Big Sandy–Lincoln–Midway 230-Kilovolt Transmission Improvement Project Lincoln, Elbert, and El Paso Counties, Colorado

Environmental Assessment

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Prepared for:

Rural Utilities Service
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Submitted by:

Tri-State Generation and Transmission Association, Inc.

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Abbreviations and Acronyms

°C	Degree Centigrade
AN	Audible Noise
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CFR	Code of Federal Regulations
CIG	Colorado Interstate Gas Company
CLRTPG	Colorado Long Range Transmission Planning Group
dBA	A-Weighted Sound Pressure
EA	Environmental Assessment
EMF	Electric and Magnetic Fields
EO	Executive Order
EPM	Environmental Protection Measure
EPTP	Eastern Plains Transmission Project
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HPX	High Plains Express
I	Interstate
IF	Isolated Find
kV	Kilovolt
kV/m	Kilovolts Per Meter
L50	Noise Levels in A-Weighted Decibels
Leq	Equivalent Sound Level
LRR	Land Resource Region
MBTA	Migratory Bird Treaty Act
mG	Milligauss
NAS	National Academy of Sciences

NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NIEHS	National Institutes of Environmental Health Sciences
NIH	National Institutes of Health
NLCD	National Land Cover Database
NRC	National Research Council
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OAHP	Office of Historic Preservation
OPGW	Overhead Optical Groundwire
ROW	Right-of-Way
RUS	Rural Utilities Service
RV	Recreational Vehicle
SDS	Southern Delivery System
SHPO	State Historic Preservation Office
Tri-State	Tri-State Generation and Transmission Association Inc.
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
V/m	Volts/Meter
VRM	Visual Resource Management
Western	Western Area Western Area Power Administration
WOUS	Water of the United States

Executive Summary

This Environmental Assessment (EA) was prepared in connection with a project proposed by Tri-State Generation and Transmission Association, Inc. (Tri-State), to modify the existing 230-kilovolt (kV) transmission line between the Big Sandy, Lincoln, and Midway substations (see Figure 1.0-1). This project is referred to as the Big Sandy–Lincoln–Midway Transmission Improvement Project. Tri-State is requesting the U.S. Department of Agriculture, Rural Utilities Service (RUS), provide financial assistance for the proposed project, which is located in Elbert, El Paso, and Lincoln counties, Colorado. Tri-State is proposing to modify portions of the existing 79-mile Big Sandy–Lincoln–Midway 230-kV transmission line to meet the current Tri-State structure loadings standards and to upgrade the thermal capacity of the line. The Big Sandy–Lincoln–Midway transmission line has had two catastrophic failures in the last six years. In 2005, 17 miles of the original construction failed during a spring storm that resulted in an 8-week outage of the circuit. In 2007, another 6 miles of the original line failed again as a result of a spring storm. The circuit was unavailable for another 6 weeks while the failed section was replaced. The replacement sections were built to existing Tri-State strength and operating standards. The remaining 56 miles of original structures are a reliability risk that needs to be remedied. The proposed project would bring the entire circuit up to current design standards and increase reliability. It would also decrease the economic risk of losing entire sections of line. An overhead optical groundwire would be installed along the entire line concurrently with the other significant construction activities as an opportunity for a least cost addition to the Tri-State communications system.

Serving as the lead federal agency, the RUS is responsible for compliance with the National Environmental Policy Act (NEPA). This EA will enable the RUS to evaluate the environmental effects of the proposed project. It will also enable the RUS to fulfill its requirements under NEPA and other environmental mandates. This EA provides a description of the project, the need for the project, alternatives to the project, an analysis of the affected environment and potential effects to the natural and human environment, mitigation and monitoring measures, and supporting materials. The EA also describes the public involvement process, including tribes, individuals, organizations, and agencies consulted in accordance with NEPA.

The proposed project is expected to have no significant impacts on the natural or built environment. The upgrades would occur within an existing transmission right-of-way (ROW) and would upgrade an existing transmission line. No significant impacts to natural resources, cultural resources, recreation, or land use are expected. The proposed project is not expected to result in significant impacts to public health and safety or to the social values and economies of the communities within the project area. Because this is a modification of an existing transmission line, no significant cumulative impacts are expected to result from the proposed project.

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1.0 Introduction

Tri-State Generation and Transmission Association Inc. (Tri-State) is a nonprofit wholesale electric power supplier owned by the 44-member cooperatives that it serves in a 250,000-square-mile service area in Colorado, Nebraska, New Mexico, and Wyoming. Tri-State owns (wholly or jointly) or has maintenance responsibilities for more than 5,200 miles of transmission lines across Colorado, Nebraska, New Mexico, and Wyoming. Tri-State provides power for approximately 1.4 million consumers in its member systems through a combination of owned baseload and peaking generation facilities, purchased power, federal hydroelectric allocations, and renewable resources. Tri-State member cooperative consumers include rural residences, farms, ranches, towns, suburban communities, commercial businesses, and industry.

Tri-State is proposing to modify the existing structures of the existing 79-mile Big Sandy–Lincoln–Midway 230-kilovolt (kV) transmission line to meet the current Tri-State structure loadings standards. The proposed transmission line modification is shown in detail on Sheet Maps 1 through 21 in Appendix A. The project vicinity map is shown on Figure 1.0-1.

The Rural Utilities Service is the lead federal agency for this Environmental Assessment (EA). This EA provides a description of the project, the need for the project, the No Action alternative to the project, an analysis of the affected environment and potential effects to the natural and human environment, mitigation and monitoring measures, and supporting materials.

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Figure 1.0-1: Project Vicinity Map

2.0 Purpose and Need for the Project

The existing 230-kV Big Sandy–Lincoln–Midway transmission line was originally electrified in 1977, and the average structural life of a wooden H-frame designed transmission line structure is approximately 30 years. After this length of time, the wood structures are subject to deterioration and their structural strength compromised. The Big Sandy–Lincoln–Midway transmission line has had two catastrophic failures in the last 6 years. In 2005, 17 miles of the original construction failed during a spring storm that resulted in an 8-week outage of the circuit. In 2007, another 6 miles of the original line failed again as a result of a spring storm. The circuit was unavailable for another 6 weeks while the failed section was replaced. The replacement sections were built to existing Tri-State strength and operating standards. The remaining 56 miles of original structures are a reliability risk that needs to be remedied. The Proposed Action Alternative would bring the entire circuit up to current design standards and increase the strength of the transmission line structures and decrease the probability of failures of the line. This action would mitigate the risk of extended outages and financial losses related to catastrophic failures.

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3.0 Alternatives and Federal Decision to be Made

Tri-State has requested financial assistance from the RUS to complete the proposed modification of this existing 230-kV transmission line in Colorado. The proposed federal action related to Tri-State's proposed project would be RUS's granting of financial assistance for the construction of the proposed modification to existing structures. The RUS has been requested to make a decision to implement the proposed project and grant the financial assistance for the construction of the proposed structural modifications based on the environmental analysis outlined in the EA.

3.1 Identification of Alternatives

Because the proposed project is a modification of an existing transmission line and does not require any new transmission line routes or new right-of-way (ROW), the alternatives were limited to the Proposed Action Alternative (the proposed modification) and the No Action Alternative (no action taken).

3.2 Description of Proposed Action

Tri-State is proposing to modify or replace the existing structures of the Big Sandy–Lincoln–Midway 230-kV transmission line to meet the current Tri-State structure loadings standards on 56 miles of the remaining original construction (the 23 miles of transmission line that were replaced in 2005 and 2007 were rebuilt to current Tri-State structure loading standards.) The primary modifications include improving the bracing on eight structures and the replacing and raising 239 structures. Modifications would also be made to allow a maximum thermal operating temperature increase from 50 degrees Centigrade (°C) to 100°C. An overhead optical groundwire (OPGW) would replace one of the existing shieldwires for the total line length of 79 miles. The OPGW would serve to ground the transmission line and provide optical fibers for utility communications. It would be installed concurrently with the other significant construction activities as an opportunity for a least-cost addition to the Tri-State communications system. The voltage and configuration of the line would remain unchanged as a single circuit at 230,000 volts (or 230 kV). These thermal and communication upgrades make up the proposed action and are referenced for the purposes of this EA as the "project."

Sheet Maps 1 through 21 (Appendix A) display each pole location and whether the structure would be left in its current location (existing) or would be removed and replaced with a new structure. The sheet maps also show the existing access roads to the transmission line. No new access road development is proposed. Access would be overland or through the use of existing county or private roads. All transmission line structures to be moved would remain in the existing 100-foot ROW.

3.2.1 Project Location and Background

The Midway Substation is located near Fountain, Colorado, and the Big Sandy and Lincoln Substations are located near Limon, Colorado. The transmission line occurs in portions of El Paso, Elbert, and Lincoln counties.

The Big Sandy–Lincoln–Midway 230-kV transmission line was under construction in 1974, and electrified in 1977. The transmission line consists of 565 wood H-frame structures with an average span of 800 feet. These existing structures sit within a ROW of 100 feet.

3.2.2 Transmission Line Thermal Upgrade

Electrical transmission lines are normally built to transfer large amounts of electrical power between two or more locations. Based upon the power transfer requirements, the type of conductor and the operating temperature are established. The operating temperature of the conductor is dependent upon amount of current flowing through the conductor and local environmental conditions such as weather conditions, elevation above sea level, and orientation of the line. As the demands increase, more power may be required to be transferred between the established locations. The transfer of the power can be completed by building new lines, reconductoring existing lines, or increasing the thermal capacity of an existing line. For the Big Sandy–Lincoln–Midway transmission line, the most efficient way to increase the transfer capacity was through a thermal upgrade.

Increasing the thermal capacity of the conductor would result in greater sag in the conductor. The sag increase may violate the safe ground clearance standards established by the RUS and the National Electric Safety Code (NESC). In order to meet these safety requirements and increase the thermal capacity of the line, the ground clearance of the conductor must be increased. To increase the ground clearance, the tension in the conductor must be increased, select structures raised, or a combination of the two activities. Owing to the limiting structural capacity at the dead-end structures, the method selected for the upgrade is to increase the height of the structures by either raising the existing structures or installing new structures adjacent to the existing structures. The conductor will be resagged to maintain the existing tensions throughout the line. These modifications to the existing line will allow a maximum thermal operating temperature increase from 50°C to 100°C while maintaining safe vertical clearances.

This project would require the replacement of 239 structures. The majority of the structures would be placed within 5 to 10 feet of the original location and within the transmission ROW. Several structures might need to be moved 20 to 50 feet from their original locations, but would still be placed within the existing transmission ROW. The old structure would be removed from the ROW and the area would be reclaimed as appropriate. Permanent impacts are limited to the width of the footings of the new structures. Construction may require up a 50-foot-by-50-foot area that would be reclaimed after the structure is in place. Tri-State would use the minimum area required to construct the new structures to minimize impacts to land use and the environment.

The construction contractor would identify staging areas for the structure replacements that would be used to store materials, park construction equipment, pre-assemble materials, and make other preparations for modification of the transmission line. The staging areas would be approximately 1 to 2 acres in size, the locations of which have not yet been identified. Tri-

State will inspect and approve the location of the staging area, complete applicable environmental surveys, and obtain any required approvals prior to construction. Material staging areas will not be placed in areas with documented archeological resources, wetlands, surface waters, raptor nests, or in areas that would affect existing land uses.

3.2.3 Optical Groundwire Installation

Fiber optic groundwire would be installed on the entire length of the line. The OPGW that is being used will be slightly larger than the existing wire, but would have sagging characteristics similar to the remaining overhead groundwire. The OPGW would be installed on the eastern side of the existing and the newly replaced structures. The reel size for the OPGW contain approximately 18,000 feet of wire. Only one reel of OPGW can be installed at any time because the ends of the reel must be spliced together at specific structure locations to maintain continuity of the fiber signal. The contractor would use the existing overhead groundwire to pull the OPGW during the installation.

The installation of the OPGW would require conductor pulling sites and wire sites be established at approximately 3-mile intervals. There would be approximately 37 of these pulling sites. The equipment at these sites would include a wire stand for the OPGW reels, a tensioner/puller for pulling the OPGW in and sagging the OPGW, and a take up reel used for coiling the replaced groundwire. The equipment would be relatively small in size and no ground disturbance would be required for equipment setup. In addition to the stringing equipment, each structure would require two visits by construction crews: one visit to install stringing blocks and transfer the groundwire into the stringing blocks, and after the OPGW is pulled in, and one visit to clip in the OPGW and remove the stringing blocks. This work can be accomplished out of bucket trucks and require no other equipment. If vegetation and soils are disturbed Tri-State will restore the areas to pre-construction conditions once the fiber is installed.

3.2.4 Construction and Maintenance Procedures

Tri-State would hire private, licensed contractors specializing in transmission systems to construct the proposed project. Modification of the existing transmission line would include the following major activities performed in sequence by small crews progressing along the length of the transmission line:

- **Traffic Control**—Traffic could be temporarily stopped or rerouted for activities that affect public safety, such as road crossings. Tri-State will coordinate public safety measures with local officials to minimize traffic disruption and to continue to provide for emergency vehicles.
- **Foundation Construction**—Crews would use heavy equipment to augur the holes for the transmission line structures along the ROW. It is expected that it would not be necessary to leave holes open overnight. If this is necessary, open holes left overnight will be covered, flagged, and fenced to protect the safety and welfare of livestock and the public. The holes that remain once the old structures are removed will be backfilled with native backfill or other backfill material.

- **Materials Hauling**—Wood poles, optical groundwire, insulators, and the necessary hardware would be staged and delivered to each individual structure site.
- **Structure Assembly and Erection**—Within a few days of the major material deliveries at each structure location, a line crew would arrive and assemble and install the transmission line structure. The crew would auger the holes for the poles, install the new poles or make modifications that are required to an existing structure, hang stringing blocks, transfer the existing conductor, and remove any structure that is being replaced. Because of the existing line, the structures would be framed with cross arms and braced in the air after the new poles are set. Native soils and or structural backfill would be installed and compacted around the base of the poles.
- **OPGW and Conductor Stringing**—The only new conductor that would be installed is the new OPGW. To install the OPGW, the OPGW would be pulled through pulleys on each transmission structure. The existing shieldwire that would be replaced would be used to pull the OPGW through the stringing blocks. The existing conductor and the remaining shieldwire would be resagged and would not require the conductor or shieldwire to be removed. Conductors would be connected to the transmission structures with the insulators. Once conductors were completely pulled between structures, they would be brought up to final installation tension and permanently attached to each structure. At the existing dead end-structures, a small amount of wire may be required to be spliced into the existing conductor to aid in achieving the existing sag and tensions.
- **Cleanup, Reclamation, and Revegetation**—Trash would be removed from the construction site daily. Any remaining or extra materials would be removed from the ROW at the conclusion of construction. Slash piles or woody debris would be disposed of in a manner acceptable to the applicable county and landowner. Areas disturbed by construction activities would be disked and revegetated with a certified weed-free seed mix. The approximate number of personnel and equipment required for modification of the transmission line is shown in Table 3.2-1.

Table 3.2-1:
Equipment and Personnel Required per Activity

Activity	Number of Workers	Equipment
Land Rights Acquisition	1	1 vehicle
Traffic Control	2–4	2 pickup trucks,
Materials Hauling	3–5	1 tractor trailer, 1 flatbed truck, 1 pickup truck
Structure Assembly and Erection	6–10	1 line truck, 1 bucket truck, 1 pickup truck
OPGW Stringing and Conductor Resagging	10–16	1 reel trailer, tensioner, puller, 1 winch truck, 1 flatbed truck, 2 bucket trucks, 1-2 pickup trucks
Cleanup, Reclamation, and Revegetation	6	1 tractor, 1 flatbed truck, 1 Bobcat, disc, 1 drill seeder, 1 pickup truck

3.2.5 Construction Schedule

The actual work involved in the structure replacement and removal should take no longer than one day per structure. The contractor would stage materials on the site prior to the start

of the work and would temporarily leave the old poles arms and braces on site. The installation of the OPGW at each structure site would require no more than a few hours to clip and unclip the wire. For each setup and pull, the work would be conducted over an approximate five-day period, with most of the activities performed at the pull sites. The work would not be continuous and there may be periods of no activity between the individual construction tasks. Tri-State and the construction contractor will work with the landowners to keep them informed as to when and how long the workers will be on the property. Construction is expected to take approximately 9 to 12 months to complete. The construction schedule may be altered or delayed based on land use and environmental constraints or due to extreme weather events such as snow or heavy rains which would prevent the contractor from getting off road. In these cases, the construction calendar could extend to 18 months.

3.2.6 Access Road Improvements

Tri-State has created standard guidelines for improving and constructing project access roads. At the end of construction, all access should be constructed and maintained at the Existing or Level I improvement standard. The majority of the access in the project area consists of existing access roads and overland access (Level I Improvement); these roads are delineated on the sheet maps included in Appendix A. The access guidelines are described below:

- **Existing Roads**—Includes private roads, well pad roads, improved native-surface and gravel-surface roads. Generally, no improvements are necessary on existing roads, except for the armored crossings at Black Squirrel Creek and Lake Creek.
- **Improvement Level 1**—No clearing or grading is required; equipment can gain access with no improvement. This does not include existing (county, or private) road profiles, but refers to travel routes or overland travel on surfaces with <5 percent lateral grade and running surface slope less than 12 percent. Currently, the design vehicle can safely traverse the access and no improvement is necessary.
- **Improvement Level 2**—Access where no grading is required but where vegetation (shrubs and saplings up to 2 inches in diameter, etc.) must be cleared to create minimum 12-foot width for access by design vehicle.
- **Improvement Level 3**—Access where minor grading (generally less than 1 foot of cut or fill) is required. Includes clearing of vegetation and the grading of rocky or rutted surfaces to create the minimum width for access by design vehicle.
- **Improvement Level 4**—Access improvements where moderate grading (generally 1 to 3 feet of cut or fill) is required. Includes clearing of vegetation and large trees. May require cut-and-fill slopes, drainage ditches, and sedimentation and erosion control measures.
- **Improvement Level 5**—Access improvements where significant grading (generally 3 to 6 feet of cut or fill) is required. Includes clearing of vegetation) and large trees greater than 8 inches diameter. May require cut-and-fill slopes, drainages ditches, and sedimentation and erosion control measures.
- **Improvement Level 6**—Armored low water crossings. Crossing will be constructed by grading and adding material as appropriate. No culverts will be placed in drainage

channel. Any excavated bank material will be graded away from the crossing. Fill material, such as large river rock, will be added to stabilize bank slopes and crossing bottoms.

- **Improvement Level 7**—Permanent Culvert Installation. Crossing is constructed by placing a culvert in a drainage and adding fill material, such as large river rock or rip-rap, to stabilize and firm stream bed, bank, and inlet. A catch basin or energy dissipation device may also be built as site specifically engineered (designed, sized, and drawn).

All cut and fill required for project construction (Levels 3 to 7) would be removed once the work has been completed. Permanent impacts would only occur at existing access roads that cross Lake Creek and Black Squirrel Creek. These improvements are required for long-term maintenance of the transmission line and to minimize resource damage from ongoing use of these existing roads.

3.2.7 Environmental Protection Measures

Tri-State will implement the Environmental Protection Measures (EPMs), listed in Table 3.2-2, as a part of the construction design to minimize impacts to the natural and human environment and to ensure the proposed project complies with applicable local, state, and federal requirements.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
General/Aesthetics	The contractor will comply with all federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel will be instructed on the protection of resources.
	The contractor will conduct its construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in or adjacent to the work areas. Any scarring, defacing, damage, or destruction of the natural landscape resulting from construction operations will be repaired by the contractor to the satisfaction of Tri-State and the affected landowner (s).
	All construction materials, waste, and debris will be moved from the project area in a timely manner. Burning or burying of waste materials on the right-of-way or at the construction site will not be allowed. All materials resulting from the contractor's clearing operations will be removed from the ROW.
	The contractor will exercise care to preserve the natural landscape and will conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for structure replacement or access road improvements, approved staging areas, or excavation operations, vegetation will be preserved and protected from damage by the contractor's construction operations and equipment.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
Land Use and Authorized Activities	The contractor will limit movement of crews, vehicles, and equipment on the ROW and approved access routes to minimize damage to property and disruption of normal land use activity. Construction trails not required for maintenance access will be restored to the original contour and made impassable to vehicular traffic. Access to the ROW is restricted in order to respect the property rights of the affected land owners.
	The contractor will maintain all fences and gates during the construction period. Any fence or gate damaged during construction will be repaired immediately by the contractor.
	The contractor will coordinate with the landowners to avoid impacting the normal function of irrigation devices and other agricultural operations during project construction.
	When weather or ground conditions permit, the contractor will eliminate, at the earliest opportunity, all construction ruts that are detrimental to agricultural operations and/or hazardous to movement of vehicles and equipment. Such ruts will be leveled, filled, and graded or otherwise eliminated in an approved manner. Damage to ditches, tile drains, culverts, terraces, local roads, and other similar land use features will be corrected as necessary by the contractor. The land and facilities will be restored as nearly as practicable to their original condition.
	Structure foundation holes will not be left open overnight, and will be covered. Covers will be secured in place and will be strong enough to prevent livestock, wildlife, or the public from falling through and into a hole.
	Tri-State will notify all fee property owners within the transmission line ROW prior to beginning construction activities.
	The contractor will abide by seasonal restrictions to avoid impacts to agricultural operations and to minimize impacts to the environment.
Geology, Paleontological, and Soils	Movement of construction vehicles and equipment will be limited to the project site and approved access routes.
	All soils compacted by construction will be loosened, leveled, and reseeded with approved weed-free grasses as approved by Tri-State.
	Vegetation will be removed only as necessary for construction, and disturbed areas would be scarified and/or ripped and reseeded to stabilize the soil. To help avoid or minimize the effects of soil compaction and rutting, direct use of areas of poor soil quality that are more vulnerable to vegetation loss and erosion will be minimized.
	During construction, vehicle and equipment travel will be limited to county roads, access roads, and designated overland travel routes on open land or rangeland. To prevent or reverse the effects of soil compaction, disturbed areas will be adequately scarified wherever appropriate to loosen the soil structure and to aerate the soil in preparation for revegetation.
	Excess Soil Excavation: Excess soil excavated from the holes of any poles, will be evenly spread on the access routes in the immediate vicinity of the pole structure.
	Erosion control measures will be implemented if necessary on disturbed areas, including areas that will be used for maintenance operations.
Air Quality	The contractor will utilize such practicable methods and devices, as are reasonably available, to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.
	Post seeding mulch may be utilized as necessary during reclamation activities to help reduce wind erosion and blowing dust. The mulch/stabilization will be performed as soon as possible after completion of project activities to minimize potential fugitive dust generation and revegetation occurs.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
	Vehicles and equipment showing excessive emission of exhaust gases due to poor engine adjustments or other inefficient operating conditions will not be operated until corrective adjustments or repairs are made.
Water Resources/Wetlands/WOUS	No stormwater permit is required for the project. Impacts will be less than 1 acre.
	Major surface water crossings will be avoided during project construction and are highlighted in red on the sheet maps in Appendix A as "No Down Line" access.
	Work within waters of the United States (WOUS) and other non-jurisdictional surface waters will occur during periods of little or no flow in the drainages.
	Tri-State will hire an environmental monitor to ensure the proposed project complies with all conditions of Nationwide Permit 12 to prevent unplanned impacts to wetlands and other WOUS. Prior to construction, all supervisory construction personnel will be trained in avoidance and minimization techniques to lessen impacts to wetlands and other waters of the United States.
	In areas where construction may occur near surface waters and wetlands but no permanent or temporary impacts are planned and permitted under a Corps permit; buffers will be created to protect these resources from sedimentation and erosion impacts. Fueling will occur only at staging areas and commercial stations to avoid potential contamination of surface waters, wetlands, and riparian communities. All fuel and chemical spills will be contained and cleaned up promptly.
	Delineated wetland boundaries within the project area will be identified clearly with wetland pin flags, fluorescent wetland tape, and/or orange plastic construction fencing. The markers will be installed prior to the initiation of construction and will be maintained throughout the construction process.
	Heavy equipment used in wetlands or other WOUS will be placed on top of mat boards during work periods, or other similar materials be used, to limit rutting and compaction in these systems.
	Temporary fills placed into wetlands or other WOUS will be removed in their entirety and the affected areas returned to preconstruction contour. Horizontal markers (e.g., fabric, weed free straw, etc.) will be placed so that the preconstruction contour can be accurately identified.
	Excavated topsoil and/or hydric soils from temporarily or permanently impacted wetlands will be selectively stockpiled for appropriate use in the project area following disturbance.
	Construction activities will be performed by methods that prevent entrance or accidental spillage of solid matter, contaminants debris, and other objectionable pollutants and wastes into flowing streams or dry water courses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution. All fuel and fluid spills within this area will be handled in accordance with appropriate state and federal spill reporting and response requirements.
	Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses will not be performed without prior approval by Tri-State and appropriate state agencies. Water and eroded materials will be prevented from entering the streams or watercourses by constructing intercepting ditches, bypass channels, barriers, settling ponds, or other approved methods.
	Excavated material or other construction materials will not be stockpiled or deposited within 100 feet from the edge of stream banks, lake shorelines, or other water course perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the actual water source itself.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
	Waste waters from construction operations will not enter streams, water courses or other surface waters without use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods. Any such waste waters discharged into surface waters will be essentially free of settleable material. Settleable material is defined as that material that will settle from the water by gravity during a one-hour quiescent period.
	Erosion control measures including silt fences, straw bales, and other stormwater runoff and sediment controls will be implemented as necessary on disturbed areas, including areas that will be used for maintenance operations (access ways and areas around structures).
	Drainages within the project area will be spanned by the transmission line. Structures will be replaced within floodplains, but no additional structures will be placed within the 100-year floodplain. Temporary construction impacts to floodplains would be restored to pre-construction condition, and revegetated with native species.
	Construction or maintenance traffic will be limited to that approved in the Nationwide 12 permits obtained from the U.S. Army Corps of Engineers for the project.
	Disposal of excess water from dust control will be done on flat upland locations away from surface drainages to prevent runoff and to encourage infiltration into the soil.
	Drainages are areas where noxious weeds frequently occur. All areas of disturbance will be monitored for the presence of state listed noxious weeds following the construction process.
Vegetation Resources	Vegetation will be preserved and protected from damage by construction operations to the maximum extent practicable. Upon completion of the work, all work areas will be left in a condition that will facilitate natural revegetation, limit the potential for invasive weeds, provide for proper drainage, and prevent erosion. All destruction, scarring, damage, or defacing of the landscape resulting from the contractor's operations will be repaired by the contractor.
	A native shortgrass prairie seed mix or a seed mix requested by the local landowner will be used to restore areas that have been disturbed for construction.
	Tri-State will avoid minimizing cutting trees in proximity to the ROW if they are not endangering the safe operation of the transmission line.
	Water turn-off bars or small terraces will be installed across all temporary construction access roads on hillsides to prevent erosion and facilitate natural revegetation.
	Disturbed areas where vegetation has been removed by construction activities to the extent that the potential for soil erosion is increased to a detrimental level will be subject to seedbed preparation techniques, reseeded to an approved seed mixture, and mulched, if necessary, during a recognized planting season. Mulching will be applied only to those areas where potential erosion will prohibit vegetation establishment and growth.
	To minimize the spread of noxious weeds, construction crews will limit transport of seeds by cleaning equipment and construction vehicles before entering the construction area. Tri-State will implement an appropriate weed suppression policy if warranted.
	On completion of the work, all work areas, except any permanent access routes, will be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.
	All construction materials and debris will be removed from the project area by the contractor prior to project completion and demobilization off site.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
Wildlife Resources/Special Status Species	Given the number of raptor nests within 0.25 mile of the project area (described under Section 5.8), the project will be constructed to the greatest extent feasible in these areas outside the avian breeding season (March 15 through September 1). If this is not feasible or construction carries over into the avian breeding season, a nesting survey would be conducted prior to construction to identify active breeding pairs and establish buffers to ensure the nest(s) are not impacted by construction activities. Tri-State will use the "Recommended Buffer Zones and Seasonal Restriction for Colorado Raptors" (Craig, 2002). If construction has to occur during the avian breeding season, Tri-State will coordinate with the U.S. Fish and Wildlife Service, Migratory Bird Office to identify appropriate avoidance and mitigation measures (such as the use of a nest monitor) to ensure construction does not result in nest abandonment or reduction in nest productivity. The construction schedule will take into consideration the areas with known nesting raptor occurrence to avoid these areas to the greatest extent feasible during the avian breeding season. No construction will occur within 0.5 mile of the golden eagle nest during the nesting season.
	If construction occurs during the avian breeding season (generally March 15 through September 1), surveys will be conducted no sooner than 72 hours proper to any ground-disturbing activity to ensure the project does not result in the "take" of any ground nesting or tree nesting avian species or nest protected under the Migratory Bird Treaty Act or disturbance to golden eagles and other raptors that occur within 0.25 mile or less of the ROW.
	The transmission line spans all existing surface waters in the project area. No access improvements are proposed in Big Sandy or Fountain Creeks to avoid impacts to aquatic species. Aquatic habitats will be spanned and buffered to avoid direct and indirect impacts to fish, amphibians, and other aquatic organisms that may occur in surface waters in the project ROW. Permanent impacts are limited to minor armoring within existing roads that parallel Lake and Black Squirrel creeks. If for some unforeseeable circumstance Tri-State needed to access one of the surface waters during project construction or during operation for routine maintenance purposes, it would occur during the fall or winter months when the water levels are at their lowest. Consultation with the Colorado Department of Wildlife, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers would also be required.
	To preclude avian electrocutions and minimize collision risk, Tri-State will incorporate Avian Protection Plan (APP) standards developed by the Avian Power Line Interaction Committee (APLIC) (APLIC 2006) and the U.S. Fish and Wildlife Service to protect birds on power lines, APP Guidelines published April 2005 (APLIC and USFWS 2005), and National Electric Safety Code, which specifies electric conductor clearances.
	If a prairie dog colony is found within the project area prior to construction, and construction is scheduled to occur during the breeding season for burrowing owls (April 1 through September 1), surveys will be conducted using the Colorado Department of Wildlife's approved protocol.
	Impacts to wildlife habitat will be mitigated through revegetation and reclamation measures outlined above under vegetation resources.
	The construction contractor will be required to avoid active burrows whenever feasible within the ROW during project construction. Avoiding burrows would minimize impacts to ground-dwelling species like the ground nesting avian species, swift fox, coyotes, prairie dogs, and other fossorial species.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
Cultural Resources	Avoidance: • Tri-State will avoid sensitive cultural resources to the greatest extent feasible. Resources that may be impacted during project construction will be flagged prior to construction as "avoidance areas" to prevent inadvertent disturbance during any phase of construction. • Movement of vehicles across sites will be restricted to the existing two-track or other access roads within the ROW. Careful planning with project engineers and contractors prior to commencement of construction will help avoid disturbance of resources. Project construction staff will be briefed on the importance of not removing materials from any archaeological sites, and any resource locations identified to crews will remain confidential. • Should archaeological materials be encountered during construction, work will cease at that location until the discovery can be assessed by a professional archaeologist. Any work activity locations (e.g., staging areas, new access roads, etc.) outside the ROW will be surveyed for cultural resources prior to construction startup.
	Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural resources with reference to relevant laws and penalties and the need to cease work in the location if cultural resource items are discovered.
	A cultural resource monitor will be on site when construction activities are planned in proximity to cultural resources to ensure the sites are not disturbed.
	Tri-State will comply with the site collection and mitigation plan approved by the Rural Utilities Service and the State Historic Preservation Office to ensure cultural resources that cannot be avoided during construction are properly mitigated prior to the initiation of any construction activities.
	Cultural Resources—Protection of Known Sites: A qualified archaeologist will direct the placement of temporary fencing to protect National Register of Historic Places-eligible sites. Site flagging will be completed prior to implementation of access road improvements, structure removal or replacement, and prior to any other potential surface disturbing activity. A qualified archaeologist will be given advance notice (2 weeks minimum), prior to the start of all construction activities in the vicinity of eligible sites to enable the scheduling of temporary fence installation. The fencing will be removed immediately after construction activities are complete. Construction and maintenance personnel will be trained to recognize the makers and understand the equipment movement restrictions involved.
	Cultural and Paleontological Resources—Inadvertent Discovery: Pursuant to 43 CFR 10.4 (g); Tri-State will notify the authorized officer, by telephone with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4 (c) and (d), Tri-State will stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer. Should any previously unknown historic/prehistoric sites or artifacts be encountered during construction, all land altering activities at that location will be suspended until such time that Tri-State is notified and appropriate measures taken to ensure compliance with the National Historic Preservation Act and enabling legislation.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
Recreation	Tri-State will notify local landowners and business owners prior to beginning construction activities to avoid impacts to recreation (hunting and fishing) in the project area.
Visual	To minimize potential visual effects, existing undisturbed topography, trees, shrubs, and native vegetation will be preserved to the extent possible to maintain visual contrast.
Transportation	The contractor will make all necessary provisions for conformance with traffic safety standards and will conduct construction operations so as to offer the least possible obstruction and inconvenience to public traffic.
Noise	Construction vehicles and equipment will be maintained in proper operating condition and will be equipped with manufacturer's standard noise control devices or better (e.g. mufflers, engine enclosures). Project activities will only occur during daylight hours to avoid after sunset noise disturbance.
Hazardous Waste and Materials	Tri-State will comply with all applicable federal laws and regulations existing or hereafter enacted or promulgated regarding toxic substances or hazardous materials. In any event, Tri-State will comply with the Toxic Substance Control Act of 1976, as amended (15 USC 2601 et seq.) with regard to any toxic substances that are used, removed, or generated by or stored on the ROW or staging areas. Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 will be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act if 1980, section 102b. A copy of any report required or requested by any federal agencies or state government as a result of a reportable release or spill any toxic substance will be furnished to the authorized officer concurrent with the filing of the reports to the involved federal agency or state government. No bulk fuel storage will occur within the public lands portion of the project ROW. All fuel and fluid spills within these areas will be handled in accordance with appropriate state and federal spill reporting and response requirements. Any waste generated as a result of the proposed action will be properly disposed in a permitted facility. Solid waste generated during construction and periodic maintenance periods will be minimal. All hazardous materials will be handled in accordance with applicable local, state, and federal hazardous material statues and regulations.
Public Health and Safety	Tri-State will comply with applicable state standards for public health and safety, environmental protection, and siting, construction, operation, and maintenance if these standards are more stringent than federal standards for similar projects. Construction vehicles will be equipped with government approved spark arresters. The contractor will maintain in all construction vehicles a current list of local emergency response providers and methods of contact/communication. Structure foundation holes will not be left open overnight and will be covered when not in use. Covers will be secured in place and will be strong enough to prevent livestock, wildlife, or the public from falling into a structure foundation hole. If necessary, the contractor will apply necessary mitigation to eliminate problems of induced currents and voltages on to conductive objects sharing a ROW, to the mutual satisfaction of the parties involved. The contractor will install fence grounds, where required, on fences that cross or are parallel to the project.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
	Regular patrols of the proposed project would occur. Although the transmission line would be regularly patrolled, emergencies may occur. If there is an issue, appropriate field crews and engineering personnel will be notified by telephone or radio and they will undertake the required procedures to correct the problem and restore the facilities to normal operations. Tri-State recognizes its responsibility to provide wholesale electric service at the lowest possible cost in a manner that is safe, reliable, and environmentally sound. This responsibility includes carefully designing, locating, and operating its facilities in strict accordance with the National Electric Safety Code and all applicable federal, state, and local regulations. Safety measures for safe work or play near transmission lines are listed below: • Special care should be taken when working or playing near transmission lines to avoid hazardous situations such as direct contact with energized conductors. • Caution should be used when operating tall equipment, such as cranes or drilling equipment, to avoid contact with a transmission line. If there is adequate clearance below the conductors, normal agricultural and other activities can be carried on safely below a transmission line. • Irrigation pipes and systems should not be tipped up near a transmission line. Irrigation pipe should be carried as low to the ground as possible and preferably unloaded at a distance from the transmission line to eliminate nuisance spark discharge shocks. • Normal grounding policies effectively mitigate the possibility of nuisance shocks on stationary objects such as fences and buildings. Since the electric fields continue (but diminish) beyond the ROW, grounding practices will extend beyond the ROW for very large objects or long fences. • Care should be taken to prevent steady streams of water from an irrigation system from striking the conductors. • Equipment should be moved out from under a transmission line when refueling. • Hazards associated with fires should be avoided under transmission lines, such as storing flammables or constructing flammable structures. • Handle conductors so as to avoid scratches or damage that would increase corona effects.
Fire Prevention Control	Construction vehicles will be equipped with government approved spark arresters. The contractor will maintain in all construction vehicles a current list of local emergency response provider and methods of contact/communication.
Training	Tri-State and its contractors will inform their employees about activities permitted within the authorized ROW for the transmission line and access routes. As part of this measure, Tri-State will provide contractors and employees copies of these Design Criteria/Environmental Protection Measures showing allowable activities and access route improvement levels. Prior to any on-the ground project activities beginning, a pre-work meeting will be held with all Tri-State contractors. Coordination meetings to discuss site operations, maintenance, and reclamation will be scheduled at least once annually.

