By

The Edison Electric Institute's Avian Power Line Interaction Committee (APLIC)

and

U.S. Fish and Wildlife Service (USFWS)

April 2005

ACKNOWLEDGEMENT

APLIC and the U.S. Fish and Wildlife Service (Service) have a long history of cooperation and collaboration on avian issues. Like the Service, current APLIC member utilities want to do their part to minimize adverse impacts to protected avian species on power lines. The public expects utilities to deliver cost-effective reliable energy and the Service to protect and enhance trust resources. Working in a partnership to benefit both the birds and the electric utility industry, the voluntary Avian Protection Plan (APP) Guidelines were developed in a joint, collaborative way.

It is the hope of both APLIC and the Service that individual utilities will utilize the voluntary principles in this document to develop an APP specific to their needs, which improves reliability and avian conservation. APPs offer the industry an additional option, one that is voluntary and without the need for formal Service concurrence, to address avian electrocutions and collisions. Utilities are also encouraged to work in partnership with Federal and State resource agencies when developing and implementing their voluntary APPs.

APLIC and the Service would like to acknowledge the efforts of those individuals responsible for the development of these voluntary guidelines. These guidelines demonstrate that through ongoing collaborative efforts the Service and industry can work together to meet energy needs while acting as responsible stewards to the environment.

April 14, 2005

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The APP Guidelines presented in this document are intended to serve as a "tool box" from which a utility can select and tailor components applicable to its specific needs. These guidelines are intended to be used in conjunction with APLIC's *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* and *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*, or the most current editions of these documents, which contain more detail on construction design standards and line siting recommendations.

These "guidelines" are being distributed electronically. While the introductory pages of the document are printed, the remainder of this "tool box" is electronic. This is a dynamic document and will be periodically updated as new information and resources become available. Additional copies of the APP Guidelines and current information on related issues can be downloaded from the Avian Power Line Interaction Committee (APLIC) (http://aplic.org) and Edison Electric Institute (EEI) (http://eei.org) websites. In addition, the *Suggested Practices for Raptor Protection on Power Lines* and *Mitigating Bird Collisions with Power Lines* manuals can be obtained from APLIC or EEI.

Editor's note: Although this draft is being distributed in paper format, the final version will be distributed electronically as described above.

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I. INTRODUCTION

Since the formation of the Avian Power Line Interaction Committee (APLIC) in 1989, the electric utility industry and the U.S. Fish and Wildlife Service (USFWS) have worked together to reduce avian electrocution and collision mortality. This has resulted in the cooperative development of guidelines for Avian Protection Plans (APP) by APLIC and USFWS, representing another milestone in avian conservation. The principles presented in these voluntary guidelines are intended to allow utilities to tailor an APP that will best fit their needs while furthering the conservation of avian species and improving reliability and customer service. A utility that implements the principles contained in these APP guidelines will greatly reduce avian risk as well its own risk of enforcement under the Migratory Bird Treaty Act (MBTA). Development and implementation of an APP makes good business sense because animal- and bird-caused outages are costly. A utility that creates an APP following these guidelines and that addresses their specific avian issues can benefit through regulatory compliance, reliability improvements, cost savings and positive recognition from regulators and customers.

What is an Avian Protection Plan?

An Avian Protection Plan is a utility-specific document that delineates a program designed to reduce the operational and avian risks that result from avian interactions with electric utility facilities. Although each utility's APP will be different, the overall goal of any APP should be to reduce avian mortality. This document provides guiding principles and examples to aid utilities in their development of an APP. Although not all of these elements need to be included in every APP because of the specific circumstances of a utility or geographical area, they represent an overview of elements that should be considered for inclusion in an APP and that individual utilities may find helpful in crafting their own, individually-tailored APPs.

Principles of an Avian Protection Plan

1. *Corporate Policy*

   An APP typically includes a statement of company policy confirming the company's commitment to work cooperatively towards the protection of migratory birds. This may include a commitment by the company to balance its goal of providing reliable electrical service in a cost-effective manner with the regulatory requirements protecting avian species, as well as the need to obtain and comply with all necessary permits, monitor incidents of avian mortality, and make reasonable efforts to construct and alter infrastructure to reduce the incidence of avian mortality.

2. *Training*

   Training is an important element of an APP. All appropriate utility personnel, including managers, supervisors, line crews, engineering, dispatch, and design personnel, should be properly trained in avian issues. This training should encompass the reasons, need, and method by which employees should report an avian mortality, follow nest management protocols, dispose of carcasses, and comply with applicable regulations, including the consequences of non-compliance. Supplemental training also may be appropriate where there are material changes in regulations, permit conditions, or internal policies. APLIC-sponsored "short courses" on avian electrocution, collision, and nest issues are conducted annually throughout the U.S. In addition, a two-hour overview presentation of avian issues that can be used for internal company training is available from APLIC (see http://aplic.org).

3. *Permit Compliance*

   An APP can identify the process under which a company obtains and complies with all necessary permits related to avian issues. Particular attention should be given to specific activities that can require take permits including, but not limited

to, nest relocation, temporary possession, depredation, salvage/disposal, and scientific collection.

4. *Construction Design Standards*

Avian interactions with facilities can cause outages or system reliability issues. To improve system reliability, avian interactions should be considered in the design and installation of new facilities, as well as the operation and maintenance of existing facilities. For those reasons, inclusion of accepted construction standards for both new and retrofit techniques also should be included in an APP. Companies can either rely upon existing construction configurations recommended by APLIC (see *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* and *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*, or the most current editions of these documents) or may choose to instead develop their own internal construction standards that meet or exceed these guidelines. These standards should be used in areas where new construction should be avian-safe, as well as where existing infrastructure should be retrofitted to provide avian safety.

5. *Nest Management*

An APP may include procedures for nest management on utility structures. These procedures should be explained to company employees during training to ensure uniform treatment of avian nest issues among personnel.

6. *Avian Reporting System*

Although reporting of avian mortalities may be required as a condition of Federal or State permits, a utility may also choose to voluntarily monitor relevant avian interactions, including mortalities, through the development of an internal reporting system. An APP should consider providing for the development of such a reporting system, which can help a company pinpoint areas of concern by tracking both the specific locations where mortalities may be occurring, as well as

the extent of such mortalities. Data collected by company personnel can be limited to avian mortalities or injuries, or could be expanded to include historical tracking of avian nest problems, particularly problematic poles or line configurations, as well as remedial actions taken. All data should be regularly entered into a searchable database compatible for use in additional analysis (see Risk Assessment Methodology below). Bird Mortality Tracking System software developed by APLIC is available for free upon request at http://aplic.org.

7. *Risk Assessment Methodology*

A utility can have the greatest impact on reducing avian mortality by focusing its efforts in a cost-effective manner on the areas that pose the greatest risk to migratory birds. Therefore, as a general matter, an APP should include a method for evaluating the risks posed to migratory birds in a manner that identifies areas and issues of particular concern. A risk assessment study will often begin with an assessment of available data addressing areas of high avian use, avian mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, effectiveness of existing procedures, remedial actions and other factors that can increase avian interactions with utility facilities. The avian reporting system discussed in the previous section is an integral component of this risk assessment, as well as the use of avian experts, birders, and biologists who can provide additional information on avian distribution. An APP also may provide for the development of models that will enable a company to utilize biological and electrical design information to prioritize poles most in need of modifications, as well as research on the varied causes of avian mortality and the benefits of utility structures to avian species.

8. *Mortality Reduction Measures*

After completing a risk assessment, a company can focus its efforts on areas of concern, ensure that the activities taken by the utility are not out of proportion to the risks encountered by migratory birds, and then determine whether an avian

mortality reduction plan needs to be implemented in certain areas. An APP could implement this approach by developing such a risk reduction plan, utilizing risk assessment results to direct where system monitoring should occur, where retrofit efforts should be focused, and where new construction warrants special attention to raptor and other bird issues. If a utility finds that implementation of such avian protection measures is appropriate, it also may choose to develop a schedule for implementation.

9. *Avian Enhancement Options*

In addition to taking steps to reduce mortality risk to avian species, an APP also may include opportunities for a utility to enhance avian populations or habitat, including developing nest platforms, managing habitats to benefit migratory birds, or working cooperatively with agencies or organizations in such efforts. Where feasible, such proactive development of new ideas and methods to protect migratory birds should be encouraged and explored.

10. *Quality Control*

An APP also may include a mechanism to review existing practices, ensuring quality control. For instance, a utility may conduct an independent assessment of its avian reporting system to ensure its effectiveness, or invest in research on the effectiveness of different techniques and technologies used to prevent collisions, electrocutions and problem nests.

11. *Public Awareness*

An APP generally should include a method to educate the public about the avian electrocution issue, the company's avian protection program, as well as its successes in avian protection.

12. *Key Resources*

An APP should identify key resources to address avian protection issues including, for example, a list of experts who may be called upon to aid in resolving avian issues. These could include consultants, State and Federal resource agencies, universities, or conservation groups. Engineers may find that internal personnel such as environmental specialists can aid in developing creative solutions to resolve avian interaction problems, and external organizations like APLIC can also serve as helpful resources by providing guidance, workshops, materials, and contacts. An understanding of raptor and other bird behavior can influence how and when avian protection should be utilized, and an APP that connects avian experts with utility decision-makers may reduce the risk of avian incidents and improve system reliability.

II. BACKGROUND

Historical Perspective

Utility poles can benefit raptors by providing perching and/or nesting structures in areas where few natural perches or nest sites exist. However, utility structures can also pose a threat to raptors and other birds through electrocutions or collisions. Although records of electrocutions and collisions date back as early as the late 19th century, avian deaths associated with power lines were not a widespread concern until the 1970's when surveys in the western United States found hundreds of eagles shot, poisoned, and electrocuted in rural areas. Throughout the 1970's, agencies and organizations such as the Rural Electrification Association (now the Rural Utilities Service), USFWS , Edison Electric Institute (EEI), and the National Audubon Society worked together to track raptor electrocutions, identify high risk configurations, and develop methods to reduce electrocutions. In 1989, biologists from the utility industry, USFWS, and the National Audubon Society formed APLIC, initially to address collision issues of sandhill and whooping cranes. The scope of APLIC's mission later expanded to include electrocution and nest issues.

APLIC now serves as a clearinghouse for information and communication on avian/power line issues. Its membership includes electric utilities, EEI, Electric Power Research Institute (EPRI), the National Rural Electric Cooperative Association (NRECA), Rural Utilities Service (RUS) and USFWS. APLIC has produced manuals for addressing electrocutions (*Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996*) as well as collisions (*Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*). In addition, APLIC produces videos addressing collisions and electrocutions; offers a short course overview of collision, electrocution, and nest issues; and funds bird/power line-related research. The APP guidelines provided in this document represent a multidisciplinary culmination of several decades of research, field testing, monitoring and assessment to minimize avian mortality associated with utility structures. APLIC encourages the development of APPs as they benefit utilities and wildlife resources through reduced long-term costs, improved reliability, avian

protection, legal compliance, and positive relations between regulatory agencies and customers.

How Electrocution Occurs

Birds are electrocuted by power lines because of two seemingly unrelated, yet interactive factors:

1. Environmental factors such as topography, vegetation, available prey and other, behavioral or biological factors influence avian use of power poles.
2. Inadequate seperation between energized conductors or energized conductors and grounded hardware can provide two points of contact.

Electrocution can occur when a bird completes an electric circuit by simultaneously touching two energized parts or an energized part and a grounded part of the electrical equipment. Most electrocutions occur on medium-voltage distribution lines (4 to 34.5 kilovolts [kV]), in which the spacing between conductors may be small enough to be bridged by birds. Poles with energized hardware, such as transformers, can be especially hazardous, even to small birds, as they contain numerous, closely-spaced energized parts.

"Avian-safe" structures are those that provide adequate clearances to accommodate a large bird between energized and/or grounded parts. Consequently, 60 inches of horizontal separation, which can accommodate the wrist-to-wrist distance of an eagle (which is approximately 54 inches), is used as the standard for raptor protection (Figure 1). Likewise, vertical separation of at least 48 inches can accommodate the height of an eagle from its feet to the top of its head (which is approximately 31 inches; Figure 2). In particular areas (*i.e*. areas with concentrations of wading birds), vertical separation may need to be increased to 60 inches. Because dry feathers act as insulation, contact must be made between fleshy parts, such as the wrists, feet, or other skin, for electrocution to occur. In spite of the best efforts to minimize avian electrocutions, some degree of mortality may always occur due to influences that cannot be controlled, *e.g.* weather.

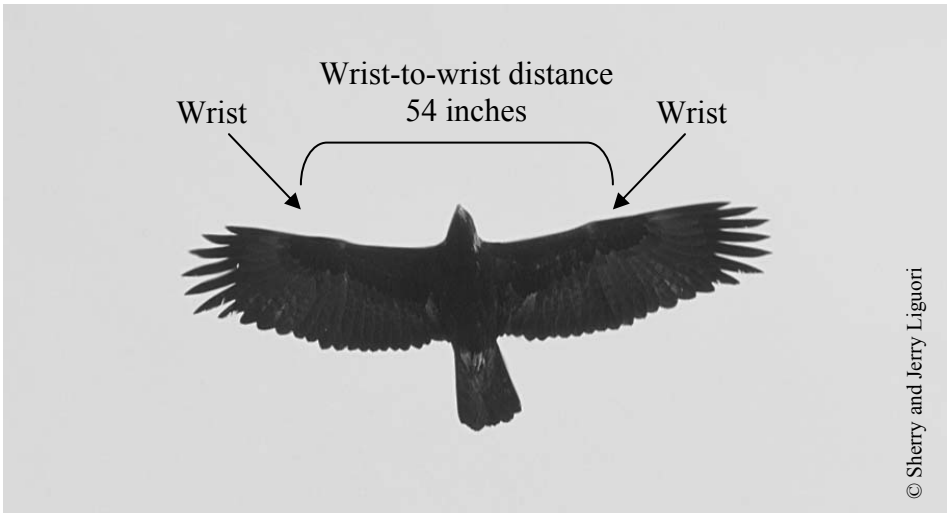

Figure 1. Wrist-to-wrist distance of an eagle.

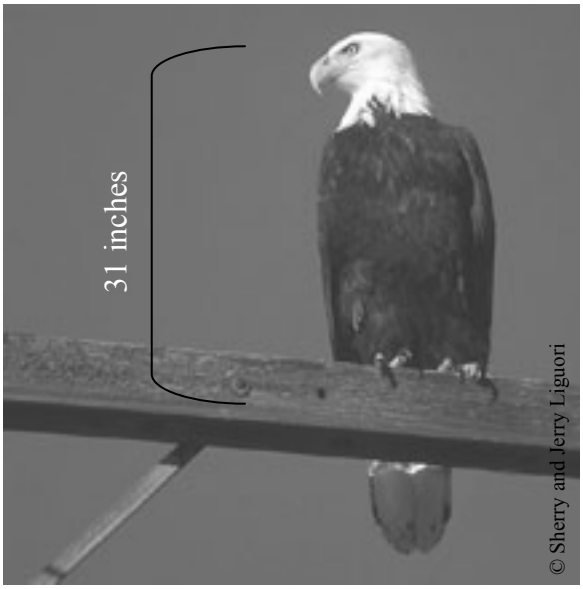

Figure 2. Head to foot distance of an eagle.

Raptors are opportunistic and may use power poles for a number of purposes, such as nest sites, high points from which to defend territories, and perches from which to hunt. "Still hunting" from a perch is energy efficient for a bird, provided that good prey habitat is within view. Some structures are preferred by birds because they provide considerable elevation above the surrounding terrain, thereby offering a wide field of

view. Identification and modification of these "preferred" structures may greatly reduce or minimize the electrocution risk on an entire line. However, in areas where lines run through homogeneous terrain, there is no apparent advantage of some poles over others. Favored perches can be identified by examining crossarms and the ground beneath them for whitewash (feces accumulations), pellets, or prey remains. Since birds such as hawks and owls cannot digest the fur, feathers, and bones of their prey, they regurgitate these parts in the form of a "pellet" or "casting."

What Species are at Risk

Electrocution has been documented as the cause of death in many raptor species in the United States, although large, open-country birds, such as eagles and buteos, are typically at greatest risk. In open habitats where few natural perches exist, such as deserts, grasslands, agricultural fields, and pastures, raptors are attracted to power poles, which provide roosting and nesting sites as well as hunting perches. The large wingspans of raptors such as golden eagles, red-tailed hawks, osprey, and great horned owls enable them to simultaneously touch energized and/or grounded parts, potentially resulting in electrocution. Although raptors are most often considered when addressing electrocution risk, other birds such as crows, ravens, magpies, small flocking birds and wading birds can also be electrocuted. Closely-spaced exposed equipment, such as jumper wires on transformers, can pose an electrocution risk to small birds such as magpies or jays. Wading birds, such as herons, egrets, ibis, or storks, may require increased vertical spacing between lines, as they may exceed 40 inches in height.

Factors Influencing Collisions

Factors that influence collision risk can be divided into three categories: those related to avian species, those related to the environment, and those related to the configuration and location of lines. Species-related factors include habitat use, body size, flight behavior, age, sex, and flocking behavior. Heavy-bodied, less agile birds or birds within large flocks may lack the ability to quickly negotiate obstacles, making them more likely to collide with overhead lines. Likewise, inexperienced birds as well as those

distracted by territorial or courtship activities may collide with lines. Environmental factors influencing collision risk include the effects of weather and time of day on line visibility, surrounding land use practices that may attract birds, and human activities that may flush birds into lines. Line-related factors influencing collision risk include the configuration and location of the line and line placement with respect to other structures or topographic features. Collisions often occur with the overhead static wire, which may be less visible than the other wires due to its smaller diameter.

Why Protect Birds?

All migratory birds in North America are protected under the Migratory Bird Treaty Act of 1918, as amended. In addition, both North American eagle species are protected under the Bald and Golden Eagle Protection Act (BGEPA), as amended. These laws provide civil and criminal penalties for the "take" of such species. "Take" under MBTA is defined as to "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt any of these acts." Take under BGEPA is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The bald eagle is also currently (April 2005) listed as threatened under the Endangered Species Act in the contiguous 48 states.

Power line electrocutions are a cause of mortality for raptors, eagles and other migratory birds. These deaths, many of which could be avoided by making relatively inexpensive modifications to existing power lines and poles, can cause power outages that inconvenience customers, spark grass and forest fires, and result in lost revenue and other costs to utilities.

Government agencies, conservation organizations, and the general public are concerned about avian safety. Industry and the public expect reliable electric service. These concerns and expectations have generated great public demand for both higher service reliability and better protection of avian populations and their habitats.

The electric power industry has long been aware that closely-spaced electric conductors, separated by a horizontal crossarm, can result in the electrocution of raptors and other birds. Thirty years ago, electric companies, USFWS, and interested non-

governmental organizations developed the first edition of *Suggested Practices for Raptor Protection on Power Lines*, which detailed how to reduce or eliminate the risk of avian electrocutions. Since the first *Suggested Practices*, utilities and agencies have worked cooperatively to identify electrocution and collision risks and improve the technology and methods used for reducing such risks.

The development of APPs by electric utilities will represent the continuation of an approach that emphasizes long-term proactive conservation partnerships between the utility industry, the conservation community, and USFWS. These voluntary plans will provide a framework for addressing electrocution hazards, committing utilities to evaluate their power lines and work with USFWS to conserve federally protected migratory birds.

III. APPLICABLE REGULATIONS

The Migratory Bird Treaty Act (16 U.S.C. 703-712; MBTA), which is administered by USFWS, 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 is a strict liability statute wherein proof of intent is not an element of a taking violation. Wording is clear in that most actions that result in a "taking" or possession (permanent or temporary) of a protected species can be a violation.

Specifically, 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, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior." The word "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

A 1972 amendment to the MBTA resulted in inclusion of bald eagles and other birds of prey in the definition of a migratory bird. The MBTA provides criminal penalties for persons who, by any means or in any manner, pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird. The MBTA offers protection to 836 species of migratory birds, including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds occurring in the U.S. in the wild except for house (English) sparrows, European starlings, rock doves (pigeons), any recently listed unprotected species in the Federal Register and non-migratory upland game birds.

For a complete list of species protected under the MBTA see http://migratorybirds.fws.gov/intrnltr/mbta/mbtintro.html.

A violation of the MBTA by an individual can result in a fine of up to $15,000 and/or imprisonment for up to six months for a misdemeanor, and up to $250,000 and/or imprisonment for up to two years for a felony. Fines may be doubled for organizations. Penalties increase greatly for offenses involving commercialization and/or the sale of migratory birds and/or their parts.

Under authority of the **Bald and Golden Eagle Protection Act** (16 U.S.C. 668-668d; BGEPA), bald and golden eagles are afforded additional legal protection. Penalties for the "take" of an eagle may result in a fine of up to $100,000 and/or imprisonment for up to one year. The BGEPA has additional provisions wherein the case of a second or subsequent conviction of the BGEPA, penalties may be imposed of up to $250,000 fine and/or two years imprisonment.

The **Endangered Species Act** (16 U.S.C. 1531-1544; ESA) was passed by Congress in 1973 in recognition that many of our Nation's native plants and animals were in danger of becoming extinct. The purposes of the Act are to protect these endangered and threatened species and to provide a means to conserve their ecosystems. To this end, Federal agencies are directed to utilize their authorities to conserve listed species, and make sure that their actions do not jeopardize the continued existence of these species. Federal agencies are encouraged to do the same with respect to "candidate" species which may be listed in the near future. The law is administered by USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). USFWS has primary responsibility for terrestrial and freshwater organisms, while NMFS has responsibility for marine species such as whales and salmon. These two agencies work with other agencies to plan or modify Federal projects so that they will have minimal impact on listed species and their habitats. Protection of species is also achieved through partnerships with the States, with Federal financial assistance and a system of incentives available to encourage State participation. USFWS also works with private landowners, providing financial and technical assistance for management actions on their lands to benefit both listed and non-listed species.

Section 9 of the ESA makes it unlawful for a person to "take" a listed species. Take is defined as ". . . to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The Secretary of the Interior, through regulations, defined the term "harm" as "an act which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." However, permits for "incidental take" can be obtained from USFWS for take of endangered species which would occur as a result of an otherwise legal activity.

Section 10 of the ESA allows for the development of "Habitat Conservation Plans" for endangered species on private lands or for the maintenance of facilities on private lands. This provision is designed to assist private landowners in incorporating conservation measures for listed species with their land and/or water development plans. Private landowners who develop and implement an approved habitat conservation plan can receive an incidental take permit that allows their development to proceed.

While the Service generally does not authorize incidental take under these Acts, USFWS realizes that some birds may be killed even if all reasonable measures to avoid the take are implemented. USFWS Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries who seek to minimize their impacts on migratory birds. Unless the take is authorized, it is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the Office of Law Enforcement focuses on those individuals, companies, or agencies that take migratory birds with disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented.

State Regulations

Individual states may have regulations that protect avian species and a utility should consult with their respective State resource agency(s) to determine what regulations apply and if permits are required.

IV. APP PRINCIPLES

The following chapter provides guidance for implementation of each of the APP principles listed below:

- 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

CORPORATE POLICY

The following are examples of utility Bird Management Policies. These policies have been included as examples to aid other utilities if they choose to develop a bird program policy.

Example 1. PacifiCorp's Bird Program Policy.

PacifiCorp Bird Management Policy

Bird interactions with power lines may cause bird injuries and mortalities, which, in turn, may result in outages, violations of bird protection laws, grass and forest fires, or raise concerns by employees, resource agencies and the public.

This policy is intended to ensure compliance with legal requirements, while improving distribution system reliability. PacifiCorp management and employees are responsible for managing bird interactions with power lines and are committed to reducing the detrimental effects of these interactions.

To fulfill this commitment, PacifiCorp will:

- Implement and comply with its comprehensive Avian Protection Plan (APP).
- Ensure its actions comply with applicable laws, regulations, permits, and APP procedures.
- Document bird mortalities, problem poles and lines, and problem nests.
- Provide information, resources, and training to improve its employees' knowledge and awareness of the APP.
- Construct all new or rebuilt lines in rural areas (outside city limits or beyond residential/commercial developments) and in areas of known raptor use, where appropriate, to PacifiCorp raptor-safe standards.
- Retrofit or modify power poles where a protected bird has died. Modifications will be in accordance with APP procedures.
- Participate with public and private organizations in programs and research to reduce detrimental effects of bird interactions with power lines.

PacifiCorp customer service and regulatory compliance will be enhanced and risk to migratory birds will be reduced through the proactive and innovative resolutions of bird power line interactions guided by this policy.

Signature, Executive Vice President_____ Date_____

Example 2. Southern California Edison's Policy and Procedures.

Avian Protection On or Near Power Lines

1.0 PURPOSE

One or more state and federal laws legally protect many species of birds in SCE's service territory. In order to ensure SCE's compliance with laws and regulations protecting these birds, it is necessary to have procedures in place that will allow SCE to determine where impacts are most likely to occur, what additional measures may need to be implemented to achieve compliance, if mitigation of impacts is needed, and to undertake other activities to facilitate protection of these legally protected birds on or near SCE power lines, substations and other facilities. This document is not intended to set out the specific legal requirements of all laws dealing with birds. Rather, this standard is intended to provide a process for achieving compliance with those laws.

2.0 POLICY STATEMENTS

N/A

3.0 REFERENCES

3.1 ESM 02.002.01, Environmental Policy

3.2 Endangered Species Alert Program Manual

3.3 SCE Distribution Overhead Construction Standards

4.0 OPERATIONS

4.1 Reporting

Raptor electrocutions and power line collisions shall be reported to Environmental Affairs (EA) within 24 hours of discovery of a carcass, using the current reporting mechanism or form. Non-raptor electrocutions and collisions will be reported using the Transmission and Distribution (T&D) Morning Report. Questions concerning reporting of other electrocutions of other animals should be referred to Environmental Affairs or your local T&D Environmental Specialist for guidance.

4.2 Retrofitting of Existing Structures

Any SCE power line structure involved in the electrocution of any eagle, endangered/threatened bird species, or other raptor species will be evaluated to determine if it is raptor safe. If not, the structure will be modified within 30 business days or sooner (for eagles or listed species) to make them raptor-safe. Environmental Affairs should be notified if structures of a similar design and in similar habitat are located in the same vicinity of any electrocution. This will allow Environmental Affairs to work with T&D in determining if these other structures should also be retrofitted to be raptor safe. Structures in the area where clusters of electrocutions have occurred *(i.e.,* three or more electrocutions per USGS quad, or two or more electrocutions per circuit) should be examined for retrofitting. Environmental Affairs will work with T&D to identify these clusters, determine which poles may need to be retrofitted, and the appropriate retrofit required.

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Example 2 *(con't).*

As opportunities arise during routine operation and maintenance activities, T&D field personnel will retrofit exposed wires and surfaces, as appropriate, if they are capable of electrocuting raptors and other birds/wildlife. Retrofits may include, but are not limited to, installing approved bushing covers on transformers, insulator hoods, protective covering on jumper wires or taps, and making other modifications, as appropriate.

4.3 New Construction

All new or rebuilt power line structures within Raptor Concentration Areas (RCAs) will be of a raptor-safe construction. All new or rebuilt power line structures on land administered by the federal government (USFS, BLM, etc.) will be evaluated by T&D and Environmental Affairs to determine if it should be made raptor safe. Environmental Affairs has identified and mapped RCAs, and will provide guidance on safe designs and copies of RCA maps.

4.4 Monitoring

Environmental Affairs shall monitor raptor mortality and direct appropriate corrective action.

4.5 Nest Protection

All activity involving active nests on SCE facilities will be coordinated with Environmental Affairs and the local T&D Environmental Specialist. Prior to trimming trees, Line Clearing personnel will inspect the trees during the nesting season (January through August) for nests, and avoid any trees with active *(i.e.,* eggs or young birds present) nests. If the trees with nests present an emergency, then Environmental Affairs Land Services will be contacted. Avoiding trees is especially important in the vicinity of riparian areas (streams, creeks or other water bodies). Line Clearing personnel will make every attempt to schedule tree-trimming activity to avoid riparian areas during the nesting season.

4.6 Training

All appropriate T&D field personnel will receive training on avian protection issues annually. All appropriate T&D contractors will receive some level of training on natural resources issues and will have contractual obligations to abide by this training.

5.0 MAINTENANCE

N/A

6.0 ATTACHMENTS

N/A

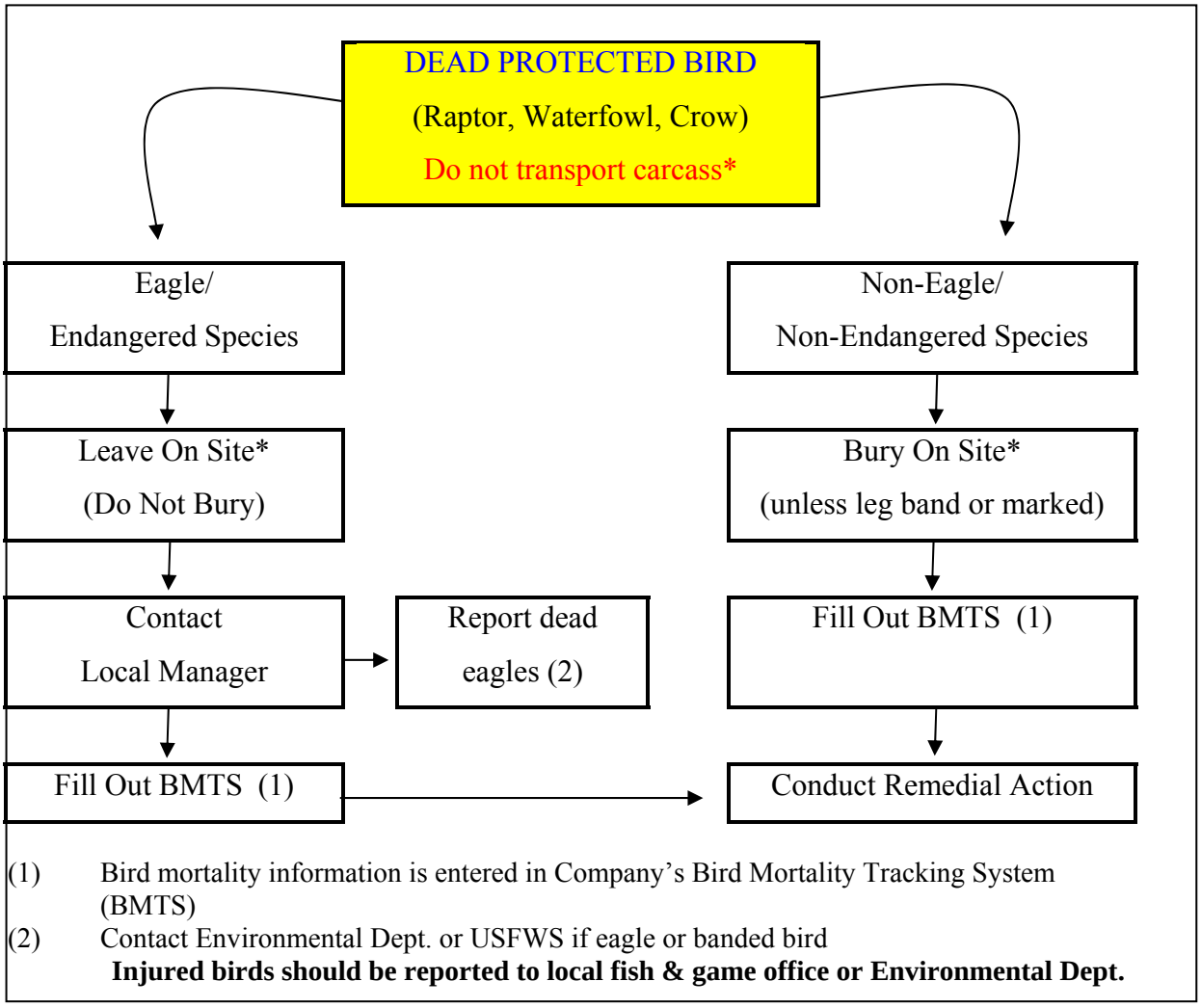
TRAINING

Training is an integral component of an APP. Workshops and short courses on avian/power line interactions are provided by APLIC (http://aplic.org) and EEI (http://eei.org). A two-hour overview of avian electrocutions and collisions intended for training use is also available through the APLIC website as part of the APP "tool box."

The following are examples of PacifiCorp and Southern California Edison training materials, including:

- Flow diagrams of company procedures for bird and nest management that can be distributed to field personnel as part of employee training.
- A brochure describing electrocution and nest issues and company raptor protection procedures.
- A brochure describing nest management procedures and protection.

Example 3. Bird mortality flow diagram based on PacifiCorp training materials.*



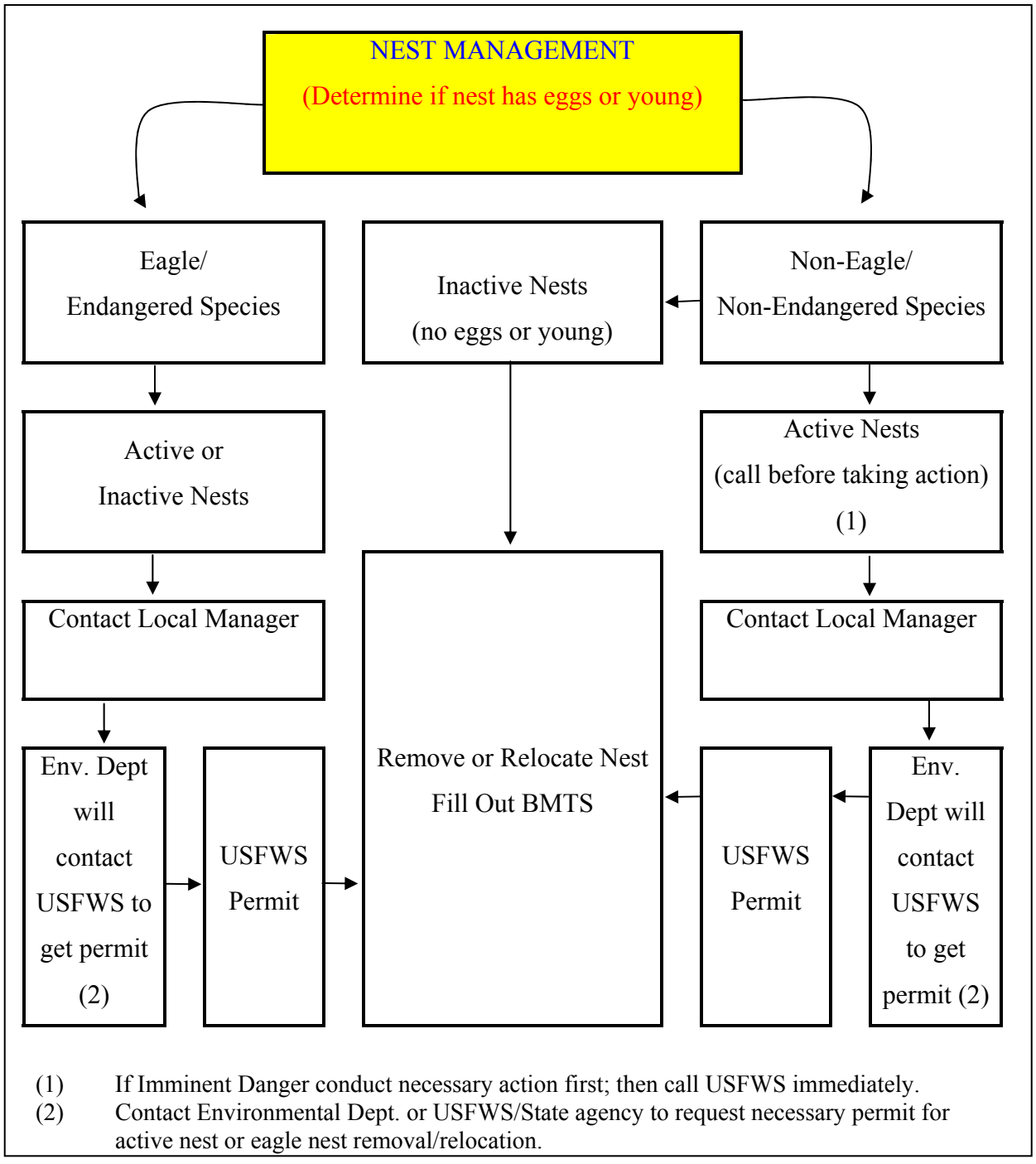
(1) Bird mortality information is entered in Company's Bird Mortality Tracking System (BMTS)

(2) Contact Environmental Dept. or USFWS if eagle or banded bird

Injured birds should be reported to local fish & game office or Environmental Dept.

* *Individual utility permits may contain different conditions regarding transport or salvage.*

Example 4. Nest management flow diagram based on PacifiCorp training materials.*



(1) If Imminent Danger conduct necessary action first; then call USFWS immediately.
(2) Contact Environmental Dept. or USFWS/State agency to request necessary permit for active nest or eagle nest removal/relocation.

* *Individual utility permits may contain different conditions regarding nest management.*

Example 5. "Raptor Protection Program" brochure, Southern California Edison.

SOUTHERN CALIFORNIA EDISON®

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RAPTOR PROTECTION PROGRAM

Raptor Protection Program Goals

Raptors, or birds of prey, are meat-eating birds that include the hawks, eagles, and owls. Most species of raptors are protected under one or more laws and/or regulations.

Edison's Raptor Protection Program is designed to:

1. Reduce impacts to raptors.
2. Ensure compliance with state and federal laws and rules and regulations protecting these species.
3. Gather and provide information from operating divisions within Edison to Environmental Affairs on facility-caused electrocutions. This information will assist Environmental Affairs in responding to regulatory agency inquiries and provide informed responses to concerns expressed by the public.
4. Assist Company biologists in identifying problem areas where raptor protection may be required. Selectively identify and install cost-effective raptor protection devices to ensure Company compliance with existing laws and regulations.
5. Help identify and isolate where bird-caused outages occur so that these can be minimized, providing higher levels of quality service to our customers.