Table 3.2-2:
Tri-State's Standard Environmental Protection Measures for the Project

Resource	Environmental Protection Measures
	Tri-State will inform their employees and contractors about relevant federal and state regulations intended to protect cultural resources and other sensitive environmental resources (raptor nests, wetlands, surface waters, etc). Training will include an explanation of the need to avoid know resource sites, cease work when previously undiscovered culture resources items are encountered, and the possibility of prosecution for removal of such items and/or damage to archaeological sites. Regulatory training will also include training on the requirements of the U.S. Army Corps of Engineers Nationwide Permits and raptor and other migratory bird protection under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

3.3 No Action Alternative

Tri-State is obligated to provide an adequate and reliable supply of electric power to its customers. Under the No Action Alternative, the proposed modifications to the existing 230-kV transmission line would not be made. Tri-State and its customers would be at risk of future catastrophic failures and resulting outages. Tri-State would continue to incur financial losses in the event of a catastrophic failure of the transmission line.

4.0 Public Involvement

A public scoping notification letter was sent out to landowners within the project area on March 15, 2010. The letter defined the purpose and need and Proposed Action associated with the proposed project. The letter also invited the public to participate in the NEPA and 36 Code of Federal Regulations (CFR) 215.6 administrative review process by providing comments about the proposed project during the public scoping, EA Notice, and comment periods. The scoping period was open from March 22 through April 23, 2010.The public scoping notification letter was sent to 156 landowners, four federal agencies, two state agencies, and three local agencies. A total of 11 comments were received during the 33-day scoping period. A copy of the Scoping Report, including the public scoping notification letter, the comment form provided to landowners, and a copy of the comments is available for review at <http://www.usda.gov/rus/water/ees/ea.htm>. Tri-State received questions and/or comments on the following topics:

- Agriculture
- Biological Resources
- Traffic
- Easements
- NEPA Process

There were seven comments pertaining to agriculture. Two commenters indicated that they own agricultural lands that are crossed by the proposed project. One commenter was interested in salvage of the structures to be removed. Another commenter expressed concern about having multiple transmission easements across their property that disturbs pastureland. There was concern from the State Land Board regarding access on the Bohart Ranch and potential impacts to agricultural operations.

One commenter was concerned about timing of construction and its potential to impact the golden eagle nest that occurs less than 0.5 mile from transmission ROW. The same commenter was concerned with reclamation and revegetation plans on the Bohart Ranch. The Colorado Division of Wildlife (CDOW) recommended that Tri-State should follow CDOW's Guidelines and Recommended Buffers for avoiding impacts to breeding raptors in the project area. The CDOW also recommended the proposed project be constructed using "Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006" (APLIC 2006). No impacts to Preble's meadow jumping mouse or the lesser prairie chicken are expected. Project construction is scheduled to begin in fall 2010 to avoid impacts to nesting raptors and to agricultural operations in the project area.

Traffic was a concern on the Bohart Ranch. The commenter requested further information regarding access locations, number, and frequency of vehicles expected on site.

The Colorado Department of Corrections commented that they would work with Tri-State on access and easements that would be required for the proposed project. The U.S. Bureau of

Reclamation commented that, although not anticipated, a crossing agreement will be required if Tri-State should wish to occupy lands within the Fountain Valley Conduit easement for any purpose.

This EA addresses agricultural concerns and easements under Section 5.1, Land Use. Biological resource concerns are addressed in greater detail in Sections 5.6 through 5.9. Traffic concerns will be addressed as described in Section 3.2, Description of the Proposed Action, and in the Section 5.17, Transportation and Access.

One commenter mentioned he would like to be kept informed on the progress of the proposed project. Tri-State has set up a website that provides information regarding the proposed project. New releases and notices in the Federal Register will alert the public of the release of the EA.

5.0 Existing Environment

The following resource sections describe the existing human and natural environments potentially affected by the proposed project.

5.1 Land Use

The existing transmission line is within Lincoln, Elbert, and El Paso counties. Guidance for general land use planning is provided by the El Paso County Policy Plan (El Paso County 1994), Elbert County Master Plan (Elbert County 1996), and the Lincoln County Comprehensive Plan (Lincoln County 2007). The existing transmission line is located within areas identified within these plans as agricultural use areas. The proposed project is consistent with each of these land use plans.

The municipalities of Fountain, Wigwam, Yoder, and Limon, Colorado, are proximate to the project area (Figure 1.0-1). As shown on Figure B-2 in Appendix B, the project area consists primarily of grasslands and rural agricultural lands, with some urban development. Uncultivated rangelands are the most common land use. Prime farmland is shown on Figure B-3. Rural residences associated with large tracts of agricultural land occur throughout the analysis area, along with a number of dispersed, small communities outside the previously mentioned municipalities. There are 22 existing homes within 500 feet of the existing transmission line.

The larger communities of Pueblo and Colorado Springs, Colorado, are outside the project area and serve as employment centers for many of the residents in the analysis area.

As shown on Figure B-1 in Appendix B, the majority of the project area is privately owned under the jurisdictions of Lincoln, Elbert, and El Paso counties. Several large Colorado State Land Board parcels are dispersed throughout the analysis area.

Several public and private airports are located within the project area (Figure B-11 in Appendix B). The locations of the airports relative to the existing transmission line are discussed in greater detail in Section 5.17, Transportation and Access.

5.2 Geology, Minerals, and Soils

5.2.1 Geology and Minerals

The existing transmission line is located in the Colorado Piedmont physiographic province (Trimble 1990). The Colorado Piedmont is primarily underlain by rocks of upper Cretaceous and lower Tertiary rocks (Paleogene). The upper Cretaceous rocks consist of the Pierre Shale, Fox Hills Sandstone, and Laramie Formation. The Laramie Formation is composed of shale, claystone, and sandstone and is an important coal-bearing unit (Tweto 1979). The Tertiary formations consist of the Denver and Dawson formations (upper Cretaceous–lower Tertiary) and the White River Formation. The Denver Formation is composed of sandstone, shale, mudstone, and conglomerate and coal beds of limited extent. The Dawson Formation

is composed of sandstone, siltstone, and claystone and conglomerate. Surface bedrock geology consists of Pierre Shale and Fox Hills Sandstone (Tweto 1979).

Oil and natural gas are the major mineral resources throughout the analysis area. However, the existing transmission line crosses an area of the Denver Basin that has relatively little oil and gas production, although some isolated fields exist north and west of Limon, Colorado (Wray et al. 2002). Sand and gravel resources may be present in larger alluvial valleys.

There are no identified geological hazards in the existing transmission line area.

5.2.2 Soils

The regional topography for the Western Great Plains Land Resource Region (LRR) is primarily rolling shale plains covered by windblown sand and silt (loess) deposits, alluvium, and outwash (NRCS 2006). In this LRR, the dominant soils are very shallow to very deep, generally well drained, and loamy or clayey. Haplustalfs were formed in loamy sediments (Baca series) and eolian sediments (Vona and Wiley series) occur on hills and plains. Haplargids (Olney series) formed in eolian sediments on hills and plains. Ustorthents (Colby series) formed in loess on hills and plains. Torriorthents formed in alluvium and/or eolian sediments on alluvial fans, floodplains, and footslopes (Limon, Manvel, and Rocky Ford series) and in residuum and/or eolian sediments on hills, cuestas, and mesas (Minnequa, Penrose, and Travessilla series).

Upland soils within the project area featured sandy and surface waters typically were determined to have sands and gravels to depths of at least 1.5 feet below ground surface. Wetland soils varied; there were some silty clays, silty clay loams, and sandy clay loams.

A soil association is a group of different types of soils that occur together in a pattern on the landscape. Most soils are named. A named soil fits within a certain range of physical and chemical characteristics in a taxonomic system similar to those used for naming plants or animals. Platner-Ascalon-Stoneham and Bresser-Truckton-Ellicott are the dominant soil associations that would be encountered in the area (STATSGO 2006). The Valent-Bijou-Wigton, Valent-Bijou-Vona, Vona-Olney-Otero, and Olney-Vona-Otero are sandy and non-cohesive and are susceptible to wind erosion when disturbed. Approximately 45 percent of the area is composed of fine textured, compaction-prone soils such as the Razor-Midway-Limon, Midway-Razor-Heldt, Manzanola-Limon-Nunn, Renohill-Christianburg-Ulm, Weld-Baca-Renohill, Christianburg-Nunn-Glenberg, and Platner-Ascalon-Stoneham associations. Most soils are susceptible to wind or water erosion if disturbed by high winds or heavy precipitation.

Midway and Razor soils are located on moderately to steeply sloping areas and are highly susceptible to water erosion when disturbed. Schamber soils are very shallow over sand and gravel outwash sediments. These soils may be difficult to reclaim if disturbed.

Two soil characteristics that can affect a soil's suitability for development are its erodibility and shrink-swell potential. The measure of erodibility is based on the soil's K factor, which indicates the susceptibility of a soil to sheet and rill erosion by water. Soils having the highest K value are the most erodible. Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of a soil to blowing and the amount of soil loss. Wind erosion groups are based on texture from fine sand through gravel. A soil's shrink/swell capacity is directly related to the clay content of a soil. Many clays swell when they absorb water and shrink when they dry. Swelling pressure of such clays may cause damage to foundations, retaining walls, and other structures.

Soils in the existing transmission line were reviewed to see if they contain a high erodibility potential (wind/water) or high shrink swell potential. Large north/south-trending areas of soils with high wind erodibility potential are located towards the southern end of the existing transmission line, south of State Highway 94 in El Paso County. Smaller areas of wind erodible soils are located along the northeast portion of the existing transmission line, south of Matheson, in Elbert County (NRCS 2005) (Figure B-4 in Appendix B). A few small areas of high water erosion potential are located near the Midway Substation and in the vicinity of the city of Wigwam (NRCS 2005). The majority of the existing transmission line crosses areas classified with a low shrink swell potential (Figure B-5 in Appendix B). Small areas of medium and high shrink-swell potential are located in the vicinity of both Midway (11 structures are shown in such soils) and Big Sandy Substations (six structures are shown in such soils). The line has been in operation since 1977 and there are no known soil issues associated with structures at any of these locations.

5.3 Air Quality

Federal air quality standards are established by the Clean Air Act and administered by the Colorado Department of Public Health and Environment (CDPHE). Limited ambient air monitoring data are available for the project area. Air quality in the region is classified as attainment for all criteria pollutants.

5.4 Noise

The primary land use in the project area is rural agriculture. Ambient noise in rural areas commonly consists of rustling vegetation, farm equipment, and infrequent truck and automobile traffic. Intermittent sources of noise may include aircraft overflights and construction activities. Other common noise sources in rural areas are location dependent and may include noise associated with roadways, railroads, and industrial operations (e.g., oil and gas wells and processing facilities). Rural populations are generally exposed to very low levels of environmental noise and typically experience average outdoor sound levels lower than the average day and night sound level (45 to 50 weighted sound pressure [dBA]). The primary noise-sensitive receptors are rural residents.

5.5 Water Resources

According to the USGS National Hydrography database, there are a total of 50 surface water crossings and irrigation ditches within or in proximity to the project area (U.S. Census 2001). CDOW's hydrography data set (CDOW 2004) identifies 87 surface water crossings within or in proximity to the Project Area. Field studies identified twenty-nine of these features are potential waters of the United States. All of these crossings are currently spanned by the existing transmission line. Stream courses in the project area are primarily dry washes consisting of sands or gravels with banks that vary from very steep to subtle terraces barely extending above the streambed. Streams in the vicinity of the project area, including Lake Creek, Big Sandy Creek, Horse Creek, Rush Creek, Adobe Creek and Steels Fork, drain southeastward, ultimately reaching the Arkansas River. The far southwestern end of the project area drains to Williams Creek and Fountain Creek and then further south into the Arkansas River. Surface water crossings are shown in Figure B-6 in Appendix B.

Review of topographic maps and hydrography data for the parts of the counties that bisect the project area showed that surface water generally flows from the northwest to the southeast, roughly perpendicular to the direction of the transmission line. Prominent named streams in the area, from northeast to southwest, include Big Sandy Creek; North, Middle, and South Forks of Rush Creek; Mustang Creek; Horse Creek; Little Horse Creek; Steels Fork; Black Squirrel Creek; Chico Creek; Williams Creek; and Fountain Creek. All of these streams flow to the Arkansas River, well south of the project area with the exception of Williams and Chico creeks, which flow south-southwest into Fountain Creek. Fountain Creek ultimately joins the Arkansas River in Pueblo, Colorado. The streams in the vicinity of the project area occur in five different watersheds. Table 5.5-1 provides details for these watersheds.

Table 5.5-1:
Watersheds in the Big Sandy to Midway Project Area

Watershed Name	Hydrologic Unit Code	Drainage Area	Flow Data
Big Sandy	11020011	1,880 square miles	Big Sandy at Lamar, Colorado, 12 cubic feet per second on June 21, 2010
Rush	11020012	1,350 square miles	None available
Horse	11020008	1,400 square miles	None available
Chico	11020004	729 square miles	None available
Fountain	11020003	917 square miles	Fountain Creek at Fountain, Colorado, 62 cubic feet per second on June 21, 2010

Twenty-nine WOUS were identified in the project area (Table 5.5-2 and shown in Appendix B, Figures B-12 through B-28). Only at Fountain Creek was there clear evidence of flowing water; at Lake Creek, Big Sandy Creek, and Williams Creek, there was standing water, although evidence suggested that these streams do flow on an intermittent basis (drift lines).There were another 25 streams are ephemeral or intermittent in nature. The U.S. Army Corps of Engineers (USACE) defines ephemeral streams are those that flow in response to

precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table. The USACE defines intermittent streams as those which have no flow during sustained periods of no precipitation and which do not support species which require flowing water for at least six months out of the year.

Table 5.5-2:
Waters of the United States in the Project Area

ID[1]	Drainage	Pole #	Description
WOUS-1	Lake Creek	Pole 29. Access Road 3D.5	Standing water with little or no flow. This tributary flows to Big Sandy Creek. It has a defined bed and bank.
WOUS-2	Big Sandy Creek	Access Road leading to Pole 37	Standing water with little or no flow. The stream has a defined bed and slight bank or terrace.
WOUS-3	Unnamed Drainage	Between Poles	No field observations. Obvious sandy channel visible on aerial. It flows south to join Middle Rush Creek.
WOUS-4	Unnamed Drainage	Between Poles	No field observations. Obvious sandy channel visible on aerial. It flows south to join Middle Rush Creek.
WOUS-5	Middle Rush Creek	Between Poles 166 and 167	No surface water present. Defined bed and bank present. Sandy substrate.
WOUS-6	South Rush Creek	Between Pole 194 and 195	No surface water present. Defined bed and bank. Sandy bed.
WOUS-7	Mustang Creek	Between Pole 209 and 210	No surface water present. Somewhat poorly defined sandy bed and bank.
WOUS-8	South Rush Creek	Between Pole 216 and 217	No surface water present. Braided channels. Sandy substrate.
WOUS-9	Adobe Creek	Between Pole 226 and 227	No surface water present. Braided channels. Sandy and gravel substrate.
WOUS-10	North Fork Horse Creek	Between Pole 233 and 234	No flow or standing water. Pea gravel and sandy bed with defined banks.
WOUS-11	Horse Creek	Between Pole 242 and 243	No flow or standing water. Wide, dry streambed. Sand to gravels in streambed. Defined bank.
WOUS-12	Little Horse Creek	Between Pole 264 and 265	No flow or standing water. Much more vegetated than other dry streambeds. Poorly defined bed and bank. Marginal WOUS.
WOUS-13	Steels Fork	Between Poles 279 and 280	No flow or standing water. Defined banks. Partially vegetated bed with sand to pea-sized gravel.
WOUS-14	Private Pond	Between Poles 339 and 340	The transmission line crosses the southeast corner of this pond. It will be easily avoided during construction.
WOUS-15	Black Squirrel Creek	Access Road that leads east to Pole 386	This is a wide and sandy stream channel with a diversity of plant life including Chinese elm and Russian olive trees. Flow is very sporadic based on the amount of large overstory vegetation growing in the channel.
WOUS-16	Black Squirrel Creek	Between Poles 399 and 400	Broad sandy stream channel with defined bed and bank. It is 1+ miles downstream from Black Squirrel Creek described above.
WOUS-17	Chico Creek	Between Poles 452 and 453	Dry wash with no flow and no standing water. Sand to pea-sized gravel in streambed.
WOUS-18	Unnamed Drainage	Between Poles 458 and 459	Dry wash with no flow and no standing water. Sand to pea-sized gravel in streambed. Private landowner has dug an access road across this meandering channel.

Table 5.5-2:
Waters of the United States in the Project Area

ID[1]	Drainage	Pole #	Description
WOUS-19	Unnamed Drainage	Between Poles 471 and 472	Dry wash with no flow and no standing water. Sand to pea-sized gravel in streambed. Stream meanders, but the project has been rerouted here to avoid multiple crossings of the WOUS.
WOUS-20	Unnamed Drainage	Between Poles 480 and 481	Access was not permitted; hence, no direct observation of this drainage. Based on the aerial image, it is assumed that the drainage has a sandy channel similar in characteristics to the unnamed drainage between poles 480 and 481.
WOUS-21	Unnamed Drainage	Between Poles 501 and 502	Dry wash with no flow and no standing water. Sand to pea-sized gravel in streambed. Stream meanders and the transmission line crosses a wide outside bend in the creek. Embankment on the east side is quite steep.
WOUS-22	Unnamed Drainage	Between Poles 502 and 503	This is a dry wash with no flow and no standing water at this point. Sand- to pea-sized gravel in streambed.
WOUS-23	Unnamed Drainage	Between Poles 506, 507, and 508	This WOUS is located near a wetland associated with Adobe Creek. Wetland vegetation exists in pockets up and downstream of this crossing.
WOUS-24	Unnamed Drainage	Between Poles 510 and 511	This stream segment is a continuation the unnamed drainage discussed above between Poles 502 and 503.
WOUS-25	Unnamed Drainage	Between Poles 512 and 513	This stream segment is a continuation the unnamed drainage discussed above between Poles 502 and 503.
WOUS-26	Unnamed Drainage	Between Poles 513 and 514	This stream segment is a continuation the unnamed drainage discussed above between Poles 502 and 503.
WOUS-27	Williams Creek	Between Poles 519 and 520 and 520 and 521	Williams Creek flows south to join Fountain Creek. There was surface water present in this system.
WOUS-28	Fountain Creek	Between Poles 531 and 532	Major stream crossing with perennial flow. Fountain Creek flows south to join the Arkansas River.
WOUS-29	Unnamed Drainage	Between Poles 537 and 538	Dry wash with no flow and no standing water. Sand- to pea-sized gravel in streambed. West of I-25. Uncertain if this channel actually has flow that reaches Fountain Creek.

[1] Please see Figures B-12 through B-28 of Appendix B. Additional detail is provided in the Delineation of Wetlands and Other Waters of the United States, a report produced for the project and available for review at <http://www.usda.gov/rus/water/ees/ea.htm>.

The existing transmission line also spans Ditch #13 and associated drainages and connected ditches. The majority of surface waters in the project area are classified as intermittent streams.

There are a number of ephemeral ponds and lakes as well as isolated and non-WOUS surface waters found in proximity to the project area. All of these areas are currently outside the existing ROW or are spanned by the existing transmission line.

Stream segments that are not fully supporting their designated uses are defined as impaired and placed on the state 303(d) List of Impaired Waters. Surface water quality impairments are documented for portions of Adobe Creek and Horse Creek (CDPHE 2008). These impairments include elevated selenium, iron, and E. coli levels found in various stream segments. Fountain Creek (Monument Creek to State Highway 47) and all tributaries to Fountain Creek (not on U.S. Forest Service or Air Force Academy Land) are also impaired because of E. coli likely sourced from urban runoff and wastewater discharge (CDPHE 2008).

Sediment from urban development is also a water quality concern in the Colorado Springs area and for Fountain Creek.

Groundwater resources in the analysis area are primarily withdrawn from surficial alluvial deposits along Fountain Creek, Chico Creek, Black Squirrel Creek, and their tributaries. Additional groundwater supplies are withdrawn from bedrock in the Denver Basin aquifer system. Along the creeks, groundwater depths are less than 20 feet. In easternmost El Paso County and southeastern Elbert County, Colorado, the depth to water is less than 20 feet in the Denver Basin aquifer system (Hall 1998). Elsewhere, the depth to groundwater is more than 50 feet.

5.6 Wetland and Floodplains

5.6.1 Wetlands

The purpose of Executive Order (EO) 11990, Protection of Wetlands, is to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. To meet these objectives, the EO requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit the potential damage if any activity affecting a wetland cannot be avoided. Where wetlands cannot be avoided, measures to minimize adverse impacts to wetlands must be examined. Section 404 of the Clean Water Act establishes a federal permitting program that regulates activities in wetlands. Section 404 requires that anyone proposing to deposit dredged or fill material into "waters of the United States" including wetlands, must obtain a permit from the USACE, the agency responsible for administering the Section 404 permitting process for such activities.

According to National Wetlands Inventory (NWI) data, wetlands are associated with Big Sandy Creek (Photograph 1), Steels Fork (Photograph 2), Horse Creek, North Fork Creek, Middle Rush Creek, Long Branch Creek, and Fountain Creek. Riparian communities are associated with Big Sandy Creek, Lake Creek, Middle Rush Creek, and Fountain Creek.

The project area was examined on 2008 and again in 2010 for the geographic location and extent of wetlands according to the routine methodology and guidelines in the USACE wetland delineation manual (Environmental Laboratory 1987) and the new regional supplement for the Great Plains region (USACE 2010).

There were four surface water crossings that were evaluated during preliminary site assessments conducted in July 2008 based on the potential for impacts to wetland and riparian communities during project upgrades and structure replacement. These were Big Sandy Creek, Lake Creek, Middle Rush Creek, and Fountain Creek. Formal delineations were conducted in 2008 at Big Sandy and Fountain Creek because of the potential for construction activities to impact wetland communities. A total of seven wetlands were delineated within these two areas. The acreage of each wetland in the ROW is provided in Table 5.6-1, as is a preliminary designation of its jurisdictional status. There were a total of 4.87 acres of potentially jurisdictional wetlands mapped within the study corridor in 2008. There were other swales and depressions that exhibited some wetland characteristics within the study corridor.

Photograph 1: Transmission Line Crossing at Big Sandy Creek

Photograph 2: Steels Fork Creek (Representative of Other Ephemeral Drainages in the Project Area)

At the time wetland delineations were conducted in 2008, access had not been identified for the proposed project. Surveys in 2010 evaluated the remainder of the transmission ROW and access roads. A total of seven wetlands were delineated during the field efforts conducted in 2008 and seven additional wetlands delineated in 2010. These wetlands are listed below in Table 5.6-1. There were a total of 4.87 acres of potentially jurisdictional wetlands mapped

within the study corridor in 2008. There were a total of 1.87 acres of potentially jurisdictional wetlands mapped within the project area in 2010. All of these wetlands are identified on the sheet maps located in Appendix B, Figures B-12 through B-28).

Table 5.6-1:
Wetlands Delineated in the 2008 Field Effort

ID[1]	Wetland Size w/in ROW (acres)	Preliminary Jurisdictional Determination	Pole Location
Wetlands Delineated in 2008			
Wetland #1	0.147	Jurisdictional	Between Pole 28 and 29
Wetland #7	0.653	Jurisdictional	Between Pole 35 and 36
Wetland #8	0.533	Jurisdictional	Between Pole 35 and 36
Wetland #11	1.778	Jurisdictional	Between Poles 527 and 529
Wetland #12	0.029	Jurisdictional	Between Poles 528 and 529
Wetland #13	0.258	Jurisdictional	Between Poles 529 and 530
Wetland #14	1.467	Jurisdictional	Between Poles 530 and 532
Wetland Delineation 2010			
Wetlands #2/3	Not within ROW	Jurisdictional	Between Poles 28 and 30 and east along an access road
Wetland #4/5	Not within ROW	Jurisdictional	East of Poles 33–37 along a project access road. The access road is an existing farm/ranch road
Wetland #6	Not within ROW	Jurisdictional	East of Poles 34–35 along a project access road
Wetland #9	0.126	Jurisdictional	Between Poles 506 and 507
Wetland #10	1.744	Jurisdictional	Between Poles 519–520 and Poles 520–521

[1] Please see wetland locations on Figures B-12 through B-28 in Appendix B. Additional detail is provided in the Delineation of Wetlands and Other Waters of the United States, a report produced for the project and available for review at <http://www.usda.gov/rus/water/ees/ea.htm>.

5.6.2 Floodplains

EO 11988, Floodplain Management (May 24, 1977), directs federal agencies to ensure that the potential effects of any action it may take in a floodplain are evaluated. Federal agencies are, therefore, required to avoid direct or indirect support of development in a floodplain or new construction in a wetland whenever there is a practicable alternative.

Floodplains in the project area were analyzed using data from the Federal Emergency Management Agency (FEMA). Floodplain data were not available for the portions of the proposed project that occur in Lincoln and Elbert counties. It is assumed for purposes of this analysis, therefore, that primary streams and tributaries found within this portion of the project

area may have associated floodplains. Floodplain locations are shown on the sheet maps included as Appendix B, Figure B-7.

There are at least six stream courses within the project area that exhibit significant floodplain development. These streams include Fountain Creek, Black Squirrel Creek, Steels Fork, Horse Creek, Middle Rush Creek, and Big Sandy Creek. Of these streams, only Fountain Creek was observed to have permanent flow during the June 2010 field delineation work. The remaining streams may be prone to flash flooding, but not with the same intensity and over as wide a floodplain as is exhibited by Fountain Creek. The only structure requiring replacement in Fountain Creek is Structure 529. This structure lies approximately 0.25 mile to the northeast of Fountain Creek and will be moved within 10 feet of the existing pole location. There are seven other structures scheduled for replacement located within the 100-year floodplain in the portions of the ROW that all occur in El Paso County. The floodplains are associated with two unnamed tributaries to Horse Creek and William's Creek. There are five additional structures to be replaced within 70 feet or less of a floodplain.

Construction work in the Fountain Creek floodplain and all other floodplain areas would consist of removal of the existing structure and installation of a new structure. The work would not require special construction, such as a raised foundation, which would alter the floodplain function or structure. The height of the structures above ground would be increased in order to maintain proper safe conductor to ground clearance as prescribed by the National Electric Safety Code during the maximum operational capacity of the line.

In order to accomplish the construction, existing access within the corridor will be used to get materials and equipment to the site. Access to these structures can be seen on the Wetland Sheet maps included as a part of this submittal. Poles will be delivered to the site on flatbed trucks as will other materials such as cross arms and braces. Two holes would be created for the installation of the wood poles. The holes shall be approximately 30 inches in diameter and 11 feet in depth. A rotary auger would be used for excavation, which is generally attached to a line truck. After the excavation, poles will be lifted and set in place by using a small boom truck. Holes would be backfilled using imported granular materials or with native material if it is deemed suitable for such uses. The poles would be dressed out by installing the cross arms, cross braces, arm braces, and insulators.

After completion of the structure erection, the conductor and shield wires would be transferred from the existing structure to the new structure. The old structure would be disassembled and removed from the job site in its entirety. Open excavation holes would be backfilled using the material that was previously removed for the excavations for the new structures. The total time on site for the structure change out would be no more than one day, and the vehicles on site may consist of a line truck, a bucket truck, pickup truck and a small boom truck.

After all structures are installed in the section of line, the conductors would be resagged and the new OPGW will be strung. Upon completion of the resagging operations, the contractor

will return to the site and clip the conductors into the clamps. The clipping would require no more than two hours and then the work at the site will be complete.

For structures that occur in floodplains that are not scheduled to be replaced, the work would consist of only unclipping the wire before the sagging operations and clipping the conductor once it has been resagged. This work normally requires no more than a bucket truck and a pickup, and would require only two trips to the structures on existing access roads.

5.7 Vegetation Resources

5.7.1 Vegetation

A biological field assessment for the proposed project was conducted on July 16 and 17, 2008, and again in June of 2010. The purpose of these assessments was to collect information on biological resources of concern within the project area. Specifically, the surveys focused on the presence of habitat for state and federally listed species, raptor and other avian nesting sites, wetland and riparian communities, vegetation communities and the occurrence of noxious weed populations in the project area. Aerial maps were reviewed prior to field surveys to allow the survey team to focus on areas that required closer evaluation in the field. Field assessments were conducted primarily from existing access roads. Where sensitive resources were identified, surveyors evaluated the area on foot or using an ATV.

According to the Colorado Land Cover data set, the proposed project occurs primarily in grasslands and agricultural landscapes (Table 5.7-1). Grassland communities in the project area have been historically, and are actively, grazed by livestock. Disturbed native shortgrass prairie communities are the primary vegetation community type found in the ROW (Photograph 3 and Figure B-2 in Appendix B). Wetland and riparian communities make up less than 1 percent of the vegetation found within the project area.

Table 5.7-1:
Land Cover Types in the Project Area

Land Cover Type	Miles Spanned	Percent of ROW
Grassland	67.33	89
Agriculture	4.76	6.3
Developed Lands	1.7	2.3
Shrublands	0.76	<1
Wetland	0.73	<1
Barren Lands	0.37	<1

Source: NLCD (2001)

Photograph 3: Heavily Grazed Shortgrass Prairie Representative of the Majority of the Project Area

5.7.1.1 Upland Vegetation

Vegetation in the project area has been affected by livestock grazing as well as drought conditions. Many areas within the project area are planted with crops, including winter wheat (*Triticum aestivum*) and corn (*Zea mays*). Rangeland has been converted to hay in some cases, featuring smooth brome (*Bromopsis inermis*). Reclaimed areas, including some swales, were commonly observed to be planted with crested wheatgrass (*Agropyron cristatum*).

The project area also features native shortgrass prairie species dominated by buffalograss (*Buchloë dactyloides*) and blue grama (*Chondrosum gracile*). Other important grasses in these native prairie sites include western wheatgrass (*Pascopyrum smithii*), needle and thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), and sand dropseed (*Sporobolus cryptandrus*). Common forbs on the native prairie sites include species of prickly pear cactus (*Opuntia macrorhiza*, *O. polyacantha*, and *O. fragilis*), many species of milkvetch (*Astragalus* spp.), prairie snowball (*Abronia fragrans*), and western wallflower (*Erysimum asperum*).

5.7.1.2 Riparian Communities

Riparian communities in the project area are associated with the larger creeks. Big Sandy Creek, Lake Creek, Middle Rush Creek, and Fountain Creek have dominant overstories of plains cottonwood (*Populus deltoides* ssp. *monilifera*) and peach-leaved willow (*Salix amygdaloides*). Tamarisk (*Tamarix ramosissima*), a Colorado B list noxious weed species, was observed Williams Creek on the southwestern end of the project area. The shrubs in the project area include coyote willow (*Salix exigua*), rabbitbrush (*Chrysothamnus nauseosus*), sand sagebrush (*Oligosporus filifolius*), and, in the southwestern portion of the study area, candelabra cactus (*Cylindropuntia imbricata*). Chinese elm (*Ulmus pumila*) and Russian olive (*Elaeagnus angustifolia*) occur in profusion in Black Squirrel Creek. Both of these tree species are non-native, and the Russian olive is a Colorado B list noxious weed species.

Big Sandy Creek and Fountain Creek are discussed in further detail under Section 5.6.1, Wetlands. Lake Creek is a tributary to Big Sandy Creek (Sheet Map 2 in Appendix A). Riparian vegetation was observed along the banks of the drainage. Species observed in this drainage included tamarisk, plains cottonwood, Russian olive, peachleaf willow, and Siberian elm. This riparian community is currently spanned by the existing transmission line.

Riparian vegetation associated with Middle Rush Creek (Sheet Map 7 in Appendix A) includes plains cottonwood, peach-leaved willow, arctic rush, coyote willow, American speedwell (*Veronica americana*), common spikerush (*Eleocharis palustris*), and inland rush (*Juncus interior*). This riparian community is currently spanned by the existing transmission line.

Big Sandy Creek's riparian community is dominated by coyote willow. There is also a cottonwood gallery forest along Big Sandy Creek to the southeast of the existing transmission ROW. The riparian communities are currently spanned within the existing transmission ROW.

Fountain Creek had the highest density of riparian vegetation within the project area. Native riparian species observed within and in proximity to the transmission ROW include coyote willow, plains cottonwood, dogbane (*Apocynum* spp.), snowberry (*Symphoricarpos* spp.), and chokecherry (*Padus virginiana*).

Table 5.7-2 presents some of the more common upland and wetland plant species observed in the project area during the biological field assessments.

Table 5.7-2:
Vegetation Species Observed in the Project Area

Scientific Name	Common Name
Abronia fragrans	Prairie snowball
Achnatherum hymenoides	Indian ricegrass
Agropyron cristatum	Crested wheatgrass
Ambrosia artemisifolia	Annual ragweed
Argemone polyanthemos	Prickly poppy
Anisantha tectorum	Cheatgrass
Aristida purpurea	Purple three-awn
Artemisia ludoviciana	White sagebrush
Artemisia frigid	Silver sage
Asclepias speciosa	Showy milkweed
Astragalus bisulcatus	Twogrooved poisonvetch
Pascopyrum smithii	Western wheatgrass
Breea arvense	Canada thistle
Buchloë dactyloides	Buffalograss
Calylophus serrulatus	Yellow evening primrose
Chondrosum gracile	Blue grama
Comandra umbellate	Bastard toadflax
Bromopsis inermis	Smooth brome
Carex lanuginose	Wooly sedge
Carex inops	Sun-loving sedge
Carex nebrascensis	Nebraska sedge
Carex praegracilis	Clustered field sedge
Carex stenophylla ssp. *Eleocharis*	Needleleaf sedge
Cryptantha spp.	Cryptantha
Eleocharis palustris	Spikerush
Erigeron spp.	Fleabane
Erysimum asperum	Western wallflower
Gaura coccinea	Scarlet gaura
Gilia pinnatifida	Sticky gilia
Helianthus annuus	Common sunflower
Hesperostipa comata	Needle and thread
Heterotheca villosa	Golden aster
Hippochaete laevigatum	Scouring rush
Juncus arcticus	WiregrassRush (Baltic rush)
Bassia sieversiana	Kochia

Table 5.7-2:
Vegetation Species Observed in the Project Area

Scientific Name	Common Name
Medicago lupilina	Black medic
Medicago sativa	Alfalfa
Melilotus officinale	Yellow sweetclover
Nuttalia nuda	Blazingstar
Oligosporus filifolius	Sand sagebrush
Opuntia macrorhiza	Pricklypear
Opuntia polyacantha	Pricklypear
Opuntia fragilis	Pricklypear
Oxytropis sericea	White locoweed
Panicum virgatum	Switchgrass
Penstemon albidus	White penstemon
Phacelia hastata	Scorpionweed
Plantago patagonica	Woolly plantain
Poa fendleriana	Muttongrass
Poa pratensis	Kentucky bluegrass
Populus deltoides ssp. *monilifera*	Plains cottonwood
Psoralidium lanceolatum	Scurf pea
Rumex crispus	Curly dock
Schizachyrium scoparium	Bluestem
Salix amygdaloides	Peach-leaved willow
Salix exigua	Sandbar willow
Schoenoplectus pungens	Three-square bulrush
Spartina pectinata	Prairie cordgrass
Sphaeralcea coccinea	Coppermallow
Sporobolus cryptandrus	Sand dropseed
Thermopsis rhombifolia	Prairie thermopsis
Tradescantia occidentalis	Prairie spiderwort
Tragapogon dubius	Salsify
Triticum aestivum	Wheat
Typha angustifolia	Narrow-leaved cattail
Vulpia octaflorap	Sixweeks fescue
Zea mays	Corn (crop)

5.7.2 Noxious and Invasive Weeds

The Colorado State List of Noxious Weeds was evaluated prior to field surveys to determine which species may occur in the project area. The state prioritizes the manner in which noxious weeds are managed and categorizes noxious weeds into List A, B, and C weeds as follows (CDA 2010):

> **List A weed species** in Colorado are designated by the Department of Agriculture Commissioner for eradication.
>
> **List B weed species** are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species.
>
> **List C weed species** are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.