Example 5 *(con't).*

Raptor Protection

Electrocutions

Raptors often perch or nest on transmission or distribution towers or poles. Occasionally, the birds will make accidental contact between phases or phase and ground, causing harm to or electrocuting the bird. These electrocutions are most common on distribution or subtransmission facilities where energized conductors are close together.

The number of electrocutions can be decreased by either designing the line to minimize contact between phases, or by retrofitting existing lines where necessary with a protective device that prevents this contact. Studies have demonstrated that raptors prefer certain poles for nesting and perching. By identifying these preferred poles, we can modify them, and thus greatly diminish the potential for raptor electrocutions in a cost-effective manner.

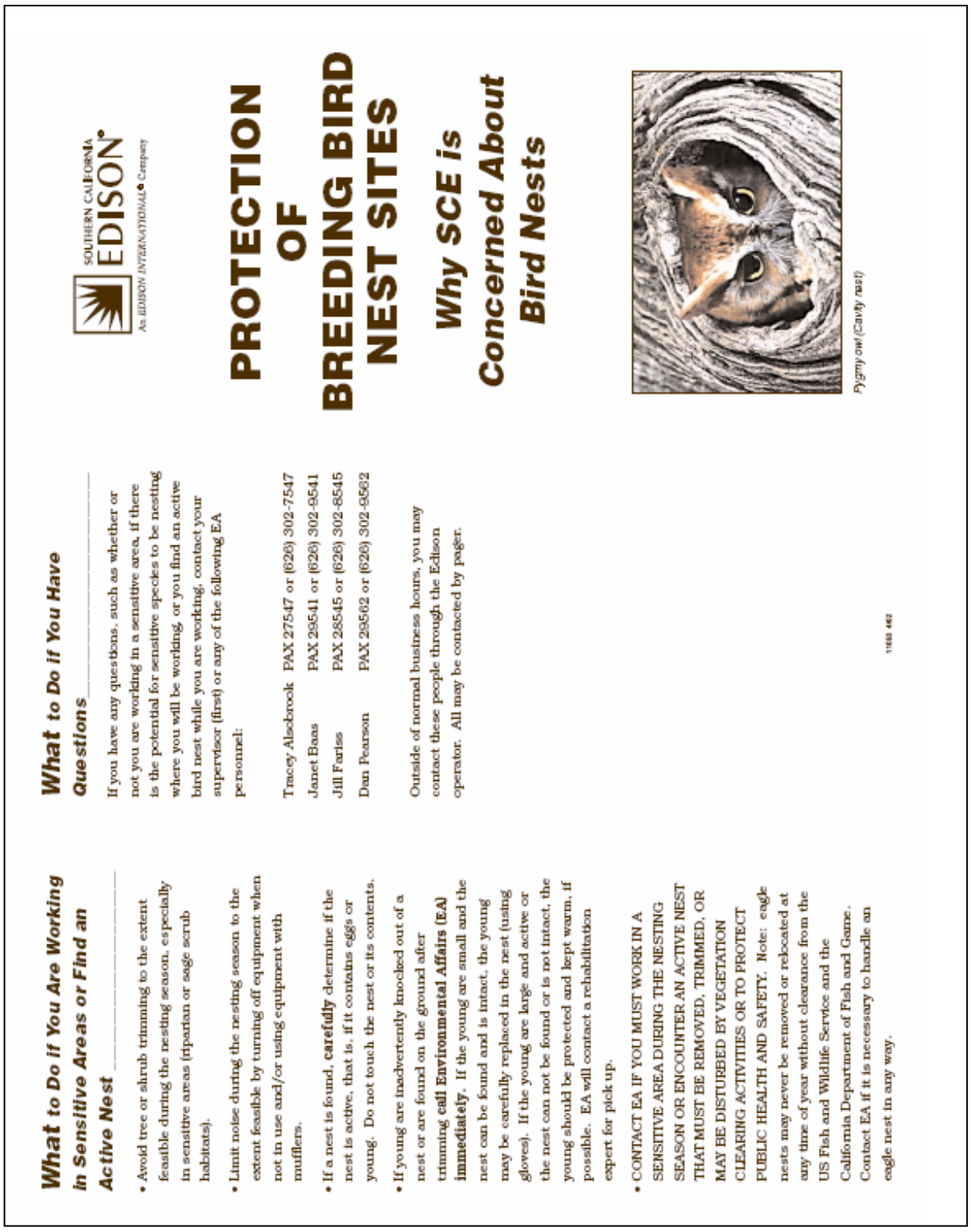
Nest Protection

In the absence of other suitable nest sites, raptors often use transmission towers and distribution poles for nesting. State and federal laws and regulations protect these nests from removal at certain times of the year without necessary permits. It is important that nests not be disturbed when eggs or young birds are in them.

Raptor Protection Program Procedures

1. All incidents of facility-related raptor mortality should be reported to your supervisor. You should then fill out the raptor mortality report form available in all district offices or from your supervisor. The completed form should be sent to Environmental Affairs in the General Office.
2. From February through June, nests should not be removed or disturbed. Under no circumstances should known eagle nests be disturbed at any time of the year.
3. If a nest is discovered during this February–June period that presents a hazardous situation for the continued safe operation of the line, try to trim the nest rather than remove it. If a nest must be removed, call Environmental Affairs. Environmental Affairs possesses or will obtain the necessary permits for removing nests.
4. If at any time you have questions regarding these procedures, please discuss them with your supervisor or call Environmental Affairs, Dan Pearson at PAX 29562, or Janet Baas at PAX 29541.

Example 6. "Protection of Breeding Bird Nest Sites" brochure, Southern California Edison.



What to Do if You Are Working in Sensitive Areas or Find an Active Nest

- Avoid tree or shrub trimming to the extent feasible during the nesting season, especially in sensitive areas (riparian or sage scrub habitats).
- Limit noise during the nesting season to the extent feasible by turning off equipment when not in use and/or using equipment with mufflers.
- If a nest is found, **carefully** determine if the nest is active, that is, if it contains eggs or young. Do not touch the nest or its contents.
- If young are inadvertently knocked out of a nest or are found on the ground after trimming **call Environmental Affairs (EA) immediately.** If the young are small and the nest can be found and is intact, the young may be carefully replaced in the nest (using gloves). If the young are large and active or the nest can not be found or is not intact, the young should be protected and kept warm, if possible. EA will contact a rehabilitation expert for pick up.
- CONTACT EA IF YOU MUST WORK IN A SENSITIVE AREA DURING THE NESTING SEASON OR ENCOUNTER AN ACTIVE NEST THAT MUST BE REMOVED, TRIMMED, OR MAY BE DISTURBED BY VEGETATION CLEARING ACTIVITIES OR TO PROTECT PUBLIC HEALTH AND SAFETY. Note: eagle nests may never be removed or relocated at any time of year without clearance from the US Fish and Wildlife Service and the California Department of Fish and Game. Contact EA if it is necessary to handle an eagle nest in any way.

What to Do if You Have Questions

If you have any questions, such as whether or not you are working in a sensitive area, if there is the potential for sensitive species to be nesting where you will be working, or you find an active bird nest while you are working, contact your supervisor (first) or any of the following EA personnel:

Tracey Alschbrook	PAX 27547 or (626) 302-7547
Janet Boas	PAX 29541 or (626) 302-9541
Jill Farliss	PAX 28545 or (626) 302-8545
Dan Pearson	PAX 29562 or (626) 302-9562

Outside of normal business hours, you may contact these people through the Edison operator. All may be contacted by pager.

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PROTECTION OF BREEDING BIRD NEST SITES

Why SCE is Concerned About Bird Nests

Pygmy owl (Cavity nest)

Example 6 *(con't).*

Virtually all birds in North America are protected by one or more state or federal laws. SCE must be in compliance with all laws and regulations protecting birds, their habitat, and nest sites. It is illegal to, among other things, pursue, hunt, harass, kill, or collect any migratory or listed bird species, including their eggs or nest. Fines and penalties, including jail, can be substantial for non-compliance.

When and Where Birds Nest

Most birds nest during the period from mid-February through August. The specific timing depends on several factors such as species of bird, its nest location (altitude and latitude), abundance of food, and weather. Birds nest in a wide variety of habitats, such as riparian areas (along streams, creeks, ponds), forests, beaches, deserts, and foothills. That is, anywhere adequate shelter and food for young can be found. Nesting sites within these habitats include trees, shrubs, holes and cavities in trees or dirt embankments, on cliff ledges, on the ground, and utility poles and towers.

Anna's hummingbird
(Tiny cup in a shrub)

Willow Flycatcher
(Small cup in willow shrubs)

Cactus wren
(Twiggy mass in cactus or yucca)

Red-tailed hawk
(Moderately large twiggy nest in tall trees or other elevated locations)

Nest sizes range from very large, obvious structures made by eagles, to very small, inconspicuous, and camouflaged ones used by hummingbirds.

Bald eagle
(Branches in large tree or on rocky outcrop)

Killdeer
(Ground nest)

Screech owl
(Cavity nest)

How to Locate and Avoid Disturbing Nesting Birds

- Be aware of when birds nest (generally mid-February through August).
- Be aware when working in especially sensitive habitats, such as riparian and sage scrub (at least partly natural areas with somewhat woody shrubs, below about 3,000 feet).
- Note any bird activity within shrubs or trees. If a bird appears agitated or reluctant to leave an area, it may indicate a nearby nest.
- Many nests are found between the ground and 10 meters high in shrubs and trees.
- Look for small dark, generally cup-shaped masses among the branches of shrubs or both small and larger masses in trees.
- Prior to trimming or cutting down trees, look for holes or cavities that may contain nests.

PERMIT COMPLIANCE

A company should work with resource agencies to determine if permits are required for their operational activities that may impact protected avian species. Particular attention should be given to specific activities that can require Special Purpose or related permits, including, but not limited to, nest relocation, temporary possession, depredation, salvage/disposal, and scientific collection.

While it is recommended that each utility developing an APP familiarize itself with the different permit types and their provisions located in 50 CFR part 21 (http://access.gpo.gov/nara/cfr/waisidx_03/50cfr21_03.html), it is highly recommended that the utility make initial contact with the Migratory Bird Permit Examiner located in the USFWS Region where the utility is specifically planning to implement its APP. The Migratory Bird Permit Offices in each of the USFWS's seven Regions are listed on pages 69 and 70 of the Key Resources section.

To acquire a permit application, contact the Migratory Bird Permit Office in the Region where your business is headquartered or in the Region (if it is different) where you propose to implement your APP. Information about Regional boundaries can be accessed at htpp://permits.fws.gov/mbpermits/birdbasics.html then click on Regional Bird Permit Offices, for locations and addresses (listed on pages 69 and 70 in the Key Resources section).

State permits may also be required to manage protected bird nests or for temporary possession of avian species. Specific information on required permits should be obtained from your State resource agency (see Key Resources, pages 76-78, for State agency contacts). Both State and Federal agencies should be consulted as you develop your APP.

Migratory Bird Treaty Act and Migratory Bird Permits

USFWS Regional offices administer permits for qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, rehabilitation, conservation education, migratory game bird propagation, salvage, take of

depredating birds, taxidermy, and waterfowl sale and disposal. These offices also administer permit activities involving bald and golden eagles, as authorized by the BGEPA.

The MBTA makes it illegal for anyone, including individuals, companies, or agencies, to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except (1) under the terms of a valid permit issued pursuant to Federal regulations or (2)under the terms of a regulation not requiring a permit. The migratory bird species protected by the Act are listed in 50 CFR 10.13 (this list is available online at http://migratorybirds.fws.gov/intrnltr/mbta/mbtintro.html).

Migratory bird permit policy is developed by the Division of Migratory Bird Management and the permits themselves are issued by the Regional Migratory Bird Permit Offices. The regulations governing migratory bird permits can be found in 50 CFR part 13, General Permit Procedures (http://access.gpo.gov/nara/cfr/waisidx_03/50cfr13_03.html) and 50 CFR part 21, Migratory Bird Permits (http://access.gpo.gov/nara/cfr/waisidx_03/50cfr21_03.html).

Bald and Golden Eagle Protection Act and Eagle Permits

The two species of eagles that are native to the United States have additional protection under the BGEPA. Under the Act, USFWS issues permits to take, possess, and transport bald and golden eagles for scientific, educational, and Indian religious purposes, depredation, and falconry (golden eagles). No permit authorizes the sale, purchase, barter, trade, importation, or exportation of eagles, or their parts or feathers. The regulations governing eagle permits can be found in 50 CFR part 13, General Permit Procedures (http://access.gpo.gov/nara/cfr/waisidx_03/50cfr13_03.html) and 50 CFR part 22, Eagle Permits (http://access.gpo.gov/nara/cfr/waisidx_03/50cfr22_03.html).

Federally Listed Species (Endangered Species Act)

To obtain a list of all federally-listed (threatened and endangered) birds, or all federally-listed fauna and flora, consult 50 CFR part 17.11. This list is available online at http://endangered.fws.gov/wildlife.html.

Where power companies propose to construct power generation, transmission, or related equipment on Federal lands, the federal land management agency must first consult under Section 7 of the ESA with USFWS. Before initiating an action, the Federal action agency (the agency authorizing a specific action) or its non-Federal permit applicant (the power company), must ask USFWS for a biological opinion (if a listed species could be impacted) and to provide a list of threatened, endangered, proposed, and candidate species and designated critical habitats that may be present in the project area. USFWS has developed a handbook describing the consultation process in detail, which is available at http://endangered.fws.gov/consultations.

When non-Federal activities (activities not on Federal lands and/or lacking a Federal nexus such as Federal funding) could result in a take of threatened or endangered species, an incidental take permit is required under Section 10 of the ESA. Some states may also have regulations that require issuance of permits or development of conservation plans. The standards for approval of an incidental take permit are found in section 10 of the ESA. Approval of an incidental take permit issued in conjunction with a Habitat Conservation Plan (HCP) requires the Secretary of Interior to find, after an opportunity for public comment, that among other things, the taking of ESA species will be incidental and that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking. An HCP must accompany an application for an incidental take permit. The HCP associated with the permit is to ensure that there are adequate conservation measures to avoid jeopardy to the species. Information about consultations and HCPs can be obtained from the nearest USFWS Ecological Services Field Office, generally located in each state. A list of those offices and their phone numbers can be accessed at http://info.fws.gov/pocketguide.

CONSTRUCTION DESIGN STANDARDS*

In certain habitats that have power equipment and the potential for avian interactions, the design and installation of new facilities, as well as the operation and maintenance of existing facilities should be bird friendly. Inclusions of accepted construction standards for both new and retrofit techniques are highly recommended for inclusion in an APP. Companies can either rely upon construction design standards found in APLIC's *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* and *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*, or the most current editions of these documents, or may choose to develop their own internal construction standards that meet or exceed these guidelines. These standards should be used in areas where new construction should be avian-safe, as well as where existing infrastructure needs to be retrofitted. An APP bird policy may require that all new or rebuilt lines in identified avian use or problem areas be built to current safe standards. Implementing avian-safe construction standards in such areas will reduce future legal and public relations problems and enhance service reliability.

New Construction

Distribution, transmission and substation construction standards must meet National Electric Safety Code (NESC) requirements and should provide general information on specialized construction designs for avian use areas. Avian-safe construction, designed to prevent electrocutions, must provide conductor separation of 60 inches between energized conductors and grounded hardware, or must cover energized parts and hardware if such spacing is not possible. Some common examples of avian-safe construction and retrofit techniques to reduce electrocution risks are presented in this section. Additional information can be found in *Suggested Practices for Raptor Protection on Power Lines.*

In areas where birds frequently collide with conductors/ground wires, or where

* Only examples of common structure configurations are presented in these Guidelines. See current edition of *Suggested Practices* for additional configurations and recommendations.

agencies are concerned about the safety of protected birds (*e.g.*, near wildlife refuges), appropriate siting and placement of lines will reduce the likelihood of collisions. When possible, avoid siting lines in areas where birds concentrate (*e.g.*, wetlands, stream crossings, historic staging areas, roosts, and nesting colonies) and take advantage of vegetation or topography that naturally shields birds from colliding with the wires (*e.g.*, placement next to cliffs or trees). If this is not possible, installing visibility enhancement devices can reduce the risk of collision on new or existing lines (see pages 43-44). These devices include marker balls, bird diverters, or other line visibility devices placed in varying configurations, depending on the line design and location. The effectiveness of these devices has been validated by Federal and State agencies and independent researchers in conjunction with APLIC. Additional information may be found in *Mitigating Bird Collisions with Power Lines.* In some situations, the additional costs and reliability risk of under grounding a section of line may be justified.

Modification of Existing Facilities

Modification of existing facilities is necessary when dead and/or injured protected birds are found, where high-risk lines are identified, or concerns of legal compliance are at issue. A "problem pole" is one where there has been a documented avian collision, electrocution, problem nest material or where there is a high risk of an avian mortality. The need for this remedial action may result when "problem poles" are identified through bird mortality records or field surveys, or when the company is notified by agency representatives or concerned customers. System reliability concerns due to bird interactions may also result in requests from field operations staff. Retrofitting to prevent electrocutions could include: 1) covering jumper wires, conductors and equipment; 2) discouraging perching in unsafe areas; 3) reframing; or 4) replacing a structure.

The objectives of remedial action are to:

1. Prevent or reduce avian mortality and outages related to bird electrocutions, collisions, or nests;

2. Provide 60-inch minimum horizontal separation between energized conductors and/or energized conductors and grounded hardware;
3. Insulate hardware or conductors against simultaneous contact if adequate spacing is not possible;
4. Discourage birds from perching in unsafe locations;
5. Provide safe alternative locations for perching or nesting; or
6. Increase the visibility of conductors or shield wires to prevent avian collisions.

Site-Specific Plans

The factors that create a hazard for birds near power lines are complex and often site-specific. Therefore, the most efficient solution for correcting a problem line is a site-specific plan that satisfies unique local conditions (*i.e.*, topography, avian populations, prey populations, land use practices, line configuration, adjacent wetlands, historical bird use areas, etc.). The plan is comprised of recommendations for the most appropriate remedial action to the poles or lines causing the problem, and should include a timetable for job completion. When a problem area or line is identified, a site meeting may be conducted with engineering and operations personnel to provide guidance on line modifications, and with company biologists or consultants to provide input on biological aspects of the affected species. The timeframe for action will be based on agency requests, public relations, budget, logistical and manpower constraints, as well as biological considerations that affect species vulnerability. The application of remedial measures to a few "problem poles" or spans can reduce problems over a wide area.

Electrocutions: Avian-Risk Designs

This section provides information about designs which have historically caused avian electrocution problems. These designs should be avoided in known raptor or other protected bird use areas and rural sites.

Most lines that electrocute raptors or other large birds are primary distribution lines. Problems occur most often when:

1. The distance between conductors is less than the wingspan or height of a landing or perching bird (see Figure 3).
2. Hardware or equipment cases are grounded and are in close proximity to energized conductors, energized parts or jumper wires (see Figure 4).

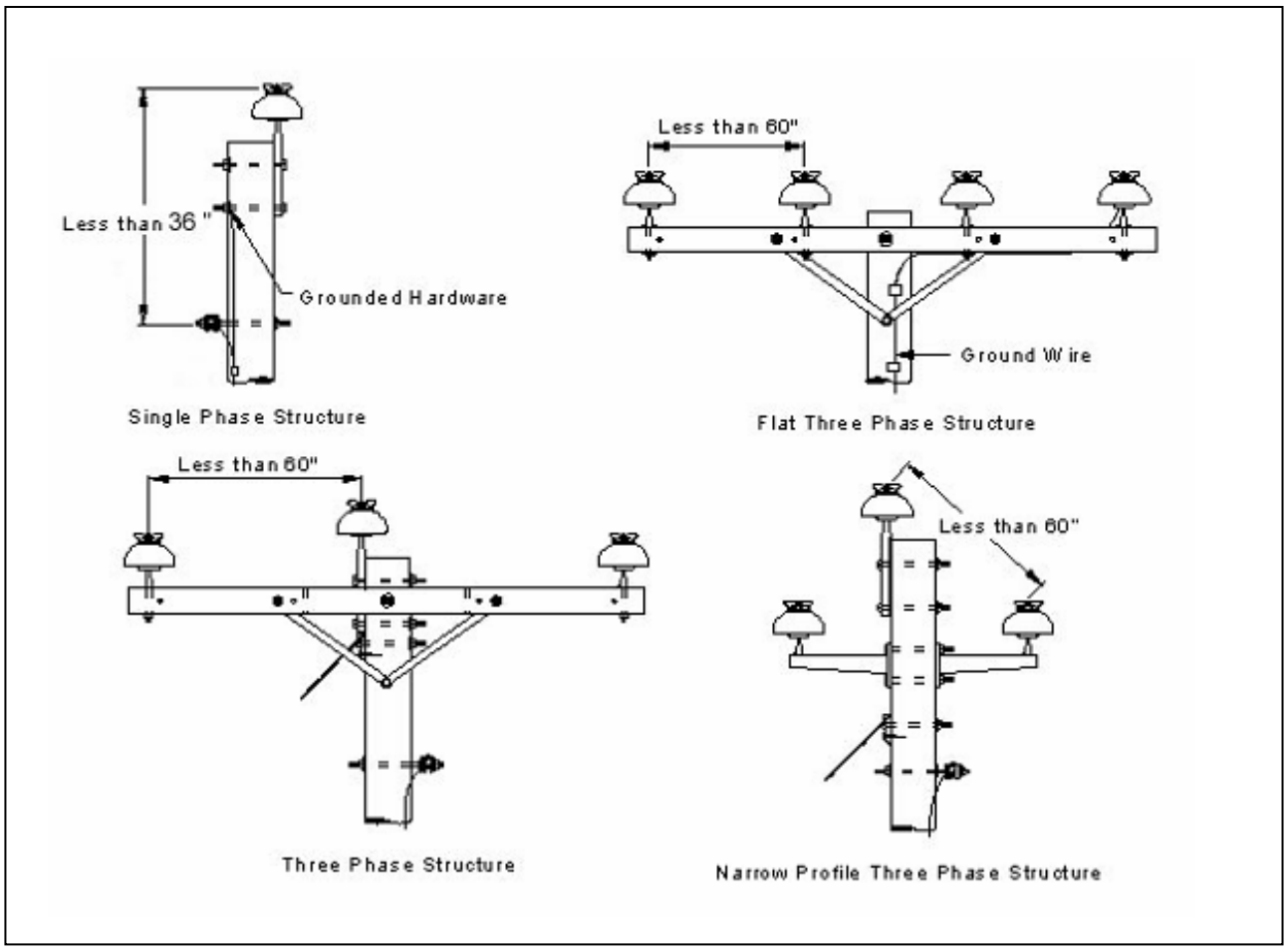


Figure 3. Typical avian-risk structures.

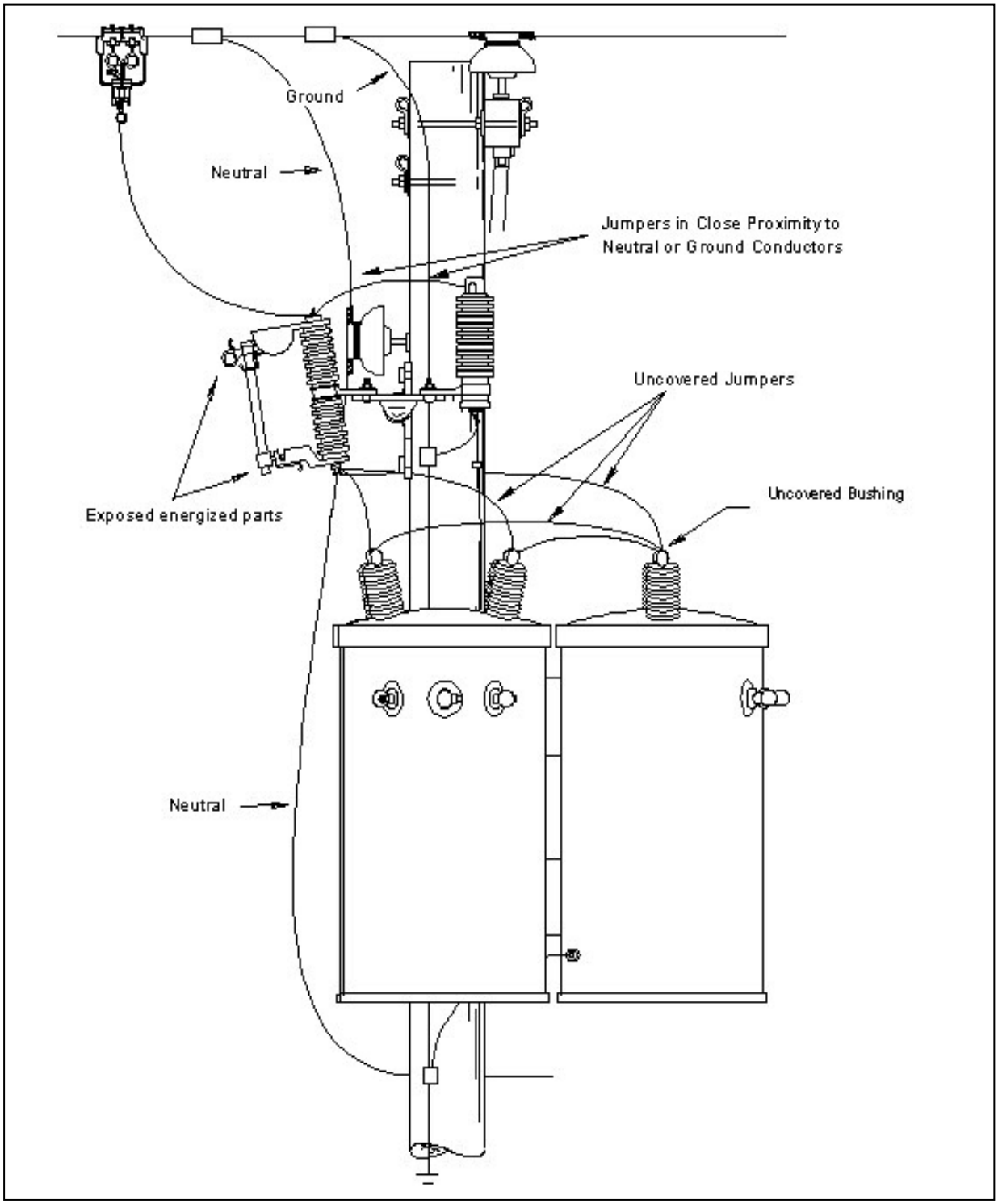


Figure 4. Typical avian-risk equipment structure.

This section provides information on designs and criteria for constructing new lines or rebuilding existing lines to avian-safe standards.

Proper Design of New Facilities

The following dimensions for primary structures are intended for use in areas with populations of raptors or other large birds or in rural sites (areas outside city limits or beyond incorporated areas with commercial or residential development). Nonetheless, avian-safe construction should be considered to improve system reliability and avian protection whenever it does not conflict with other considerations. When a new line or extension is designed, avian-safe standards for construction of the distribution system should be followed (see Figures 5 and 6 for typical safe designs).

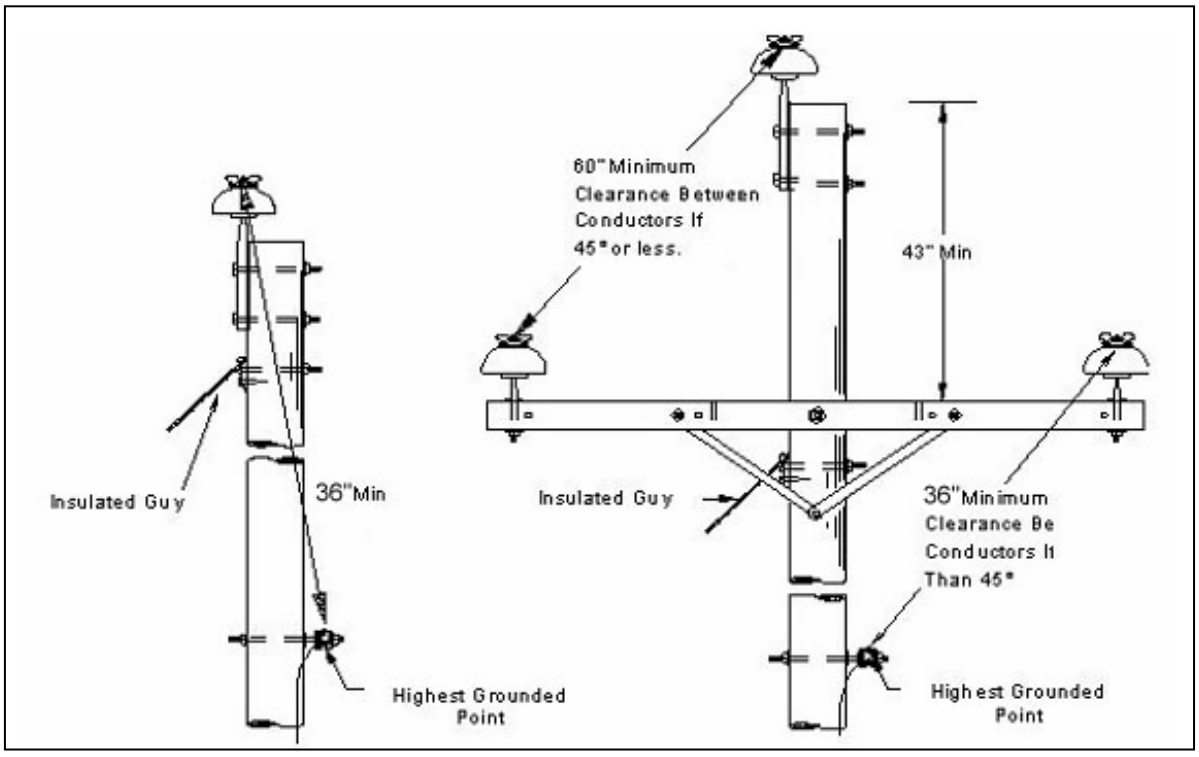


Figure 5. Typical avian safe structures: single phase (left), three-phase with lowered 8-foot crossarm (right).

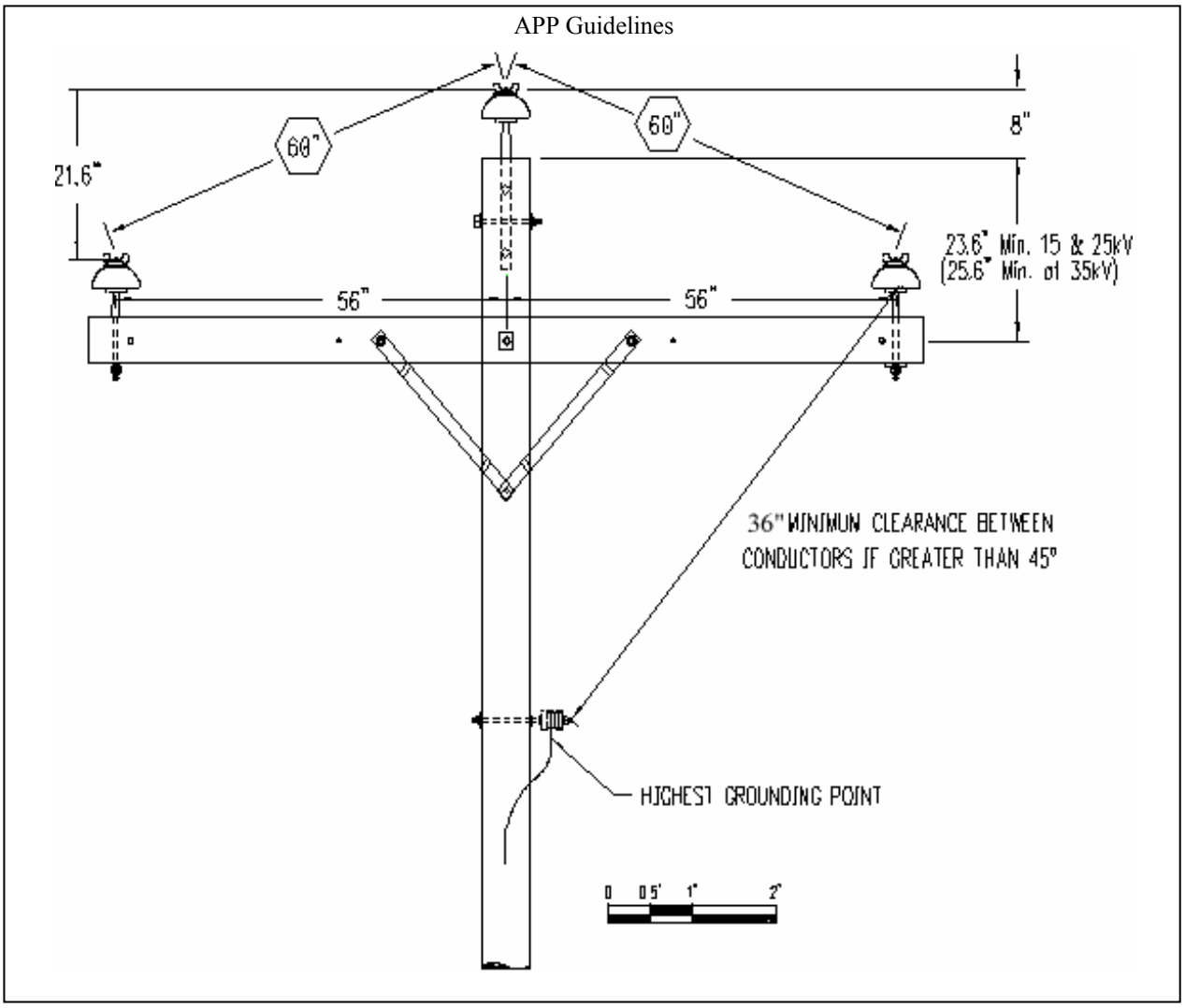


Figure 6. Typical three–phase avian-safe structure with 10–foot crossarm.

On single phase structures, a minimum vertical separation of 36 inches from phase to ground is needed to safely accommodate eagles and most wading birds (Figure 5). On three phase structures, a vertical clearance of at least 43 inches between un-insulated conductors, ground wires and grounded hardware on poles with 8-foot crossarms will provide the 60-inch required clearance (Figure 5). Separation can be accomplished by lowering crossarms and neutral attachments, or if vertical space is not available, an 8–foot crossarm can be replaced with a 10–foot arm (see Figure 6). If there is not enough pole height to drop the crossarm, a 10-foot crossarm can be the economical choice. Structural strength of the longer arm must be considered if the arm is replaced. Also, narrow rights-of-way may dictate the horizontal width of a crossarm, possibly requiring more pole height to achieve avian-safe spacing. Regardless of the configuration, hardware should not be grounded above the neutral position.

An alternate method for ensuring separation of energized conductors is to use vertical construction (see Figure 7). This is not the preferred method of separation, since considerable pole height is required to attain adequate clearance, making this an expensive solution. However, it may be useful in some situations, such as turning corners, where normal separation methods are not possible.

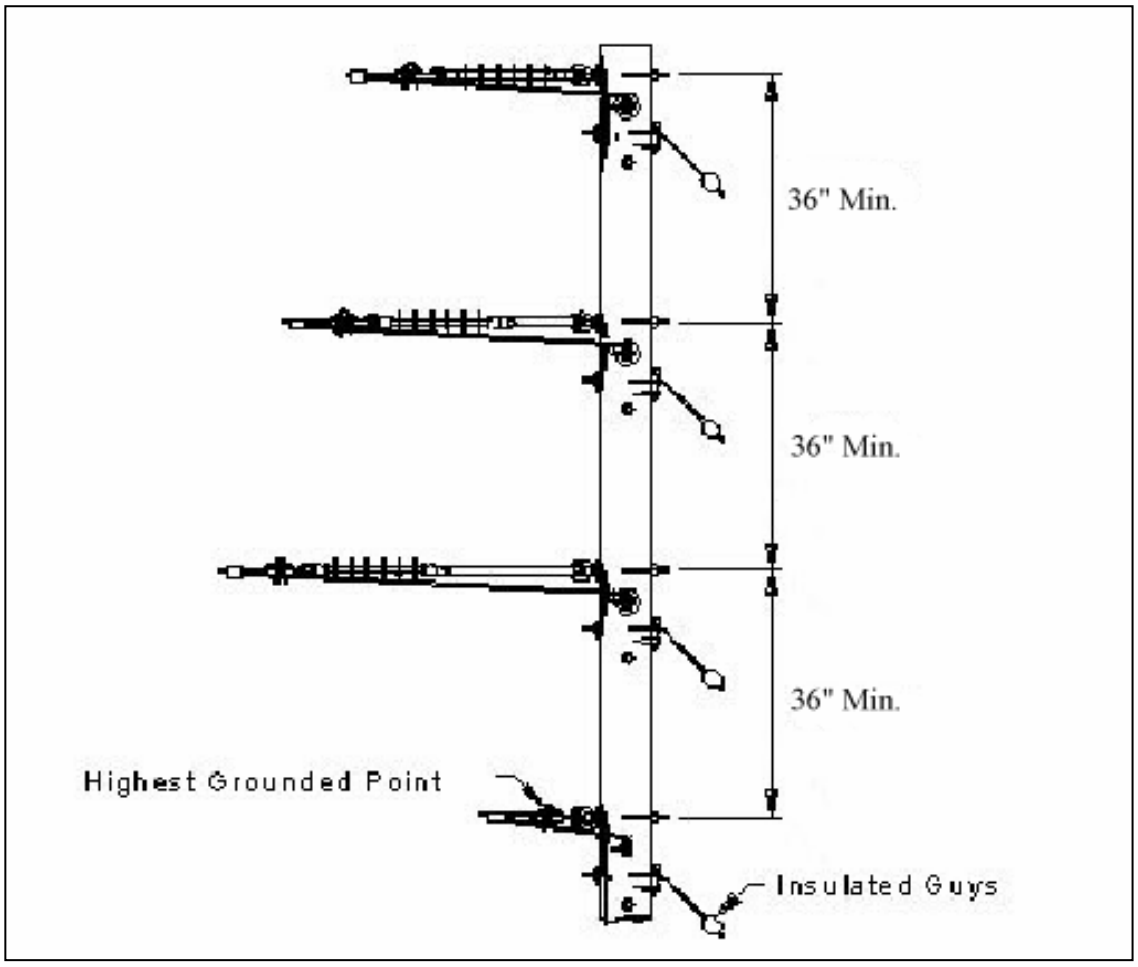


Figure 7. Typical avian-safe three-phase vertical corner configuration.