The project area has been significantly altered through agricultural practices, although the majority of the state listed noxious weeds observed within the project area were associated with wetland and riparian communities. The most critical of these areas is Fountain Creek. There are multiple transmission line corridors present in this portion of the project area and there are dense populations of noxious and invasive species both within and adjacent to the project area. Noxious weeds observed within the Fountain Creek area include spotted knapweed (*Acosta maculosa*), musk thistle (*Carduus nutans*), Canada thistle (*Breea arvensis*), tamarisk), field bindweed (*Convolvulus arvensis*), common teasel (*Dipsacus fullonum*), Russian olive, and whitetop (*Cardaria draba*) (Sheet Map 21 in Appendix A). Additional invasive species observed in the Fountain Creek area include catnip (*Nepeta cataria*), annual ragweed (*Ambrosia artemisiifolia*), orchardgrass (*Dactylis glomerata*), curly dock (*Rumex crispus*), kochia (*Bassia prostrate*), common reed (*Phragmites australis*), and knotweed (*Polygonum paronychiodes*). Poison ivy (*Toxicodendron rydbergii*), a native but non-desirable species, was found in dense stands throughout the Fountain Creek section of the project area.

Leafy spurge and Canada thistle are the dominant noxious weed species observed at Big Sandy Creek. A list of state listed noxious weeds (and their classification) found within the project area are shown in Table 5.7-3. Noxious weed populations found within the project area are shown in Sheet Maps 1 through 21 in Appendix A. Other invasive species observed in the project area are listed in Table 5.7-4.

Table 5.7-3:
Noxious Weeds Observed in the Project Area

Scientific Name	Common Name	Noxious Weed List Classification
Acosta maculosa	Spotted knapweed	B
Acroptilon repens	Russian knapweed	B
Anisantha tectorum	Cheatgrass (downy brome)	C
Breea arvensis	Canada thistle	B
Cardaria draba	Hoary cress/whitetop	B
Carduus nutans	Musk thistle	B
Convolvulus arvensis	Field bindweed	C
Dipsacus fullonum	Common teasel	B
Elaeagnus angustifolia	Russian olive	B
Euphorbia esula	Leafy spurge	B
Tamarix ramosissima	Salt cedar/tamarisk	B

Table 5.7-4:
Invasive Species Found in the Project Area

Scientific Name[1]	Common Name
Bassia sieversiana	Kochia
Bromus inermis	Smooth brome
Chenopodium sp.	Lambsquarter
Dactylis glomerata	Orchardgrass
Medicago lupulina	Black medic
Melilotus officinalis	Yellow sweet clover
Nepeta cataria	Catnip
Phleum pretense	Timothy
Phragmites australis	Common reed
Polygonum spp.	Knotweed
Rumex crispus	Curly dock
Sisymbrium altissimum	Tumble mustard
Tamarix ramosissima	Tamarisk
Thinopyrum ponticum	Tall wheatgrass
Thlaspi arvense	Field pennycress
Tragopogon dubius	Salsify
Ulmus pumilla	Siberian elm
Anisantha tectorum	Cheatgrass (downy brome)

5.8 Wildlife and Wildlife Habitat

The dominant vegetation community that provides habitat for wildlife in the project area is shortgrass prairie. Shortgrass prairie habitats have been heavily disturbed by livestock grazing and agricultural production throughout the project area. Avian diversity was highest in rangelands and riparian communities. Trees and larger shrubs are primarily confined to wetland and riparian communities. These areas provide important habitat for a variety of avian species, white-tailed deer, pronghorn, and other wildlife that use these areas for forage and cover. The wildlife species observed during field surveys are listed in Table 5.8-1.

Table 5.8-1:
Wildlife Species Observed within the Project Area

Scientific Name	Common Name	Activity	Habitat
Avian			
Aquila chrysaetos	Golden eagle	Nesting 0.25 mile or less from the ROW	Cliff
Buteo regalis	Ferruginous hawk	Nesting 0.25 mile or less from ROW and second nest located on an existing transmission structure	Riparian/grassland
Buteo jamaicensis	Red-tailed hawk	Nesting within ROW	Riparian
Buteo swainsoni	Swainson's hawk	Nesting 0.25 mile or less from ROW	Pine tree at residence
Circus cyaneus	Northern harrier	Nesting 0.25 mile or less from ROW	Riparian
Asio flammeus	Short-eared owl	Possible nest 0.25 mile or less from ROW	Riparian
Falco sparverius	American kestrel	Occurrence	Grassland
Chordeiles minor	Common nighthawk	Possible breeding in proximity to ROW	Grassland
Ardea herodias	Great blue heron	Nesting 0.25 mile or less from ROW	Riparian
Meleagris gallopavo	Wild turkey	Foraging	Riparian
Zenaida macroura	Mourning dove	Foraging	Grassland
Columba fasciata	Band-tailed pigeon	Foraging	Grassland/residence
Charadrius vociferous	Killdeer	Foraging	Riparian/wetland
Chondestes grammacus	Lark sparrow	Foraging	Grassland
Calamospiza melanocorys	Lark bunting	Foraging	Grassland
Melospiza melodia	Song sparrow	Foraging	Riparian/wetland
Tyrannus verticalis	Western kingbird	Nesting within ROW	Grassland/riparian
Tyrannus tyrannus	Eastern kingbird	Foraging	Grassland
Sturnella neglecta	Western meadowlark	Foraging	Grassland
Agelaius phoeniceus	Red-winged blackbird	Likely nesting within ROW	Wetland/riparian
Lanius ludovicianus	Loggerhead shrike	Nesting within ROW	Grassland/riparian
Eremophila alpestris	Horned lark	Foraging	Grassland

Table 5.8-1:
Wildlife Species Observed within the Project Area

Scientific Name	Common Name	Activity	Habitat
Hirundo rustica	Barn swallow	Foraging	Grassland
Turdus migratorius	American robin	Foraging	Riparian
Dendroica petechia	Yellow warbler	Foraging	Riparian
Toxostoma rufum	Brown thrasher	Occurrence	Riparian
Big Game			
Antilocapra Americana	Pronghorn	Occurrence	Grassland
Odocoileus virginianus	White-tailed deer	Occurrence	Riparian
Odocoileus hemionus	Mule deer	Occurrence	Riparian
Small Mammals			
Canis latrans	Coyote	Occurrence	Grassland
Vulpes velox	Swift fox	Occurrence	Grassland
Taxidea taxus	American badger	Occurrence	Grassland
Sylvilagus sp.	Cottontail	Occurrence	Grassland
Reptiles and Amphibians			
Crotalus viridus	Western rattlesnake	Occurrence	Grassland

Avian nests were observed in proximity to the ROW along Big Sandy Creek, Middle Rush Creek, and Fountain Creek. There were five documented nest sites found in proximity to the transmission ROW. A red-tailed hawk nesting complex was documented in 2008 and again in 2010, in proximity to Lake Creek.

Loggerhead shrikes and western kingbird chicks were also observed in nests in proximity to the ROW. Loggerhead shrikes are a species that are being closely tracked in Colorado due to population declines on the eastern plains. This species inhabits open riparian areas, agricultural areas, grasslands, and shrublands, especially semidesert shrublands, and sometimes open piñon-juniper woodlands (NDIS 2010). Breeding birds are usually found near isolated trees or large shrubs. Western kingbirds were nesting along Middle Rush Creek. Raptor nesting information is considered sensitive and is not shown on the sheet maps in Appendix A.

Fountain Creek had the highest avian diversity and nesting habitat of all the wetland/riparian communities found within the project area. Based on territorial displays observed during field surveys, a pair of Red-tailed hawks and northern harriers is likely nesting in proximity (less than 0.25 mile) from the transmission ROW. A great blue heron rookery (communal nesting site) was identified within less than 0.5 mile of the transmission ROW. There are other species that likely nest in this riparian community. Surveys were not conducted outside the ROW because of access permission constraints, but Global Positioning System points were taken in direct lines with nest sites and the points were moved to approximate locations using *ArcView GIS*. The area has been heavily disturbed by the construction of several

transmission lines. The riparian zone adjacent to the transmission corridor, however, provides high-quality habitat for avian and other wildlife species that occur in the county.

Two ferruginous hawk nests were observed nesting on the eastern end of the project area and a second was documented on a nesting platform constructed by Tri-State on an existing transmission structure (that is not scheduled for replacement) in El Paso County.

A Swainson's hawk nest was observed at the eastern end of the project area. A loggerhead shrike nesting tree was also observed nesting in the same vicinity.

A pair of owls was observed outside the ROW to near Middle Rush Creek. This species may be nesting in the area, but no nests were identified within the transmission ROW.

A golden eagle nest is located on the western side of the project area in El Paso County. This species is discussed in further detail under Section 5.9.

The majority of these nests are within 0.25 mile or less of the transmission ROW.

White-tailed deer, mule deer, and pronghorn were observed within the project area during the site assessments conducted in 2008. Both species of deer were observed at Big Sandy Creek and Fountain Creek. Pronghorn were observed throughout the project area. According to CDOW's geographic information system (GIS) data (CDOW 2009), pronghorn winter range and winter concentration areas occur south of State Highway 94 within the project area. A resident population has also been mapped near these winter habitat areas (Figure B-8 in Appendix B). A pronghorn concentration area is also located west of Black Squirrel Creek. Big Sandy Creek and the area to the southeast have been mapped by the CDOW as white-tailed deer concentration and winter range habitat (Figure B-9 in Appendix B). Mule deer severe winter range, critical winter range, and concentration areas have been mapped by the CDOW along Fountain Creek and Big Sandy Creek. Mule deer concentration areas have been mapped by the CDOW north of State Highway 94 within the project area (Figure B-10 in Appendix B).

Big Sandy Creek and Fountain Creek provide perennial aquatic habitat for fish, amphibians, and other aquatic species. The other intermittent and ephemeral creeks found in the project area, including Black Squirrel Creek, and Middle Rush Creek, may provide aquatic habitat for fish and other aquatic organisms in spring and summer.

5.9 Special Status Species and Migratory Birds

According to the U.S. Fish and Wildlife Service (USFWS) Colorado Field Office County List (updated March 2010); there are 11 federally listed or candidate species that may occur in El Paso, Elbert, and Lincoln counties. The Colorado list of threatened and endangered species (CDOW 2010b) was also reviewed to determine which species may occur in the project area. Eight of the 11 species that carry federal protection are also protected by the state of Colorado.

The counties in which each of these species have historically occurred or have the potential to occur in the project area are listed in Table 5.9-1.

Table 5.9-1:
Federal and State Listed Species for El Paso, Elbert, and Lincoln Counties

Scientific Name	Common Name	Regulatory Status	County Occurrence
Athene cunicularia	Burrowing owl	ST	Elbert, El Paso and Lincoln
Botrychium lineare	Slender moonwort	FC	El Paso
Charadrius melodus	Piping plover	FT, ST	Elbert, El Paso, and Lincoln
Etheostoma cragini	Arkansas darter	FC, ST	Elbert, El Paso, and Lincoln
Grus Americana	Whooping crane	FT, SE	Elbert, El Paso, and Lincoln
Mustela nigripes	Black-footed ferret	FE. SE	Elbert, El Paso, and Lincoln
Oncorhynchus clarki stomias	Greenback cutthroat trout	FT, ST	El Paso
Scaphirhynchus albus	Pallid sturgeon	FE	Elbert, El Paso, and Lincoln
Spiranthes diluvialis	Ute ladies'-tresses orchid	FT	El Paso
Sternula antillarum	Least tern (interior population)	FE, SE	Elbert, El Paso, and Lincoln
Tympanuchus pallidicinctus	Lesser prairie chicken	FC, ST	Lincoln
Zapus hudsonius prebli	Preble's meadow jumping mouse	FT, ST	Elbert, El Paso

FC = Federal Candidate, FE = Federal Endangered, FT = Federal Threatened, SE = State Endangered, ST = State Threatened

Tri-State met informally with the USFWS in its Lakewood office on August 5, 2009, to provide information on the proposed project and obtain concurrence that the project was not likely to adversely affect any federally listed species. Because a year has passed since the informal consultation was initiated, Tri-State followed up with the U.S. Forest Service in August 2010 to ensure the USFWS did not have any additional concerns or new information on federally listed species in the project area and to confirm their previous concurrence that the project is "not likely to adversely affect" and federally listed species. The USFWS responded by email on August 9, 2010, and concurred the project is not likely to adversely affect any federally listed, candidate, or proposed species. Tri-State also contacted the CDOW to provide information on the proposed project, obtain any information that was available on state listed species, and to identify possible mitigation measures that would minimize impacts to state listed species and wildlife that may occur in the project area. Letters of concurrence from the USFWS and CDOW are included in Appendix C. Further detail and a complete record of consultation with both agencies are included in the Scoping Report completed for the project, which is available for review at <http://www.usda.gov/rus/water/ees/ea.htm>.

5.9.1 Federal Listed Species

5.9.1.1 Federal and State Species

Based on the review of species range and habitat preference, the federal and state listed species that may have habitat in the project area are the Ute ladies'-tresses orchid (*Spiranthes diluvialis*), Preble's meadow jumping mouse (*Zapus hudsonius prebli*), Arkansas darter (*Etheostoma cragini*), lesser prairie chicken (*Tympanuchus pallidicinctus*), and burrowing owl (*Athene cunicularia*). The piping plover, interior least tern, whooping crane,

and pallid sturgeon are not known to occur in the project area, but are included in this analysis because of the potential for water depletions in the Colorado and South Platte River Basins, which may affect the species and/or critical habitat in downstream reaches in other states.

The Ute ladies'-tresses orchid is known to occur within the Fountain Creek floodplain. Surveys for the Ute ladies'-tresses orchid were conducted within the project area in August 2008. No Ute-ladies'-tresses orchids were found within the project ROW. A complete survey report is provided in Appendix D.

The Preble's meadow jumping mouse (Preble's) is a federal and state threatened species in Colorado. This species inhabits riparian areas and adjacent uplands. Preferred riparian habitat includes mixed vegetation types where dense herbaceous or woody vegetation occurs near the ground level and where available open water exists during the mouse's active season. There are no documented occurrences of Preble's or designated critical habitat for this species in the project area (EDAW 2009). The riparian communities and surface water associated with Big Sandy Creek and Lake Creek are within USFWS-designated block clearance zones for the Preble's meadow jumping mouse. The mouse is known to occur in El Paso County, although conversations with the USFWS (EDAW 2009) indicated that the section of Fountain Creek that the proposed project would span is outside the documented range for this species. Habitat is found to the north of the project area near Colorado Springs. No surveys for the Preble's meadow jumping mouse were required for the proposed project by the USFWS.

5.9.1.2 Colorado Endangered Fish Recovery Program-Focus Species

In 2006, an agreement was signed between the governors of Colorado, Nebraska, and Wyoming and the U.S. Secretary of the Interior to implement a basin-wide Platte River Recovery Implementation Program. This program has extended to the Colorado River and its associated tributaries, including the Arkansas River Basin. The purpose of this program is to provide Endangered Species Act (ESA) compliance for water users in the Colorado and Platte River Basins for effects on the target species and critical habitat, while managing certain land and water resources to provide benefits for those species. The whooping crane, least tern, piping plover, and pallid sturgeon are the targeted species for recovery in the program.

The interior least tern and piping plover are typically found near water. Terns are fish eaters and prefer to nest on sandy or pebbly beaches around lakes and reservoirs or on sandbars in river channels. Piping plovers feed on a variety of beach-dwelling invertebrates and nest on sandy lakeshore beaches, sandbars within riverbeds, or even sandy wetland pastures. Piping plovers and interior least terns may be found in eastern Colorado during spring migration. Suitable stop-over habitat is present at Fountain Creek on the western edge of the project area.

The whooping crane is one of the rarer birds in North America. Of three extant populations, the Arkansas National Wildlife Refuge/Wood Buffalo National Park population is the largest, with a population of184 birds in 2003. This population utilizes the Central Flyway, and in

Nebraska, the central Platte River Valley is an important resting area during migration (DOI 2003, USGS 2007). The whooping crane is known to migrate through Weld County. Use of the Platte River floodplain as a migration resting area is well documented and monitored and a portion of the river floodplain is even designated critical habitat. In addition, cranes may, on occasion, stop at other water bodies, including a variety of wetland types and even agricultural fields (USGS 2007).

Dust abatement and use of water for construction purposes are addressed in the recovery plan as uses that may result in water depletions. The USFWS has determined that projects that result in depletion in flow of less than 0.1 acre-foot/year to the nearest surface water tributary to the Colorado and Platte River system qualifies for de minimis exceptions for water-related activities in the Colorado and Platte River basin. The USFWS considers these projects to have insignificant effects on the Colorado and Platte River target species and do not require consultation with the USFWS. In addition, detention basins that are designed to detain runoff for less than 72 hours, and temporary withdrawals of water (e.g., for hydrostatic pipe testing) that return all water to the same drainage basin within 30 days, are considered to have an insignificant effect and do not require consultation.

5.9.2 State Listed Species

The lesser prairie chicken is a state threatened species and a federal candidate for listing under the ESA. Lesser prairie chickens are found in sand sagebrush, yucca, and bluestem communities and are also found in agricultural areas in the winter. The project area occurs in heavily grazed shortgrass prairie and cropland. Sand sagebrush habitat is found on the southwestern end of the project area, but the habitat has been heavily impacted by livestock grazing. There are no known occurrences of lesser prairie chicken populations in Elbert, Lincoln, or El Paso counties. The project area is outside of the overall range of the lesser prairie chicken as mapped by the CDOW (NDIS 2009). Conversations with CDOW's Area Wildlife Manager in 2009 and letter provided on July 13, 2009, confirmed that lesser prairie chickens do not occur in the project area (Appendix C). This species is primarily found in southeastern Baca County, but also in Kiowa and Prowers counties. Further detail and a record of consultation with the CDOW are included in the Scoping Report completed for the project, which is available for review at <http://www.usda.gov/rus/water/ees/ea.htm>.

The Arkansas darter is a state threatened species and is also a candidate for listing under the ESA. The Arkansas darter is found exclusively in the tributaries of the Arkansas River in Colorado, Kansas, Missouri, and Oklahoma (NDIS 2008a). In Colorado, the darter is found in the Upper Arkansas, Fountain Creek, Horse Creek, Upper Arkansas at John Martin, Big Sandy Creek, Rush Creek, Black Squirrel Creek, and Chico Creek drainages (CDOW 2009). Darter populations persist in large, deep pools during late summer low-water periods when streams may become intermittent (CDOW 2009a). In Colorado, darters spawn throughout spring and summer. Spawning takes place in shallow water over a bottom of coarse gravel (CDOW 2009a).

The western burrowing owl is a state-listed species that may occur in the project area. In Colorado, Western burrowing owls are found in grassland communities and are generally

associated with prairie dog colonies. There are no documented occurrences of burrowing owls in the project area. No prairie dog colonies were observed during site assessments conducted in 2008, and in areas where access was unavailable at the time surveys were conducted; aerial maps were analyzed to determine whether prairie dog colonies were present. None were identified; however, additional analysis will be required prior to construction.

A swift fox was observed in 2008 where the transmission line crosses County Road 27. The swift fox is a Species of Special Concern in Colorado. In Colorado, swift fox inhabit shortgrass and midgrass prairies in eastern Colorado (NDIS 2009). NDIS has mapped the entire project area as overall range for the swift fox.

5.9.3 Migratory Birds

The rangeland, riparian, and wetland communities within the project area provide nesting habitat for a variety of species protected under the Migratory Bird Treaty Act (MBTA). All of the avian species listed in Table 5.9-1 are protected under the MBTA.

The raptors nesting in the project area along with the breeding populations of loggerhead shrikes and western meadowlarks documented in the project area are all protected under the MBTA.

While golden eagles are no longer listed as federally threatened under the ESA, they are still afforded federal protection under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. There is an active golden eagle nest in El Paso County less than 0.5 mile from the transmission ROW. A juvenile golden eagle was observed sitting on the nest in 2008.

The National Bald Eagle Management Guidelines and the CDOW specify no surface occupancy (beyond that which historically occurred in the area) within 0.25-mile radius of a golden eagle nest site and associated alternate nests. The “Recommended Buffers and Seasonal Restrictions for Colorado Raptors” (Craig 2002) also recommend seasonal restrictions to human encroachment within 0.25 mile of the nest and any alternate nests from December 15 to July 15.

Fountain Creek provides winter forage for bald eagles. There are no documented bald eagle nests or roost sites within 2 miles or more of the project area.

5.10 Recreation

Within the project area, recreation opportunities include dispersed hunting and fishing on private lands. No designated recreation areas are immediately adjacent to or crossed by the existing Big Sandy–Lincoln–Midway transmission line. Outside the project area, the communities of Limon, Fountain, and Colorado Springs provide recreation opportunities. Limon, Colorado, offers several parks, a swimming pool, a golf course, a gun club, and several private recreational vehicle (RV) campgrounds. Fountain contains one RV campground and several parks. Colorado Springs contains several private campgrounds for RV and/or tent camping, a gun club, two golf courses, many parks, and several swimming pools. The gun club is located less than 0.25 mile from the transmission ROW near the

southern portion of the transmission line in El Paso County. Pike National Forest is approximately 30 miles northwest of Fountain and 20 miles northwest of Colorado Springs and offers numerous recreational opportunities including camping, hiking, mountain biking, fishing, kayaking, rafting, sightseeing, and four-wheeling.

5.11 Visual Resources

Visual or aesthetic resources are defined as the natural and man-made features of a landscape. This section describes the landscape character and built facilities in the project area. Landscape character includes the distinctive qualities and arrangement of the features of a landscape, such as land, water, vegetation, and structures.

The Bureau of Land Management (BLM) Visual Resource Management (VRM) System is a nationally recognized system used by other agencies and jurisdiction to assess visual impacts. The VRM System divides views into distance zones of foreground-middleground (0 to 4 miles) and background (4 miles to the horizon). The visual contrast created by a 500-kV transmission structure (much larger than the existing and proposed structures), for example, is discernible within the first 4 miles (the foreground to middleground distance zone). Beyond 4 miles, structures or vegetation are discernible more as patterns or outlines. Eventually, the forms of individual structures or vegetation are no longer discernible on the landscape (BLM 2006).

Using the BLM VRM System guidance, the visual study area of the proposed project is a 4-mile-wide buffer on either side of the existing transmission line centerline. The dominant land cover in the project area is grassland, agriculture, and developed lands. The terrain of the area is mainly rolling hills. Tablelands and bluffs become more pronounced closer to the Midway Substation. The terrain, combined with wooded valley bottoms, provides screening in some areas. Near Interstate I-25 (I-25) and the Midway Substation, land uses become more diverse with industrial and highway commercial uses. Rural residential areas are more prevalent. The southwestern portion of the visual study area is dominated by extensive sandy areas. The middle and eastern portions of the visual study area contain multiple small creeks that run to the southeast. The municipalities of Limon and Fountain, Colorado, are located in the visual study area. There are 14 known existing transmission lines in the visual study area with voltages of 69 kV or greater (see Figure B-1 in Appendix B).

A representative visual simulation of the existing and proposed structures is shown in Figure 5.11-1. The existing structures are 70 feet above grade, and would be raised 5 to 15 feet depending on location and terrain features. The existing structures are two-pole wood H frames located, on average, approximately 800 feet apart. The replacement structures would be similar two-pole wood H frames located, on average, approximately 800 feet apart. The current insulators are ceramic and the new insulators would be ceramic. Where possible, existing insulator strings would be reused and transferred from the existing structures to the new structures. The existing conductors are 1.345 inches in diameter. The existing groundwires are 0.375 inches in diameter. The new OPGW would be 0.643 inches in diameter.

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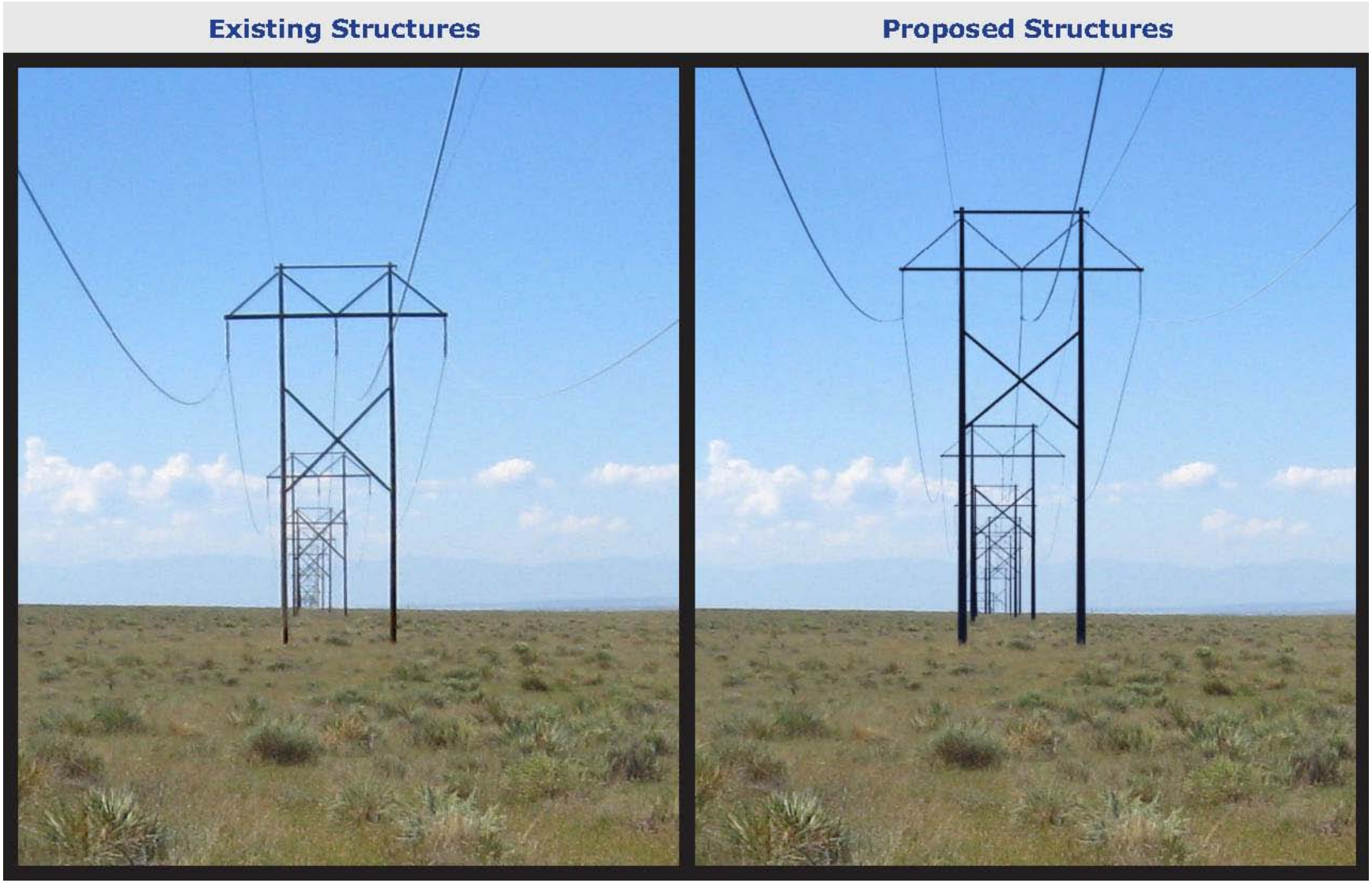

Figure 5.11-1: Representative Visual Simulation of Existing and Proposed Structures

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Scenic areas in the visual study area include Riverbend, Bohart, and Chico Stewardship Trust Lands; El Paso County or Colorado Springs Open Space; and Nature Conservancy Land.

5.12 Economics and Social Values

Elbert, El Paso, and Lincoln counties have been identified as the socioeconomic study area for this project. This section describes the social and economic characteristics of the study area. The proposed project is located in the east central part of Colorado in a primarily rural/agricultural region of the state. The largest cities in the study area are Colorado Springs, Fountain, and Limon. These cities are all within commuting distance of the project area. This section examines local socioeconomic indicators including population, employment, income, housing, community services, and infrastructure.

5.12.1 Population

The population trends for the study area are summarized in Table 5.12-1. Population data were gathered for an 18-year period of time (1990 to 2008). Population within the study area increased for all cities and counties between 1990 and 2000. There has been a slight decrease between 2000 and 2008 in the communities of Calhan and Limon. From a county perspective, the most growth occurred in Elbert County, where the population has more than doubled, while an analysis of the larger communities indicates that the least growth has occurred in Limon, where the population grew between 1990 and 2000, but has declined by 104 people between 2000 and 2008.

Table 5.12-1:
Study Area Population

Area	1990	2000	2008
El Paso County	397,282	516,929	596,053
Colorado Springs	280,430	360,890	400,411
Fountain	9,984	15,197	23,049
Calhan	562	896	894
Ramah	94	117	125
Elbert County	9,761	19,872	22,929
Elizabeth	818	1,434	1,452
Kiowa	275	581	612
Simla	481	633	718
Unincorporated Areas	8,072	17,224	20,514
Lincoln County	4,516	6,087	5,286
Limon	1,831	2,071	1,967
State of Colorado	3,294,473	4,301,261	5, 011,390

Source: DOLA (2008)

5.12.2 Employment and Income

The most recent employment information is available by county from the Colorado Department of Labor and Employment (2010) for the study area as shown in Table 5.12-2. In general, the study area is being affected by the nationwide economic downturn, although unemployment rates are somewhat below the national average. El Paso County had the highest unemployment rate in the study area during 2009 and also exceeded the state unemployment rate of 7.7 percent. June 2010 unemployment for El Paso County increased to 9.1 percent (Colorado Department of Labor and Employment 2010). Per capita income during 2007 was lowest in Lincoln County and greatest for Elbert County. The state average per capita income was higher than all counties in the study area.

Table 5.12-2:
Study Area 2009 Employment and 2007 Income

Area	Employment (in labor force)	Unemployment Rate (percent)	Annual Per Capita Income
El Paso County	272,888	8.3	$35,658
Lincoln County	3,082	4.4	$23,380
Elbert County	12,865	7.5	$39,857
Colorado State	2,701,026	7.7	$42, 449

Source: Colorado Department of Labor and Employment (2010)

5.12.3 Temporary Housing

Temporary housing in the study area primarily exists in the larger communities of Colorado Springs, Fountain, and Limon. Such accommodations consist of available rental housing, hotels, motels, RV sites, and campgrounds. The Colorado Springs metro area, located in El Paso County, is the most populated area in the study area and has the most housing units, the most housing vacancies, and the most seasonal/occasional vacancies (U.S. Census 2000d). In addition, several campgrounds and RV parks are located in the Colorado Springs area; several RV/campground facilities are also located in Limon. These facilities could accommodate temporary workers who might camp or bring trailers to live in while working on the project.

5.12.4 Community Services and Infrastructure

A large portion of the project area is served by the Big Sandy Fire Protection District, which serves more than 500 square miles of eastern Elbert and northeastern El Paso counties. The Limon Fire Protection District also serves the northeastern portion of the project area. There are 15 fire protection districts in El Paso County, including the Colorado Springs Fire and Rescue Departments. Police protection in Elbert, El Paso, and Lincoln counties is provided by the Elbert County Sheriff and the El Paso County Sheriff and the Lincoln County Sheriff, respectively. Nearby hospitals are located in Colorado Springs, including Memorial and Penrose Hospitals, both of which offer emergency services. Lincoln Community Hospital is located near Hugo (approximately 10 miles southeast of Limon); however, this facility does not offer emergency services.

5.13 Environmental Justice

This section describes populations in the study area to identify environmental justice concerns. The study area for this analysis is defined as Elbert, El Paso, and Lincoln counties in east-central Colorado. Nearby cities in this analysis include Colorado Springs, Fountain, and Limon. Under EO 12898 and Title VI of the Civil Rights Act, federal agencies are required to identify and address disproportionately high or adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

U.S. Census Bureau data (U.S. Census 2000a) indicate that income levels are diverse across the analysis area (Table 5.13-1). They show a per capital income range from $15,510 in Lincoln County to $27,076 in Colorado Springs. These numbers reflect the disparity of incomes in the more agriculture-oriented areas such as Limon and Lincoln County as compared to more urban areas such as Colorado Springs and El Paso County. Poverty levels in the three-county project area are generally lower than the state as a whole. The lowest poverty level in the study area, 4.1 percent, occurs in Elbert County. Lincoln County (includes the city of Limon) and Colorado Springs exceed the state poverty level of 9.3 percent at 11.1 percent and 11.7 percent, respectively. The highest poverty percentages are centered within the greater urbanized portions of the project area.

The predominant race across the analysis area is white. In general, most areas have lower minority populations than the state average (Table 5.13-1). El Paso County has the highest minority population in the study area at 25.2 percent (primarily located in Colorado Springs metro area). This is lower than the overall minority population (32.9 percent) percentage for the state.

5.14 Hazardous Materials or Solid Waste

No active contamination sites or landfills are identified in the project area (CDPHE 2009). There are no known existing hazardous materials within the project area.

5.15 Public Health and Safety

Tri-State will comply with applicable regulatory compliance standards for public health and safety. Although the potential does exist, given the stringent safety measures during construction and operation, hazards of fire, explosion, and other dangers to employees and the public are not anticipated.

Tri-State prohibits storage of flammables, construction of flammable structures, and other activities that have the potential to cause or provide fuel for fires on its easements and ROWs. There are no explosive substances associated with the proposed transmission line. Construction may require the use of implosion sleeves for splicing conductors. All Tri-State electric facilities are designed, constructed, operated, and maintained to meet or exceed all applicable standards of design and performance set forth in the NESC.

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Table 5.13-1:
Minority Populations and Income Status (2000 Census)

City or County	Population	Percent White	Percent Black	Percent Asian	Native Hawaiian or Pacific Islander	Percent Other Race	Percent Hispanic Origin	Per Capita Income (in dollars)	Percent Below Poverty Level
Colorado Springs (El Paso County)	390,397	78.6	6.6	2.9	0.2	6.4	14.2	27,076	11.1
Fountain (El Paso County)	15,197	75.1	8.7	2.0	0.6	6.7	15.1	15,975	8.3
Limon (Lincoln County)	2,071	93.0	0.3	0.4	0	2.8	7.2	16,250	10.3
El Paso County	516,929	81.2	6.5	2.5	0.2	4.7	11.3	22,005	8.0
Elbert County	19,872	95.2	0.6	0.4	0.1	1.3	3.9	24,960	4.0
Lincoln County	6,087	86.3	5.0	0.6	0	5.7	8.5	15,510	11.7
Colorado State	4,301,261	82.8	3.8	2.2	0.1	7.2	19.6	24,049	9.3

Source: U.S. Census (2000a)

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5.16 Cultural Resources

The National Historic Preservation Act of 1966 (NHPA, as amended) and the Archaeological Resource Protection Act of 1979 require that any federal undertaking consider the potential effects to cultural resources. Federal undertakings include direct agency actions as well as projects that involve permitting and/or funding by a federal agency. Section 106 of the National Register of Historic Places (NRHP) establishes the processes by which a federal agency identifies, evaluates, and consults on the significance of cultural resources that may be affected by their undertaking. Cultural resources are defined as the physical evidence and remains of prehistoric and historic human activities. They may include sites, buildings, structures, artifacts, and even locations or natural features where important events occurred. Cultural resources are nonrenewable and generally must be over 50 years old to be considered historic.

All cultural resources within the Area of Potential Effect (APE) that could be impacted by the proposed action must be evaluated for potential inclusion in the NRHP. These evaluations are based largely on two concepts: (1) integrity and (2) significance. Four NRHP criteria have been established to evaluate a resource's significance. Determining a resource's significance is the first step in evaluating its eligibility for the NRHP. To be considered significant, a resource must meet one or more of the following criteria (NPS 2002):

a. The resource is associated with events that have made a significant contribution to the broad patterns of our history; or
b. The resource is associated with the lives of significant persons in our past; or
c. The resource embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. That has yielded or may be likely to yield, information important in history or prehistory.

Prehistoric and historic archaeological resources are most commonly considered significant under to criterion d; however, they may also meet other criteria. Archaeological sites must have the potential to address generally accepted research questions and data gaps, and resources containing features such as hearths or habitation structures, and/or temporally or culturally diagnostic materials are more likely to be considered significant. Historic sites, especially ones with standing structures, can be found *Eligible* under any of the criteria. Linear historic features such as roads, railroad grades, and ditches are more likely to be found significant for their association with important events (criterion a) than for archaeological potential.

To qualify for the NRHP, a resource must be significant and retain integrity. Integrity refers to a resource's ability to convey those characteristics for which it is significant (NPS 2002). The

NRHP defines seven aspects of integrity. These are: (1) location, (2) design, (3) setting, (4) materials, (5) workmanship, (6) feeling, and (7) association. A resource must retain integrity of a majority of these aspects to be considered *Eligible* for inclusion in the NRHP. In practice, the integrity of archaeological sites is typically established by demonstrating the presence of intact subsurface deposits. Once established, integrity and significance are used in conjunction to determine whether a resource is *Eligible*, *Not Eligible*, or *Needs Data* for inclusion in the NRHP. *Eligible* resources are characterized by both significance and integrity. *Not Eligible* resources are lacking in significance or integrity, or may lack both requirements. Resources evaluated as *Needs Data* have not been documented to the extent necessary for establishing NRHP eligibility, i.e., the presence of intact subsurface materials on an archaeological site is suspected but unproven. *Needs Data* resources must be treated as *Eligible* until final determinations have been made. Resources determined *Not Eligible* normally do not require any additional work; the information contained at the resource is considered have been sufficiently documented.

5.16.1 Culture History Summary

To further understand the significance of a resource, it is necessary to place the resource in the framework of the larger culture history of the region, to identify its role in the trends and patterns of history. The prehistoric culture history of Colorado is divided into the four major watersheds of the state; the Colorado River Basin (north and south), the Arkansas River Basin, the Platte River Basin, and the Rio Grande River Basin. This project area falls within the Arkansas River context area, and the culture history summary in Appendix E is summarized from that context (Zier and Kalasz 1999). For more detailed description of the culture history of the region, see Colorado Prehistory: A Context for the Arkansas River Basin (Zier and Kalasz 1999). Table 5.16-1 presents the cultural taxonomy as proposed in Zier and Kalasz (1999). It is possible for resources from any period or stage to occur within the project area.

Table 5.16-1:
Cultural Taxonomy

Cultural Taxon	Temporal Range
Paleoindian Stage	11,500–7800 B.P.
Pre-Clovis Period	>11,500 B.P.
Clovis Period	11,500–10,950 B.P.
Folsom Period	10,950–10,250 B.P.
Plano Period	10,250–7800 B.P.
Archaic Stage	7800–1850 B.P. (A.D. 100)
Early Archaic Period	7800–5000 B.P.
Middle Archaic Period	5000–3000 B.P.
Late Archaic Period	3000–1850 B.P.
Late Prehistoric Stage	1850–225 B.P. (A.D. 100–1725)
Developmental Period	1850–900 B.P. (A.D. 100–1050)
Diversification Period	900–500 B.P. (A.D. 1050–1450)
Apishapa Phase	900–500 B.P. (A.D. 1050–1450)
Sopris Phase	900–750 B.P. (A.D. 1050–1200)
Protohistoric Period	500–225 B.P. (A.D. 1450–1725)

Source: Zier and Kalasz (1999)

The Historic Stage begins with the arrival of Spaniards in the southwest in the early 1500s. In 1540, Coronado led an expedition searching for the legendary “Seven Cities of Gold.” While the Coronado expedition passed to the south and east of Colorado, this expedition marked the start of Euro-American interaction with the local Native American groups through trade and the introduction of non-native diseases. In 1806, Zebulon Pike explored the headwaters of the Arkansas River in an attempt to define the new boundary between Spanish possessions to the south and the newly acquired lands of the Louisiana Purchase. American traders pushed into eastern Colorado using the Arkansas River as a travel corridor, known from Spanish times as the Santa Fe Trail.

Fur trappers and traders were the first Americans to spend time along the Arkansas River. In 1834, William Bent and his brother built Bent’s Fort on the Arkansas River 12 miles above the mouth of the Purgatoire River. Settlement in the area was sporadic and the towns of Pueblo, Hardscrabble, Greenhorn, and Huerfano were abandoned by the mid-1850s. The city of Pueblo was reestablished by 1859. Four conditions led to the eventual permanent settlement of the area (Anderson 1989). These conditions included removal of the Native American populations to reservations, the Pikes Peak gold rush, the Homestead Act of 1862 and the Desert Land Act of 1877, and improved transportation, including stage and railroad routes. By the late 1860s, many of the Native Americans had either left or had been removed from the Arkansas River Basin, which marks the beginning of the Pike’s Peak gold boom that brought more settlers into the area (West 1998). By 1872, the railroad entered Pueblo, and outlying areas shortly thereafter, which greatly facilitated growth and development of the area. Over the next 20 years, most of the towns in southeastern Colorado were founded, and Pueblo became a major regional commercial center.

5.16.2 Cultural Resource Investigations

A cultural resources file search was conducted in April 2009 at the Office of Archaeology and Historic Preservation (OAHP) in Denver, Colorado. The archival research indicated nine previous cultural resource investigations intersect or are in the vicinity of the present project ROW. Seven previously recorded linear resources (four historic railroad grades and three historic ditches) intersect the ROW, and four previously recorded isolated finds were located within the ROW. No other previously recorded sites or isolated finds were found to be located within the current project ROW.

Tri-State contracted RMC Consultants, Inc. to conduct a Class III cultural resource intensive pedestrian inventory of 79-mile Big Sandy–Lincoln–Midway 230-kV transmission line. Since this project involves the replacement of structures on an existing line, the APE is considered to be the 100 feet ROW. Access to the line is by numerous public roads (state, county or section line) that intersect the line, and by a two-track within the ROW; no access roads outside the ROW were surveyed.

The inventory resulted in the documentation of 23 new archaeological sites (13 prehistoric, five historic, five multi-component); four new segments of previously recorded linear historic

sites; and 27 isolated finds (19 prehistoric, seven historic, one multi-component). Isolated finds (IFs) represent locations of limited human activity, and are not normally considered *Eligible* for the NRHP. Fieldwork was conducted from May to July 2009. The surveyed transmission line corridor totals 953 acres.

Of the 23 newly-documented sites, six are recommended *Eligible* for listing in the NRHP under criterion d, and 10 sites are recommended *Needs Data* before an eligibility evaluation can be made. The remaining seven sites have been recommended *Not Eligible* for the NRHP. Two of the new segments of previously recorded railroads are recommended as contributing segments to the overall site, and two others are recommended *Needs Data*. Given the sensitive nature of cultural resources, the exact locations of the resources are not included in this EA and the inventory report is not available for public distribution. Cultural resource reports containing locational information are exempt from the Freedom of Information Act.

The primary component of the Section 106 process is consultation with the State Historic Preservation Officer (SHPO) regarding the significance (eligibility) of and potential impacts to resources that may be affected by federal actions. Tri-State has submitted the resource documentation to SHPO, who has concurred with all eligibility recommendations, with the exception of the two railroad segments recommended non-contributing. SHPO has requested additional justification for determining these segments non-contributing portions of the resources and recommended they be considered *Needs Data* segments. Should these segments be determined to be contributing, project actions would not affect those characteristics for which they are contributing; the existing line currently spans the segments, and no additional physical impacts would occur.

Additional consultation occurred between SHPO, Tri-State, and RUS when the site testing plan was completed for the *Eligible* or *Needs Data* resources that cannot be avoided. Of the six resources tested, four have been determined Not Eligible based on the testing results and two have been determined Eligible. SHPO concurred with all eligibility and effect determinations resulting from the site testing. Resources determined to be Not Eligible require no further work for mitigation of potential effects. Mitigation measures have been implemented and approved by SHPO and RUS for the resources determined to be Eligible. SHPO concurred in a letter dated February 1, 2011, that if management recommendations and mitigation measures outlined for the Project are implemented, a no adverse effect determination is appropriate. Should data recovery become necessary to mitigate impacts at any resource, SHPO will review the data recovery plan prior to implementation.

5.17 Transportation and Access

Transportation corridors in the project area generally consist of a network of east-to-west and north-to-south two-lane county roads, state highways, U.S. highways, and interstate highways (Figure B-11 in Appendix B).

The existing transmission line crosses residential roads, county roads, two state highways, one U.S. highway, and two interstate highways. It also crosses two railroads and two 69-kV transmission lines. The transmission line intersects the following major roads and railroads:

- I-25, approximately 7.5 miles south of Fountain
- The Union Pacific/Burlington Northern Santa Fe railroad line, approximately 7.5 miles south of Fountain
- Colorado Highway 94, approximately 1.7 miles west of Yoder
- Colorado Highway 71, approximately 3.9 miles south of Limon
- The Union Pacific railroad, approximately 2.6 miles southeast of Limon
- U.S. Highway 40, approximately 3.1 miles east of Limon
- Interstate I-70 (I-70), approximately 3.0 miles east of Limon
- The Kyle Railway, approximately 3.0 miles east of Limon

Several public and private airports are located within the project area (Figure B-11 in Appendix B). The locations of the airports relative to the existing transmission line are shown in Table 5.17-1.

Table 5.17-1
Distance from the Project to Nearest Airports

Airport	Distance from Existing Transmission Line (miles)
Limon Municipal Airport	1.4
Matheson Airport	4.4
Peakview Airport	0.1
Tranquila Airport	1.7
Cable's Corners Airport	4.7
Air Force Bullseye Auxiliary Airstrip	1.5
Falcon Air Force Base Helipad	2.2

5.18 Electrical Characteristics and Public Safety

5.18.1 Electrical and Magnetic Fields

EMF is a term that refers to electric and magnetic fields. Electric transmission lines produce EMF when they are in operation. These fields are caused by different aspects of the operation of a transmission line and can be evaluated separately.

Electric fields are produced whenever a conductor is connected to a source of electrical voltage. An example of this is the plugging of a lamp into a wall outlet in a home. When the lamp is plugged in, a voltage is induced in the cord to the lamp, which causes an electric field to be created around the cord.

Electric fields decrease in strength with distance from the source and are shielded or weakened by materials such as trees and buildings. Electric fields are measured in units of

volts/meter (V/m) or kilovolts per meter (kV/m). Electric and magnetic fields (EMF) extend out from the conductors (transmission lines spanning the distance between transmission structures) and decrease rapidly with distance from the transmission line. Existing sources of 60-Hertz (Hz) electric fields and magnetic fields in the project area include the existing Big Sandy–Lincoln–Midway transmission line, other transmission lines and distribution substations, electric distribution lines that deliver electricity to homes and businesses, electrical wiring, and appliances used in homes and businesses.

Magnetic fields are produced whenever an electrical current flows in a conductor. In the lamp example, if the lamp is turned on allowing electricity to flow to the lamp, a magnetic field is created around the lamp cord in addition to the electric field. Magnetic fields are typically measured in units of milligauss (mG).

Unlike electric fields, which are easily shielded by common conductive objects, magnetic fields cannot easily be shielded. Most materials (such as those that make up buildings, trees, and the ground) do not effectively shield magnetic fields. Certain ferromagnetic materials (i.e., those containing iron, nickel, or cobalt) have properties that, when in the proper orientation and location, can shield magnetic fields. Eddy currents are induced in highly conductive metal used in conductive shielding and cancel the imposed magnetic field.

This section describes electrical characteristics of transmission lines and modeling results.

5.18.1.1 Modeling Methodology

The EMF for the Big Sandy-Midway Transmission Line Project was predicted using EMF Workstation: ENVIRO (Version 3.52), a Windows-based model developed by the Electric Power Research Institute. It is a program that accurately predicts the electric and magnetic fields produced by linear transmission lines such as those in the proposed project.

To perform this modeling, detailed information on the design of the line was required, which included projected electrical power flows, operating voltage, tower configuration, conductor size and type, the height and horizontal location of each conductor, conductor sag, and conductor phasing. The modeling was conducted with a maximum load power flow. The detailed modeling approach is included with the full EMF report in Appendix F.

These data were input into the ENVIRO program, which produced the lateral profiles of the electric and magnetic fields out to 250 feet on each side of the centerline. These profiles were then plotted to produce the graphs that are presented below. The profiles were calculated with the lowest-phase conductor at 28 feet above the ground, the minimum ground clearance per the NESC, which coincides with the lowest point of conductor sag, providing the most conservative results. The calculations are computed at a height of 1 meter (3.3 feet) above the ground. The accuracy of the modeling is dependent on the accuracy of the input data (i.e., if the average-phase current is higher than what was modeled, so will the resulting magnetic fields). The resulting field plots are within a few percent of the true value for the conditions modeled.

5.18.1.2 Modeling Results

The project 230 kV transmission line was modeled as a single-circuit wood H frame structure. The electric and magnetic field results are presented in Figures 5.18-1 and 5.18-2, respectively. The transmission line would be located on a 100-foot-wide easement, 50 feet on each side of the centerline, which is shown as vertical dashed lines in Figures 5.18-1 and 5.18-2. The results of the electric field modeling plotted in Figure 5.18-1 show that on both the left and right easement edge the electric field is approximately 1.4 kV/m. The maximum electric field within the easement is approximately 2.9 kV/m.

Figure 5.18-2 presents the results of the magnetic field modeling for the existing power flow, peak power flow, and typical power flow, which is assumed as 60% of the peak power flow. These results show that on both the left and right easement edge the magnetic field is approximately 119.4 mG for peak power flow, 71.6 mG for typical power flow, and 65.6 mG for existing power flow. The maximum magnetic field within the easement is approximately 343.2 mG for peak power flow, 205.9 mG for typical power flow, and 188.5 mG for existing power flow.

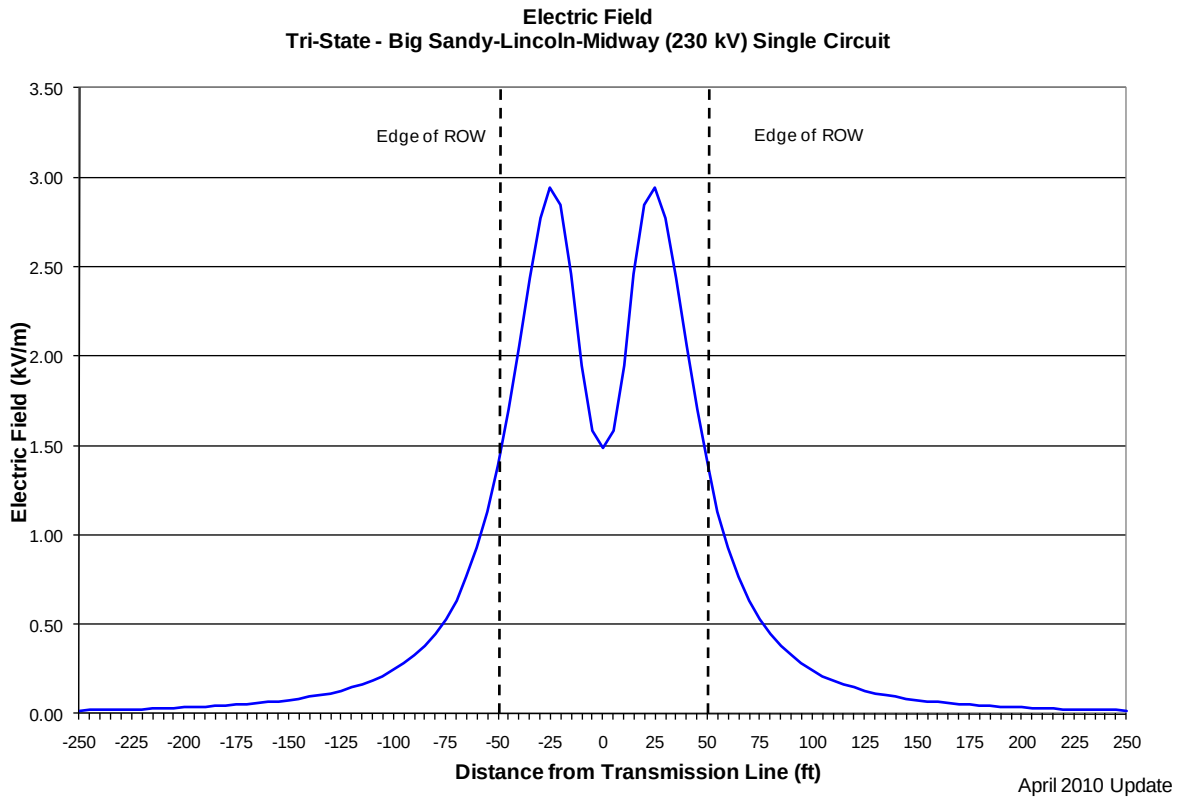

Figure 5.18-1: Electric Field Modeling Results

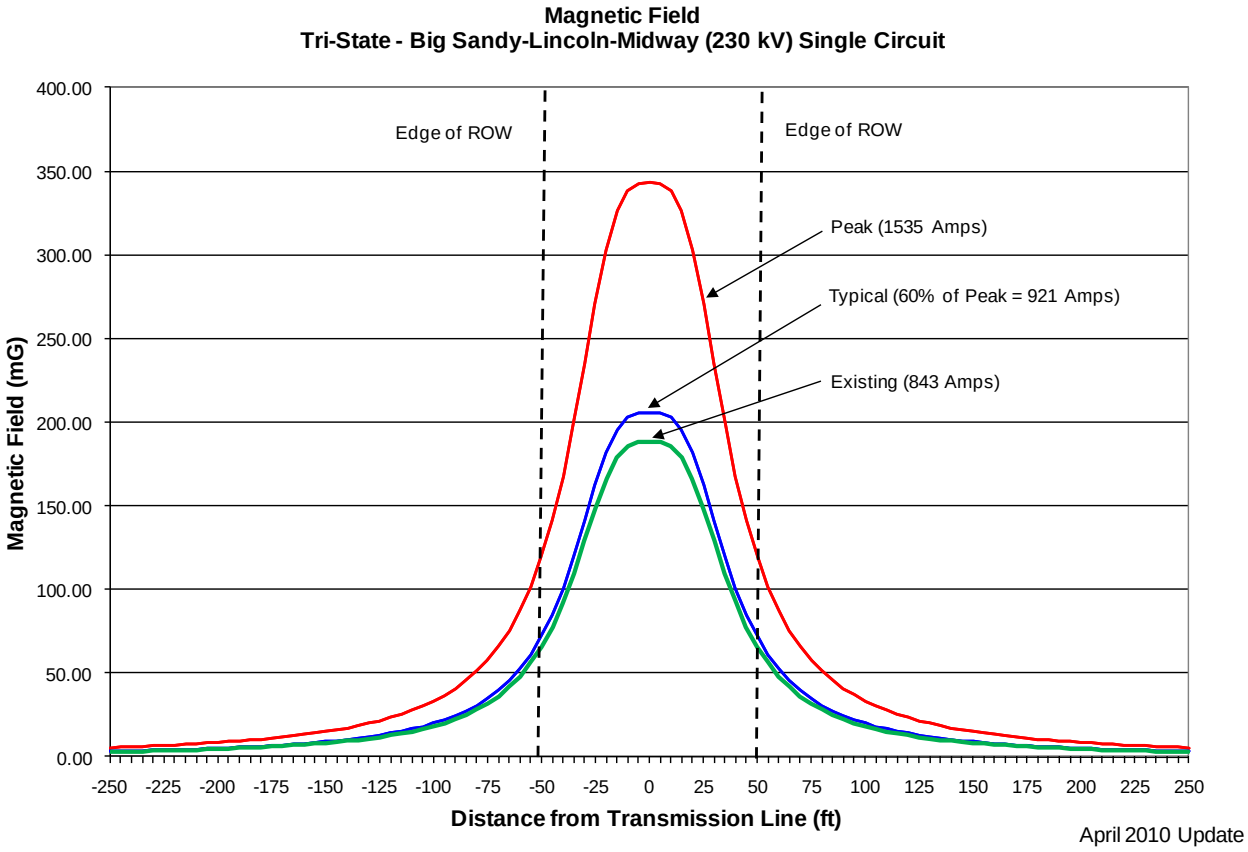

Figure 5.18-2: Magnetic Field Modeling Results

5.18.2 Corona Characteristics

Corona is the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware due to very high electric field strength. Corona may result in audible noise being produced by the transmission lines.

Corona on transmission lines has been studied extensively for many years. The parameters of importance in the estimations of corona are the line voltage, line configuration or geometry, number and diameter of the conductors, altitude above sea level, and the weather condition (e.g., whether it is raining). Power flow does not affect the amount of corona produced by a transmission line. Corona typically becomes a design concern for transmission lines at 345 kV and above and is less noticeable from lines like these that are operated at lower voltages.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal.

Irregularities (such as nicks and scrapes on the conductor surface or sharp edges on suspension hardware) concentrate the electric field at these locations and thus increase the electric field gradient and the resulting corona at these spots. Similarly, foreign objects on the conductor surface, such as dust or insects, can cause irregularities on the surface that are a source for corona.

Corona also increases at higher elevations where the density of the atmosphere is less than at sea level. Audible noise will vary with elevation with the relationship of A/300 where A is the elevation of the line above sea level measured in meters (EPRI 2005). Audible noise at 600 meters elevation will be twice the audible noise at 300 meters, all other things being equal. The proposed project was modeled with an elevation of 5,000 feet.

Raindrops, snow, fog, hoarfrost, and condensation accumulated on the conductor surface are also sources of surface irregularities that can increase corona. During fair weather, the number of these condensed water droplets or ice crystals is usually small and the corona effect is also small. However, during wet weather, the number of these sources increases (e.g., rain drops standing on the conductor) and corona effects are therefore greater. During wet or foul weather conditions, the conductor will produce the greatest amount of corona noise. However, during heavy rain the noise generated by the falling rain drops hitting the ground will typically be greater than the noise generated by corona and thus will mask the audible noise from the transmission line.

Corona produced on a transmission line can be reduced by the design of the transmission line and the selection of hardware and conductors used for the construction of the line. For instance, the use of conductor hangers that have rounded rather than sharp edges and no protruding bolts with sharp edges will reduce corona. The conductors themselves can be made with larger diameters and handled so that they have smooth surfaces without nicks or burrs or scrapes in the conductor strands.

Corona-generated audible noise (AN) from transmission lines is generally characterized as a crackling, hissing, or humming noise. The noise is most noticeable during wet conductor conditions, such as rain or fog. Transmission line noise is commonly expressed in terms of exceedance levels (e.g., L50 refers to the noise levels in a-weighted decibels [dBA] that are exceeded 50 percent of the time). Separate exceedance levels are generally given for fair weather and wet weather. The L50 wet weather level corresponds closely to an average value over all wet weather conditions for a long period of time, usually one year. The overall average noise level depends on the amount of foul weather at a particular location.

The electric field of a high voltage transmission line can cause corona to occur at sharp edges or points on the surface of the conductors, insulators, and hardware of the line. Corona represents a conversion of electrical energy into audible noise, electromagnetic interference with radio and television signals, visible light, and heat. The intensity of the electric field at the surface of a conductor is the most important factor in determining the amount of corona. Electric field strength is dependent on the voltage and the size of the conductor, and is

influenced by the altitude of the line above sea level. The smaller the radius of the curvature of an object (i.e., if it has a sharp edge or point), the higher the electric field will be at the surface of the object for a given voltage. Corona on conductors occurs where protrusions such a nicks, insects, or water drops exist on the conductor.

5.18.2.1 Modeling Methodology

The audible noise for the proposed project was predicted using EMF Workstation: ENVIRO (Version 3.52), the same program used to predict EMF from the proposed project.

The data presented in Appendix A of the EMF Report (presented in Appendix F of this EA) were input into the ENVIRO program to calculate the corona audible noise, with the addition of elevation of the line above sea level. The project was modeled with an elevation of 5,000 feet. Because the equations that predict audible noise were created from empirical measurements, the accuracy of the model is as good as the measurements that produced the original equations. In addition, the model is as good as the accuracy of the parameters input to the model (e.g., the actual elevation of the transmission line at a particular location rather than the average elevation of the entire project). Given these potential uncertainties, the resulting field plots are within a few percent of the true value for the conditions modeled.

5.18.2.1 Modeling Results

The proposed project was modeled as a single-circuit wood H frame structure. The corona audible noise plot is presented in Figure 5.18-3. The transmission line would be located on a 100-foot-wide easement, 50 feet on each side of the centerline, which is shown as vertical dashed lines in Figure 5.18-3. The figure show two conditions, fair and rain, to show the range in corona effects related to changes in weather.

The results of the corona audible noise modeling plotted in Figure 5.18-3 show that on both the left and right easement edge the audible noise is approximately 19.8 dBA in fair weather and 44.8 dBA in wet weather. The maximum noise that occurs on the easement is 23.3 dBA in fair weather and 48.3 dBA in wet weather.

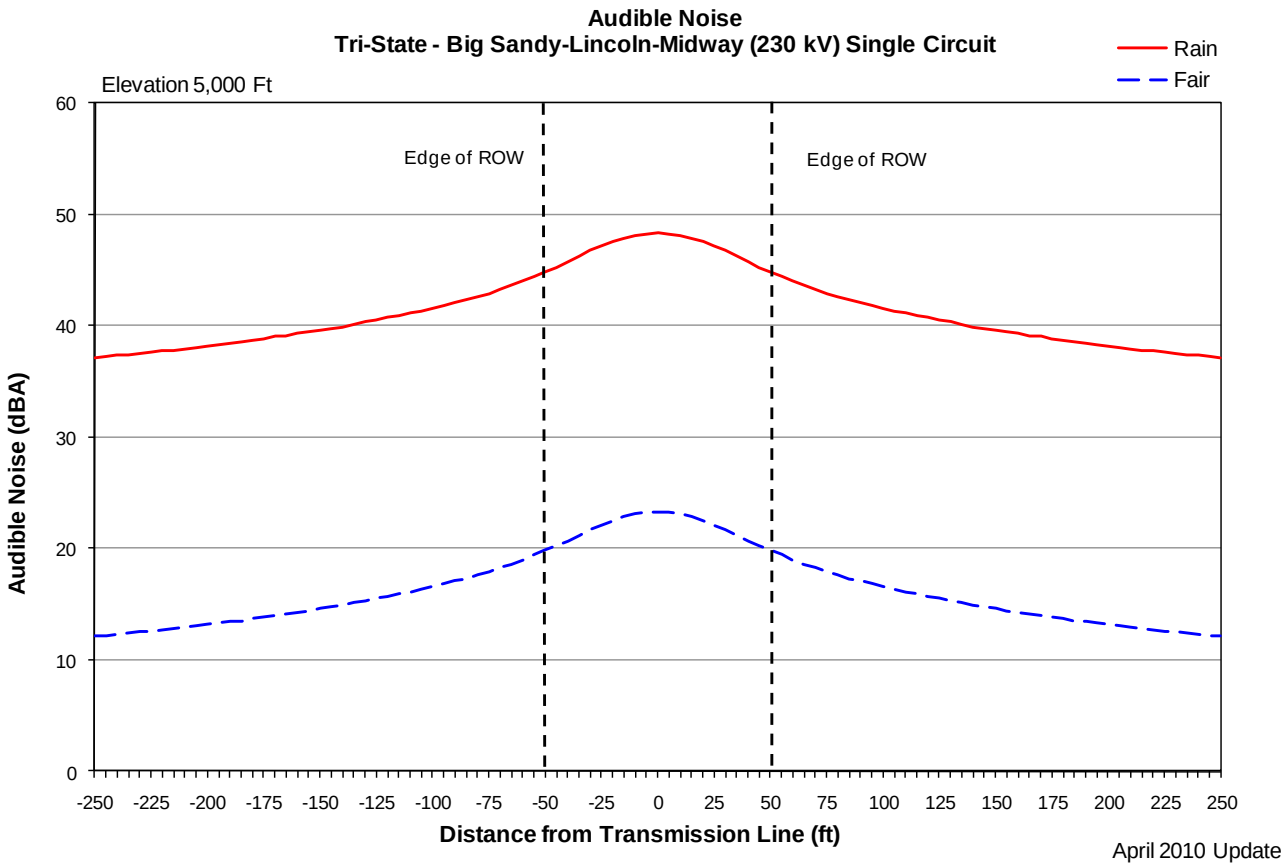

Figure 5.18-3: Corona Characteristics Modeling Results

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6.0 Environmental Consequences and Mitigation

The following resource sections describe the anticipated effects from construction, operation, and maintenance of the proposed action and the No Action Alternative to existing human and natural environments.

Tri-State implements mitigation and monitoring measures, otherwise known as environmental protection measures (EPMs) (as described in Section 3.2.7), for every construction project as standard operating procedure. EPMs are measures taken during the construction phase of the project to avoid, minimize, or mitigate a foreseeable effect to the human or natural environment. Tri-State uses construction inspectors and environmental monitors during construction to ensure that EPMs are followed along with any other federal, state, or local mitigation requirements.

6.1 Proposed Action

6.1.1 Land Use

6.1.1.1 Impacts

Local planning for major utilities is typically addressed in city and county land use plans. As a federal jurisdiction, however, the RUS would comply with applicable federal permit and regulatory requirements while seeking to comply with local requirements.

During construction, there would be temporary impacts on agricultural and grazing land within the transmission line ROW and within the construction staging areas (if they are placed outside the project ROW). The project would occur within an existing transmission line corridor, so impacts to land use would be restricted to the construction period only. Landowners may be required to avoid the construction ROW for the duration of construction in the area. This impact is expected to be minor and short term in nature. Modification of each transmission structure would affect the ROW for approximately three days over a period of several months. Landowners would be notified prior to the start of construction and would be notified of the anticipated timing of construction activities.

The proposed project would have no long-term effect on land use within the project area. The existing transmission line crosses approximately 27 miles of prime farmland. After construction, with the exception of the area disturbed for the new transmission line poles, there would be no major impacts to prime farmland or the use of this farmland within the ROW.

The proposed project would not impact existing utilities or airports.

Overland travel and existing county roads and other local roads would be used to access the construction site. No new access road construction is proposed. Improvements would be required to safely move construction vehicles across existing access roads at Lake and Black Squirrel creeks. These areas would be armored to minimize construction and long-term maintenance impacts in these surface waters/wetlands. Temporary fill would also be required

to facilitate vehicle crossings along the ROW at some surface water locations. All of this material would be removed immediately once construction is complete and the banks restored to their pre-construction condition if any damage should occur. Construction access is not expected to have any long-term or adverse effects on land use.

Staging areas would be restored and reseeded as appropriate.

6.1.1.2 Mitigation

Design standards and mitigation measures outlined in Table 3.2-2 would mitigate and minimize any potential impacts to land use.

6.1.2 Geology, Minerals, and Soils

6.1.2.1 Impacts

Potential effects to geological resources in the analysis areas would be associated with unstable slopes, oil and gas fields, and sand and gravel mines, as described below. The direct effect of placing a transmission structure on an unstable slope would be the potential for slope failure.

Potential impacts to a mineral resource from construction of the proposed project would be future inaccessibility to the resource caused by a transmission line or by interference with access to existing mineral extraction operations. Mineral resources (such as oil, gas, coal, sand, and gravel) underlie portions of the alignment; however, construction of the proposed project would not preclude future access to these resources. The existing transmission line has been in this location for 35 years and has not impacted access to mineral extraction.

Construction activities would occur in the vicinity of the structures to be rebuilt. Most of the ROW would receive little activity. In addition, during construction, vehicle and equipment travel would be limited to overland (cross-country) travel, county, local, and private roads. To prevent or reverse the effects of soil compaction, disturbed areas would be adequately scarified to loosen the soil structure and to aerate the soil in preparation for revegetation.

Direct and short-term impacts associated with removal and erection of the new structures would result from soil compaction related to overland travel, soil excavation for structure sites, and site preparation for construction of the transmission line structures. All of these activities may result in disturbance to soils, soil erosion, runoff, and sedimentation of nearby water bodies. In addition, without the implementation of EPMs, soil, groundwater, and surface water bodies could potentially be contaminated by spills from vehicles and heavy equipment or by mishandling of hazardous substances at the construction sites. Impacts to soil resources would be minimized through adherence mitigation discussed in Table 3.2-2. Operation would not represent additional effects beyond the already required maintenance activities.

Forty-four structures scheduled for replacement would be located in areas of high erodibility by wind and/or water and 36 structures would be located in areas identified as highly erodible by wind. No structures scheduled for replacement are located in areas of moderate or high shrink swell potential. The existing 35-year-old line currently has structures located in these areas and no issues related to erodibiliy or shrink swell potential have occurred. The proposed project is not expected to have any adverse affects to geology, minerals, or soils.

6.1.2.2 Mitigation

In general, soil disturbances would occur primarily in areas designated for transmission structure replacement, pulling and tensioning areas, staging areas, and routes designated for overland travel. Design standards and EPMs outlined in Table 3.2-2 will mitigate impacts to soil resources.

6.1.3 Air Quality

6.1.3.1 Impacts

Construction activities associated with the proposed project would generate less than significant amounts of particulate matter from soil disturbances and diesel-powered equipment, and less than significant amounts of carbon monoxide and the precursor pollutants to ozone formation from tailpipe emissions. Any air pollutants generated would be widely dispersed across the project area, short-term in duration, and minimized by the small-scale of construction operations for installation of structures and resagging of the conductor. Air pollutants also would be minimized through implementation of the mitigation and monitoring measures described in Table 3.2-2 for dust suppression and proper vehicle maintenance. Construction of the project, therefore, is not expected to negatively contribute to the air quality status in the area. There would be no long-term air quality effects associated with routine operation and maintenance of the proposed transmission line.

6.1.3.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to air quality.

6.1.4 Noise

6.1.4.1 Impacts

The main sources of noise from construction of the transmission lines would be the following activities:

- Assembly and erection of replacement transmission structures and removal of existing structures
- Helicopter-assisted erection of structures and stringing of the OPGW, if necessary, in rugged or inaccessible terrain.

Typical equipment associated with transmission line construction and their associated noise levels at full power are shown in Table 6.1-1. The shaded areas indicate reference noise levels.

Table 6.1-1:
Construction Equipment Noise Levels

Equipment	Typical Noise Levels 50 feet from Source (dBA)[1]
Rural area during daytime[1]	40
Residential area during daytime	50
Normal conversation at 6 feet	55–65
Trucks	75
Air compressor	81
City traffic	80
Backhoe	80
Concrete mixer	85
Mobile crane	83
Bulldozer	85
Grader	85
Rotary drilling rig[2]	87
Peak combined equipment[3]	89
Lawn mower	90

Note: Green-shaded areas indicate reference noise levels.

1 Source DOT (2006) except as noted.

2 Yantak (2007)

3 DOE (2002)

Under peak conditions, with the noisiest construction equipment operating simultaneously, the highest average expected noise level is estimated to be 89 dBA-equivalent sound level (Leq) at a reference distance of 50 feet (DOE 2002). This noise level is approximately equivalent to noise experienced on a sidewalk next to a busy urban street. Noise decreases with distance at a rate of approximately 6 dBA per doubling of distance from the noise source. Based on this attenuation rate, at distances above 0.25 mile, peak construction noise would be approximately 61 dBA, or equivalent to normal conversation at 6 feet.

There are 22 homes within 500 feet of the existing transmission line. As a result, construction noise effects along the transmission line would be expected to be minor and short-term. Construction is expected to take 1 day per structure replacement and two days for OPGW installation once the structure replacements are complete (depending on the number of structures to be replaced on the property) and generally equivalent to current background noise levels in the vicinity of the nearest homes.

Post construction, the noise effects from inspection and maintenance activities would be insignificant because of their short duration and infrequency.

Noise impacts from corona are discussed in Section 5.18.

6.1.4.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to air quality.

6.1.5 Water Resources

6.1.5.1 Impacts

The proposed project would result in the upgrade of an existing transmission line. The existing line currently spans all surface waters and wetland resources found in the project area. Any permanent and temporary impacts to WOUS and other surface waters would be minimized by careful siting of project facilities to follow pre-existing surfaces and upland terrain. Construction methods to span watercourses and wetlands, where possible, will result in minimization of impacts.

Desktop and field work evaluation has documented 29 WOUS in the project area. A comparison of these WOUS locations to planned temporary and permanent project features shows that no replacement support poles will be installed in any designated WOUS. There will be no down-line access through WOUS-5, -10, -11, -13, -16, -19, -21, -24, -28, or -29 (see Figures B-12 through B-28 in Appendix B). The access route would skirt WOUS #14 to the southeast. WOUS #14 is a pond feature on the northwestern edge of the transmission ROW. No placement of fill would be necessary for construction and maintenance vehicles to cross WOUS-2, -7, -8, -9, -12, -18, -22, and -23 given the sufficient integrity of the substrate to support heavy vehicles and a reasonable lead-in and lead-out of the stream course. Temporary fill would be placed into WOUS-3, -4, -6, -17, -19, -20, -24, -25, -26, and -27 (see Figures B-12 through B-28 in Appendix B).