Modification of Existing Structures

On existing structures where raptors or other large birds have been electrocuted or injured, the preferred remedial measure is to provide 60–inch separation between energized conductors. Reframing using a 10–foot crossarm which allows 60–inch separation between conductors may be a suitable alternative to pole replacement.

However, pole replacement utilizing a safe design may be required on poles where bird mortalities have been documented and other safe modifications are not feasible due to pole height or condition.

Other remedial options include covering conductors and equipment or installing bird perch guards (triangles) or triangles with perches. These options do not offer total protection for birds, but may greatly reduce the chance of avian electrocutions. These options should be used when separation of the conductors is not possible, or where equipment is on the pole.

Perches and Guards

If conductor separation cannot be achieved and covering or reframing is impractical, perch guards (triangles) with optional perches may be used for large perching bird protection (Figure 8). Since raptors will often perch on the highest vantage point, the installation of perch guards between closely-spaced conductors and the placement of perches above existing arms and conductors may keep a bird from contacting energized parts or wires. Perches may not be effective when used without perch guards. Perches and guards, when properly installed, are not an absolute solution, but they do reduce the risk to birds. Ideally, when a perch guard is installed, an alternative, safe perch site should be provided. The open part of the crossarm, as shown in Figure 8, could serve as such a site. Perch guards are generally 18 to 22 inches wide and should not be used when conductor spacing is greater than 32 inches. When spacing is between 32 and 60 inches, use an insulator cover (see Figure 9) instead of a triangle or perch. Protective equipment should not be installed when conductors are more than 60 inches apart.

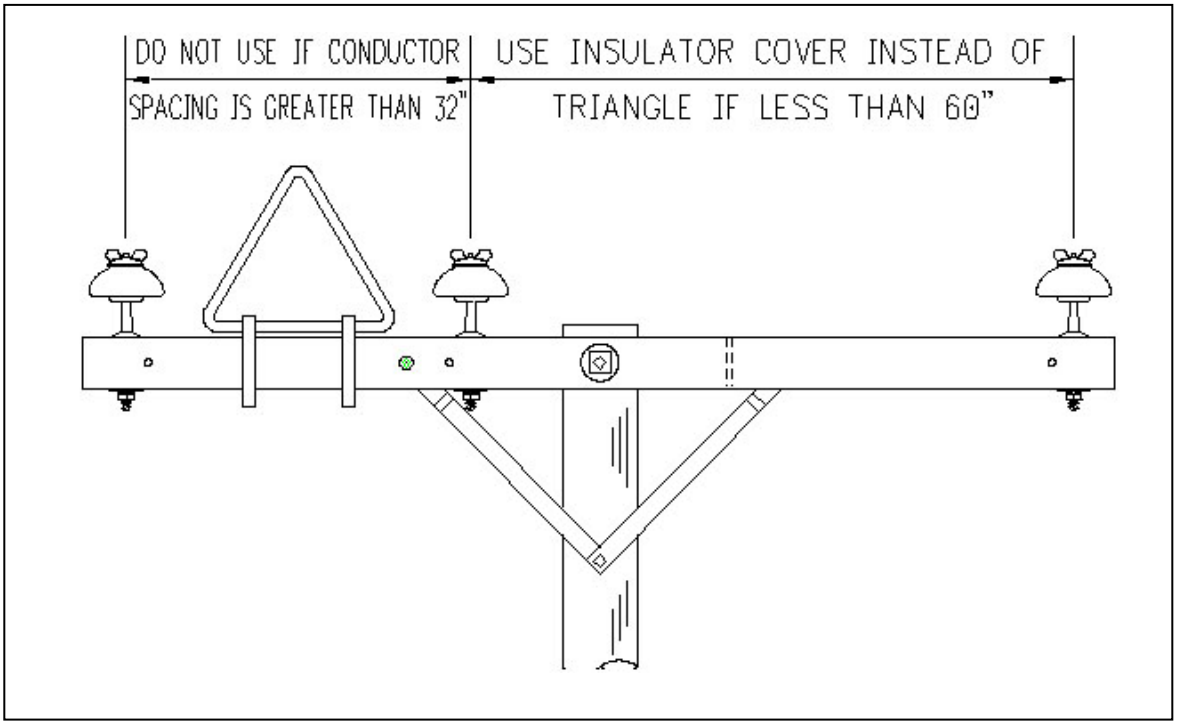


Figure 8. Properly installed perch guard.

Covering Conductors

Where adequate separation of conductors, or conductors and grounded parts, cannot be achieved, covering conductors may be the only solution short of reframing or replacing structures. Covering material should be used to cover both the conductor and the insulator. On three phase structures, the cover should extend a minimum of three feet from the pole top pin insulator (see Figure 9). Occasionally, on double circuits or distribution underbuild, a smaller (32 to 36-inch) one–piece cover may be used in areas where eagles or other large birds are absent. There are many manufactures of insulator covers. Insulator covers are similar to the temporary cover-ups used to protect crews working on energized lines. ***However, the products should not be used for human protection or considered as insulation.***

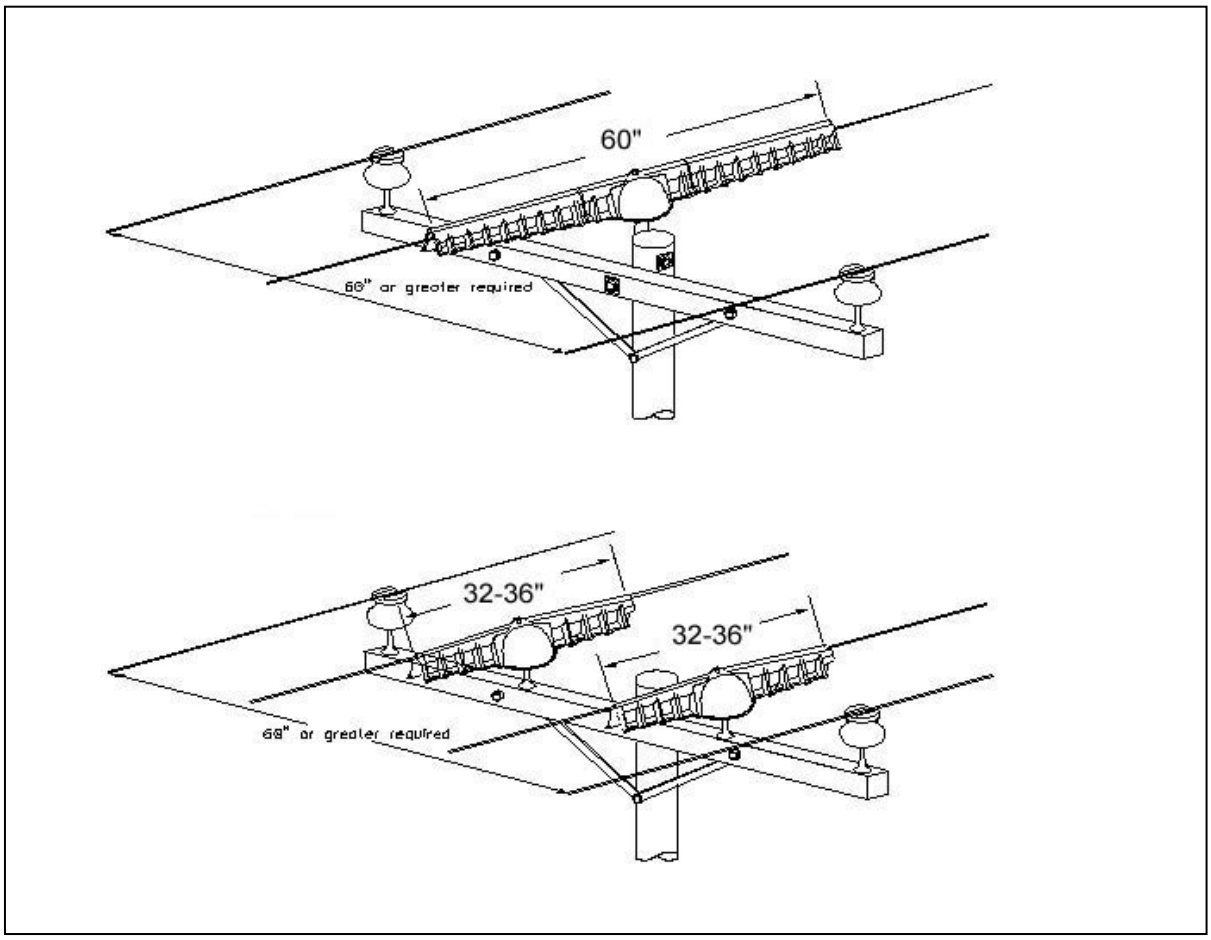


Figure 9. Conductor and insulator covers.

Covering Equipment Parts

If transformers, cutouts or other energized or grounded equipment are present on the structure, jumpers, cutouts and bushings should be covered to decrease the chance of a bird electrocution (Figure 10). For jumper wires, use a bird jumper wire guard, cover-up hose or insulated power cable. For cutouts, various covers are available to fit different sizes and styles of cutouts. For bushings, use a bushing guard that provides the protection needed. (*Note* - Your APP should include specifications on materials your utility will accept).

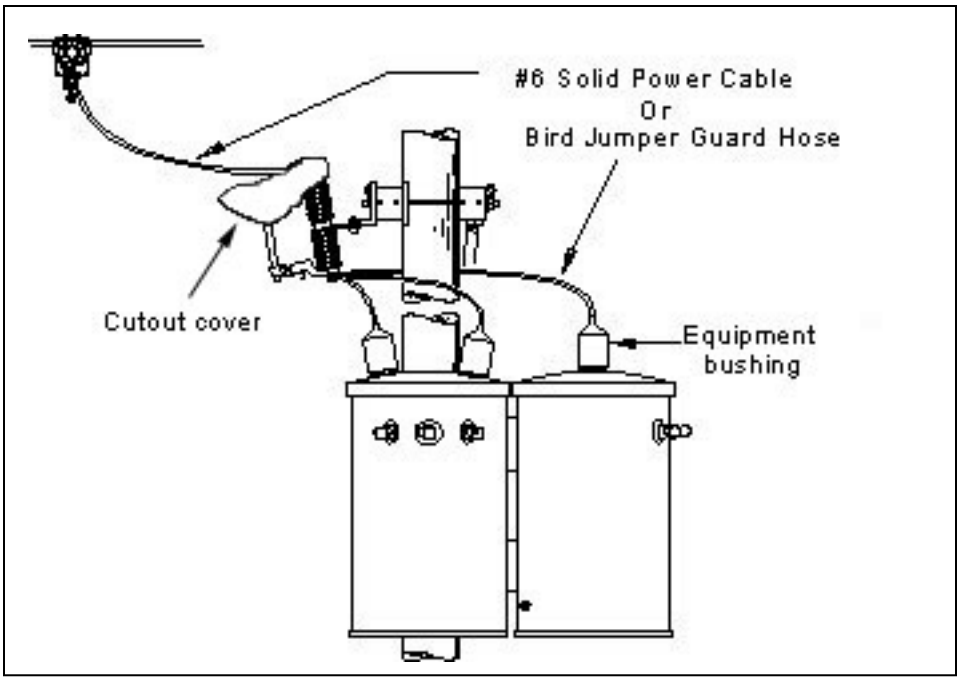


Figure 10. Hose and bushing caps.

Collisions: Bird Protection

The proximity of a line to high bird-use areas, vegetation that may attract the birds, and topographical features that affect local and migratory movements should be considered when determining the extent of necessary remedial action or when siting a new line. Avoiding construction of new lines in areas of high bird use may be the best way to prevent or minimize collision issues.

On existing lines, the risk of collision may be reduced or eliminated by burying or relocating the line, reconfiguring the line, removing the overhead ground wire, or marking the line to increase visibility. Because in most instances remediation of only a few spans will eliminate the problem, burying, relocating or reconfiguring the line are not cost-effective solutions. Removal of the overhead ground wire may not be feasible due to operational or safety concerns. However, research indicates that marking the shield wire (transmission lines) or conductors (distribution lines) to increase visibility significantly reduces the incidence of avian collisions.

Marker balls, swinging markers, bird flight diverters, or other similar devices are commercially available products designed to increase the visibility of overhead wires to

birds. Examples of one type of swinging marker and a bird flight diverter are shown in Figure 11. While some older clamping devices could damage lines, some of the newer devices have been designed to prevent damage to lines.

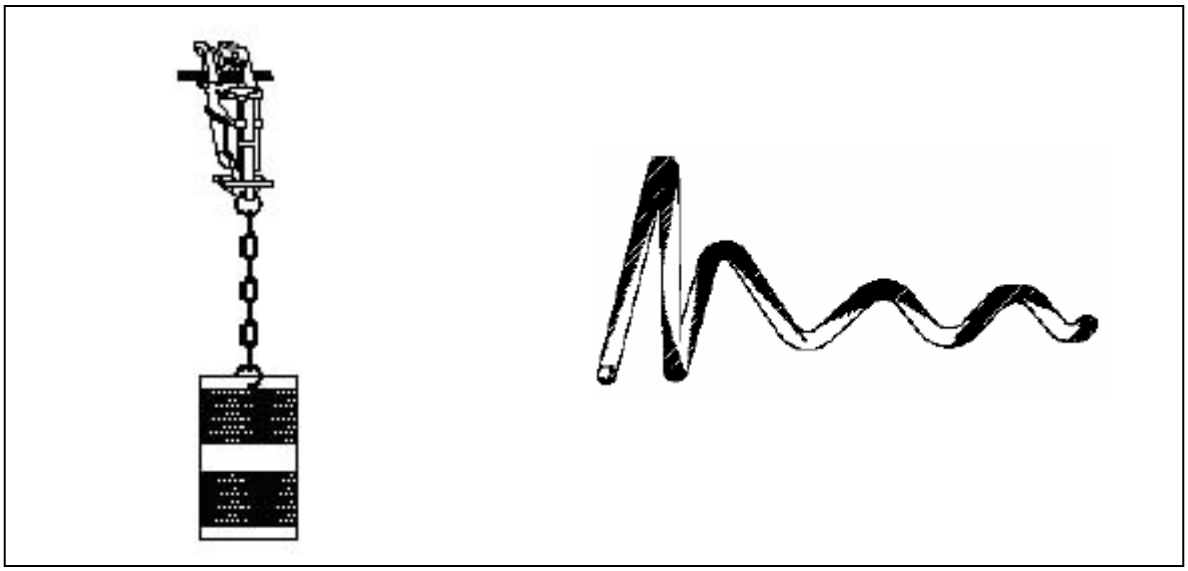


Figure 11. Swinging marker device (left) and bird flight diverter (right).

NEST MANAGEMENT

Raptors, and some other avian species, benefit from the presence of power lines by utilizing distribution poles and transmission structures for nesting. Although electrocution of birds that nest on transmission towers is infrequent, bird nests can cause operational problems. Removal of nests generally does not solve the problem because most species are site-tenacious and rebuild shortly after the nest material is removed. There are also regulatory and public relations components to nest removal (see Permit Compliance section for information on nest-related permits). Further, companies may experience public relations benefits by providing safe nesting locations. All active nests (eggs or young present) of designated migratory birds are protected by the Migratory Bird Treaty Act. A permit issued by USFWS may be required before managing an active nest. If a problem with a specific nest is anticipated, permit requirements may be avoided by removing the nest or taking the appropriate action during the non-breeding season while it is inactive (excluding eagles and endangered/threatened species). The breeding season and dates when nests may be active varies by location and species, but for most North American raptors falls between February 1 and August 31. However, a nest is considered active only when eggs or young are present. If there are questions whether a problem nest is active or inactive, company environmental staff, USFWS, or State wildlife agencies should be consulted.

A memorandum from USFWS on nest management and nest destruction is provided in Figure 12 (page 47). This document can also be accessed online at http://permits.fws.gov/mbpermits/PoliciesHandbooks/MBPM-2.nest.PDF.

Nesting platforms have proven to be valuable tools in dealing with problem nests, both in terms of reducing outages and increasing positive publicity. Nesting platforms are generally needed more often for problem nests on distribution poles (because of closely spaced conductors) than for those on transmission towers. Platforms provide for the needs of the birds, while preventing electrocutions and electrical outages. Artificial nesting substrates in a variety of designs are often accepted by nesting raptors, especially ospreys. Because birds usually tend to stay at the pole where the initial nesting attempt occurs, a nesting platform should be placed nearby on a new, non-energized pole and

perch discourager(s) installed on the existing structure. The new nest platform pole should be as tall as or taller than the existing pole and should be placed adjacent to or near the existing pole with the problem nest. In some cases a new pole cannot be installed so a nest platform can be mounted above the crossarm. Mounting a nest platform above energized equipment is not encouraged because birds are likely to drop nest materials that could cause a fire or outage. Nest discouragers should be erected on the original nest pole to prevent birds from rebuilding. The existing nest, or other nesting material, should be relocated to the new platform to attract the birds. Nest platforms are commercially available or can be constructed with materials on hand such as wire spool ends or wooden pallets. In addition, volunteers can be solicited to construct nest platforms. Dimensions for a raptor nest platform are provided in the Avian Enhancement Options section (see Figure 14 on page 65). Additional designs can be found in *Suggested Practices.*

There may be times when nesting should be discouraged to prevent avian electrocutions or risks to electrical equipment. Concerns of local customers should be considered and proper placement of perch discouragers is important. Plastic or metal spike discouragers are not recommended to prevent nesting because they may actually provide a nest substrate attachment point for some species. PVC or fiberglass material perch discouragers, mounted on the crossarm, will usually prevent the placement of nesting material. See *Suggested Practices* for additional recommendations on nest deterrents.

Figure 12. USFWS memo on migratory bird nest destruction.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Washington, D C 20240
MBPM-2
Date: APR 15, 2003

MIGRATORY BIRD PERMIT MEMORANDUM

SUBJECT: Nest Destruction

PURPOSE: The purpose of the memorandum is to clarify the application of the Migratory Bird Treaty Act (MBTA) to migratory bird nest destruction, and to provide guidance for advising the public regarding this issue.

POLICY: The MBTA does not contain any prohibition that applies to the destruction of a migratory bird nest alone (without birds or eggs), provided that no possession occurs during the destruction. To minimize MBTA violations, Service employees should make every effort to inform the public of how to minimize the risk of taking migratory bird species whose nesting behaviors make it difficult to determine occupancy status or continuing nest dependency.

The MBTA specifically protects migratory bird nests from *possession, sale, purchase, barter, transport, import,* and *export,* and *take.* The other prohibitions of the MBTA - *capture, pursue, hunt,* and *kill* - are inapplicable to nests. The regulatory definition of *take,* as defined by 50 CFR 10.12, *means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt hunt, shoot, wound, kill, trap, capture, or collect.* Only *collect* applies to nests.

While it is illegal to collect, possess, and by any means transfer possession of any migratory bird nest, 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. The MBTA does not authorize the Service to issue permits in situations in which the prohibitions of the Act do not apply, such as the destruction of unoccupied nests. (Some unoccupied nests are legally protected by statutes other than the MBTA, including nests of threatened and endangered migratory bird species and bald and golden eagles, within certain parameters.)

However, the public should be made aware that, while destruction of a nest by itself is not prohibited under the MBTA, nest destruction that results in the unpermitted take of migratory birds or their eggs, is illegal and fully prosecutable under the MBTA.

Due to the biological and behavioral characteristics of some migratory bird species, destruction of their nests entails an elevated degree of risk of violating the MBTA. For example, colonial nesting birds are highly vulnerable to disturbance; the destruction of unoccupied nests during or near the nesting season could result in a significant level of take. Another example involves ground nesting species such as burrowing owls and bank swallows, which nest in cavities in the ground, making it difficult to detect whether or not their nests are occupied by eggs or nestlings or are otherwise still essential to the survival of the juvenile birds. The Service should make every effort to raise public awareness regarding the possible presence of birds and the risk of violating the MBTA, the Endangered Species Act (ESA), and the Bald and Golden Eagle Protection Act (BGEPA), and should inform the public of factors that will help minimize the likelihood that take would occur should nests be destroyed (i.e., when active nesting season normally occurs).

The Service should also take care to discern that persons who request MBTA permits for nest destruction are not targeting nests of endangered or threatened species or bald or golden eagles, so that the public can be made aware of the prohibitions of the ESA and the BGEPA against nest destruction.

In situations where it is necessary (i.e., for public safety) to remove (destroy) a nest that is occupied by eggs or nestlings or is otherwise still essential to the survival of a juvenile bird, and a permit is available pursuant to 50 CFR parts 13 and 21, the Service may issue a permit to take individual birds.

Steve Williams
Director

AVIAN REPORTING SYSTEM

USFWS Avian Mortality Reporting System

USFWS attempted in the 1970's, and again within the last few years, to estimate bird strike and electrocution mortality caused by power lines and utility structures nationwide. These estimates have been based on actual counts, extrapolations from industry, other data, and estimates based on the best information available. However, they cannot be considered conclusive, since a comprehensive nationwide study has not yet been conducted on power structures and their overall impacts on bird populations.

The former US Bureau of Sport Fisheries and Wildlife (now USFWS) published a one-time summary of bird mortality in 1979, entitled, *Human Related Mortality of Birds in the United States* (Banks 1979[1]). The report estimated annual avian mortality from varying causes between 1966 to 1972, mentioning strikes with electrical transmission wires as likely low at that time, while raising concerns about electrocutions from power transmission lines (now defined as power distribution lines) and electric fences (Banks 1979). Unfortunately, no updated mortality summary broadly encompassing hunting, scientific collecting, automobile collisions, communication tower strikes, picture window strikes, lead poisoning, electrocutions and power line strikes has been published more recently by USFWS. USFWS has published several papers on more current estimates of avian mortality, including estimates for power line strikes and electrocutions (Manville 2001a[2], 2001b[3], 2004[4]), but these publications are nowhere as comprehensive as the Banks (1979) paper. John Bridges of the Western Area Power Administration (Bridges

[1] Banks, R.C. 1979. Human related mortality of birds in the United States. U.S. Fish & Wildlife Service, National Fish and Wildlife Lab, Special Scientific Report -- Wildlife No. 215:1-16. GPO 848-972.

[2] Manville, A.M., II. 2001a. The ABCs of avoiding bird collisions at communication towers: next steps. Pp 85-103 in R.L. Carlton (editor). Avian interactions with utility and communication structures. Proceedings of a workshop held in Charleston, South Carolina, December 2-3, 1999. EPRI Technical Report, Concord, CA. 343 pp.

[3] Manville, A.M., II. 2001b. Avian mortality at communication towers: steps to alleviate a growing problem. Pp 75-86 in B.B. Levitt (editor). Cell towers -- wireless convenience? or environmental hazard? Proceedings of the "Cell Towers Forum," state of the science/state of the law, December 2, 2000, Litchfield, Connecticut. New Century Publishing 2000, Markham, Ontario. 348 pp.

[4] Manville, A.M., II. 2004. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science -- next steps toward mitigation. Bird Conservation Implementation in the Americas; Proceedings 3rd International Partners in Flight Conference 2002. C.J. Ralph and T.D. Rich, Editors USDA Forest Service GTR- PSW-191, Albany, CA 14 pp. In press.

2002 and 2003, personal communication) has provided annual summaries for avian strike mortality at a power transmission line across the Audubon National Wildlife Refuge, ND. That information, however, is site- and project-specific. The Division of Migratory Bird Management (DMBM) maintains a mortality fact sheet (prepared and periodically updated by Al Manville for public dissemination), but it is not comprehensive.

Utility Bird Mortality Tracking System

An important part of an APP is a utility's system for documenting bird mortalities and nest management activities. This system should be designed to meet the needs of the specific utility and be compatible with other data management and analysis programs. The system could utilize paper forms such as the following examples or may be an internal web-based program. The information collected should be used to help a utility conduct risk assessments by identifying avian problem areas and potential or known high risks. To protect birds and minimize outages, these data can be prioritized for corrective actions. Avian information collected by a utility should be maintained internally. Data may be required as a condition of an annual Federal permit for direct take of birds or their nests. If a Federal permit is issued, an annual report is required. The USFWS does not issue "accidental, incidental or unintentional" take permits. Bird Mortality Tracking System software developed by APLIC is available upon request for free at http://*aplic.org*.

Example 7. Dead bird/nest reporting form. This form can be used in conjunction with the Bird Mortality Tracking System software available from APLIC.

Dead Bird/Nest Form

Operations Area:

Dead Bird (circle one)		**or**	**Nest (circle one)**
Crow/magpie/raven	Eagle		Active
Hawk/falcon/osprey	Owl		Inactive
Small bird (protected)	Waterfowl		
Unknown species			

Bird Count_____

Date Found_____ **Time Found**_____

Sign of Death (circle one)

Collision Electrocution Shot Unknown

County_____

Finder's Name_____

Finder's Phone_____

Line Name/Circuit No._____

Pole Identification No._____

Recommended Action (circle)

Dead Bird Actions	*Nest Actions*
Cover transformer equipment	Install nest platform
Install insulator cover(s)	Relocate nest
Install triangle(s)	Trim nest
Reframe structure	Install nest guards
Replace structure	Remove nest
Remove pole	Evaluate to determine appropriate action
De-energize	No action
Install bird flight diverters/fireflies	
Evaluate to determine appropriate action (Provide action in comments)	
Continue to monitor line (Justification required)	
No action (Justification required)	

Comments_____

Example 8. Southern California Edison's reporting and training materials.*

Avian Protection

Electrocutions

Raptors often perch or nest on transmission or distribution towers or poles. Occasionally, the birds make accidental contact between phases or phase and ground, injuring or electrocuting the bird. These electrocutions are most common on distribution or subtransmission facilities where energized conductors are close together. The number of electrocutions can be decreased by either designing the line to minimize contact between phases, or by retrofitting existing lines where necessary with a protective device that prevents this contact. Studies have demonstrated that raptors prefer certain poles for nesting and perching. By identifying these preferred poles, we can modify them, and thus greatly diminish the potential for raptor electrocutions in a cost-effective manner.

Nest Protection

In the absence of other suitable nest sites, raptors (and other protected species such as ravens) often use transmission towers and distribution poles for nesting. State and federal laws and regulations protect these nests from removal at certain times of the year without first obtaining authorization from state and federal wildlife agencies. It is important that nests not be disturbed when eggs or young birds are in them. An important note is that **there are only a few species of birds that are NOT protected by law** in SCE's service territory: **house sparrow, European starling, rock dove (common pigeon)** and certain game birds. All other species, including crows and ravens are protected by law and cannot be moved without proper authorization.

If there is a threat to power operations SCE must sometimes move an active nest (a nest with eggs or young in it). If you must move an active nest ensure environmental compliance and contact an Environmental Affairs biologist for assistance. They will make the necessary contacts with the regulatory agencies to obtain authorization for the nest to be moved.

House sparrow

European starling

Rock dove (common pigeon)

* Note: information presented in this example is specific to Southern California Edison. Contact USFWS for information on permits related to transporting eagles.

Example 8 *(con't).*

Raptor Mortality Procedures

When a dead or injured raptor is found near or on SCE equipment and facilities (e.g., poles, towers, substations) an internal report must be filed with Environmental Affairs (EA). EA will make the determination if a report to government agencies must also be filed. This is a step-by-step guide to help in the process of completing the raptor mortality report.

Both bald and golden eagles occur within SCE's service territory. Though rare, eagle electrocutions do occur on our lines, especially golden eagles. When an eagle is electrocuted, EA must be contacted immediately and special arrangements must be made for transport of the bird. It is illegal to transport eagles in the U.S. **DO NOT transport any eagle unless authorized by EA**.

1. Identify the species of raptor.
Identify the species if possible, especially to determine whether the raptor is an eagle or other raptor. Adult bald and golden eagles range anywhere from 30" to 40" in length and have a 72" to 84" wingspan while other raptors, such as red-tailed hawks are considerably smaller at about 19" in length and a 48" to 56" wingspan. See the attached guide. Whenever there is a doubt, contact Environmental Affairs (EA) for guidance. Take pictures (digital preferred) and send to EA so we can identify the bird.

If the bird is an eagle, follow the instructions directly below. For all other species, go directly to Step Number 2.

Eagle electrocutions:
Call or page EA immediately. You will be given guidance on the next course of action to take. It is illegal to transport eagles in the U.S. Do NOT transport an eagle unless authorized by EA. If the incident occurs after business hours, have the Edison operator connect you with EA staff.

All structures where an eagle electrocution has occurred must be corrected right away. Please contact EA for assistance in making these corrections to the structures.

After contacting EA and following the instructions given, continue to number 2.

2. Fill out a Raptor Mortality Report.
This form is available through EA or can be found on the Environmental Affairs website on SCE's Intranet. Fill out the report as completely as possible. Include maps of the area and, if possible, pictures of the structure, the bird, and the surrounding area (so we have an idea of the habitat in the vicinity of the pole.) Submit this report to EA as soon as possible after the incident.

Whenever multiple electrocutions occur within a few span lengths or on the same structure, these structures should be made raptor safe as soon as possible. Please contact EA for assistance in making these corrections to the structures.
Species other than eagles can be buried on site (away from the pole). You should have a current copy of SCE's U.S. Fish & Wildlife Permit in your vehicle in order to do this legally.

This permit requires us to maintain records of electrocutions. If you do not have a copy of this document, please contact EA.

3. Send the completed form and attachments to EA.
Send the completed form and any pictures to:
Tracey Alsobrook, Environmental Affairs, G.O. 1

Remember, ordinary people and agencies are watching our activities. We must comply with the laws that protect almost all birds in the U.S. Report all known mortalities to EA. We need your assistance to keep the Company in compliance with the laws and in protecting these natural resources.

Call us when you need help with raptor mortality procedures or raptor protection.

	PAX		PAX
Daniel C. Pearson	29562	Janet Baas	29541
Tracey Alsobrook	27547	Jill Fariss	28545

Golden Eagle | Red-Tailed Hawk | Great-horned Owl

Eagles:
(e.g., golden & bald eagles)
Length: 30-40”
Wingspan: 6½ to 7 feet

Hawks:
(e.g., red-tailed & red-shouldered hawks)
Length: 15-23”
Wingspan: 4 to 4½ feet

Owls:
(e.g., great-horned, barn & great gray owls)
Length: 16-27”
Wingspan: 3½ to 4 ½ feet

Golden Eagle Silhouette

General Hawk Silhouette

Example 8 *(con't).*

Animal/Bird Mortality Report

To: Tracey Alsobrook
Environmental Affairs (EA)
GO1, Quad 1A

Date: _____

From: Name _____
Work Location_____ PAX _____

Describe the species of the Animal or Bird that was mortally injured by SCE facilities (electrocuted/hit by a SCE vehicle, etc.).

_____
_____

If any bands or tags please return to EA or write number and agency here

_____
_____

Describe how the Animal or Bird was mortally injured by SCE facilities (bird contacted transformer bushings, etc.).

_____
_____
_____
_____

Weather Conditions (e.g. rainy and cold, sunny and warm, etc.)

_____
_____
_____

Circuit Name & Voltage_____

Specific Problem Location (e.g. Pole #/Address/Cross Streets, etc.)

_____
_____
_____

Description of Terrain and Vegetation in Area (e.g. near agriculture area, dense city area, residential housing, etc.)

_____
_____
_____

Please attach picture of the Bird or Animal if possible.

Example8 *(con't).*

Raptor/Bird Nesting Record

To: Tracey Alsobrook
Environmental Affairs
GO1, Quad 1A

Date: _____

From: Name _____
Work Location_____ PAX _____

Species of Raptor/Bird (if known) _____

Circuit Name and Voltage _____

Specific Nest Location (pole no.) _____

Condition of Nest
_____
_____

Are Eggs or Young Birds Apparent? If so, please describe.
_____
_____
_____

Description of Terrain and Vegetation in Area (e.g. near agriculture area, dense city area, residential housing, etc.)
_____
_____
_____

History of Previous Nesting on This Circuit
_____
_____
_____

History of Electrocutions/Mortality on This Circuit
_____
_____
_____

Recommendations
_____
_____
_____

Please attach picture of the Bird and/or Nest, if possible.

RISK ASSESSMENT METHODOLOGY

Thousands of utility poles occur in areas of suitable habitat for migratory birds. Because remedial actions on all poles in such areas are neither economically justifiable nor biologically necessary, a method is needed to identify configurations or locations of greatest risk. Risk assessment studies and models can be implemented to more effectively allocate resources to protect migratory birds. While risk assessment procedures will vary among utilities based on geographic scale, available data, and funding resources, included below are examples of risk assessment methods employed by different utilities.

Example 9. Risk Assessment Methodology Employed by PacifiCorp.

Reactive, preventative, and proactive measures can be adopted to minimize avian electrocutions. Reactive measures can be conducted at a structure after a mortality has occurred; preventative measures can be taken by constructing new structures to avian-safe standards in avian use areas; proactive measures can incorporate protocols to assess electrocution risk in an effort to prevent avian mortality on existing structures. Such risk assessment procedures can be useful aids when deciding where to allocate limited dollars over large geographic areas. The risk assessment methodology described in this example is based upon field surveys of poles, however, similar procedures could be followed using comparable GIS (Geographic Information System) data.

Based on a need to identify and quantify raptor electrocution risks throughout its service area, PacifiCorp implemented a program to assess electrocution risk, develop a scoring system to prioritize structures and circuits for remedial action, and create a GIS to assist in managing and analyzing spatial information regarding line locations, pole configurations, electrocutions, outages, and raptor distributions. Trained observers, while walking rights-of-way, recorded data on structure configuration, evidence of avian activity, and presence of dead birds. They searched an area encompassing 15 ft. on each side of the central line and a 25-ft. radius around each pole for carcasses, prey remains, pellets, and whitewash. At each pole, data were recorded on the pole location, habitat type, pole configuration, avian mortalities, live

species observed, evidence of raptor use, and presence of avian nests (see Example 10 for data sheet). In addition, the surveyor assessed whether or not each structure was avian-safe (based on current *Suggested Practices* standards).

Existing GIS data layers containing information on habitat type and raptor nest locations were compiled. State wildlife resource agencies, Natural Heritage Programs, universities, USFWS, Bureau of Land Management, U.S. Forest Service, and U.S. Geological Survey may serve as clearinghouses for such data. Pole locations and configurations, raptor nest site locations, habitat, and other field survey data were compiled and analyzed in ArcView GIS.

To assess the risk of electrocution, each non-avian-safe structure was assigned a score based on abundance (>50% total area) of suitable raptor habitat within a 1-km radius, evidence of raptor use, presence of raptor nests within 1 km, and presence of avian mortalities. Structures were assigned one point each for presence of suitable habitat, raptor nests, or evidence of raptor use. Structures at which non-eagle avian mortalities were documented were assigned four points. Structures with eagle mortalities were assigned five points. All scores of five or greater were lumped together in a "very high risk" category.

Using the above scoring method, non-avian-safe poles were assigned the following risk assessment scores:

Score	**Risk Assessment**
0	N/A
1	LOW RISK
2	LOW/MODERATE RISK
3	MODERATE RISK
4	HIGH RISK
5+	VERY HIGH RISK

These risk assessment scores are then used to target remedial actions. While structures with mortalities (risk scores ≥4) receive immediate attention, structures or circuits without mortalities are prioritized for ongoing remedial efforts based on their relative risk and circuit reliability. In addition to selecting poles that pose a moderate risk, other structures are selected for remedial actions based on a "common sense" review of the data. This "common sense" review applies additional data layers (i.e. outages and historical mortalities) and best

***Example 9** (con't).*

Example 9 *(con't).*

professional judgment to identify structures that warrant proactive remedial action. Below is a list of criteria that may elevate the risk scores of structures:

- Poles adjacent to mortality poles
- Poles near mortality poles with a similar configuration
- Circuits, lines, or taps where multiple mortalities have occurred
- Deadend equipment poles in remote or rural areas
- Configurations that have been documented to have a heightened risk in a particular district
- Non-raptor-safe poles in otherwise raptor-safe lines
- Non-raptor-safe poles adjacent to poles with perch discouragers
- Incomplete or improper installation of existing avian protection devices
- Circuits or lines with a history of bird-caused or unknown-cause outages
- Poles that pose other safety or reliability risks

Once all poles are identified, a comprehensive remedial action plan is developed with the appropriate service district that identifies a course of action, timeline, and resources required. The location and number of poles retrofitted, and associated costs are documented. Future monitoring is conducted to document the effectiveness of these efforts and to identify other areas that may require action. In addition, this methodology can be used to research electrocution risks associated with particular configurations or species. This risk assessment database is updated and refined as new information becomes available. For additional information on this risk assessment methodology, contact Jim Burruss (jim.burruss.@pacificorp.com) or Sherry Liguori (sherry.liguori@pacificorp.com).

Example 10. PacifiCorp's Risk Assessment Data Sheet.

Avian Electrocution Risk Assessment
Data Sheet

Date_____

Observer(s) _____

Sheet _____ **of** _____

IF A MORTALITY WAS DOCUMENTED, CHECK HERE _____

Operations Area _____ **Circuit**_____ **Line**_____

HABITAT TYPE (Circle. If more than one apply, indicate percent of each.)