Tri-State's environmental monitors will ensure the construction contractor utilizes the minimum area required and the best location to cross wetlands and surface waters. The access road length and orientation through surface waters is also planned in such fashion as to minimize temporary impacts to the greatest extent possible. Shoring of road perimeters and maintained sediment control are imperative when passing adjacent to or through wetlands and surface water bodies. It is conservatively estimated that average access road width will not exceed 16 feet.

Nine surface waters would require temporary fill of sand, rock, or other construction materials to allow for temporary construction access. These materials would be used to ensure safety and structural integrity for construction access. Horizontal markers would be placed prior to placement of fill to aid in returning the streambed to the correct elevation and profile following the removal of fill.

Temporary impacts may potentially vary from placement of soil, sand, or gravel in stream courses to mechanical damage to vegetation from heavy machinery driven through these systems. The placement of fill in channels would be temporary and would be removed once construction has been completed. Tri-State would remove all temporary fills to WOUS in the

project area and return those sites to original elevations, with the exception of the small areas of armoring in Lake Creek (WOUS-1) and Black Squirrel Creek (WOUS-115). Vegetation that is removed in the WOUS would be restored per USACE stipulations.

The proposed project is not expected to have any permanent or temporary impacts to Big Sandy Creek. William's Creek (WOUS-27) is currently predicted to have 0.066 acres of temporary fill placed to facilitate a safe crossing during construction. There is a narrow two-track access road currently at this location, but the temporary fill would improve the safety of this crossing.

The proposed project would utilize an existing access route across Lake Creek (approximately 0.5 mile south of the locations of wetlands # 2 and #3 in WOUS-1). This crossing is planned to receive a permanent rock armoring (0.030 acres) as well as temporary fill (0.030 acres) to facilitate a safer and more durable crossing that would minimize future impacts to this small stream during construction and future maintenance.

Permanent impacts to WOUS would consist of very minimal armoring along existing access roads that currently cross Lake Creek (WOUS-1) and Black Squirrel Creek (WOUS-11) (totaling 0.076 acres for both sites). This armoring would be completed in a manner that would not change the flood flows or normal stream flows, i.e., no raised berms or wingwalls would be used that could disrupt or change flow patterns in these streams.

The impact calculations, as recorded in Table 6.1-2, are very conservative estimates. Temporary impacts may be minimized well below this level in areas where Tri-State may be able to use mat boards or other types of temporary structures. Project impacts should be confined primarily to temporary impacts at a predicted total acreage of 0.641 acres. Permanent impact acreage for the proposed project is limited to Lake Creek (0.030 acres) and Black Squirrel Creek (0.046 acres).

The other surface waters present in the project area that are not regulated under the Clean Water Act are ephemeral drainages and swales not connected to a WOUS. These areas may be crossed during project construction during dry periods. EPMs outlined under Section 3.2.7, Environmental Protection Measures, apply to these areas as well as the WOUS.

A second indirect impact that could result from project construction is accidental spills from fuel, lubricants, or other contaminants used during construction that could enter surface water or migrate into groundwater, creating adverse effects to water quality. Both effects would be avoided or mitigated through proper management controls as outlined in Section 3.2.7, Environmental Protection Measures.

Table 6.1-2:
Predicted Impacts to Surface Waters (WOUS)—Project Construction

ID	Drainage	Predicted Temporary Impact (acres)	Predicted Permanent Impact (acres)	Description
WOUS-1	Lake Creek	0.030	0.030	Half the fill will be permanent in order to armor the lead in to the access road at Lake Creek. Half the fill will be temporary.
WOUS-2	Big Sandy Creek	0		No fill anticipated. Vehicles will drive on established access road.
WOUS-3	Unnamed Drainage	0.039		Placement of temporary fill to facilitate crossing WOUS.
WOUS-4	Unnamed Drainage	0.043		Placement of temporary fill to facilitate crossing WOUS.
WOUS-5	Middle Rush Creek	0		No down-line access over the WOUS.
WOUS-6	South Rush Creek	0.062		Placement of temporary fill to facilitate crossing WOUS.
WOUS-7	Mustang Creek	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-8	South Rush Creek	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-9	Adobe Creek	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-10	North Fork Horse Creek	0		No down-line access over the WOUS.
WOUS-11	Horse Creek	0		No down-line access over the WOUS.
WOUS-12	Little Horse Creek	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-13	Steels Fork	0		No down-line access over the WOUS.
WOUS-14	Private Pond	0		No impacts predicted in this WOUS. Vehicles will drive around the WOUS.
WOUS-15	Black Squirrel Creek	0.046	0.046	Half the fill will be permanent in order to armor the western lead in to the access road at Black Squirrel Creek. Half will be temporary fill.
WOUS-16	Black Squirrel Creek	0		No down-line access over the WOUS.
WOUS-17	Chico Creek	0.083		Placement of temporary fill to facilitate crossing WOUS.

Table 6.1-2:
Predicted Impacts to Surface Waters (WOUS)—Project Construction

ID	Drainage	Predicted Temporary Impact (acres)	Predicted Permanent Impact (acres)	Description
WOUS-18	Unnamed Drainage	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-19	Unnamed Drainage	0.067		No direct down-line access over the WOUS. New access route will minimize the temporary fill needed for accessing the line.
WOUS-20	Unnamed Drainage	0.064		Placement of temporary fill to facilitate crossing WOUS.
WOUS-21	Unnamed Drainage	0		No direct down-line access over the WOUS.
WOUS-22	Unnamed Drainage	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-23	Unnamed Drainage	0		No fill anticipated. Vehicles will drive over current WOUS substrate.
WOUS-24	Unnamed Drainage	0.033		No direct down-line access over the WOUS. New access route will minimize the temporary fill needed for accessing the line.
WOUS-25	Unnamed Drainage	0.047		Placement of temporary fill to facilitate crossing WOUS.
WOUS-26	Unnamed Drainage	0.061		Placement of temporary fill to facilitate crossing WOUS.
WOUS-27	Williams Creek	0.066		Placement of temporary fill to facilitate crossing WOUS.
WOUS-28	Fountain Creek	0		No down-line access over the WOUS.
WOUS-29	Unnamed Drainage	0		No down-line access over the WOUS.

[1] Please see Appendix B, Figures B-12 through B-28, to review WOUS locations. Additional detail is provided in the Delineation of Wetlands and Other Waters of the United States, a report produced for the project and available for review at <http://www.usda.gov/rus/water/ees/ea.htm>.

A significant effect to surface water or groundwater would occur if the following were experienced from construction or operation of the proposed project:

- Contamination of surface water from erosion or stormwater runoff that would cause a violation of state water quality standards
- Long-term degradation of surface water quality that would cause the loss of designated uses for humans or aquatic species
- Degradation of groundwater quality that would cause exceedances of state standards
- Groundwater depletion or interference with groundwater recharge that would adversely affect existing or proposed uses of an aquifer

Disturbance would be limited to the area needed for structure replacement (a maximum of 50 feet by 50 feet). Structure site work for the proposed transmission line would temporarily disturb ground cover and soils, exposing soil and loose rock that have the potential to be blown or washed into nearby waterbodies. Any effects would be temporary and would be avoided or minimized through the mitigation and monitoring measures described in Section 3.2.7. A wetland monitor would be present at all times when construction occurs near surface waters and wetlands. Mitigation and monitoring measures will be taken if necessary to control sedimentation and erosion. Construction equipment and equipment laydown areas would be kept away from waterbodies. After construction, work areas would be cleared of construction debris and recontoured, as necessary, and revegetated to ensure proper surface drainage and to minimize erosion. There would be no long-term effects to water quality from operation and maintenance of the proposed transmission line.

Long-term direct effects to surface water and groundwater are not anticipated from the project as structures are not proposed in lakes, streams, or rivers. Temporary impacts would include disturbance of ground cover and soils and exposing soil and loose rock that have the potential to be blown or washed into nearby waterbodies. After construction, work areas would be cleared of construction debris, recontoured, as necessary, and revegetated to ensure proper surface drainage and to minimize erosion. There would be no long-term effects to water quality from operation and maintenance of the proposed transmission line.

It is not likely that water would be needed during project construction. If water is needed for dust suppression, it would be the responsibility of the construction contractor. Tri-State will require that the water come from a municipal or other permitted water source to ensure the proposed project has no effects on federally listed or candidate fish species found in the Arkansas River Basin. There would be no anticipated measurable drawdown effects to wells or aquifers from such short-term construction activities.

Through implementation of EMPs and measures outlined in Tri-State's Nationwide Permit 12 from the USACE, construction and operation of the project area not expected to result in significant effects on surface or groundwater quality. In the absence of construction in waterbodies or waterbody crossings, potential sources of pollutants would largely be limited to sediments associated with stormwater runoff.

6.1.5.2 Mitigation Measures

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to water resources.

6.1.6 Wetland and Floodplains

6.1.6.1 Impacts

Wetlands

The 14 wetlands delineated in the project area were evaluated based on the areas proposed for construction and access. Figures B-12 through B-28 of Appendix B show the locations of all wetlands in the project area. No replacement support poles or access roads are planned within the perimeter of any delineated wetlands.

The proposed project would utilize an existing access route across Lake Creek (approximately 0.5 mile south of the locations of wetlands # 2 and #3 in WOUS-1 (Sheet Map 2 in Appendix A).

No permanent or temporary impacts are predicted for wetlands #4, #5, and # 6 (WOUS-2). There will be no down-line access through wetlands #7 and #8, so there will be no permanent or temporary impacts in those locations. Wetland #9 will be avoided by the construction process. Wetland #10 (William's Creek—WOUS-27) is currently predicted to have 0.066 acres of temporary fill placed to facilitate a safe crossing during construction. There is a narrow two-track access road currently at this location, but the temporary fill would improve the safety of this crossing. No fill would be placed into wetlands #11, #12, #13, or #14.

Temporary impacts may potentially vary from placement of soil, sand, or gravel in stream courses to mechanical damage to vegetation from heavy machinery driving through these systems. The placement of fill in channels fill would be temporary and removed once construction is complete, with the exception of the small areas of armoring in Lake Creek (WOUS-1) and Black Squirrel Creek (WOUS-15). Temporary impacts may be minimized well below this level in areas where Tri-State may be able to utilize mat boards and other types of temporary structures.

Tri-State would avoid staging materials in wetland and riparian communities. The proposed project is expected to have minor and short-term impacts on wetlands and riparian communities. Tri-State has requested coverage under Nationwide Permit 12 from the USACE for temporary and permanent impacts to WOUS in the project area.

Floodplains

The proposed project would result in upgrades to an existing transmission line within an existing transmission ROW. Eight structures would be replaced in floodplains in El Paso County; only one structure would be replaced in the Fountain Creek floodplain. Impacts would be limited to the areas the poles would be removed and the areas the new structures would be placed. Disturbed areas would be restored using native species post-construction to

ensure there are no long-term adverse effects to the floodplain. The proposed project would not result in additional impacts to floodplains where transmission structures are already present. The EPMs outlined in Section 3.2.7, Environmental Protection Measures, would minimize and mitigate any potential impacts to floodplains. The proposed project is not expected to result in adverse impacts to the 100-year floodplain.

6.1.6.2 Mitigation Measures

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to wetlands, WOUS, and floodplains.

6.1.7 Vegetation Resources

6.1.7.1 Impacts

The project area has been heavily influenced and disturbed by agriculture activities—grazing and cultivation—and by residential use. Construction-related impacts to vegetation would be concentrated within the construction ROW. In general, construction activities could result in vegetation removal, increased trampling of vegetation, fugitive dust impacts, erosion, soil compaction, and sedimentation. Ground disturbance also can result in propagation of noxious weeds, particularly in areas that have existing weed infestations. Noxious weeds can be spread from unwashed construction equipment, vehicles transporting noxious weed-inoculated soil or plant materials into previously un-infested areas, or from transfer of topsoil inoculated with noxious weeds. Propagation of noxious weeds can result in the loss of native plant communities and alteration of natural drainage patterns. Implementation of EPMs and a noxious weed management plan as discussed in Table 3.2-2 would mitigate any long-term impacts to vegetation found in the overland access areas.

During project construction, existing access roads would be used to the greatest extent feasible. In areas where no existing access roads are present, the transmission line would be accessed overland. Overland access could result in vegetation removal, trampling, soil compaction, erosion, and spread of noxious weeds within the project area and adjacent lands. Implementation of EPMs outlined in Section 3.2.7, Environmental Protection Measures, and noxious weed management would mitigate any long-term impacts to vegetation found in the overland access areas.

Permanent impacts would be limited to the 239 structures that would be replaced as part of the proposed project. It is expected that these structures would be placed within 5 to10 feet (20 to 50 feet in some cases) in proximity to the existing structure so new disturbance is expected to be minimal. The areas surrounding these structures that are temporarily impacted would be restored with native grass species or using a seed mix approved by the local landowner once the structures are in place. In addition, minor impacts to vegetation would occur from the removal of older structures. These areas would be revegetated and restored once the poles have been removed. All other impacts to vegetation are expected to be minor and temporary in nature.

Riparian communities and forested vegetation only accounts for approximately 1 percent of the vegetation within the project area. The proposed project would occur in an existing transmission ROW, so there are currently no large trees located directly under the line. Trees and riparian communities that occur in proximity to the transmission would be avoided to the greatest extent feasible during the construction of replacement structures.

The mitigation measures provided above in Section 3.2.7, Environmental Protection Measures, and below under Section 6.1.7.2 would minimize and mitigate impacts to vegetation communities within the ROW and reduce the spread of noxious weeds.

6.1.7.2 Mitigation Measures

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to vegetation resources.

6.1.8 Wildlife and Wildlife Habitat

6.1.8.1 Impacts

The proposed project would modify an existing transmission line and would result in minimal new disturbance within the existing transmission ROW. Accordingly, impacts to wildlife are expected to be short term and minor in nature. Wildlife may temporarily avoid the construction ROW during project construction. Avian species that inhabit the project area are likely habituated to the presence of the transmission line and minimal increase in the risk for avian collision is expected. Tri-State is in the process of completing an avian protection plan for their transmission system. This line will be evaluated as part of this process and will be retro-fitted to mitigate areas with known or potential collision risk.

There are five documented raptor nests, three potential raptor nests or breeding territories, a great blue heron rookery, and two documented loggerhead shrike and western kingbird nest sites located within 0.5 mile or less of the project area. Most raptor species in Colorado require a 0.25-mile buffer from construction disturbance during their respective nesting periods. New construction is not permitted within 0.25 mile of an active bald or golden eagle nest site, and no site disturbance is allowed during the nesting season within 0.5 mile of an active nest site. All of the documented avian nests sites are located 0.5 mile or less from the construction ROW. To mitigate potential impacts to nesting raptors, Tri-State is proposing to construct the new transmission structures and the fiber optic line outside of the avian breeding season (after August 15) to the greatest extent feasible or to avoid certain areas where raptors are nesting within 0.25 mile of the transmission ROW until the adults have fledged their young. No construction would occur within 0.5 mile of the golden eagle nest during the breeding season.

Tri-State will adhere to the guidelines outlined in the “Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors” (Craig 2002) to determine the necessary timing and buffer guidelines for specific raptor species that occur in the Project Area. If construction is ongoing into the avian breeding season, nesting surveys would be conducted prior to

construction to ensure the project does result in the “take” of any active nest or migratory bird. If active raptor nests are found within 0.25 mile of the ROW, and buffers cannot be maintained because of other land use constraints or construction issues, Tri-State will consult with the USFWS Migratory Bird Office and the CDOW to identify appropriate measures to mitigate construction disturbance to prevent nest abandonment. Through the implementation of these Environmental Protection Measures, no impacts to nesting avian species are expected from project construction or routine maintenance activities if these guidelines and mitigation measures are followed.

Big game and other non-game animals might be temporarily impacted during project construction due to noise, human presence, and minor impacts to vegetation. Revegetation of areas impacted during construction and noxious weed management would mitigate impacts to wildlife foraging habitat. The transmission line is being constructed within an existing transmission ROW and the project would not result in significant long-term impacts to wildlife movement patters and would result in minor habitat fragmentation. It is expected that operation of the transmission line would have no long-term impacts on wildlife in the project area.

Potential impacts to special status avian species are discussed in more detail below under Section 6.1.9, Threatened and Endangered Species. Permanent habitat loss would be restricted to the footprint of the new structures. Through implementation of mitigation measures outlined below in Section 6.1.8.2 and above in Sections 6.1.6.2 and 6.1.7.2, impacts to common wildlife and their habitats are expected to be minor.

The proposed project would span all aquatic habitats in the project area. Through the implementation of EPMs described above under Section 3.2.7, the proposed project would have no significant impacts aquatic species or habitat, water quality, or water availability.

6.1.8.2 Mitigation Measures

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to wildlife and fisheries resource and habitats.

6.1.9 Threatened or Endangered Species

6.1.9.1 Impacts

Federally Listed, Candidate, and Proposed Species

The proposed project is expected to have no impacts to whooping crane, interior least tern, piping plover, or pallid sturgeon. The contractor will be responsible for obtaining water used for construction from a source that would not result in depletions to the Platte River or Arkansas River Basins, such as a municipal water district where the water use has already been reserved. No water use and depletion issues are expected to occur during construction of this project.

Surveys were conducted by qualified specialists for the Ute ladies'-tresses orchid at Fountain Creek and Big Sandy Creek in August 2008. No populations were found within the project ROW. The transmission line spans suitable habitat for the Ute ladies'-tresses orchid throughout the remainder of the project ROW. No permanent access would be constructed within wetland or riparian habitats, with the exception of the rock armoring of existing private access roads that occur adjacent to Lake Creek and Black Squirrel Creek. Construction would be conducted in a manner to avoid any and all impacts to suitable habitat for the Ute ladies'-tresses orchid. The project is not expected to adversely affect this federally listed plant species.

There are no known occurrences of Preble's meadow jumping mouse within the portion of the ROW that spans Fountain Creek. Conversations with the USFWS affirmed that the mouse does not occur within the reaches of Fountain Creek that occur in the project area. Documented Preble's occurrence is further to the north, near Colorado Springs. The wetland and riparian communities associated with Fountain Creek have been heavily disturbed by three transmission lines running through the corridor. Only one structure would be replaced within the Fountain Creek floodplain, and impacts to riparian communities are expected to be minimal. The proposed project is not likely to adversely affect the Preble's meadow jumping mouse.

In correspondence dated August 11, 2009 and again on August 9, 2010, (Appendix C), the USFWS concurred that the proposed project not likely to adversely affect any listed species.

The proposed project would span and avoid all surface waters in the project area. Standard environmental protection and mitigation measures described above in Table 3.2-2 would ensure the project does not impact surface waters that provide habitat for Arkansas darter.

State Listed Species and Species of Special Concern

There are no known populations of burrowing owls within the project ROW. If construction occurs during the burrowing owl breeding season (April 1 through September 1) and a black-tailed prairie dog colony 1.0 acre or greater has moved into the construction ROW, surveys would be conducted following CDOW protocol to ensure the proposed project does not affect this state listed species.

Construction would occur outside the golden eagle nesting season to avoid impacts to this species. The improvements would occur in an existing ROW and collision risk is not expected to increase from the proposed modifications. Eagles and other raptors are not as susceptible to collision as other avian species because of their keen eyesight and maneuverability (APLIC 1994). The golden eagle nest is not located adjacent or in front of the transmission line, which minimizes the risk of fledgling eagles (who are not as adapt at flying) to collide with the line when leaving the nest. The line would be constructed using APLIC and USFWS guidelines for mitigating electrocution risk on the transmission line.

There are no known populations of lesser prairie chickens in the project area or the counties in which the proposed project would occur. The Colorado Division of Wildlife concurred that the project would not impact lesser prairie chicken populations in their letter dated July 13, 2009 and they submitted the same letter in response to scoping for the EA on March 25, 2010.

The swift fox may temporarily avoid areas where construction is occurring because of human presence and construction noise. The proposed project would result in minimal permanent disturbance to prairie habitats. Dens and burrows for ground-dwelling species would be avoided to the greatest extent feasible during project construction to avoid impacts to these species.

The proposed project would modify an existing transmission line and result in the replacement of 239 structures. The project would have minimal and short-term impacts to special status species and their habitats. No long-term adverse effects are expected from construction or operation of the project.

6.1.9.2 Mitigation Measures

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts special status species that may occur in the project area.

6.1.10 Recreation

6.1.10.1 Impacts

Recreational opportunities in the project area are limited. Dispersed hunting and fishing are the primary activities that occur in the project area. Temporary impacts to hunting and fishing activities would be limited to the construction period.

The existing transmission line does not cross any designated recreation areas. The nearest recreation facility is the XYZ Gun Club, which is located less than 0.25 mile from the project area. Construction workers who do not live in the area may choose to camp in Limon, Fountain, or Colorado Springs during the construction period. The existing campgrounds in these communities may experience an increased demand that would be limited to the construction period. Construction workers may choose to participate in recreational activities within Pike National Forest; no adverse impacts are anticipated.

The proposed project is upgrading an existing transmission line in an existing transmission ROW. Potential impacts to recreational activities are not anticipated to be significant from construction or operation of the project.

6.1.10.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to recreation resources.

6.1.11 Visual Resources

6.1.11.1 Impacts

Modification of the existing transmission line would create direct short-term effects to visual resources by introducing vehicles, equipment, materials, and a workforce to the visual analysis area. Viewers would see transmission structure assembly and erection and conductor stringing activities.

There are 22 homes within 500 feet of the existing transmission line. As this is modification of an existing transmission line, visual impacts to residents are anticipated to be minor in nature once construction activities have been completed.

This proposed project is a modification of an existing transmission line; after construction, the only visual impacts would be different heights of transmission line structures for the structures that will be replaced and raised, and slightly different span lengths between structures that are to be replaced. Post-construction, the modifications are not anticipated to be distinguishable from the original transmission line to the casual observer.

6.1.11.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential visual impacts from the project.

6.1.12 Economics and Social Values

6.1.12.1 Impacts

The actual time construction would occur within the ROW is expected to be 9-12 months. At its peak, the construction is anticipated to include approximately 15 to 25 employees. Work would be performed from 7:00 a.m. to 5:30 p.m., seven days a week, depending on the contractors work schedule and agreements with the affected landowner. Construction schedule and length may vary in order to comply with seasonal constraints, such as raptor nesting, irrigation, calving operations, etc.

Temporary indirect benefits during construction would include local expenditures from construction workers for food and services, possible increased employment, and some local expenditure for construction materials and services. However, the time to rebuild the existing transmission line is limited and effects to the local economy are expected to be temporary and minor.

Social and economic concerns would be limited primarily to housing and support service needs of the temporary workforce. This would include temporary use of hotel/motels and RV/campground facilities in nearby cities including Colorado Springs, Fountain, and Limon. It is expected that sufficient temporary housing would be available, because hotels/motels and RV/campgrounds were identified in these cities. Colorado Springs and Limon are the most likely locations that workers would seek lodging because of the availability of amenities, including dining, lodging, groceries, and fuel, and their proximity to within the project area.

Colorado Springs is located within 20 to 60 miles of the project area. Limon offers fewer services and lodging choices, and is located approximately 2 to 70 miles from portions of the project area.

Local clinics and hospitals for emergency care, police, and fire protection would be adequate to serve the project during construction if an emergency incident occurred. The need for additional long-term public services is not anticipated. Local police and fire officials would be notified of construction activities prior to the start of construction.

The populations in the study area are generally expected to benefit from the proposed project's increased reliability of electric power.

6.1.12.2 Mitigation

The proposed project is expected to have a beneficial socioeconomic impact on local communities by improving electric reliability; therefore, there are no anticipated mitigation measures recommended for socioeconomics.

6.1.13 Environmental Justice

6.1.13.1 Impacts

Guidance from the Council on Environmental Quality directs that minority populations should be identified where (1) the minority population of the affected area exceeds 50 percent, or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. It is also important to note that the proposed project would follow the same route as the existing transmission line and that the improvements would generally improve electric reliability for the project area populations.

Minority populations in the study area (city and county levels) do not approach 50 percent of the overall population (see Table 5.13-1). Compared with the overall minority population percentage for the state of Colorado, the study area does not indicate a meaningfully greater minority population. The urban areas of Colorado Springs and Fountain have the greatest minority populations; however, these areas are located more than 10 and 5 miles respectively from the nearest point of the project. Therefore, the proposed project is not indicated to have a disproportionately negative effect on minority populations.

Incomes in the study area are generally lower than the state average; however, this lower amount is to be expected as agricultural areas typically have lower incomes than urban areas. The poverty threshold information indicates the highest levels are centered on urban areas, and that more rural areas are below the state poverty percentage level. A disproportionate effect on low-income populations along the existing transmission line corridor is therefore not indicated.

6.1.13.2 Mitigation

The proposed project would not adversely impact minority or low income populations; therefore, no mitigation is proposed.

6.1.14 Hazardous Materials or Solid Waste

6.1.14.1 Impacts

Construction of the proposed project may produce small volumes of solid waste in the form of materials packaging and scrap material and the removal of treated wood pole structures. Solid waste generated during project activities would be disposed of in appropriate off-site waste collection containers. There may also be small volumes of other hazardous materials present (e.g., ethylene glycol, oil, transmission/hydraulic fluids, etc.) and used for emergency maintenance of vehicles and equipment. Small spills or leaks of these fluids and/or vehicle fuels may occur as part of the project activities.

In accordance with the EPMs in Table 3.2-2, Tri-State would comply with all applicable federal laws and regulations existing or hereafter enacted or promulgated regarding toxic substances or hazardous materials. No fuel storage would occur within the project ROW on private or state lands. All fuel and fluid spills within BLM-authorized ROW area would be handled in accordance with appropriate state and federal spill reporting and response requirements.

Any waste generated as a result of the proposed action would be properly disposed of in a permitted facility. Solid waste generated during the construction and subsequent periodic maintenance periods would be minimal. All hazardous materials would be stored, handled, and disposed of in accordance with applicable local, state, and federal hazardous material statues and regulations. No burning of trimmed material or solid waste would be performed within the proposed project area. Impacts associated with hazardous materials are assessed as low.

6.1.14.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential hazardous waste impacts from the project.

6.1.15 Public Health and Safety

6.1.15.1 Impacts

The greatest danger from a transmission line is direct contact with electrical conductors. Accordingly, extreme caution must be exercised when operating vehicles and equipment for any purpose in close proximity to the project.

Post-construction, the project would be unmanned and controlled remotely by Tri-State's operation center. Transmission line poles and conductors may occasionally be hit by lightning during a thunderstorm; therefore, the area near towers and other tall objects, such as trees,

should be avoided during thunderstorms. The proposed project is designed with overhead groundwires and grounded towers to protect the system from damage from lightning.

6.1.15.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential public health and safety issues that may result from project construction.

6.1.16 Cultural Resources

6.1.16.1 Impacts

Structures are scheduled for replacement at or near two of the resources recommended *Eligible* and four of those are recommended as *Needs Data*. The majority of resources will not be affected by construction activities. Replacement of one of the existing shieldwires with an OPGW does not require any ground disturbances, only connection of the conductor to each structure.

The six resources potentially impacted by construction activities are all archaeological sites. Ground-disturbing activities have the potential to disturb intact subsurface artifacts, features, or materials, resulting in a potential loss of significant additional data on the resources. Loss of additional data from a site is considered an adverse effect. Even relatively shallow disturbance, such as movement of tracked vehicles, can disturb shallowly buried materials; many sites contain artifacts within the first 10 to 20 centimeters (4 to 8 inches) of soil. Construction crew activities, truck/wheeled equipment movement, and even placement or movement of materials (poles, conductor spools, etc.) across sites, can also displace or damage materials. Excavation for new structure placement can potentially impact more deeply buried site components and possibly completely destroy small features. Staging and conductor pull locations can impact sites as well. Indirect impacts would primarily consist of increased access by the general public to sensitive archaeological sites, or the inadvertent disclosure of resource locations to the general public. Both types of indirect impacts could result in vandalism or unauthorized collection at the resources.

Staging and conductor pull locations would be located well away from any resources. No permanent improvements or upgrading of access roads would be undertaken in areas with known resources.

Through the implementation of design guidelines and EPMs outlined above in Table 3.2-2, along with the implementation of a testing and recovery plan (if necessary), the proposed project is not expected to have an adverse affect on cultural or historic resources.

6.1.16.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate cultural and historic resources that are known to occur in the project area. In addition, the following outlines the testing strategies that will be used to mitigate impacts to known or potentially sensitive cultural resources, when avoidance is not a viable option.

6.1.16.3 Testing

Where avoidance is not possible, archaeological testing will be conducted. The testing of a site can provide information important to knowledge of prehistory/history and also vital information for planning construction activities. Knowing the nature and extent of subsurface deposits can provide for better planning for structure locations and access.

Site testing generally involves the placement of a series of auger and/or shovel tests to recover evidence of subsurface materials or features. Auger tests have the advantage of reaching deeper levels, while shovel tests provide a better view of soil deposition and stratigraphy. A limited number of small, formal excavation units may also be completed to facilitate the characterization of potential features. A combination of testing methods was recommended for the sites in this project area, depending upon the individual characteristics of each site. A brief testing plan was prepared to outline how and where the testing would be conducted at each site, and a testing report detailing the methods and results has been prepared and submitted to SHPO for concurrence with the results and recommendations.

For the four resources recommended *Needs Data*, testing was conducted to determine the presence or absence of subsurface artifacts and/or features. Testing was negative on all four sites for intact subsurface materials. Based on the negative test results, the resources have been recommended as *Not Eligible; the resources* lack potential to provide additional data (Criterion d). Sites determined *Not Eligible* require no further work; all available data contained on the site are considered to have been sufficiently documented.

For the two resources already determined *Eligible*, testing was conducted within the proposed disturbance areas to determine potential impacts. Testing was negative on both sites for subsurface materials within the proposed disturbance areas. However, both sites are recommended to retain their Eligible status; testing was conducted in limited areas of the sites, and the majority of the site areas were not tested. Therefore, both sites still retain potential to yield additional data (criterion d). As long as construction actions are conducted within the tested areas, no adverse impacts will occur to the resources. Avoidance areas outside of the proposed disturbance areas will be delineated onsite prior to construction to avoid inadvertent disturbance, and access across site areas will be restricted to the existing two-track under the ROW.

Monitoring of construction activities at or near sensitive areas by a professional archaeologist will ensure that artifacts or materials not detected during surface examination or testing is recovered if inadvertently revealed during activities. Once any additional site data have been recovered from the proposed disturbance areas, construction work will proceed without any loss or damage to the resource. Compliance with this process will result in no significant short or long term damage to the resources.

6.1.17 Transportation and Access

6.1.17.1 Impacts

Construction activities would use existing private and public access as well as overland travel in the ROW.

There are 22 homes within 500 feet of the existing transmission line. Short-term effects to transportation and access from construction activities would include increases in traffic volumes on state and local roads that provide access to construction sites. Increases in the use of interstate highways (I-25 and I-70) would be less than measurable in comparison to the day-to-day traffic counts on interstates. Temporary increases in traffic would be generated for one-way and roundtrip construction activities including surveying, removal of existing structures, construction materials hauling, pole-hole excavation, structure assembly and erection, groundwire and conductor stringing, sagging and clipping, and ROW cleanup and restoration.

Potential short-term effects from construction also could include traffic delays or temporary lane closures while conductors are strung between transmission structures across affected roadways. The conductors are already in place except for the OPGW, so the setup of equipment for the road crossing would be greatly simplified. The contractor would use the existing 3/8-inch overhead groundwire for pulling in the new OPGW. This process would keep the conductor raised above the roadbed and would allow traffic to flow beneath it; traffic safety measures and personnel would be provided by the contractor. On interstates, the process would be the same. In either case, bucket trucks may be positioned in the ROW and have the arm extended horizontally to provide a measure of protection should the conductor inadvertently sag too low or there is a mechanical failure. Stringing operations would be discussed with the appropriate transportation organization and, if required, state highway troopers would be enlisted to assist with public safety and to ensure minimal disruption to traffic flow or the operations may be required to occur at night so as to have minimal traffic interruption. The final determination of the best method for conductor stringing would be site specific and made by the construction contractor with the approval of Tri-State and the affected transportation organization. Any effects would be minimized because stringing conductors across a roadway would require approximately one day, or less, to execute and because the majority of the proposed project would be located in a rural area with light traffic counts. Resagging operations for the existing conductor should not require the stringing of new conductor and is not expected to require the closure of any roads, nor the protective measure in the right-of-way. Roads would only be closed if the counties or Colorado Department of Transportation required a closure.

Short-term effects could occur where proposed transmission line would need to cross railroad tracks. Stringing conductors over railroad tracks could delay rail operations. Any such activities would be coordinated with the affected rail line to minimize scheduling disruptions.

Other potential transportation effects associated with transmission lines are the potential conflicts between transmission structures and aviation. Private and public airports in the analysis area are shown on Figure B-11 in Appendix B and the distances from the nearest airports to the existing transmission line is shown in Table 5.17-1. The U.S. Air Force Bullseye Auxiliary Airstrip is located approximately 1.5 miles from the existing transmission line. For public airports, Federal Aviation Administration (FAA) guidelines state that construction and operation of structures could significantly affect aviation where structures are more than 200 feet above ground. The guidelines also state that significant effects could occur where an object penetrates an imaginary plane extending outward and upward at a ratio of 100-to-1 from the edge of the airport runway to a horizontal distance of 20,000 feet (approximately 3.8 miles) (FAA 2008). Because the proposed transmission structures would be less than 200 feet above ground and the existing transmission line does not intersect a horizontal distance of 20,000 feet from the airport runways, the proposed modifications to the existing transmission structures would not trigger either provision.

Routine operation and maintenance of the transmission line would have no anticipated effects on transportation or access in the project area. Personnel would use light-duty pickup trucks on public roads and overland travel in the ROW to conduct inspections and to provide maintenance at individual transmission structures.

If traffic delays or land closures were necessary, contractors would coordinate with local public safety officers and the Colorado Department of Transportation to ensure provisions for emergency vehicles and emergency response times. Contractors also would make necessary provisions for conformance with traffic safety standards using traffic control, signage, and hazard cones as necessary to minimize the obstruction and to provide for the smooth flow of traffic around or through the construction area.

Every effort will be made to avoid access disruptions to individual residential properties when stringing conductors or during structure replacement. Any construction activities in the railroad ROWs would be coordinated with the individual railroad companies to avoid disruptions.

6.1.17.2 Mitigation

Design standards and EPMs outlined in Table 3.2-2 will minimize and mitigate any potential impacts to transportation in the project area.

6.1.18 Electrical Characteristics and Public Safety

6.1.18.1 Overview

Concerns with long-term exposure to electric and magnetic fields have been tempered over the past decade because specific adverse impacts to human health have not been conclusively identified. Research into possible health impacts has been conducted using humans, animals, tissues, and cells. The research results have been reviewed by numerous

authors and scientific panels. The existence of adverse impacts, however, has not been established.

There were two noteworthy literature reviews commissioned by Congress and conducted by federal agencies. The first was conducted by the National Institutes of Environmental Health Sciences (NIEHS) in the National Institutes of Health (NIH). NIEHS was instructed by Congress following the 1992 Energy Policy Act to perform a literature search and to prepare a report to Congress on its findings. A conclusion of this report, "NIEHS Report on Health Effects from Exposure to Power Line Frequency Electric and Magnetic Fields," is that the "scientific evidence suggesting that (electric and magnetic field exposures) pose any health risk is weak" (NIEHS 1991, page 9).

Congress also instructed the National Research Council (NRC) Act to conduct a similar study following the 1992 Energy Policy. The National Academy of Science (NAS), which concluded that "the results of…the program do not support the contention that the use of electricity poses a major unrecognized public health danger" (NAS 1997). The NAS further recommended that the federal government cease funding additional research on electric and magnetic fields. The federally funded research program was subsequently shut down.

Regarding potential impacts to animals, numerous studies have investigated the impacts to livestock from the electrical environment of high-voltage transmission lines. There is no evidence that exposure to electric fields beneath transmission lines affects livestock behavior or productivity.

The bulk of the scientific literature on the subject of electric and magnetic fields fails to conclude that exposure is a health threat. While some studies do suggest a link, the vast majority of the scientific literature indicates otherwise. Both the NIEHS and NAS reports referenced above support the conclusion of no conclusive link. The proposed project, therefore, is not expected to cause adverse health effects related to EMF or corona.

The potential impacts from the proposed project would be equivalent or similar to impacts from the existing 79-mile high-voltage transmission line. All transmission lines generate corona. Corona typically increases with increasing voltage, as does the electric field. The existing transmission line operates with an electric field of 60 Hz. Unlike corona and electric fields, the magnetic field does not vary by voltage. Potential impacts electric fields, magnetic fields, and from corona are described more specifically below.