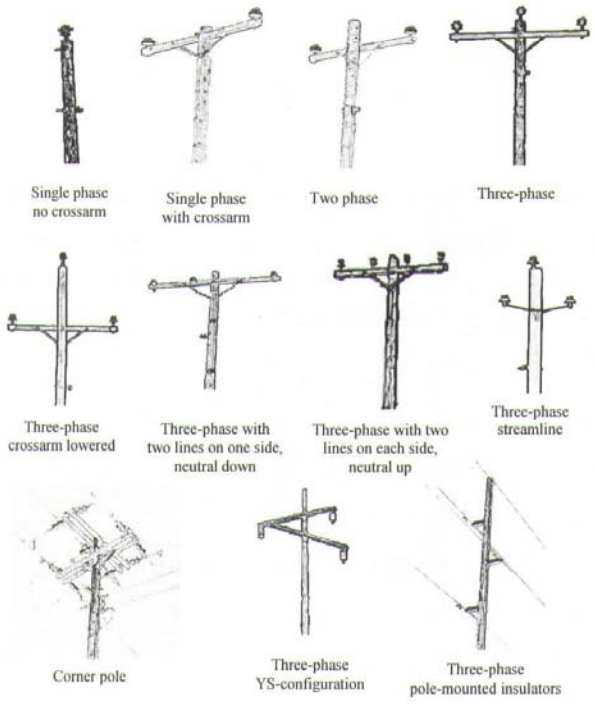
Grassland/ meadow Cropland/Pasture Scrub/shrub Barren Riparian Residential/developed Deciduous forest Coniferous forest
Wet meadow Mudflat Open water Other:_____

POLE LOCATION/IDENTIFICATION:

Structure Identification Number_____

GPS Coordinates: _____ Coordinate System: _____ Units: meters feet

POLE CONFIGURATION (Circle one. If pole does not match any shown, draw it on other side of sheet.)



Is structure raptor safe? Yes No

Total no. energized conductors_____

(if corner pole or underbuilt, indicate number phases in each direction, i.e. 3-3 or 3-2-1)

Number of transformers_____

Are there exposed parts? (circle all that apply)

transformers, capacitors, cutouts, arresters, jumper wires

Crossarm material: wood metal fiberglass

Crossarm brace material: wood metal fiberglass

Location of ground wire:

Below crossarm At or above crossarm

Circle all that are present: Hose Bushing cap
Arrester cap Cutout cover Insulator cover
Perch guard Perch Down-guy insulator
Other protective devices:_____

Circle if present: Pellets Whitewash Prey remains

Are there live raptors, mortalities, nests, or pole damage? No Yes* (*if yes, continue on other side)

Example 10 *(con't).*

POLE CONDITION (Circle all that apply)

Broken insulator Broken crossarm Leaking transformer Broken/burned/leaning pole Broken guywire

Other: _____

MORTALITIES/INJURIES

Status: dead injured **Number individuals** _____ **Distance to nearest pole (ft.)**_____

Species (circle one): Red-tailed Hawk Ferruginous Hawk Swainson's Hawk Broad-winged Hawk Harris's Hawk Red-shouldered Hawk Rough-legged Hawk Golden Eagle Bald Eagle Osprey Peregrine Falcon Prairie Falcon Merlin American Kestrel Great Horned Owl Barn Owl Common Raven American Crow Great Blue Heron

Other: _____

Cause of death/injury: Unknown Electrocution Collision Shot Roadkill Other: _____

Evidence of electrocution: Burnt feathers Burnt talons Burnt bill Exit wound Other: _____

Status of carcass/remains: Buried Collected Left on-site **Band number** (if applicable) _____

Directions _____

Photo number _____ **Camera number** _____

Recommended remedial action _____

_____

LIVE SPECIES OBSERVED

Species _____ **Number of individuals** _____ **Behavior** _____

Species _____ **Number of individuals** _____ **Behavior** _____

Species _____ **Number of individuals** _____ **Behavior** _____

Nest? _____ **Species** _____ **Is nest active?** Yes No

Nest location: Tree Cliff Ground Utility pole Other: _____

Pole Diagram:

NOTES _____

_____

_____

_____

Record Tracking:

USFWS Notification _____ Date _____

Bird Mortality Tracking System Entry _____ Date _____

Remedial Action Status _____ Date _____

MORTALITY REDUCTION MEASURES

A utility can have the greatest impact on reducing avian mortality by focusing its efforts in a cost-effective manner on the areas that pose the greatest risk to migratory birds. Therefore, as a general matter, mortality reduction plans should include a method for evaluating the risks posed to migratory birds in a manner that identifies areas and issues of particular concern. A risk assessment will often begin with an evaluation of available data addressing areas of high avian use, avian mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, and other factors that can increase avian interactions with utility facilities. The assessment may also include outage and circuit reliability information. Mortality reduction plans should also utilize biological and electrical design information to prioritize poles most in need of repair and identify causes of avian mortality and benefits to utility customers. A successful APP and mortality reduction plan require management support as well as the following:

- assessment of facilities to identify risks;
- allocation of resources;
- standards for new or retrofit construction;
- budget for Operation and Maintenance (O&M) and Capital fixes;
- system for tracking remedial actions and associated costs;
- timely implementation of remedial measures;
- positive working relationship with agencies.

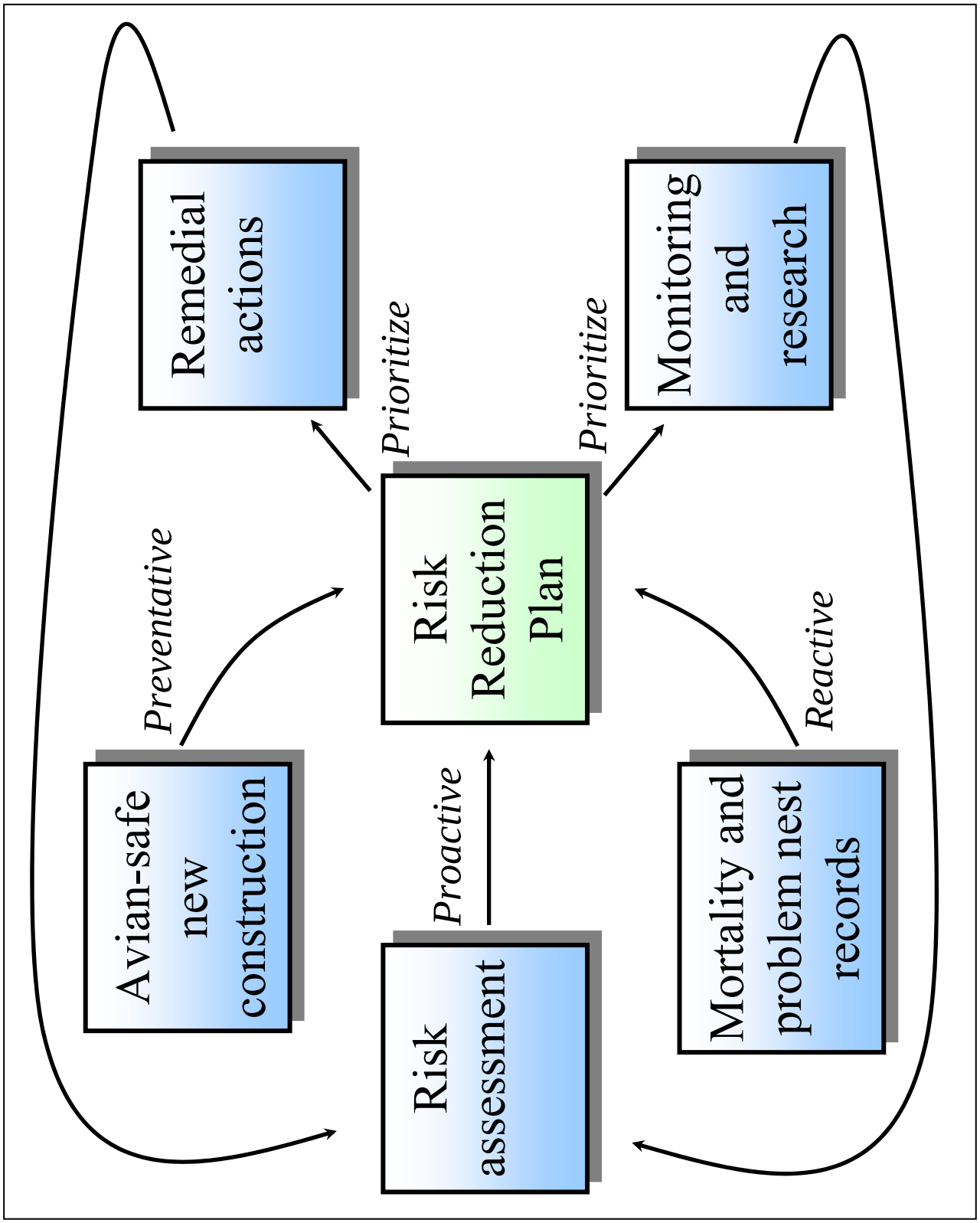
Mortality reduction plans may include a strategy that incorporates preventative, reactive and proactive measures that focus on issues, risks, and reliability commitments facing a utility (Figure 13). An example of how this multi-faceted approach might be used is as follows:

- **Preventative**: Construct all new or rebuilt lines in high avian use areas to Company avian-safe standards. Ensure APP is in compliance with applicable laws, regulations and permits.

- **Reactive**: Document bird mortalities and problem nests; conduct assessment of problems and apply remedial measures where appropriate. Notify resource agencies in accordance with Company's permits and policy.
- **Proactive**: Provide resources and training to improve employee's knowledge and awareness. Partner with organizations that conduct research on effects of bird interactions with power lines. Evaluate electrocution and collision risks of existing lines in high avian use areas and modify structures where appropriate.
- **Collaborative**: Collaboration with USFWS and State agencies on electrocutions reported and remedial actions undertaken. Annually review the APP in the context of risk assessment and electrocution and collision incidents and modify as appropriate, ideally with agency input.

Modification of existing facilities may be deemed necessary when dead and/or injured birds are found, high-risk lines are identified, or concerns of legal compliance are at issue. "Problem poles" or high-risk lines may be identified through bird mortality records, field surveys, or notifications from agency representatives or concerned customers. System reliability concerns due to bird interactions may also result in requests from field operations staff. Retrofitting to prevent electrocutions could include: 1) covering jumper wires, conductors and equipment; 2) discouraging perching in unsafe areas; 3) reframing; or 4) replacing a structure. Retrofitting to prevent collisions may include: 1) installing markers to enhance the visibility of lines; 2) managing habitats to reduce the likelihood of birds crossing lines during daily flights; or 3) managing human activity near collision risk areas to prevent flushing. Implementing preventative, reactive, and proactive measures to reduce avian mortality can benefit a utility through reduced long-term costs, improved reliability, positive public and agency relations, and conservation of migratory birds.

Figure 13. Roles of preventative, proactive, and reactive measures in a mortality risk reduction plan.



AVIAN ENHANCEMENT OPTIONS

While an APP will include measures to reduce avian mortality associated with electrical operations, it can also include opportunities to enhance avian populations through the creation of nest platforms, habitat improvements for migratory birds, or cooperative efforts with agencies or organizations. USFWS and State wildlife resources agencies, as well as other experts, can be consulted for recommendations on habitat enhancement projects. Nest platforms can be erected on poles for birds such as osprey, eagles, hawks, owls, herons, and cormorants, etc. (Figure 14). In addition, nest boxes can be erected for cavity-nesting species such as bluebirds, swallows, chickadees, wrens, and others. Such boxes may also benefit bats and flying squirrels. Construction designs for bird boxes can be found at http://50birds.com. Commercially-made nest boxes and platforms may also be available from local nature centers or specialty stores. The construction, maintenance, and monitoring of nest boxes can be done in conjunction with volunteers, such as scouts, or avian conservation organizations (see Key Resources for a list of bird conservation organizations/centers). Such collaborative efforts are excellent opportunities to educate the public about the company's avian protection plan and its partnerships with wildlife conservation agencies and organizations.

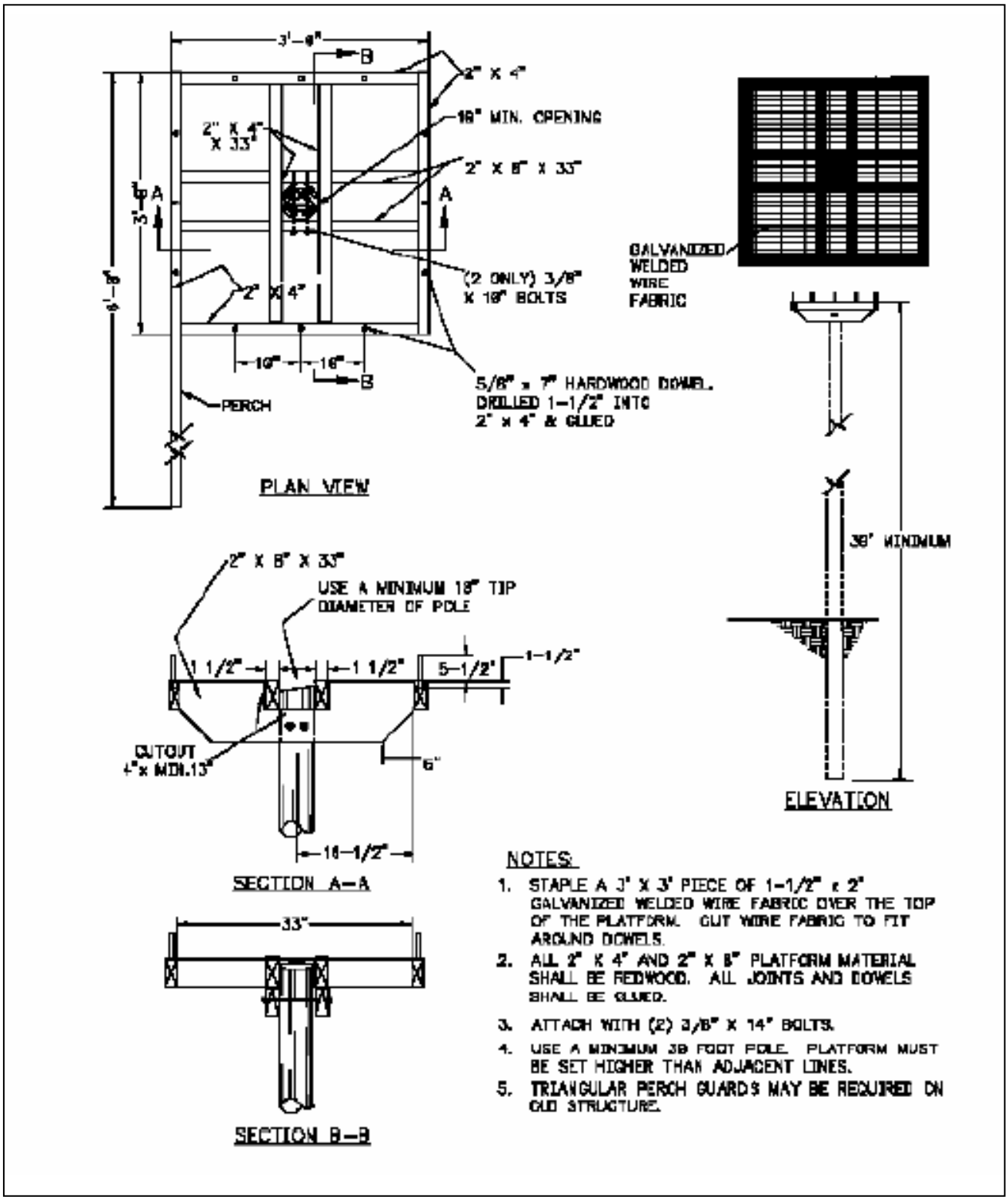


Figure 14. Raptor nest platform, pole mounted.

QUALITY CONTROL

A quality control mechanism can and should be incorporated into an APP to evaluate the effectiveness of a company's avian protection procedures. Some examples of quality control assessments include:

- assessing remedial action techniques through follow-up surveys to evaluate their effectiveness in reducing avian mortality;
- assessing avian protection devices to identify products preferred for avian protection as well as ease of application and durability;
- assessing mortality reporting procedures to ensure that discoveries of avian mortalities are properly documented;
- assessing response to avian mortalities to ensure that appropriate actions are taken in a timely manner;
- assessing compliance with company procedures to ensure that personnel are consistently following company methods for avian-safe construction, mortality reporting, nest management, etc.;
- assessing public and agency opinions on system reliability and avian protection.

The quality control component of an APP is an ongoing process. Information gathered during assessments of existing practices should be used to improve the effectiveness and timeliness of avian protection efforts, which, in turn, can help to reduce costs associated with such efforts.

PUBLIC AWARENESS

A public awareness program can be an integral part of an APP. This program can be used to enhance general public awareness and support for an electric utility's APP. It allows stakeholders such as government agencies, Tribes, non-profit organizations, wildlife rehabilitators and other interested parties an opportunity to provide input to the decision-making process, enabling all parties to work openly and collaboratively towards recommendations that can be effectively implemented. This collaboration often leads to improved relationships within the community and to more efficient and positive projects. The relationships developed through this process may also encourage the public to report bird mortalities and encourage them to seek assistance for birds that have been injured in power line related accidents.

Effectively communicating the components involved in an APP can be done through a variety of public outreach tools including fact sheets, newsletters, brochures, videos, websites and speaker bureau presentations. These tools can also be used to record the successes of an APP, thereby documenting the utility and electric industry's efforts to reduce avian mortalities. The goal of these outreach efforts is to convey to the public that electric utilities are responsible stewards of the environment working cooperatively with wildlife agencies towards reducing avian mortalities while continuing to provide safe, reliable, affordable electricity to their customers.

Many utilities have specific examples of their environmental stewardship and innovative ways they have taken into consideration reducing environmental impacts in their business decisions. A company’s cooperative and innovative efforts to minimize avian mortalities should be shared with the public and resource agencies.