6.1.18.2 Electric Fields

Impacts

The 60-Hz electric field associated with transmission lines varies by transmission line voltage. The unperturbed electric field at a height of 3 feet above the ground, therefore, is used to describe the electric field near transmission lines. For the Big Sandy–Lincoln–Midway transmission line, the electric field would be approximately 1.45 kV/m at the edges of the ROW and would diminish to ambient background at approximately 250 feet from the

transmission line centerline. The maximum electric field within the easement is approximately 3.9 kV/m. In comparison, the electric field next to electric blanket wires is approximately 1 to 10 kV/m. The electric field of a typical refrigerator is approximately 0.06 kV/m (Table 6.1-3).

Table 6.1-3:
Electric Field Values for Common Objects

Appliance	Electric Field Strength (kV/m)
Electric blanket	1–10[1]
Broiler	0.13
Stereo	0.09
Refrigerator	0.06
Iron	0.06
Hand mixer	0.05
Coffee pot	0.03

[1] 1 to 10 kV/m next to blanket wires (Enertech 1985)

Electric fields are a common phenomenon. When the electric field under a transmission line is sufficiently great, it can be perceived as raising the hair on a hand or arm, like the sensation of a slight breeze. It is unlikely, however, that the electric field under a transmission line would be perceivable when standing on the ground. Instead, an individual may perceive skin stimulation when working on top of equipment under a transmission line.

In an electric field, a conducting object will assume some voltage if the object is not grounded. These induced voltages in a transmission line ROW could cause nuisance shocks. For example, a spark discharge shock could occur when contact is made with an object, such as a vehicle, where there is an inadequate ground. This would be similar to a "carpet" shock that can occur when touching a doorknob after walking across a carpet on a dry day. This type of shock typically would occur directly under the transmission line near mid-span where the conductors are nearest to the ground.

Because carrying or handling conducting objects under a transmission line also could result in nuisance shocks, irrigation pipe should be carried as low to the ground as possible and preferably unloaded at a distance from the transmission line to eliminate nuisance shocks. The primary hazard with irrigation pipe is direct contact with the conductors. Direct contact could occur when the pipe is tipped up to remove an object, such as a dead animal.

Normal grounding policies effectively mitigate the possibility of nuisance shocks from induced currents on stationary objects, such as fences and buildings. Since electric fields extend beyond the ROW, grounding practices would extend beyond the ROW for very large objects or long fences. Properly applying grounding practices during and after construction will effectively mitigate the potential for shocks from stationary objects near the transmission lines. Adequate grounding techniques also would apply to metal water and feed troughs for

livestock. Like all conducting objects, their potential to induce nuisance shocks can be eliminated with grounding.

In addition to nuisance shocks, one historical concern regarding electric fields has been the possibility of interference with cardiac pacemakers. There are two common types of pacemakers, asynchronous and synchronous pacemakers. The asynchronous pacemaker pulses at a predetermined rate and is practically immune to interference because it has no sensing circuitry and is not complex. The synchronous pacemaker, however, pulses only when its sensing circuitry determines that pacing is necessary. Interference from a transmission line electric field could cause a spurious, or false, signal on the pacemaker's sensing circuitry. When these pacemakers detect a spurious signal, such as a 60-Hz signal, they are programmed to revert to an asynchronous or fixed pacing mode of operation and will return to synchronous operation within a specified time after the signal is no longer detected. Research and reviews indicate that the risk to pacemaker wearers from transmission lines is minimal. To date, no evidence has been found that a transmission line has caused a serious problem to the wearer of a pacemaker. In addition, pacemaker manufacturers have redesigned recent models to be less sensitive to this concern.

Lastly, it is possible for electric fields to cause minor damage to leaf tips from induced corona on the upper most parts of plants (McKee et al. 1978). The impacts are limited to corona damage at sharp terminal parts of plants at very high electric field levels. The impact generally is too limited to be noticeable under field conditions. In addition, the electric fields calculated for the proposed project are below levels where the leaf tip corona phenomenon has been observed. No damage or harm to crops, therefore, is expected to occur from electric fields under the proposed transmission lines.

In general, the electric fields associated with the project would be similar to household appliances at the edge of the ROW and would diminish rapidly to ambient background approximately 250 feet from the transmission line centerline. Nuisance shocks could be avoided through proper equipment handling in the transmission line ROW and through adequate grounding techniques. Potential impacts to pacemakers and agricultural crops have been demonstrated in theory but have not presented adverse impacts in the field. Effects associated with electric fields from the transmission lines, therefore, are not considered significant.

Mitigation

As described above, impacts associated with the electrical fields are not considered significant. Tri-State has adopted, as corporate policy, programs that ensure that its electric facilities are designed, constructed, and operated in such a manner as to minimize, to the extent prudent and practicable, the level of EMF that is created (see Appendix G). Normal grounding policies would effectively mitigate the possibility of nuisance shocks on stationary objects, such as fences and buildings. Because the electric fields continue (but diminish) beyond the ROW, grounding practices would extend beyond the ROW for very large objects or long fences.

6.1.18.3 Magnetic Fields

Impacts

Magnetic fields from household appliances also are comparable to, or greater than, those from transmission lines. The maximum (peak) calculated 60-Hz magnetic field for a 230-kV transmission line ROW easement would be approximately 343.2 mG and would diminish to approximately 119.4 mG at the edge of the ROW (Table 6.1-4). In comparison, the maximum magnetic field of a clothes dryer is approximately 3 to 80 mG. The maximum magnetic field of an electric range is approximately 100 to 1,200 mG (Table 6.1-5). In comparison to the magnetic fields of typical household appliances, the magnetic fields associated with the Big Sandy–Lincoln–Midway Transmission project at the edge of the ROW are not considered significant.

Table 6.1-4
Predicted Magnetic Fields for the Project

Location	Existing Operating Conditions	Normal Operating Conditions	Maximum Thermal Operating Conditions
Edge of ROW	65.6 mG	71.6 mG	119.4 mG
Center of ROW	188.5 mG	205.9 mG	343.2 mG

Table 6.1-5:
Typical Magnetic Field Values for Appliances

Appliance	Magnetic Field (mG)	
	Distance of 1 foot	Maximum
Electric Range	3 to 30	100 to 1,200
Electric Oven	2 to 25	10 to 50
Garbage Disposal	10 to 20	850 to 1,250
Refrigerator	0.3 to 3	4 to 15
Clothes Washer	2 to 30	10 to 400
Clothes Dryer	1 to 3	3 to 80
Coffee Maker	0.8 to 1	15 to 250
Toaster	0.6 to 8	70 to 150
Crock Pot	0.8 to 1	15 to 80
Iron	1 to 3	90 to 300
Can Opener	35 to 250	10,000 to 20,000
Mixer	6 to 100	500 to 7,000
Blender, Popper, Processor	6 to 20	250 to 1,050
Vacuum Cleaner	20 to 200	2,000 to 8,000
Portable Heater	1 to 40	100 to 1,100
Fans/blowers	0.4 to 40	20 to 300
Hair Dryer	1 to 70	60 to 20,000
Electric Shaver	1 to 100	150 to 15,000
Color TV	9 to 20	150 to 500
Fluorescent Fixture	2 to 40	140 to 2,000

Table 6.1-5:
Typical Magnetic Field Values for Appliances

Appliance	Magnetic Field (mG)	
	Distance of 1 foot	Maximum
Fluorescent Desk Lamp	6 to 20	400 to 3,500
Circular Saw	10 to 250	2,000 to 10,000
Electric Drill	25 to 35	4,000 to 8,000

Source: Gauger (1985)

Mitigation

As described above, impacts associated with the magnetic fields are not considered significant. Tri-State has adopted, as corporate policy, programs that ensure that its electric facilities are designed, constructed, and operated in such a manner as to minimize, to the extent prudent and practicable, the level of EMF that is created (see Appendix G).

6.1.18.4 Corona Characteristics

Impacts

Corona from transmission lines can create audible noise (buzzing, humming, or crackling) or radio and television interference. Each condition is described below.

Corona noise can be a result of defects or damage to the surface of conductors. Practicable measures for eliminating or reducing wet weather noise are generally limited to carefully handling the conductor during construction to avoid damaging the surface. The construction contractor would be expected to treat the conductor with care to avoid creating irregularities (e.g., nicks, scrapes, and burrs) on the conductor surface. The contractor would normally take such precautions to avoid damaging the conductor because its physical strength and ability to transmit power could also be compromised (California PUC 2006).

The parameters of importance in measuring corona are the transmission line voltage, transmission line configuration, number, and diameter of the conductors, altitude above sea level, and weather conditions. Modeling for the proposed project demonstrated that noise levels from the corona effect would be approximately 44.8 dBA at the edge of the 230-kV transmission line (50 feet from the transmission line centerline) during wet weather and 19.8 dBA in fair weather (Table 6.1-6). Modeling at 230 kV represents the maximum expected corona for the proposed project. During wet weather, the noise is likely to be masked by falling rain so that the noise generated by corona would be barely discernable. The noise at the edge of the ROW in fair weather conditions is comparable to a soft whisper. The corona noise shown in Table 6.1-6 is compared to typical noise levels encountered in daily life in Table 6.1-7.

Table 6.1-6:
Predicted Audible Noise Levels

Location	Fair Weather L50 AN (dBA)	Wet Weather L50 AN (dBA)
Center of ROW	23.3	48.3
Edge of ROW	19.8	44.8

Table 6.1-7:
Audible Noise Decibel Ratings of Common Noises

Typical Decibel Level (dB)	Common Noises	Resulting Effect
0		Lowest Level Audible to Human Ear
30	Soft Whisper	Audible Noise From Electric Transmission Lines Generally Occurs in This Range
50	Rainfall	
70	Freeway Traffic	Critical Level Begins
90	Subway	
110	Power Saw	Danger Level
130	Race Car	
150	Fireworks	Hearing Loss
170	Shotgun	

Source: American Academy of Otolaryngology (2009)

Because wet weather corona noise would be barely distinguishable from background noise levels at distances more than 250 feet from a transmission line, its impacts are not considered to be significant for humans, wildlife, livestock, or domestic animals. Likewise, the noise increase over background conditions would be less than the significance criteria of 10 dBA and, because of its association with wet weather, would not be continuous.

In addition to generating audible noise, corona from transmission lines can emit noise at frequencies used to transmit radio and television signals. This can cause radio and television interference that is recognized as static for radio reception and as “snow” for television reception.

The most common radio interference is to the AM broadcast band (535 to 1,605 kHz). Even there, only AM radio receivers very near transmission lines have the potential to be affected because “amplitude modulated” transmission of radio frequencies in the 535 to 1,605 kHz broadcast band can be altered by physical features. Frequency modulated transmission of radio transmission is rarely affected. The estimated radio interference associated with the Big Sandy–Lincoln–Midway transmission line is shown in Figure 6.1-1.

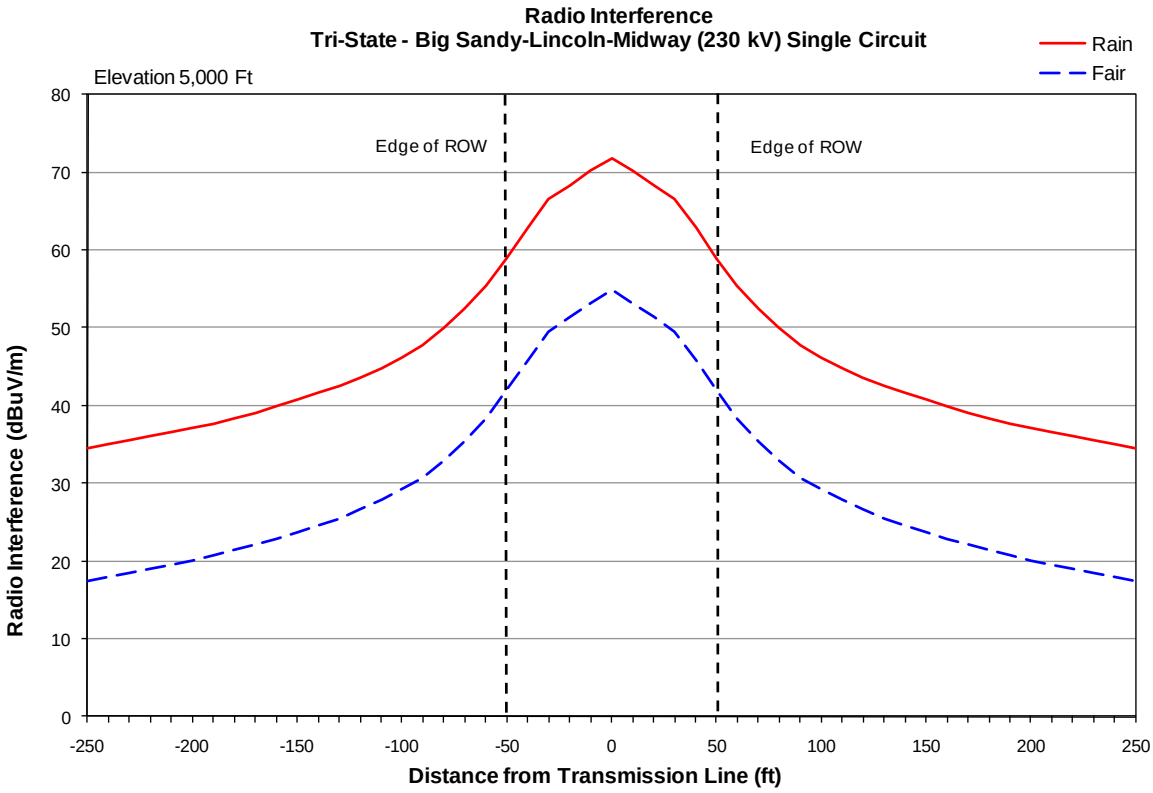

Figure 6.1-1: Predicted Radio Interference Levels

Television interference would only affect broadcast signals received through an antenna and would not affect cable television or digital satellite television reception. Television interference from corona could occur at the edge of the ROW during wet weather and generally only for transmission lines with voltages of 345 kV or higher. The estimated television interference associated with the Big Sandy–Lincoln–Midway transmission line is shown in Figure 6.1-2.

In general, modeling for the proposed project demonstrates that corona effects outside of the ROW are expected to be low enough so that no objectionable radio or television interference would occur beyond the ROW. In those instances where television reception is degraded by the line, mitigating techniques exist and would be applied on a case-by-case basis. Corona effects from all of the alternatives modeled are expected to be low enough so that no objectionable audible noise or radio or television interference will result outside the ROW.

Corona can also be dimly visible as a bluish glow or as bluish plumes. Corona on conductors is observable only under the darkest and/or rainiest conditions when the corona is most intense. It likely is visible only with the aid of binoculars. Without a period of adaptation for the eyes, and without intentionally looking for corona, it generally is not perceivable.

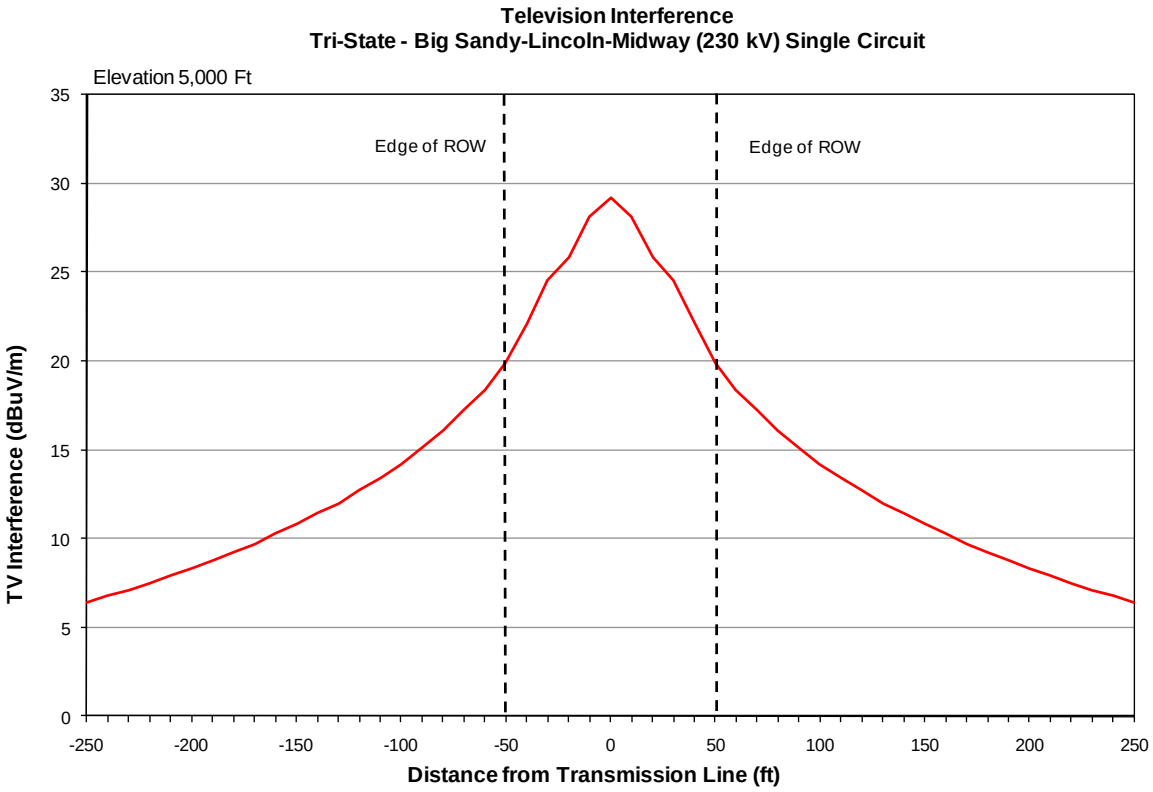

Figure 6.1-2: Predicted Television Interference Levels

Mitigation

As described above, impacts associated with corona are not considered significant. Tri-State has adopted, as corporate policy, programs that ensure that its electric facilities are designed, constructed, and operated in strict accordance with the NESC and all applicable federal, state, and local regulations.

6.2 No Action Alternative

Selection of the No Action alternative would not result in any new or cumulative impacts to the existing natural or human environment. Without implementation of the Proposed Action, impacts to the natural and human environment could occur in the future as the transmission structures continue to deteriorate and require upgrades because of old age or destructive weather events.

7.0 Cumulative Impacts

Cumulative impacts result from the incremental impact of an action when added to other past, present, and future actions regardless of who undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Past actions within the project area include Comanche–Daniels Park transmission line. This project involved the following components:

- Double circuit 345-kV transmission line from Comanche Station to Midway Substation, located between Pueblo and Colorado Springs. This double-circuit facility did not tie into the Midway Substation but connected with the transmission lines on the eastern side of the transmission corridor between Midway Substation and Daniels Park Substation (south of Denver).
- Rebuilt the western existing single-circuit 230-kV facility to a double-circuit facility capable of operating at 345 kV from Midway Substation to Daniels Park Substation.
- Modified and upgraded existing switchyards at Comanche Station, Midway Substation, and Daniels Park Substation. Added autotransformers at the Comanche Substation and the Daniels Park Substation so that these circuits operate at 345 kV. Expansion of surrounding fence lines at the sites to accommodate the additional equipment.

Reasonably foreseeable future actions near the project area include portions of the Eastern Plains Transmission Project (EPTP), High Plains Express (HPX) transmission line, Southern Delivery System (SDS), Prairie Falcon Parkway Express, Lafarge Sand and Gravel, the Colorado Interstate Gas Project—Raton Gas Expansion Project, Clipper Wind Project, and the Fountain Creek Corridor Restoration Master Plan. These projects are discussed in greater detail below.

7.1 EPTP

The EPTP was proposed to assist Tri-State to serve the long-term needs of its member systems, enhance power delivery system reliability in the region, relieve existing constraints, and provide opportunities for additional interconnections, including those from renewable energy projects.

The EPTP and other regional transmission projects are being evaluated as part of the Colorado Long Range Transmission Planning Group (CLRTPG) 2018 transmission planning study. Tri-State and other regional utilities and transmission providers participate in the CLRTPG, which provides a forum for electric load-serving entities in the region to jointly explore the potential for the development of a coordinated transmission network.

Tri-State is evaluating its members' needs, and with other utilities is evaluating regional system requirements that could change the scope of EPTP. On October 9, 2008, Tri-State announced an agreement with Xcel Energy to begin technical studies to determine the

feasibility of joint transmission projects in southern and eastern Colorado, including portions of the EPTP.

7.2 High Plains Express Transmission Line

The HPX project includes a consortium of seven western electric transmission owners and an independent transmission company that are participating in a study of a high-voltage backbone transmission system between Wyoming, Colorado, New Mexico, and Arizona.

The proposed HPX transmission line would extend a 500-kV transmission line through Wyoming, Colorado, New Mexico, and Arizona. The primary benefits expected to be realized from the HPX project would be to enhance the reliability of the eastern portion of the Western Electricity Coordinating Council grid; facilitate substantial new renewable energy integration consistent with public policy; provide for efficient energy transfers and associated economic benefits for customers and consumers in each of the HPX states; provide economic development stimuli for all HPX states; and provide a “roadmap” for local and regional transmission expansion (Xcel Energy 2008). One of the proposed transmission line routes would connect through the Big Sandy Substation (Xcel Energy 2008). To date, the HPX project has not been approved and is currently in the planning process.

7.3 Southern Delivery System

The proposed SDS would provide regional water delivery to the following Colorado project participants: the cities of Colorado Springs and Fountain, Pueblo West Metropolitan District, and Security Water District. The project is forecast to meet participant water needs through 2046 by piping water from the Arkansas River near Pueblo to the participating service areas (BOR 2009).

According to the SDS Environmental Impact Statement (BOR 2009), SDS would use the 42,000 acre feet of existing storage capacity in Pueblo Reservoir on an as-available basis and a Bureau of Reclamation pipeline below Pueblo Dam to connect to the raw water intake. The system is estimated to deliver 96 million gallons of water per day via a 43-mile-long, 66-inch-diameter pipeline and three pump stations. The system would terminate at a 30,500-acre foot storage reservoir and water treatment plant. Transmission pipelines then would convey potable water from the water treatment plant to local water distribution systems.

This project would run parallel to the Lincoln to Midway segment of the transmission line.

7.4 Prairie Falcon Parkway Express

Prairie Falcon Parkway Express is a proposed 210-mile-long, privately developed transportation, rail, and utility corridor in the following seven Colorado counties: Adams, Arapahoe, Elbert, El Paso, Larimer, Pueblo, and Weld (Prairie Falcon Parkway Express no date). The project would include a four-lane divided toll road, rail line, and utility ROW. The project is intended to provide an alternative north-south transportation system.

This project has been in the planning stages for many years and has not moved forward to date.

7.5 Lafarge Sand and Gravel

Lafarge North America will be opening a sand and gravel mining operation in the vicinity of Fountain Creek near Fountain, Colorado. The project was approved by the El Paso County Board of County Commissioners in January 2010. The mining operation will be located on a 514-acre parcel on the eastern side of I-25 just south of the Pikes Peak International Raceway, near Exit 122 and in proximity to the Big Sandy–Lincoln–Midway transmission line ROW and Midway Substation.

7.6 Colorado Interstate Gas Project—Raton Expansion Project

Colorado Interstate Gas Company (CIG), a subsidiary of El Paso Corporation, is building the Raton Expansion Project to serve the increasing national demands for Rocky Mountain natural gas supplies. The Raton Expansion Project involves the installation of approximately 117 miles of 16-inch pipeline and measurement facilities in Las Animas, Huerfano, Pueblo, and El Paso counties, Colorado. The project will start in southern Las Animas County and will terminate in southern El Paso County at an interconnection with CIG's pipeline system. This expansion will enable gas to be transported to CIG's mainline for ultimate delivery to the Cheyenne Hub in northern Colorado for delivery to major national markets.

7.7 Clipper Wind Farm and Proposed Transmission line

Colorado Springs Utilities (Colorado Springs) is planning to purchase 50 megawatts of wind energy from Clipper Windpower PLC (Clipper Windpower). Wind turbines for the project will be constructed in eastern El Paso County. The associated transmission line is proposed to primarily parallel State Highway 24.

7.8 Fountain Creek Corridor Restoration Master Plan

The purpose of this master plan is to improve watershed health by reducing erosion, sedimentation, and flooding and improving water quality; creating stable riparian and wetland ecosystems to attract and support native wildlife and vegetation; sustaining productive agricultural lands along corridor; creating a trail from Colorado Springs to Pueblo with recreational and educational opportunities; and gaining public and private support through partnerships to facilitate implementation and future funding.

The project would be constructed within an existing transmission ROW using existing access roads, so long-term cumulative effects from construction and continued operation of the transmission line are expected to be minor. The project would not result in additional infrastructure or access; it would only improve an existing transmission system.

The newer linear projects and the sand and gravel pit would result in increased cumulative effects to the areas surrounding the transmission line. These impacts include loss of vegetation including wetland and riparian habitat, soil disturbance, wildlife habitat loss and

fragmentation, increased potential for noxious weed infestations, and increased noise and human disturbance in the area. The project would not result in long-term cumulative impacts to water resources or the socioeconomic environment. Permanent impacts to wetlands for the project would be limited to minor armoring of existing access roads that span two creeks.

Tri-State would implement Environmental Protection Measures, which addresses surface water protection, avian nest protection, and reclamation measures to ensure the project does not result in significant long-term impacts to the Fountain Creek Corridor.

The proposed project is being constructed to improve and upgrade an existing, aging, transmission line in an existing transmission ROW to provide greater reliability in the service area. The project is not expected to result in adverse cumulative impacts to the natural or human environment.

8.0 Permitting and Construction

Tri-State will continue coordination with regulatory agencies for compliance and to develop appropriate mitigation measures that are compatible with project goals and that will minimize impacts to natural resources along the transmission line. Environmental permits are secured prior to construction as standard operating procedure. Tri-State has submitted for the following permits:

- Location Approval and Site Development Plan Permit from El Paso County
- Location Approval from the Fountain Creek Watershed, Greenway, and Flood Control District.
- Nationwide Permit(s) 12 for crossing of wetlands and other WOUS
- Colorado Department of Transportation—Crossing Permits

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9.0 Individuals, Organizations, Tribes and Agencies Consulted

This section to be determined based on current discussion regarding agency consultation.

The final scoping report prepared for the proposed project summarizes all of the coordination and consultation completed for this project. Agencies that were included in the notification for scoping are as follows:

- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- Natural Resource Conservation Service
- State Historic Preservation Office
- U.S. Bureau of Reclamation
- Colorado Division of Wildlife
- Colorado State Land Board
- Elbert County
- Lincoln County
- El Paso County

Tri-State received responses from the CDOW, the Colorado State Land Board, and the U.S. Bureau of Reclamation. The U.S. Bureau of Reclamation comments were received after the scoping deadline, but are included as part of this section.

The USFWS and CDOW were contacted early in the planning process for the proposed project. The USFWS concurred in 2009 that the project may affect but is not likely to adversely affect any federally listed species. The USFWS concurred that the project is not likely to affect federally listed species in an email dated April 11, 2009. Tri-State followed up with the USFWS again in August 2010 to ensure the USFWS had no additional concerns or issues as they pertain to federally listed species. The USFWS sent a concurrence email on August 9, 2010, to verify their previous review of the project and concurrence of not likely to affect was still appropriate (included below). The USFWS and CDOW's primary concerns were related to potential construction impacts to nesting raptors and other migratory birds. Letters and email correspondence of concurrence are attached as Appendix C.

Tri-State has obtained coverage for the project from the USACE under Nationwide Permit 12 for stream crossings required for project construction.

No comments were received during or post-scoping from the Natural Resource Conservation Service.

Tri-State has received comments from the State Historic Preservation Office on the Class III Inventory Report, the site testing plan, and formal concurrence on the findings for the proposed project and this letter is included in Appendix C.

RUS has solicited Native American Tribes that may have an interest in the Project and results of the environmental analysis.

Tri-State met with county representatives from Elbert, Lincoln, and El Paso counties on February 1 and 2, 2010, to ensure the proposed project complies with local requirements.

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10.0 List of Preparers

The key team members who conducted the environmental impact analysis and prepared this EA are listed in Table 10.0-1.

Table 10.0-1:
List of Preparers

Name	Title	Responsibility/Specialty
Tri-State		
Diana Leiker	Environmental Planner	Environmental Compliance
Gary Mueller	Senior Engineer	Project Engineer
Burt Norem	Senior Land Rights Specialist	Land Rights
EDAW | AECOM and Tetra Tech, EC, Inc.		
Jennifer Chester	Project Manager	GIS
Sarah McCall	Assistant Project Manager, Environmental Planner	NEPA Compliance
Matt Smith	GIS Specialist	GIS
Carly Collins	Environmental Planner	Public Involvement
Ashli Gornall	Environmental Planner	Socioeconomics/Geology and Soils
Teresa Kacprowicz	Editor	Editor/Document Production
Diana Leiker	Biologist	Biology
Stephanie Myers	Environmental Planner	Public Involvement
Robert Thayer	GIS Technician	GIS

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Appendix A:
Project Sheet Maps

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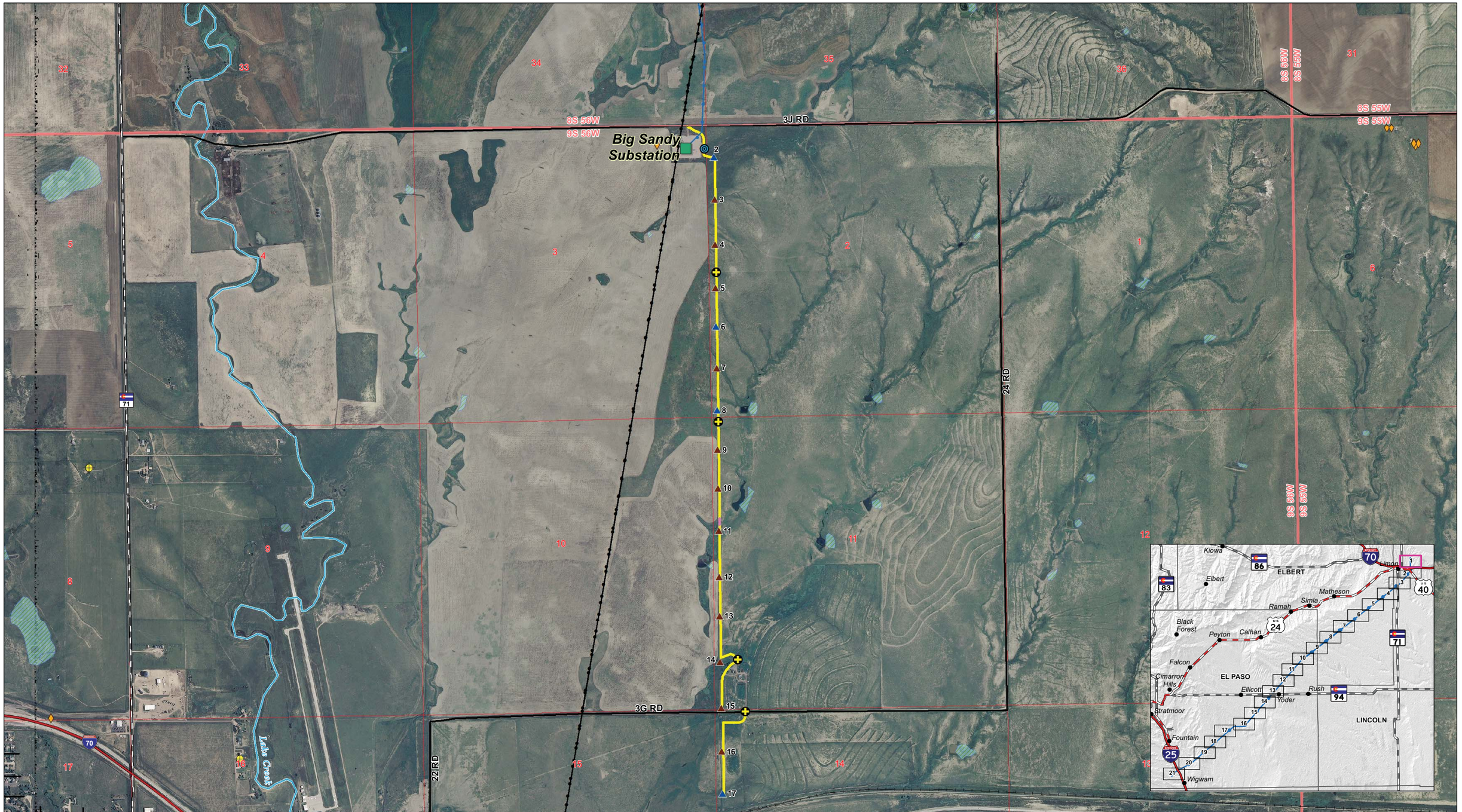

Sheet Map 1

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

*Digital data exists for El Paso County only

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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Sheet Map 2

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

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Wetlands and Weeds

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- NWI Wetland

Access Routes
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- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

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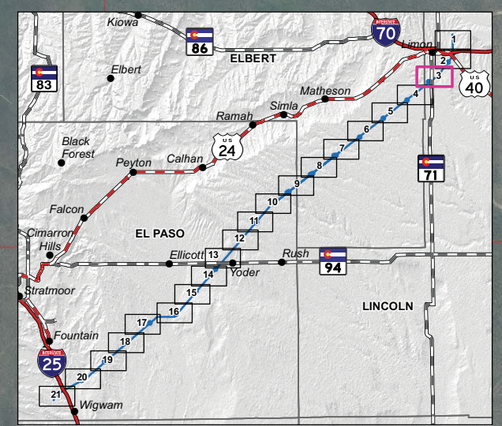
wetland 6

Lincoln Substation

9S 57W
10S 57W
98 RD
3C RD
9S 56W
10S 56W
201 RD
Elbert County
Lincoln County
10S 56W
10S 57W



Sheet Map 3

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
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Access Features
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- Gate
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- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

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Sheet Map 4

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

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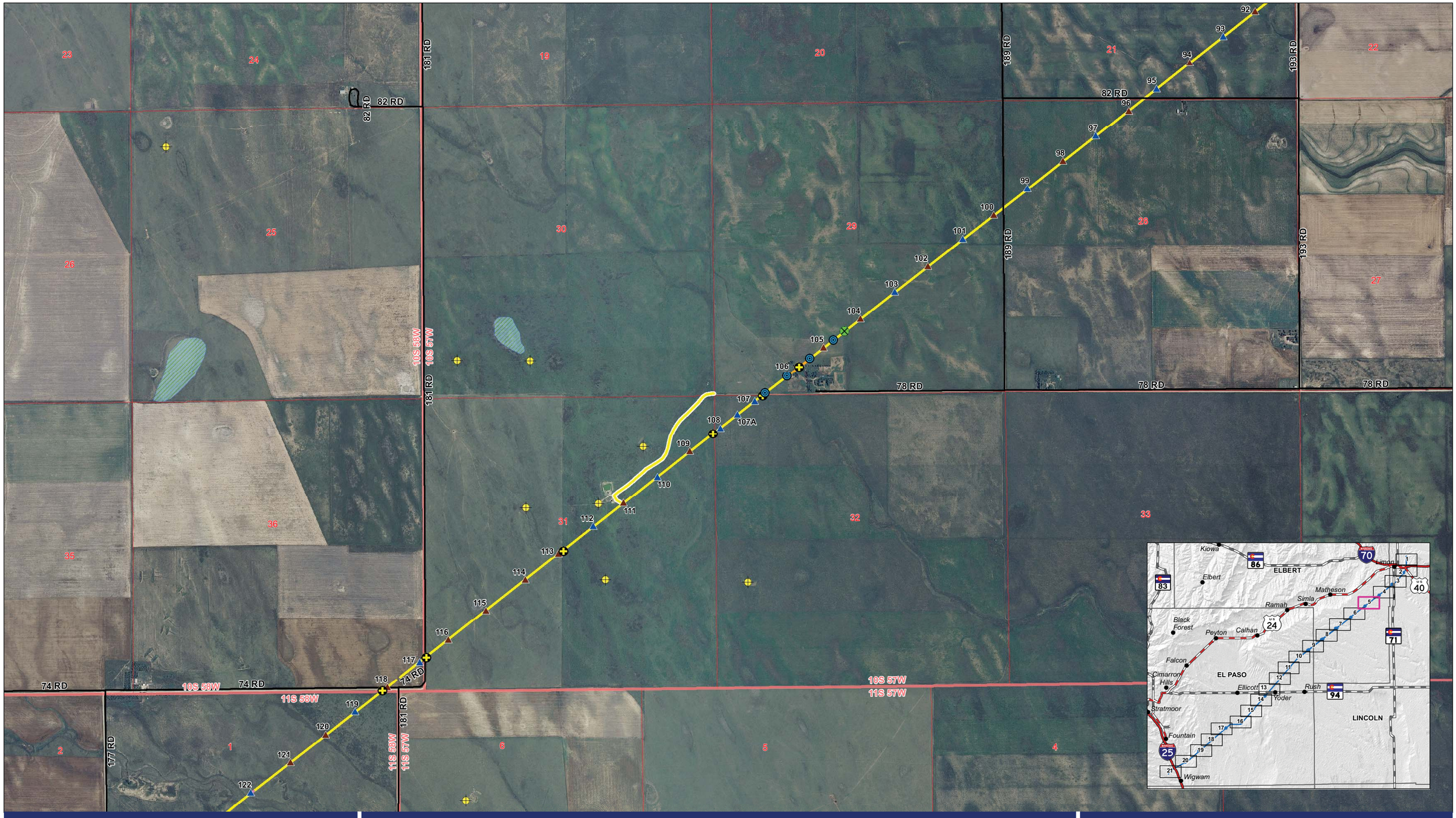

Sheet Map 5

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes

(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

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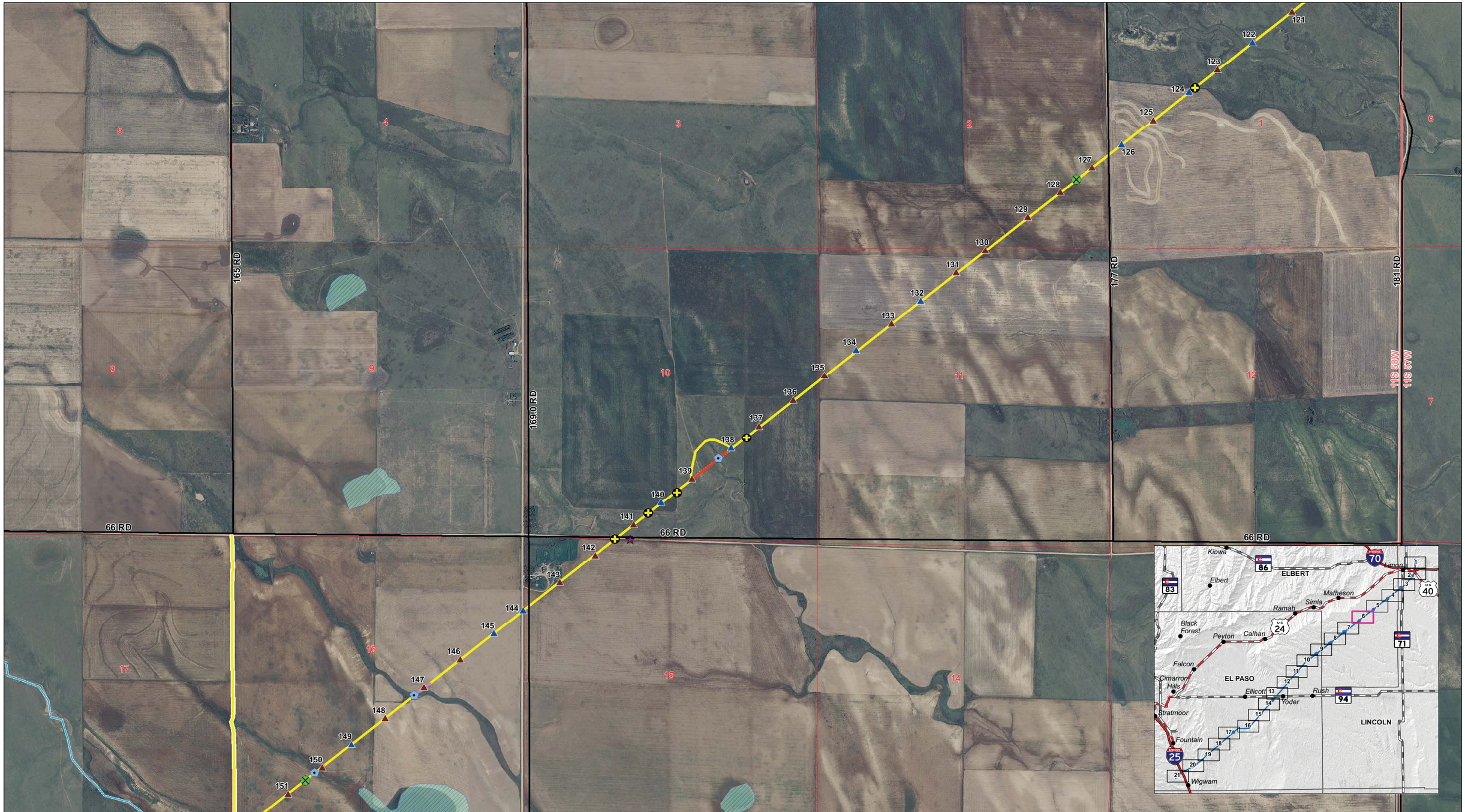

Sheet Map 6

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

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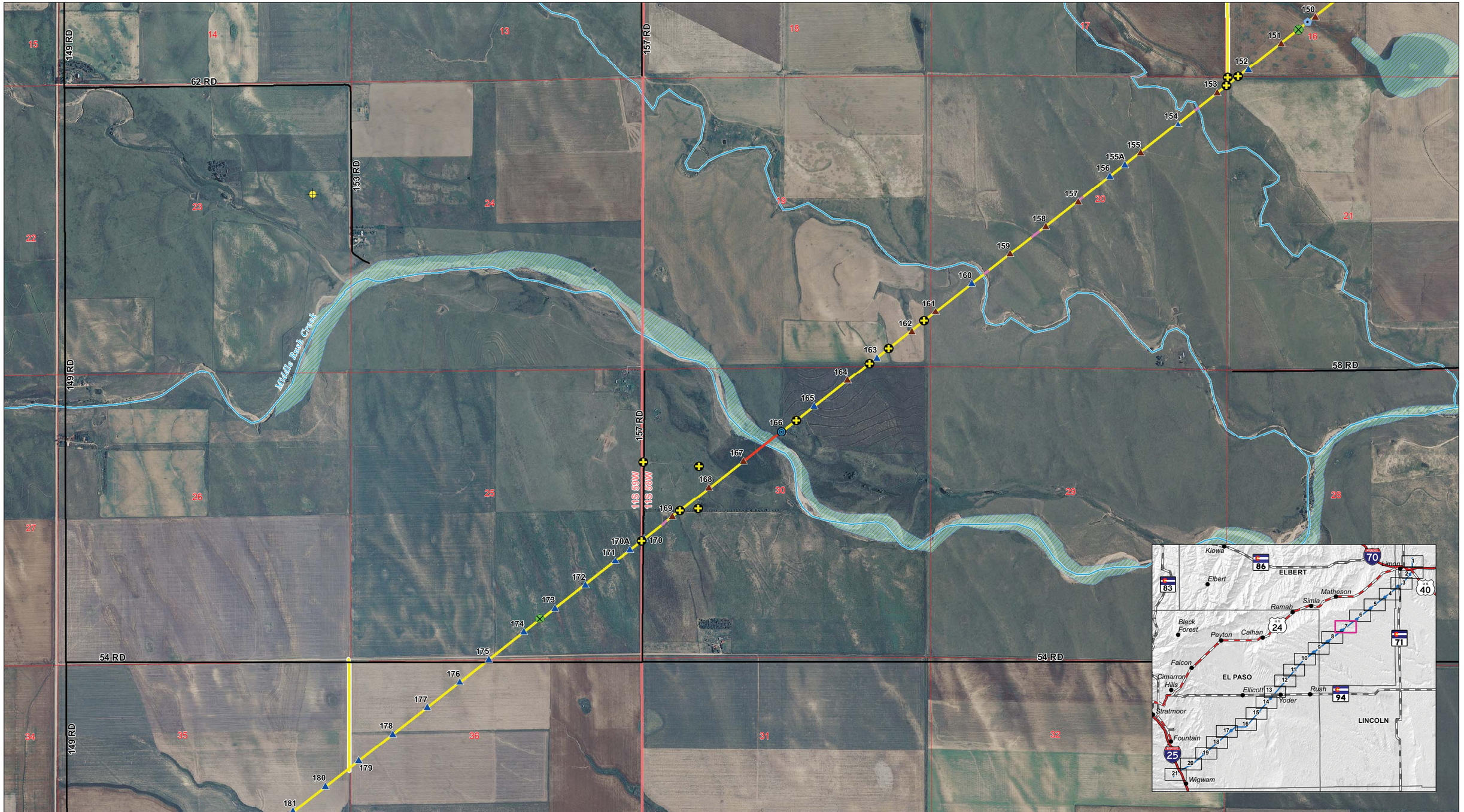

Sheet Map 7

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

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Existing Gas Line

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Wetlands and Weeds

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Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

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Sheet Map 8

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

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Existing Transmission Lines

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Existing Gas Line

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Wetlands and Weeds

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Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
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FEMA Floodplain

- 100-year Floodplain

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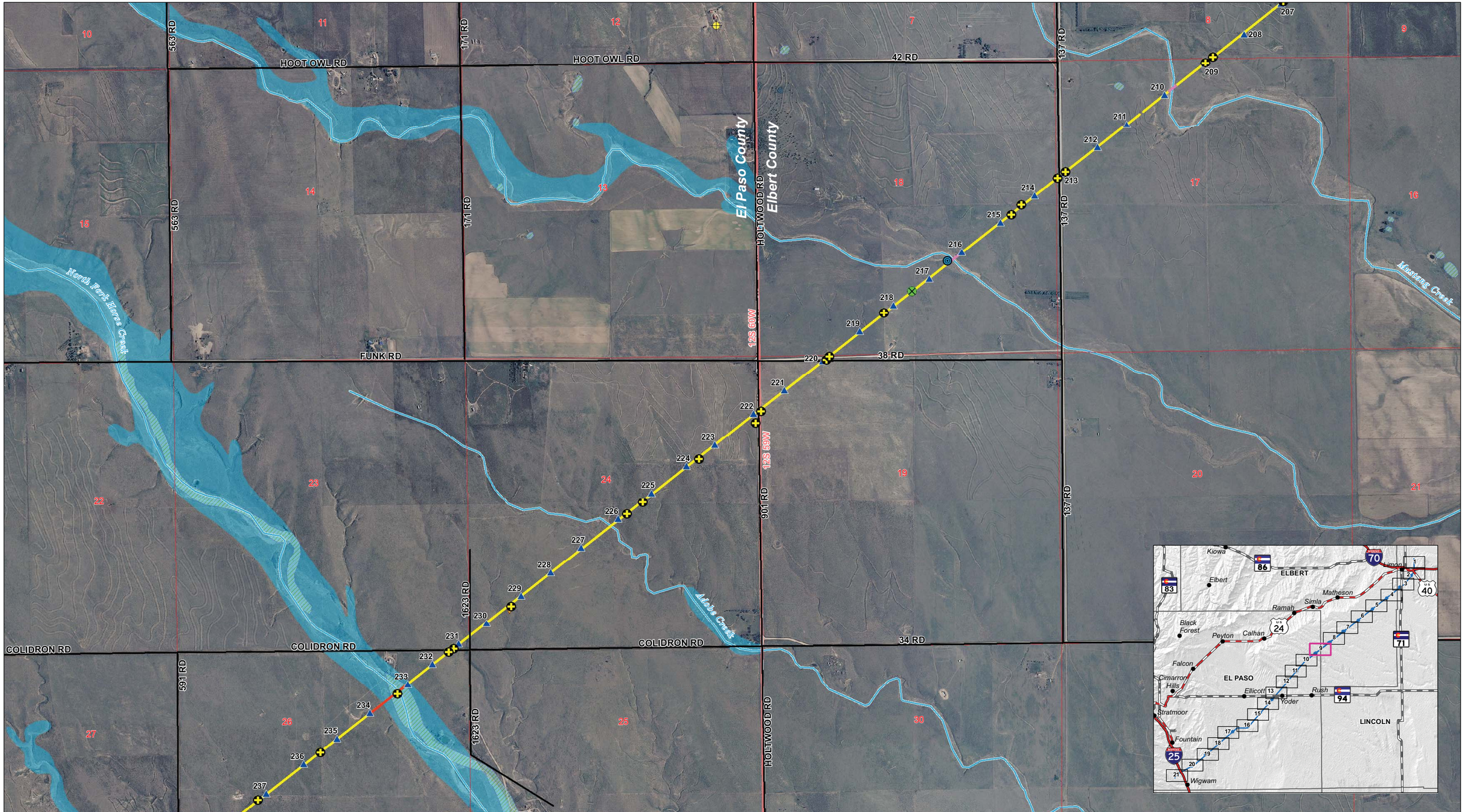

Sheet Map 9

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

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FEMA Floodplain
- 100-year Floodplain

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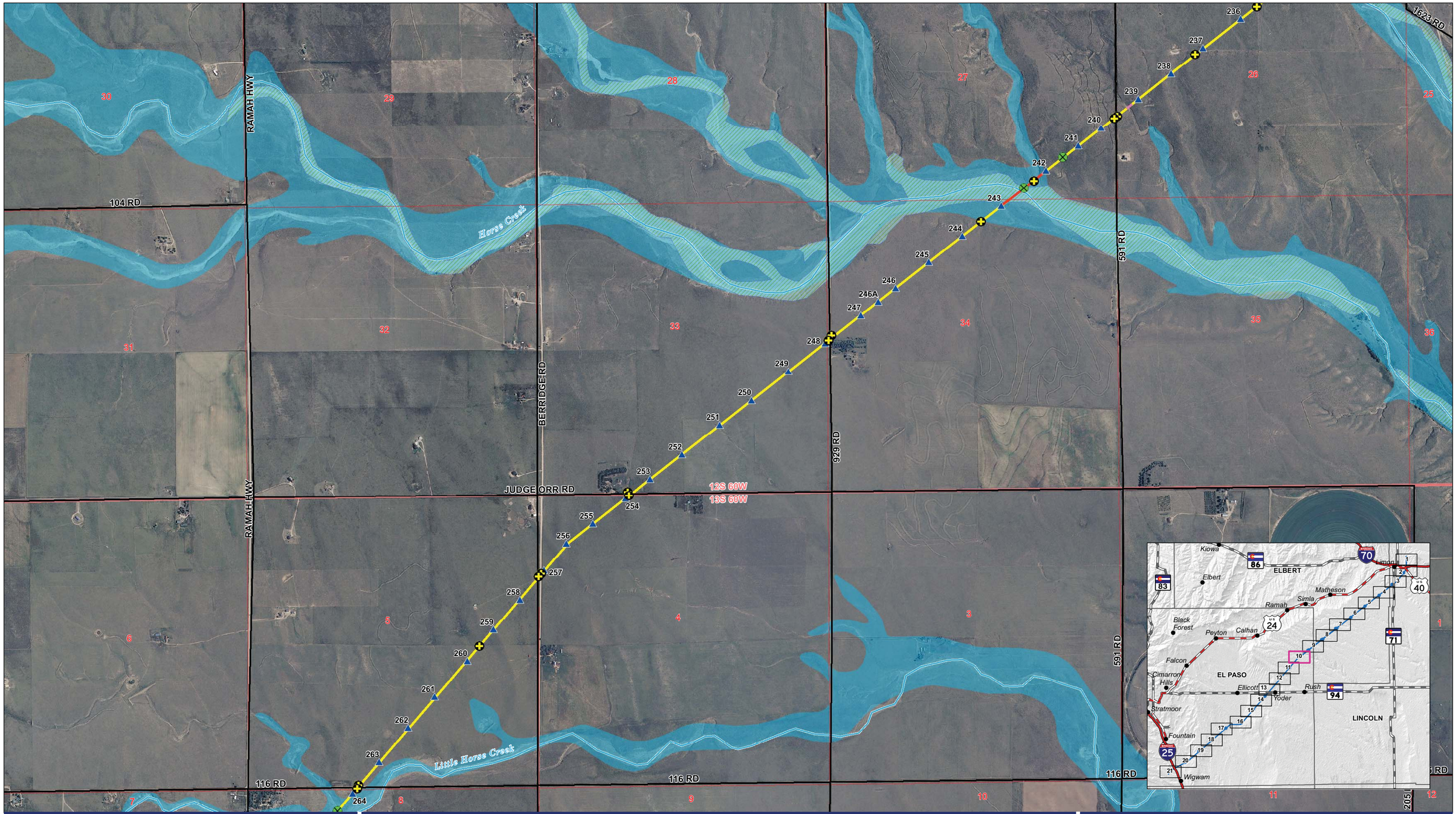

Sheet Map 10

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

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- Water of the U.S.

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FEMA Floodplain

- 100-year Floodplain

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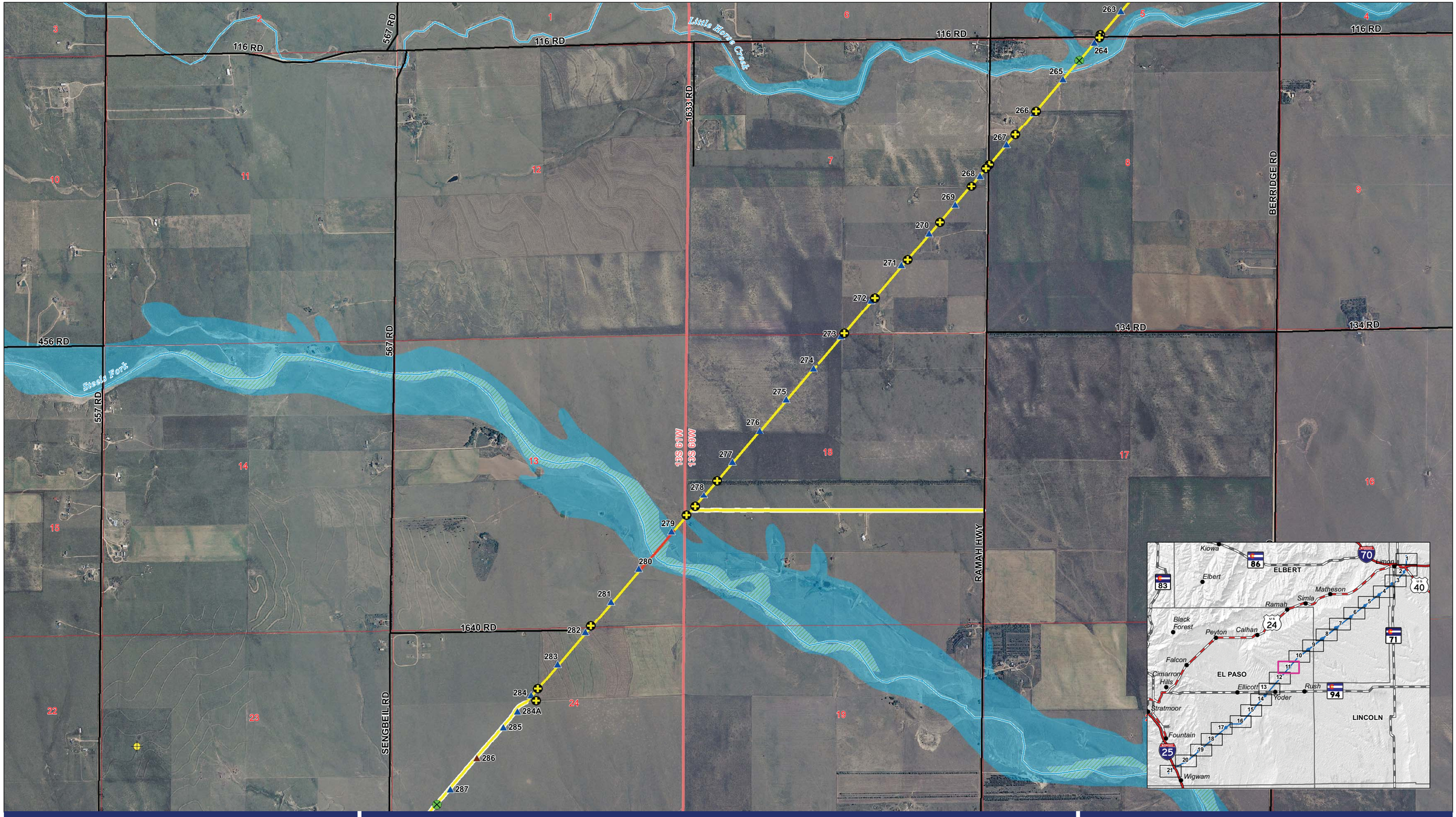

Sheet Map 11

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
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- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

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- Level 1
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- Level 5
- No Downline Access
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FEMA Floodplain

- 100-year Floodplain

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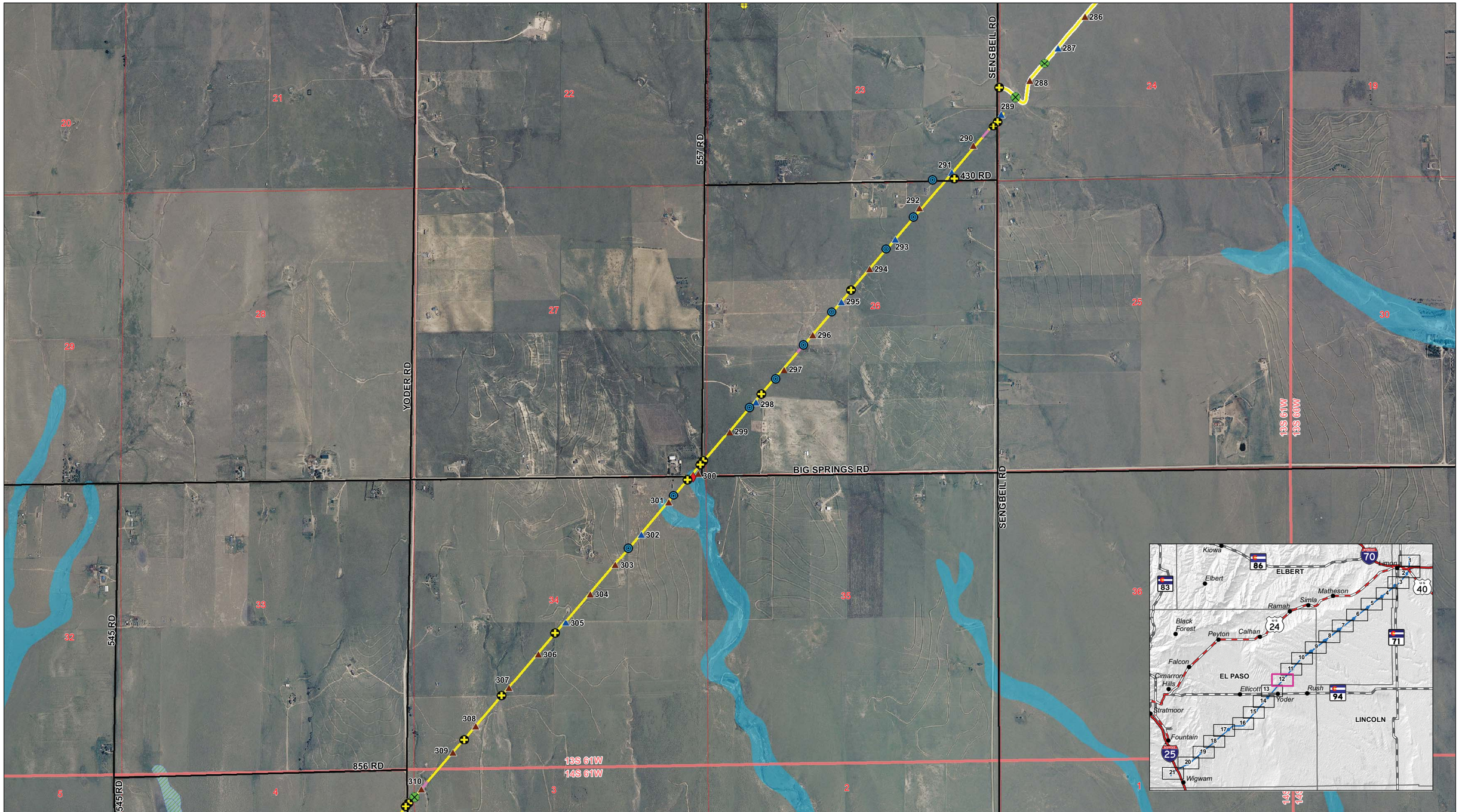
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 12

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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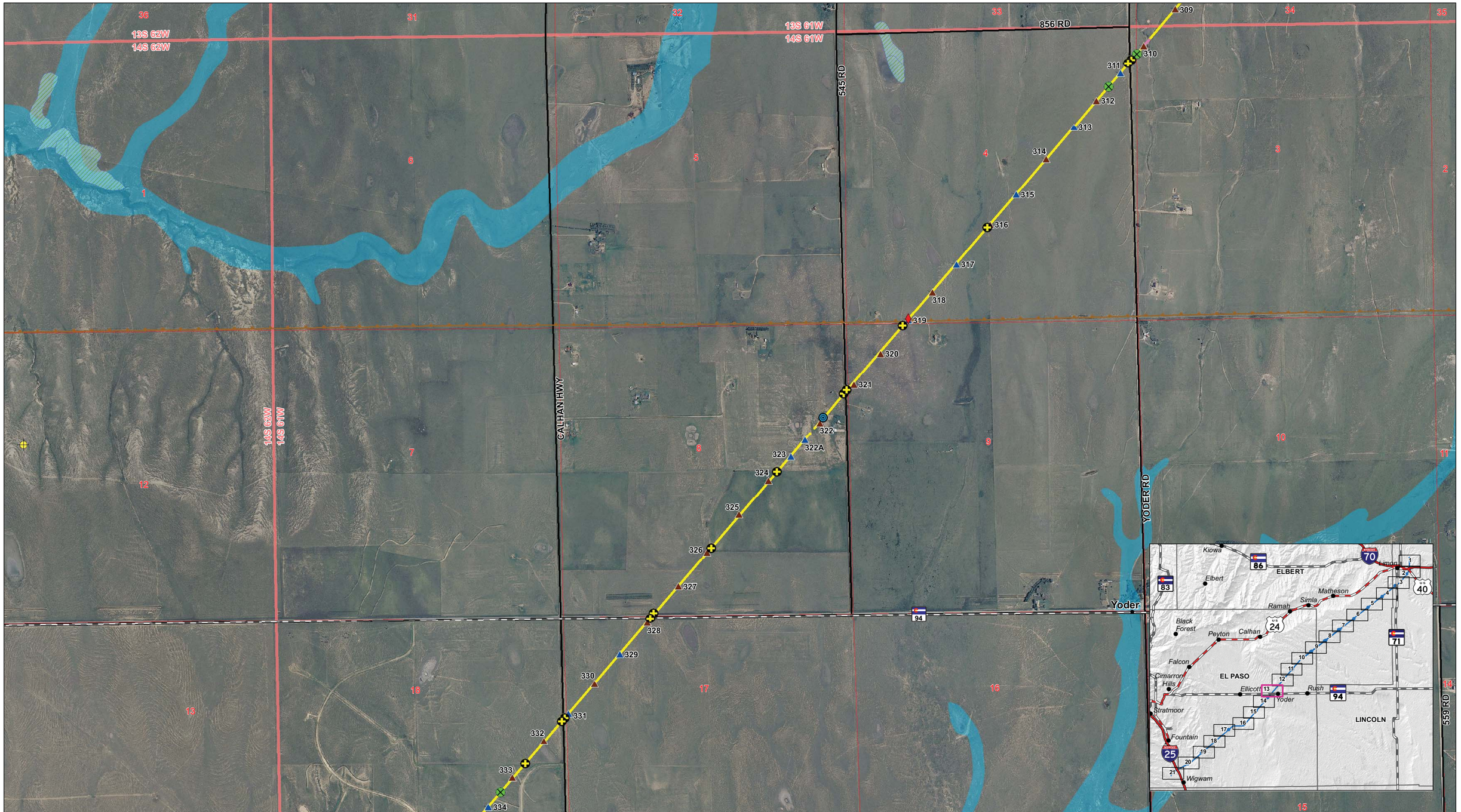
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 13

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

HANDLE RD

SANBORN RD

CALHAN HWY

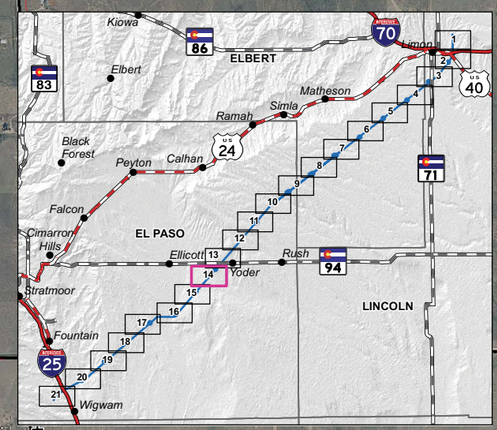
35 RD

14S 62W

14S 61W

15 14 13 18 17 16 23 24 19 20 21 22 26 25 30 28 27 34 35 36 31 33

333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358



Sheet Map 14

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

*Digital data exists for El Paso County only

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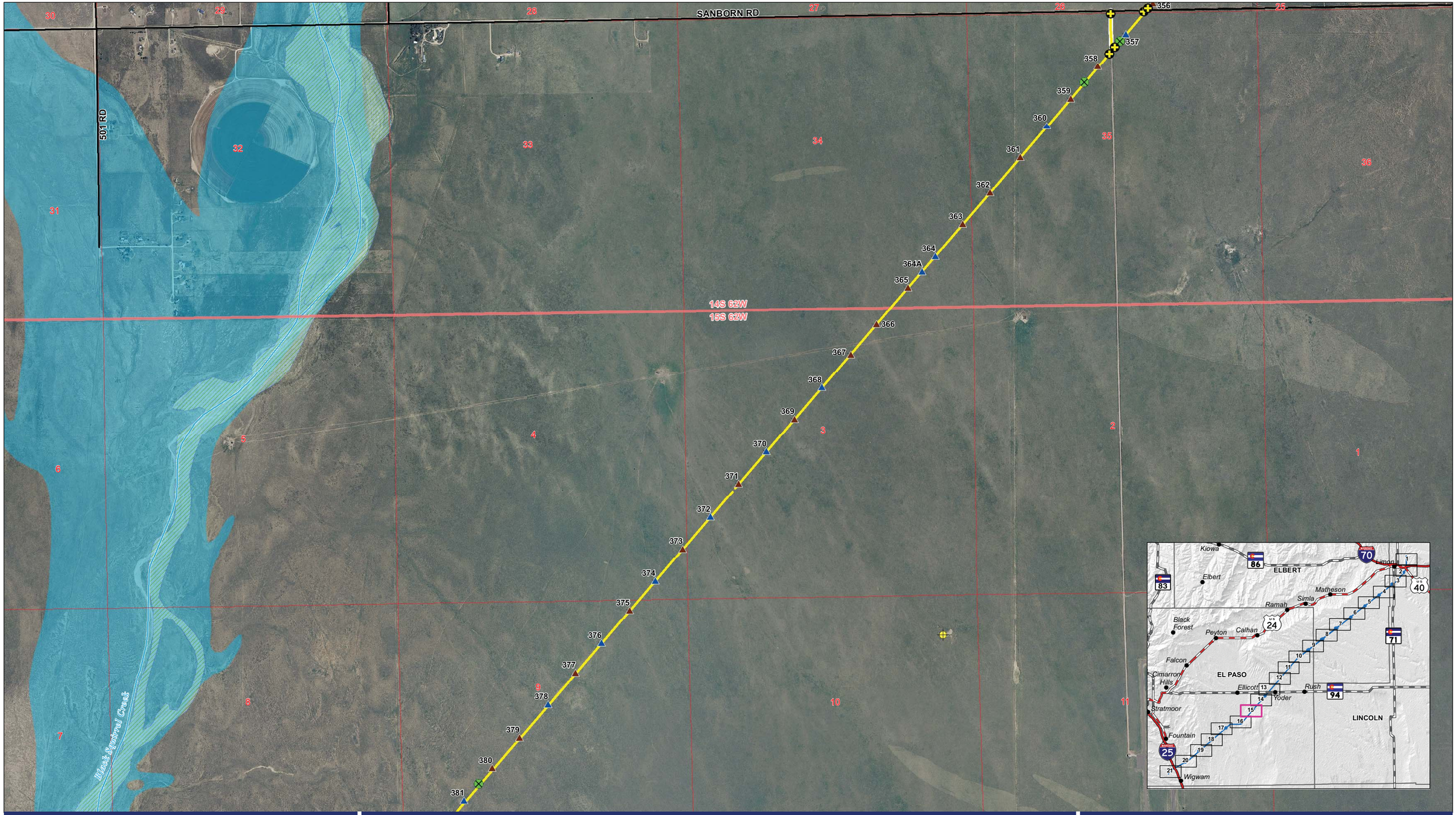
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 15

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

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File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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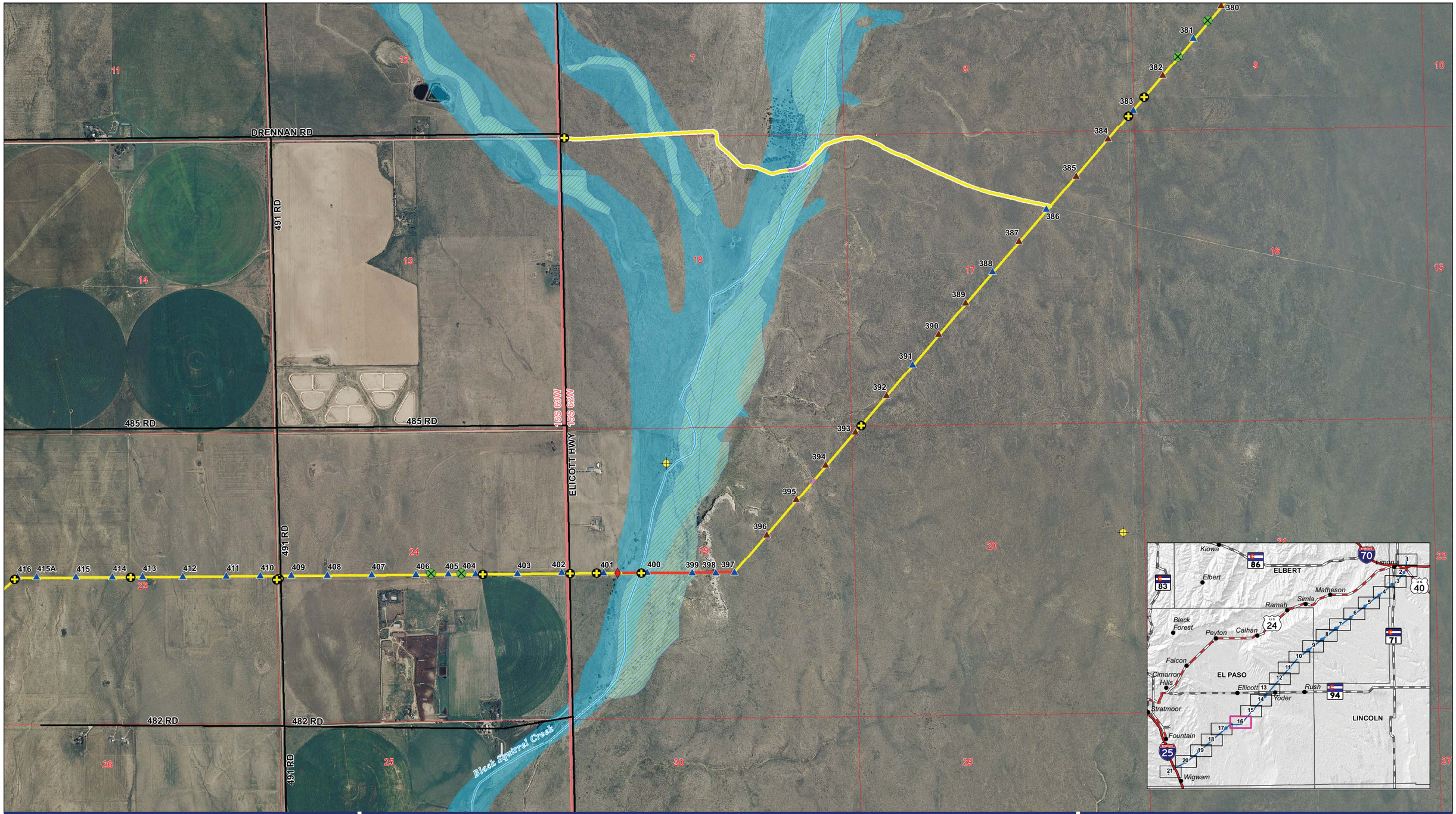
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 16