KEY RESOURCES

U.S. Fish and Wildlife Service Migratory Bird Permit Regional Offices

Region 1: (California, Hawaii, Idaho, Nevada, Oregon, Washington, Guam, CNMI, American Samoa)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
911 N.E. 11th Avenue
Portland, OR 97232-4181
Tel. (503) 872-2715. Fax (503) 231-2019.
Email: permitsR1MB@fws.gov

Region 2: (Arizona, New Mexico, Oklahoma, Texas)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
P.O. Box 709
Albuquerque, NM 87103
Tel. (505) 248-7882. Fax (505) 248-7885.
Email: permitsR2MB@fws.gov

Region 3: (Iowa, Illinois, Indiana, Minnesota, Missouri, Michigan, Ohio, Wisconsin)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
One Federal Drive
Fort Snelling, MN 55111
Tel. (612) 713-5436. Fax (612) 713-5393
Email: permitsR3MB@fws.gov

Region 4: (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virgin Islands, Puerto Rico)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
P.O. Box 49208
Atlanta, GA 30359
Tel. (404) 679-7070. Fax (404) 679-4180
Email: permitsR4MB@fws.gov

Region 5: (Connecticut, District of Columbia, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, West Virginia)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
P.O. Box 779
Hadley, MA 01035-0779
Tel. (413) 253-8643. Fax (413) 253-8424
Email: permitsR5MB@fws.gov

Region 6: (Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, Wyoming)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
P.O. Box 25486 DFC (60154)
Denver, CO 80225-0486
Tel. (303) 236-8171. Fax (303) 236-8017
Email: permitsR6MB@fws.gov

Region 7: (Alaska)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
1011 E. Tudor Road
Anchorage, AK 99503
Tel. (907) 786-3693. Fax (907) 786-3641
Email permits: R7MB@fws.gov

U.S. Fish and Wildlife Service Office of Law Enforcement

National Headquarters:
Office of Law Enforcement
U. S. Fish and Wildlife Service
4401 North Fairfax Drive,
MS-LE-3000
Arlington, Virginia, USA 22203
Telephone: 703-358-1949
Fax: 703-358-2271

Regional Offices:

Pacific Region (1): California, Hawaii, Idaho, Nevada, Oregon, Washington, Guam, CNMI, American Samoa)
U. S. Fish & Wildlife Service
Office of Law Enforcement
911 N. E. 11th Avenue
Portland, Oregon, USA 97232-4171
Phone: (503) 231-6125 Fax: (503) 231-6197

Southwest Region (2): Arizona, New Mexico, Oklahoma, Texas
U. S. Fish & Wildlife Service
Office of Law Enforcement
P.O. Box 329
Albuquerque, New Mexico, USA 87103
Phone: (505) 248-7889 Fax: (505) 248-7899

Great Lakes - Big Rivers Region (3): Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin
U. S. Fish & Wildlife Service
Office of Law Enforcement
One Federal Drive
Fort Snelling, Minnesota, USA 55111-0045
Phone: (612) 713-5320 Fax: (612) 713-5283

Southeast Region (4): Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands
U. S. Fish & Wildlife Service
Office of Law Enforcement
P.O. Box 49226
Atlanta, Georgia, USA 30359
Phone: (404) 679-7057 Fax: (404) 679-7065

Northeast Region (5): Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia,
U. S. Fish & Wildlife Service
Office of Law Enforcement
300 Westgate Center Drive
Hadley, Massachusetts, USA 01035
Phone: (413) 253-8274 Fax: (413) 253-8459

Mountain-Prairie Region (6): Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, Wyoming
U. S. Fish & Wildlife Service
Office of Law Enforcement
P.O. Box 25486 - DFC
Denver, Colorado, USA 80225
Phone: (303) 236-7540 Fax: (303) 236-7901

Alaska Region (7): Alaska
U. S. Fish & Wildlife Service
Office of Law Enforcement
1011 E. Tudor Road, Mail Stop 151
Anchorage, Alaska, USA 99503-6199
Phone: (907)786-3311 Fax: (907)786-3313

Other Resource Agency Contacts

BLM Snake River Birds of Prey National Conservation Area

- The Snake River Birds of Prey NCA is home to the largest concentration of nesting raptors in North America.
- http://id.blm.gov/bopnca/index.html

Canadian Wildlife Service

- http://cws-scf.ec.gc.ca/index_e.cfm

Code of Federal Regulations (CFR) websites

- Main CFR webpage
  - http://gpoaccess.gov/cfr/
- List of migratory birds, 50CFR10.13
  - http://a257.g.akamaitech.net/7/257/2422/01dec20031500/edocket.access.gpo.gov/cfr_2003/octqtr/50cfr10.13.htm
- General permit procedures, 50CFR13
  - http://access.gpo.gov/nara/cfr/waisidx_03/50cfr13_03.html
- Endangered and threatened wildlife and plants, 50CFR17
  - http://access.gpo.gov/nara/cfr/waisidx_03/50cfrv2_03.html
- Migratory bird permits, 50CFR21
  - http://access.gpo.gov/nara/cfr/waisidx_03/50cfr21_03.html
- Eagle permits, 50CFR22
  - http://access.gpo.gov/nara/cfr/waisidx_03/50cfr22_03.html

International Association of Fish and Wildlife Agencies

- The International Association of Fish and Wildlife Agencies (IAFWA) was founded in 1902 as a quasi-governmental organization of public agencies charged with the protection and management of North America's fish and wildlife resources. The Association has been a key organization in promoting sound resource management and strengthening federal, state, and private cooperation in protecting and managing fish and wildlife and their habitats in the public interest. The Association's governmental members include the fish and wildlife agencies of the states, provinces, and federal governments of the U.S. and Canada. All 50 states are members.
- http://iafwa.org

National Biological Information Infrastructure

- The National Biological Information Infrastructure (NBII) is a broad, collaborative program to provide increased access to data and information on the nation's biological resources. The NBII links diverse, high-quality biological databases, information products, and analytical tools maintained by NBII partners and other contributors in government agencies, academic institutions, non-government organizations, and private industry. NBII partners and collaborators also work on new standards, tools, and technologies that make it easier to find,

integrate, and apply biological resources information. Resource managers, scientists, educators, and the general public use the NBII to answer a wide range of questions related to the management, use, or conservation of this nation's biological resources.

- http://birdcon.nbii.gov

NOAA Photo Library

- Public domain images for download
- http://photolib.noaa.gov/index.html

U.S. Fish and Wildlife Service

- http://fws.gov

U.S. Fish and Wildlife Service National Eagle Repository

- http://mountain-prairie.fws.gov/law/eagle
  U. S. Fish and Wildlife Service
  National Eagle Repository
  Rocky Mountain Arsenal, Building 619
  Commerce City, Colorado 80022
  phone: (303) 287-2110
  fax: (303) 287-1570

U.S. Fish and Wildlife Service National Image Library

- Public domain images for download
- http://images.fws.gov

USGS Bird Banding Laboratory

- http://pwrc.usgs.gov/bbl/

USGS Patuxent Bird Identification InfoCenter

- Presents photographs, songs, videos, identification tips, maps, and life history information for North American birds.
- http://mbr-pwrc.usgs.gov/id/framlst/framlst.html

USGS Patuxent Wildlife Research Center

- Patuxent's mission is to excel in wildlife and natural resource science, providing the information needed to better manage the nation's biological resources
- http://pwrc.usgs.gov

USGS Raptor Information System

- The Raptor Information System (RIS) is a computerized literature retrieval system. It deals with raptor management, human impacts on raptors, the mitigation of adverse impacts, and basic raptor biology (with an emphasis on population dynamics and predation). The RIS may be the largest collection of literature on birds of prey found anywhere in the world, with approximately

30,000 references on raptor biology and management. RIS staff members regularly update the files and accompanying data base with recently published and/or newly acquired references on raptors. The collection includes reprints of published papers as well as a significant amount of "gray literature" in the form of popular articles, theses, dissertations, unpublished government reports, and progress reports.
http://ris.wr.usgs.gov

State Agencies

Alabama Division of Wildlife and Freshwater Fisheries
- http://dcnr.state.al.us/agfd/index.html

Alaska Department of Fish and Game
- http://adfg.state.ak.us

Arkansas Game and Fish Commission
- http://agfc.com

Arizona Game and Fish Department
- http://gf.state.az.us

California Department of Fish and Game
- http://dfg.ca.gov

Colorado Division of Wildlife
- http://wildlife.state.co.us

Connecticut Bureau of National Resources, Wildlife Division
- http://dep.state.ct.us/burnatr/wildlife/wdhome.htm

Delaware Division of Fish and Wildlife
- http://dnrec.state.de.us/fw

Florida Fish and Wildlife Conservation Commission
- http://floridaconservation.org

Georgia Division of Wildlife Resources
- http://georgiawildlife.dnr.state.ga.us

Hawaii Department of Land and Natural Resources
- http://state.hi.us/dlnr

Iowa Department of Natural Resources
- http://iowadnr.com

Idaho Fish and Game
- http://state.id.us/fishgame

Illinois Department of Natural Resources
- http://dnr.state.il.us

Indiana Department of Natural Resources
- http://in.gov/dnr

Kansas Department of Wildlife and Parks
- http://kdwp.state.ks.us

Kentucky Department of Fish and Wildlife
- http://kdfwr.state.ky.us

Louisiana Department of Wildlife and Fisheries
- http://wlf.state.la.us/apps/netgear/page1.asp

Massachusetts Division of Fisheries and Wildlife
- http://state.ma.us/dfwele/dfw/dfw_toc.htm

Maryland Department of Natural Resources
- http://dnr.state.md.us

Maine Department of Inland Fisheries and Wildlife
- http://state.me.us/ifw

Michigan Department of Natural Resources
- http://michigan.gov/dnr

Minnesota Department of Natural Resources
- http://dnr.state.mn.us/index.html

Missouri Department of Conservation
- http://conservation.state.mo.us

Mississippi Department of Wildlife, Fisheries and Parks
- http://mdwfp.com

Montana Department of Fish, Wildlife and Parks
- http://fwp.state.mt.us

Nebraska Game and Parks Commission
- http://ngpc.state.ne.us/homepage.html

Nevada Department of Wildlife
- http://ndow.org

New Hampshire Fish and Game Department
- http://wildlife.state.nh.us

New Jersey Division of Fish and Wildlife
- http://state.nj.us/dep/fgw

New Mexico Game and Fish Department
- http://gmfsh.state.nm.us

New York Division of Fish, Wildlife and Marine Resources
- http://dec.state.ny.us/website/dfwmr/index.html

North Carolina Wildlife Resources
- http://ncwildlife.org

North Dakota Game and Fish Department
- http://state.nd.us/gnf

Ohio Division of Wildlife
- http://ohiodnr.com/wildlife/default.htm

Oklahoma Department of Wildlife Conservation
- http://wildlifedepartment.com

Oregon Department of Fish and Wildlife
- http://dfw.state.or.us

Pennsylvania Fish and Boat Commission
- http://pgc.state.pa.us

Rhode Island Division of Fish and Wildlife
- http://state.ri.us/dem/programs/bnatres/fishwild/index.htm

South Carolina Department of Natural Resources
- http://water.dnr.state.sc.us

South Dakota Department of Game, Fish and Parks
- http://state.sd.us/gfp

Tennessee Wildlife Resources Agency
- http://state.tn.us/twra/index.html

Texas Parks and Wildlife Department
- http://tpwd.state.tx.us

Utah Division of Wildlife Resources
- http://wildlife.utah.gov

Virginia Department of Game and Inland Fisheries
- http://dgif.state.va.us

Vermont Department of Fish and Wildlife
- http://vtfishandwildlife.com

Washington Department of Fish and Wildlife
- http://wdfw.wa.gov

Wisconsin Department of Natural Resources
- http://dnr.state.wi.us

West Virginia Division of Natural Resources
- http://wvdnr.gov

Wyoming Game and Fish Department
- http://gf.state.wy.us

Bird Conservation Organizations/Centers/Resources
(Includes organization's mission statement/description followed by website)

Alaska Bird Observatory
- The Alaska Bird Observatory is an Alaska nonprofit corporation. The mission of ABO is to advance the appreciation, understanding, and conservation of birds and their habitats through research and education.
- http://alaskabird.org

American Bird Conservancy
- American Bird Conservancy (ABC) is a 501(c)3 not-for-profit organization, whose mission is to conserve wild birds and their habitats throughout the Americas. It is the only U.S.-based, group dedicated solely to overcoming the greatest threats facing birds in the Western Hemisphere.
- http://abcbirds.org

Cornell Lab of Ornithology
- The Lab is a nonprofit membership institution whose mission is to interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds. Our programs work with citizen scientists, government and nongovernment agencies across North America and beyond.
- http://birds.cornell.edu

50 Birds
- Wood bird house designs for more than 50 North American birds
- http://50birds.com/Default.htm

Gulf Coast Bird Observatory
- The mission of the Gulf Coast Bird Observatory is the study and conservation of birds and their habitat in and around the Gulf of Mexico. Our purpose is to be a catalyst for bird conservation through individual and community partnerships and the sharing of expertise and knowledge.
- http://gcbo.org

Hawk Mountain Sanctuary Association
- Hawk Mountain's mission is to foster the conservation of birds of prey worldwide and to create a better understanding of, and further the conservation of, the natural environment, particularly the Central Appalachian region.
- http://hawkmountain.org

Hawks Aloft, Inc.
- Hawks Aloft, Inc. (HAI) was founded in February of 1994 in Albuquerque, New Mexico. Our mission is to conserve indigenous wild birds and their habitats through research and public education. HAI projects take place almost entirely within the state of New Mexico. We have become a leader in providing quality

education programs and field research. Using live raptors as educational aids, our naturalists reach more than 30,000 students annually. Our long-term research projects monitor raptor and songbird populations, as they relate to land management practices.
- http://hawksaloft.org

HawkWatch International
- Mission: To monitor and protect hawks, eagles, and other birds of prey and their environment through research, education, and conservation.
- http://hawkwatch.org

Idaho Bird Observatory
- IBO's Mission: To contribute to the conservation of western migratory birds and their habitats through cooperative research and public education.
- http://boisestate.edu/biology/ibo

Klamath Bird Observatory
- A nonprofit research and educational organization
- http://klamathbird.org/kbohome.htlm

Massachusetts Audubon Society
- Massachusetts Audubon Society is the largest conservation organization in New England, concentrating its efforts on protecting the nature of Massachusetts for people and wildlife. Mass Audubon protects more than 30,000 acres of conservation land, conducts educational programs for 250,000 children and adults annually, and advocates for sound environmental policies at the local, state, and federal levels. Established in 1896 and supported by 68,000 member households, Mass Audubon maintains 42 wildlife sanctuaries that are open to the public and serve as the base for its conservation, education, and advocacy work across the state.
- http://massaudubon.org

Montana Raptor Conservation Center
- Mission: Montana Raptor Conservation Center was founded in response to the rapid development of southwest Montana and resulting negative conflicts between humans and birds of prey. Through education, habitat enhancement, research, and the rehabilitation and release of injured birds of prey, our mission is to conserve and restore raptors, as well as other avian species that are endangered, threatened or of special concern.
- http://montanaraptor.org

National Audubon Society
- Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.

- http://audubon.org

National Fish and Wildlife Foundation

- The National Fish and Wildlife Foundation conserves healthy populations of fish, wildlife and plants, on land and in the sea, through creative and respectful partnerships, sustainable solutions, and better education. The Foundation meets these goals by awarding matching grants to projects benefiting conservation education, habitat protection and restoration, and natural resource management.
- http://nfwf.org

The Nature Conservancy

- Mission: To preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.
- http://nature.org

New Jersey Audubon Society

- The New Jersey Audubon Society fosters environmental awareness and a conservation ethic among New Jersey's citizens; protects New Jersey's birds, mammals, other animals, and plants, especially endangered and threatened species; and promotes preservation of New Jersey's valuable natural habitats.
- http://njaudubon.org

North American Bird Conservation Initiative (NABCI)

- US NABCI Vision: Populations and habitats of North America's birds are protected, restored, and enhanced through coordinated efforts at international, national, regional, state, and local levels, guided by sound science and effective management. US NABCI Goal: To deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape-oriented partnerships.
- http://nabci-us.org

Partners in Flight

- Partners in Flight (PIF) is a cooperative effort involving partnerships among federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. PIF's goal is to focus resources on the improvement of monitoring and inventory, research, management, and education programs involving birds and their habitats.
- http://partnersinflight.org

Partners in Flight – Canada

- http://cws-scf.ec.gc.ca/birds/lb_ot_e.cfm

Partners in Flight – International

- http://partnersinflight.org/pubs/latangara.htm

The Peregrine Fund/World Center for Birds of Prey

- Established in 1970, The Peregrine Fund works nationally and internationally, working to conserve birds of prey in nature. We conserve nature by achieving results - results restoring species in jeopardy, conserving habitat, educating students, training conservationists, providing factual information to the public, and by accomplishing good science. The World Center for Birds of Prey in Boise, Idaho is The Peregrine Fund's world headquarters. At the World Center we propagate birds of prey for release to the wild. Research and educational programs are also conducted.
- http://peregrinefund.org

Point Reyes Bird Observatory

- PRBO Conservation Science is dedicated to conserving birds, other wildlife, and ecosystems through innovative scientific research and outreach. Founded in 1965 as Point Reyes Bird Observatory, our 120 staff and seasonal biologists study birds to protect and enhance biodiversity in marine, terrestrial and wetland systems in western North America.
- http://prbo.org

The Raptor Center

- The Raptor Center at the University of Minnesota College of Veterinary Medicine specializes in the medical care, rehabilitation, and conservation of birds of prey. Working with about 30 eagles, hawks, owls, and falcons that are permanent residents, we reach 250,000 people each year through educational programs and events. The essence of our mission is to strengthen the bond between humans and birds, to improve the quality of life for both, and to contribute to the preservation of the natural world.
- http://raptor.cvm.umn.edu

Rocky Mountain Bird Observatory (formerly Colorado Bird Observatory)

- RMBO was founded in 1988 to address a bird conservation and related public education need in the western U.S. Our mission is the conservation of Rocky Mountain and Great Plains birds through research and public education. We accomplish our mission through numerous research and public education programs which have dual goals: to conserve birds and bird habitat, and to increase people's understanding of birds--how they interact with humans, what habitats they use, and what factors threaten their survival.
- http://rmbo.org

Smithsonian Migratory Bird Center

- Dedicated to fostering greater understanding, appreciation, and protection of the grand phenomenon of bird migration.
- http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds

Southeast Arizona Bird Observatory

- The Southeastern Arizona Bird Observatory (SABO) is a non-profit organization dedicated to the conservation of the birds of southeastern Arizona, their habitats and the diversity of species that share those habitats through research, monitoring and public education.
- http://sabo.org

Vermont Institute of Natural Science

- Protecting Vermont's natural heritage through education and research designed to engage individuals and communities in the active care of their environment.
- http://vinsweb.org

Whitefish Point Bird Observatory

- WPBO is a non-profit membership organization established in 1978 to document and study the birds in the Great Lakes Region, with special emphasis on migration.
- http://wpbo.org

Wildlife Rehabilitation Resources

How to contact a wildlife rehabilitator

- http://tc.umn.edu/~devo0028/contact.htm

National Wildlife Rehabilitators Association

- http://nwrawildlife.org

Wildlife International

- http://wildlife-international.org

The Wildlife Rehabilitation Information Directory

- http://tc.umn.edu/~devo0028/

Utility Resources

Avian Power Line Interaction Committee (APLIC)
- http://aplic.org

Edison Electric Institute (EEI)
- http://eei.org

Electric Power Research Institute (EPRI)
- http://epri.com

Institute of Electrical and Electronics Engineers (IEEE)
- http://ieee.org

National Rural Electric Cooperative Association (NRECA)
- http://nreca.org

Rural Utilities Service (RUS)
- http://usda.gov/rus

V. LIST OF ACRONYMS

APLIC – Avian Power Line Interaction Committee

APP – Avian Protection Plan

BGEPA – Bald and Golden Eagle Protection Act

BMTS – Bird Mortality Tracking System

DMBM – Division of Migratory Bird Management

EEI – Edison Electric Institute

EPRI – Electric Power Research Institute

ESA – Endangered Species Act

GIS – Geographic Information System

HCP – Habitat Conservation Plan

MBTA – Migratory Bird Treaty Act

NESC – National Electric Safety Code

NMFS – National Marine Fisheries Service

NRECA – National Rural Electric Cooperative Association

REA – Rural Electricification Association (currently RUS)

RUS – Rural Utilities Service

USFWS – U.S. Fish and Wildlife Service