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

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Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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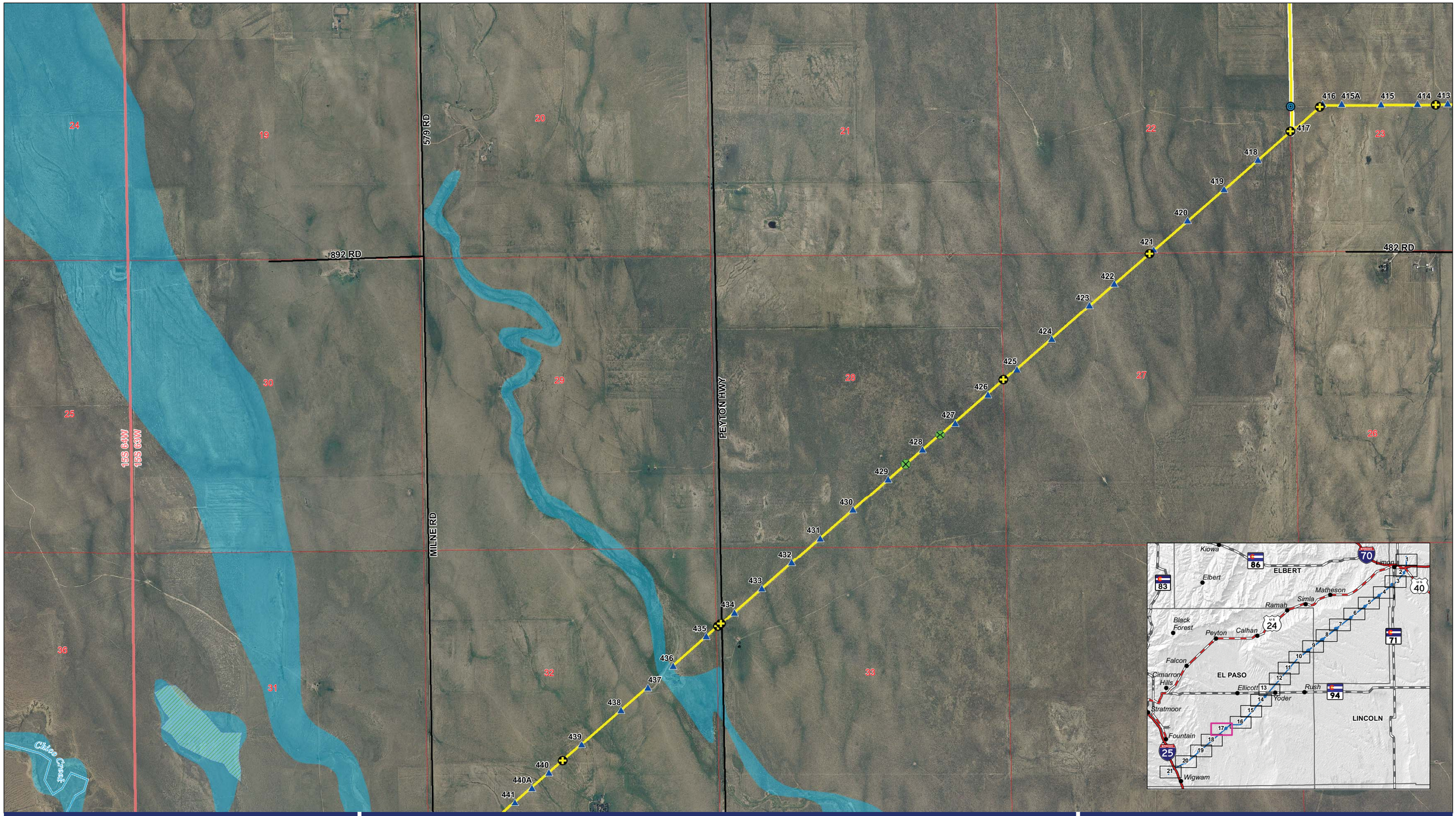
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 17

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
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- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

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Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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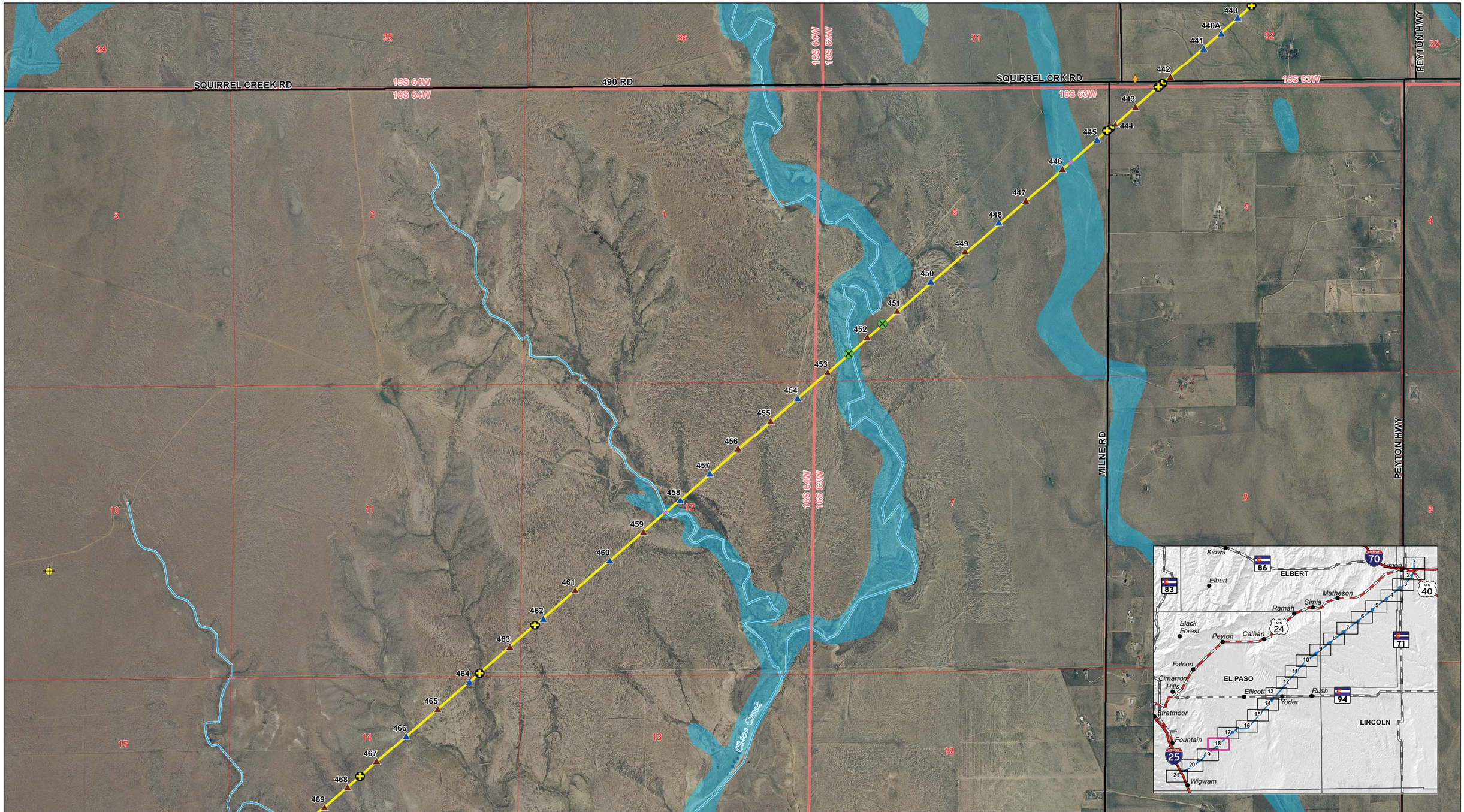
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 18

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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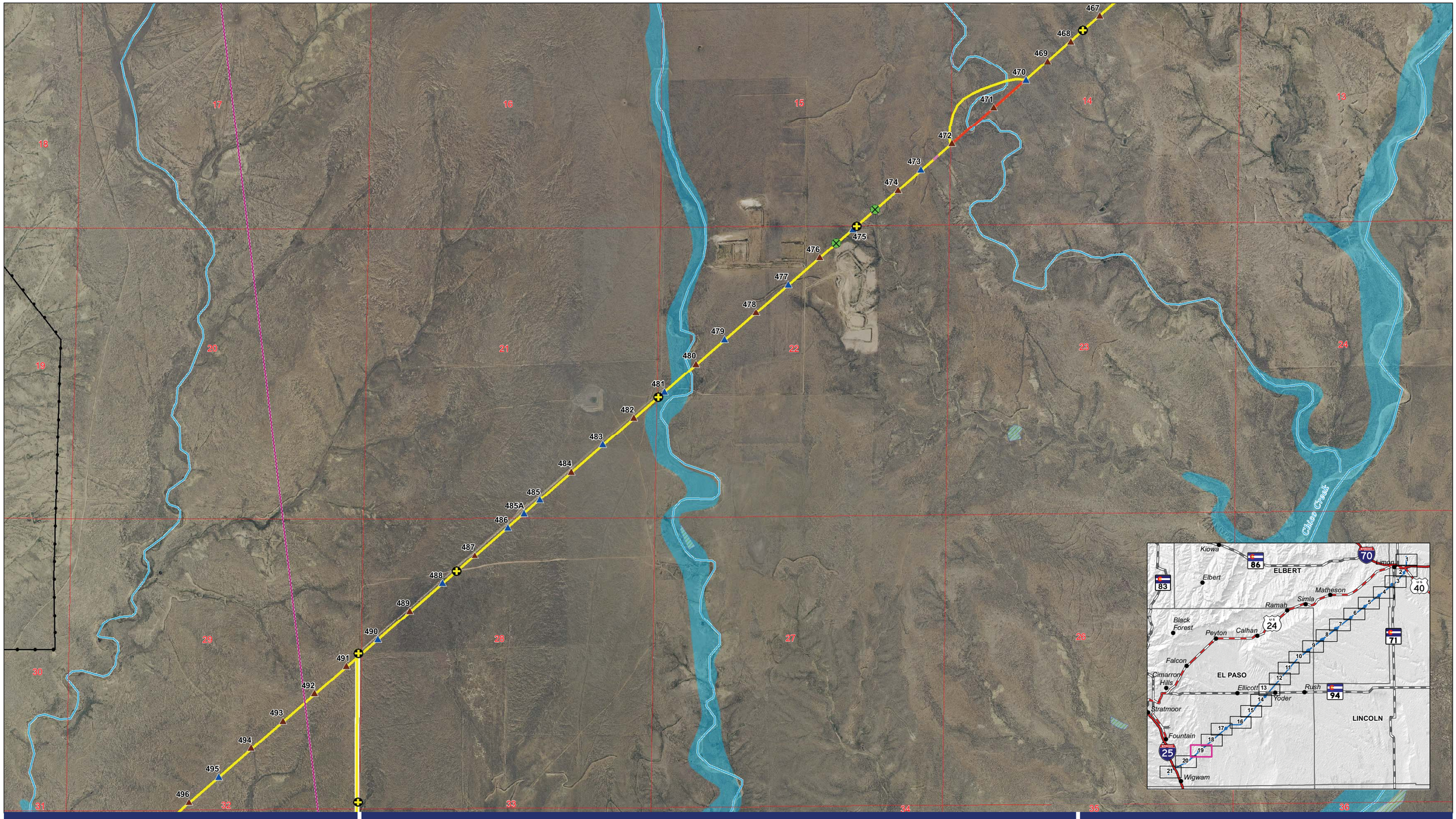
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 19

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines

- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line

- Natural Gas Pipeline

Structures

- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features

- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds

- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain

- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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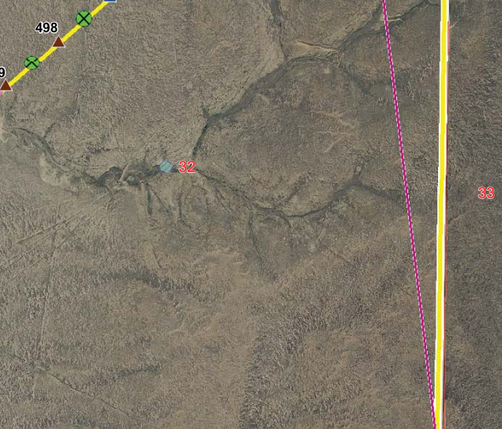
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Sheet Map 20

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles



Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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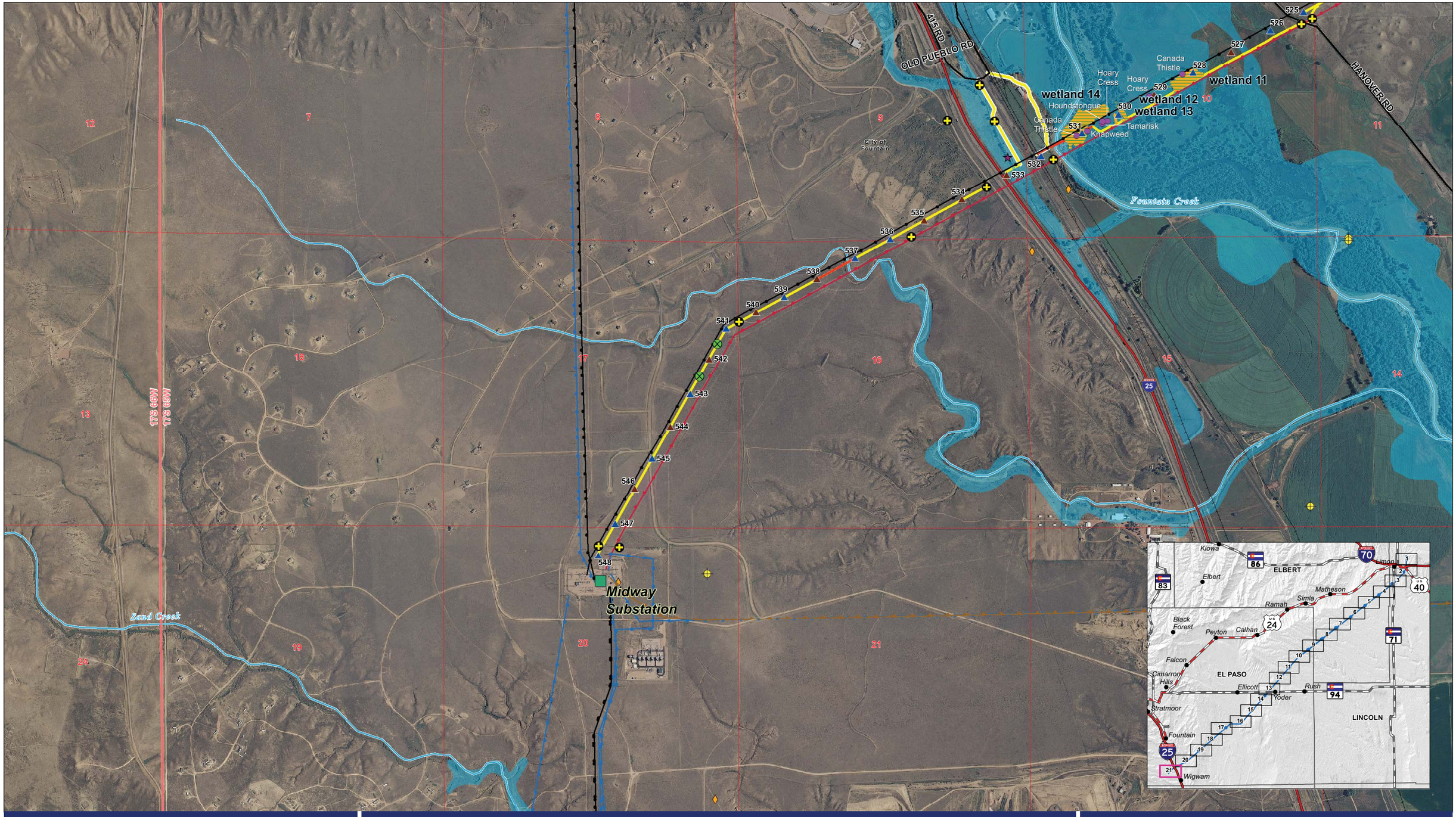
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)



Sheet Map 21

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 0.25 0.5 1 Miles

Legend

- Oil and Gas Well
- Registered Communication Facility
- Non-Jurisdictional Water
- Water of the U.S.

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

Access Features
- OPGW Pull Site
- Culvert, Existing
- Gate
- New Gate
- Needs Gate Installed
- New Culvert

Wetlands and Weeds
- Weed Point
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access

FEMA Floodplain
- 100-year Floodplain

*Digital data exists for El Paso County only

Last Revised: July 22, 2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**100722_EA_Sheetmap.pdf**

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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Appendix B:
Resource Maps

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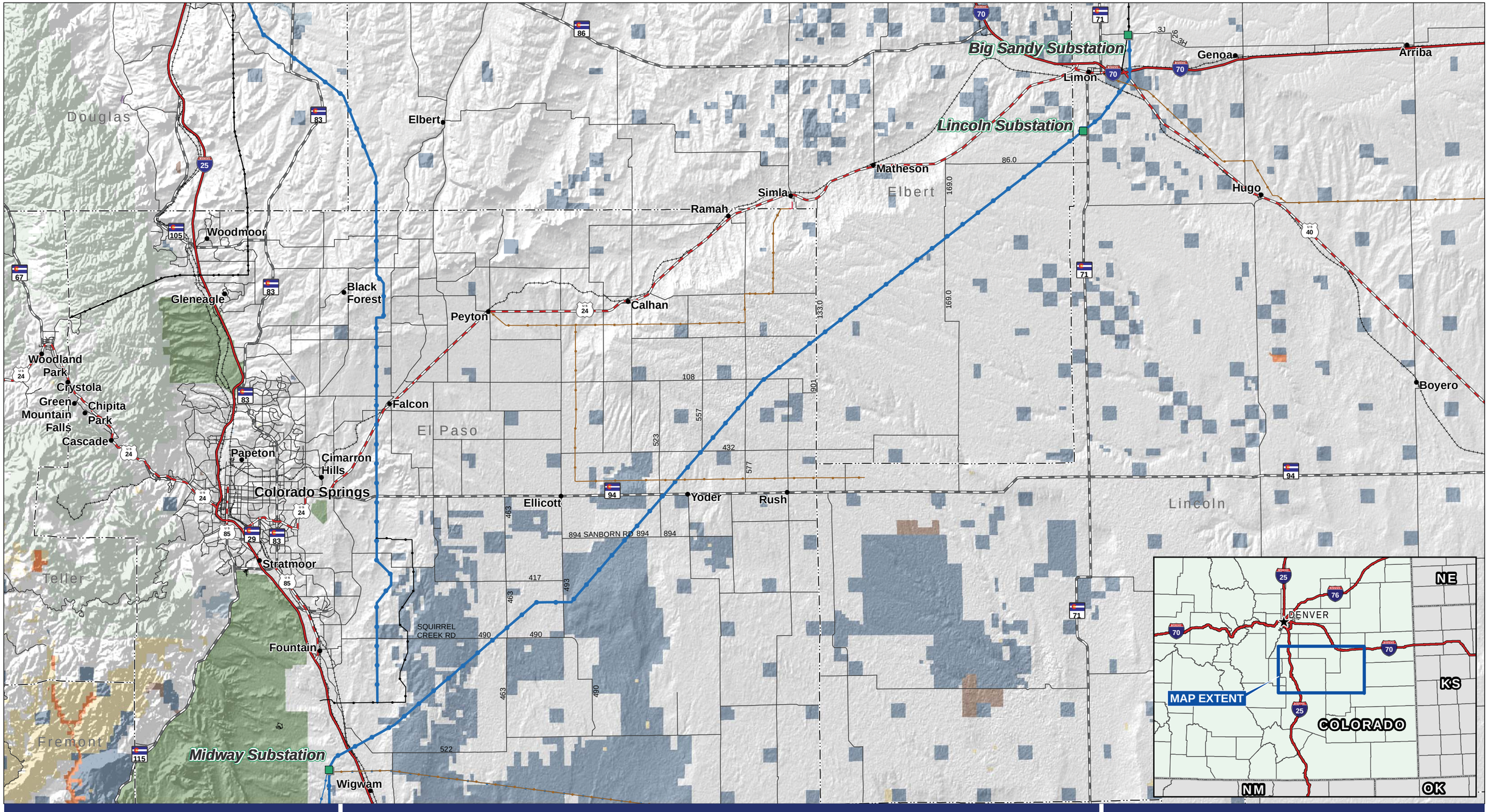

Land Ownership

- BLM
- CDOW
- State
- State Parks
- USFS
- Federal DOD
- Land Trust
- Metro District
- Non-Governmental Organization
- School District
- State Land Board

Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**land_ownership.pdf**

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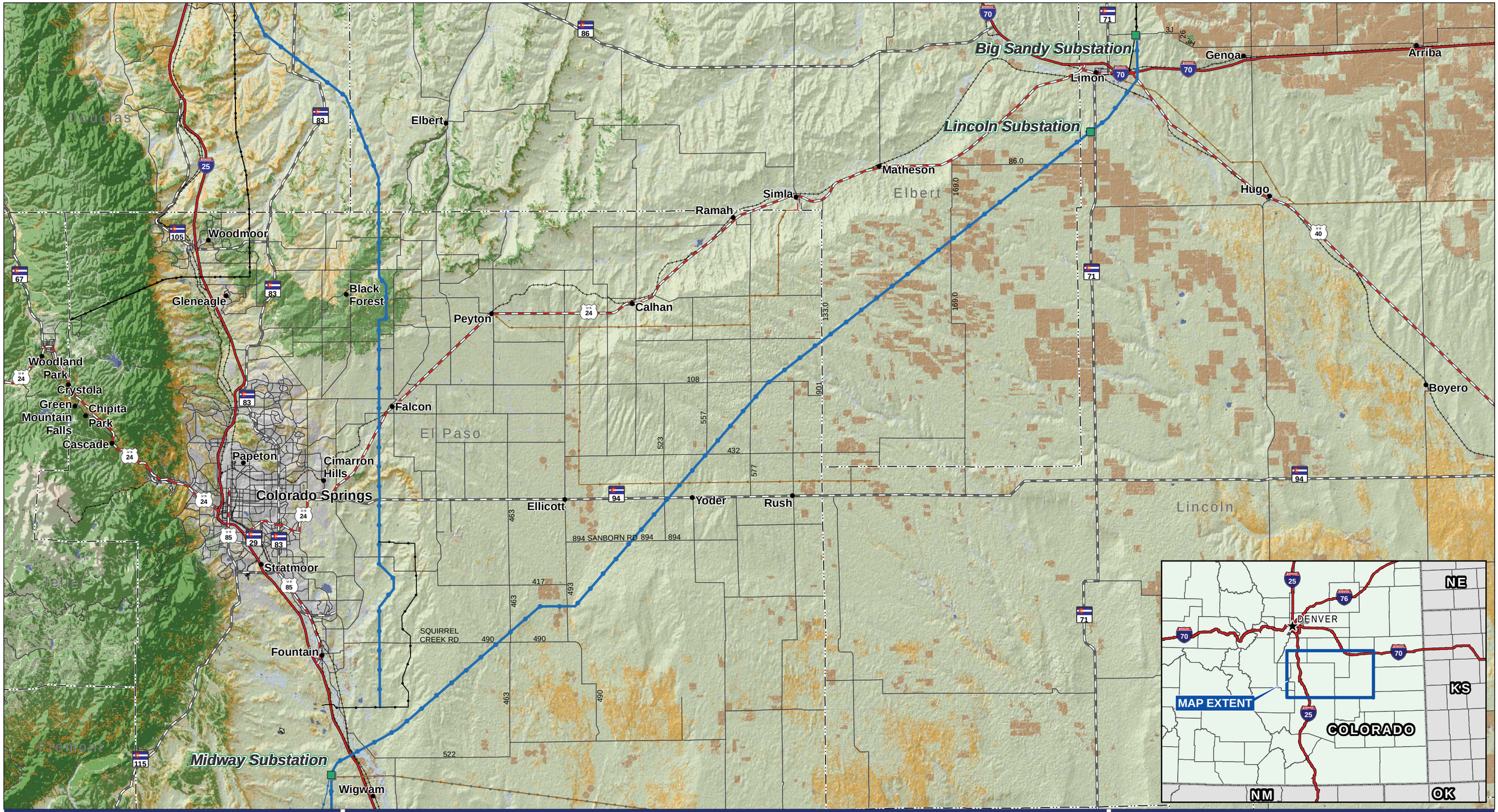
Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), CSU (Land Ownership 2008)

Figure B-1 (Appendix B) Land Ownership



Land Cover

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Land Cover

- Open Water
- Developed
- Barren Land
- Forest
- Shrub/Scrub
- Grassland
- Pasture/Hay
- Agriculture
- Wetland

Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**land_cover.pdf**

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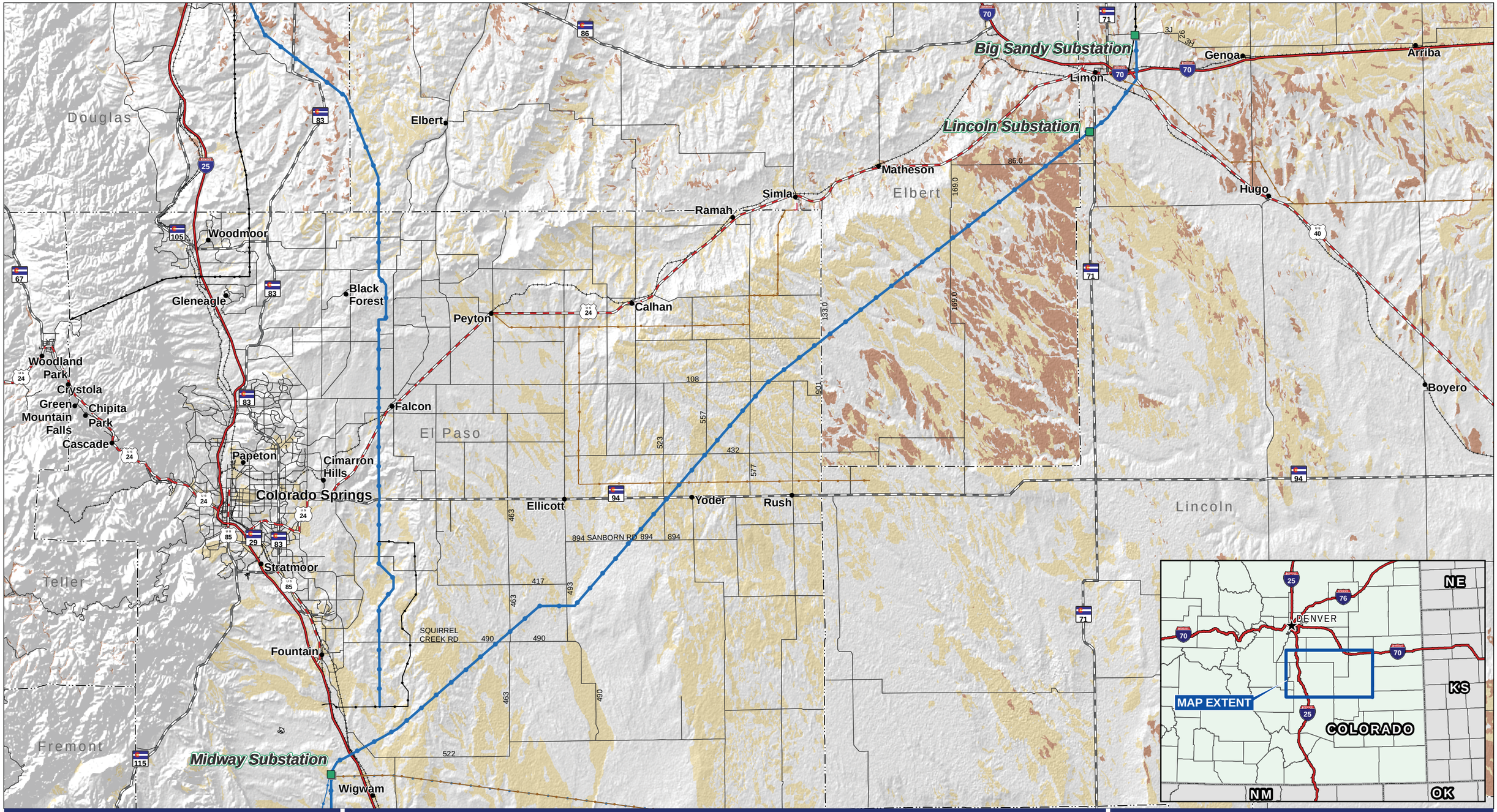
Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), NLCD (Land Cover)

Figure B-2 (Appendix B) Land Cover



Prime Farmland

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Prime Farmland
- Farmland of Statewide Importance
- Prime Farmland if Irrigated

Transportation
- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines
- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**prime_farmland.pdf**

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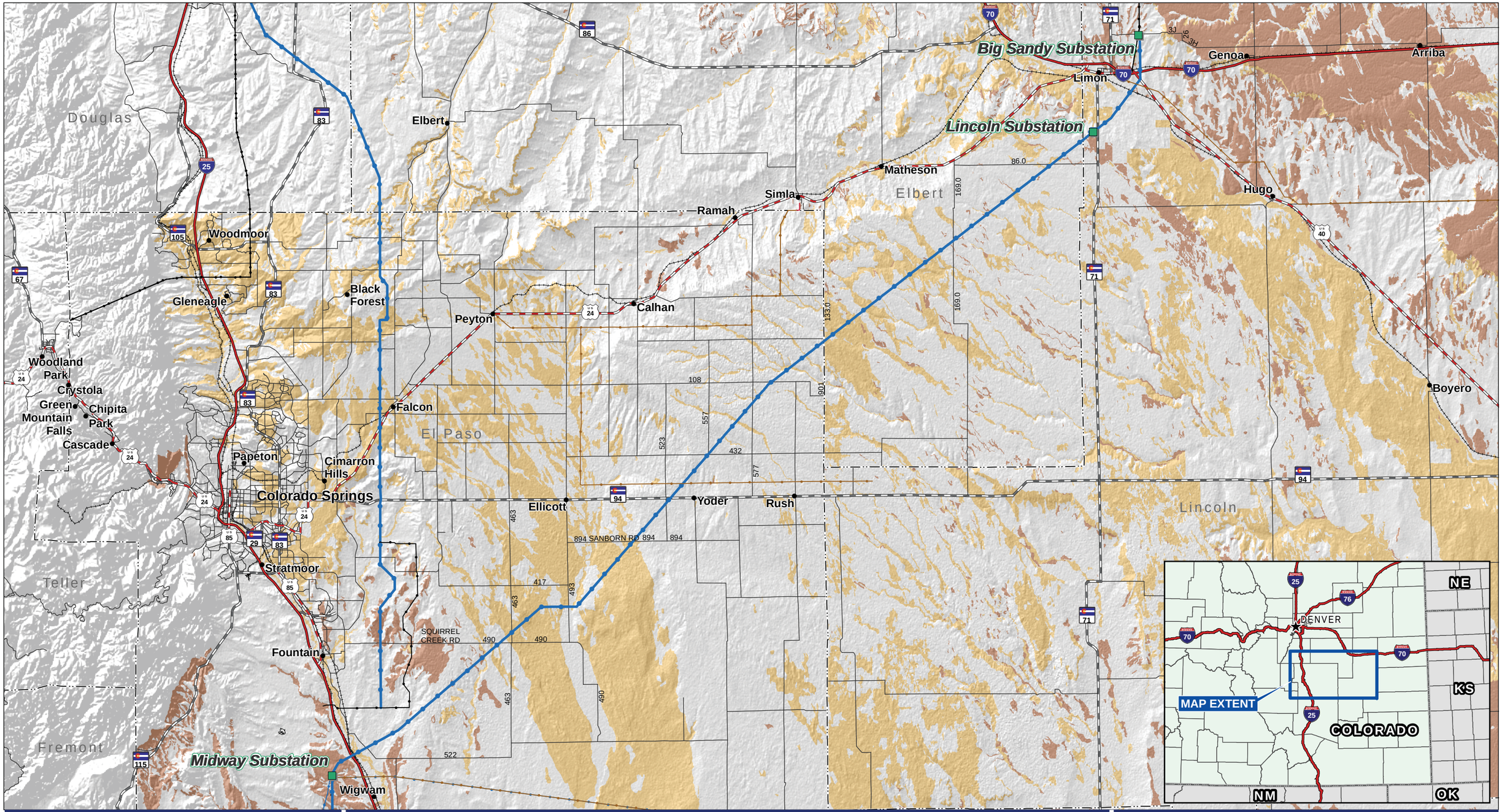
Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), NRCS (Prime Farmland)

Figure B-3 (Appendix B) Prime Farmland



Highly Erodible Land

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Highly Erodible Land
- Water
- Wind

Transportation
- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines
- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

Last Revised: 07/26/2010

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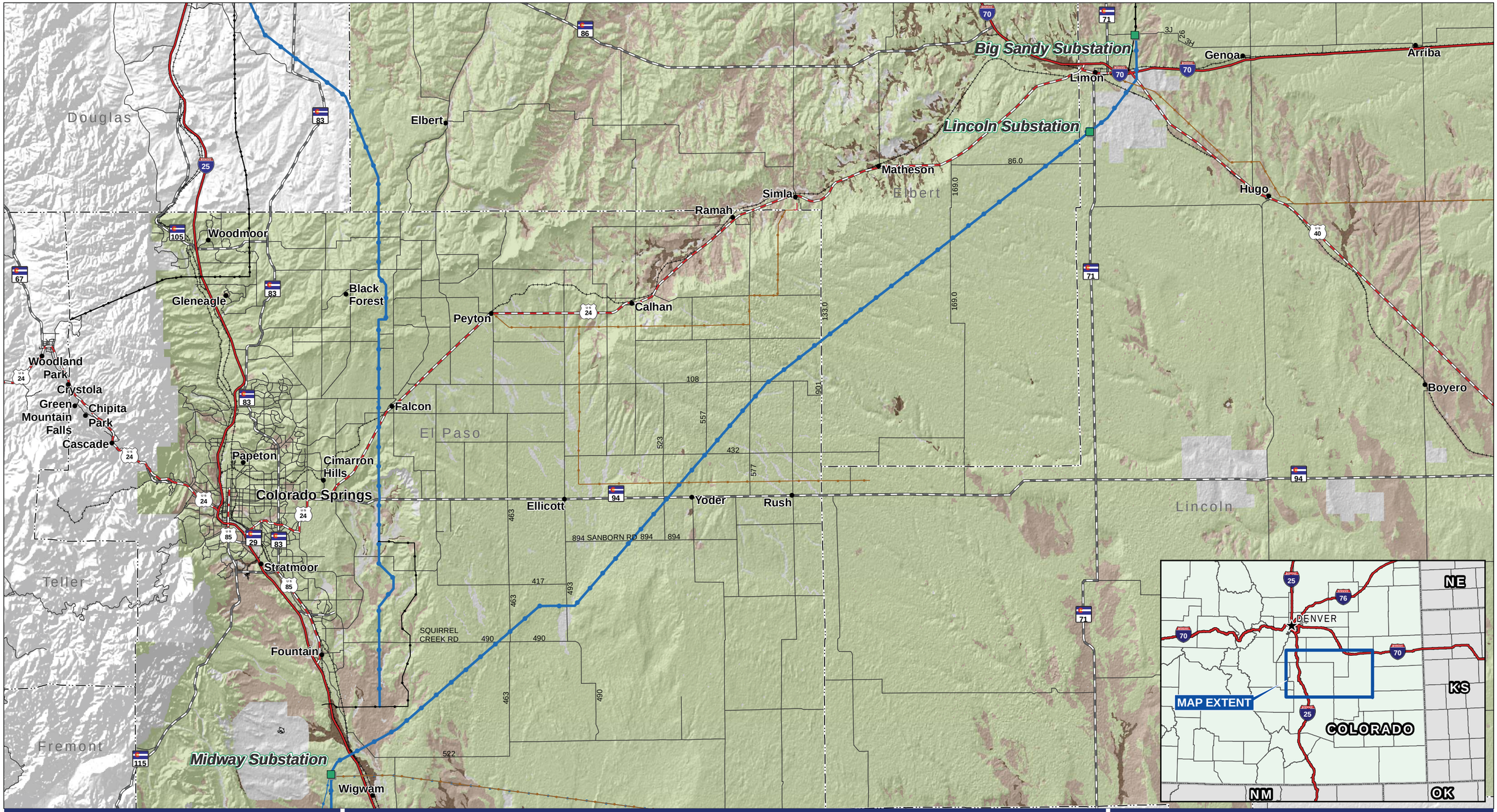
MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\highly_erodible_land.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), NRCS (highly erodible land)

Figure B-4 (Appendix B) High Soil Erodibility Potential



Shrink Swell Potential

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Shrink Swell Potential
- None
- Low
- Medium
- High

Transportation
- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines
- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

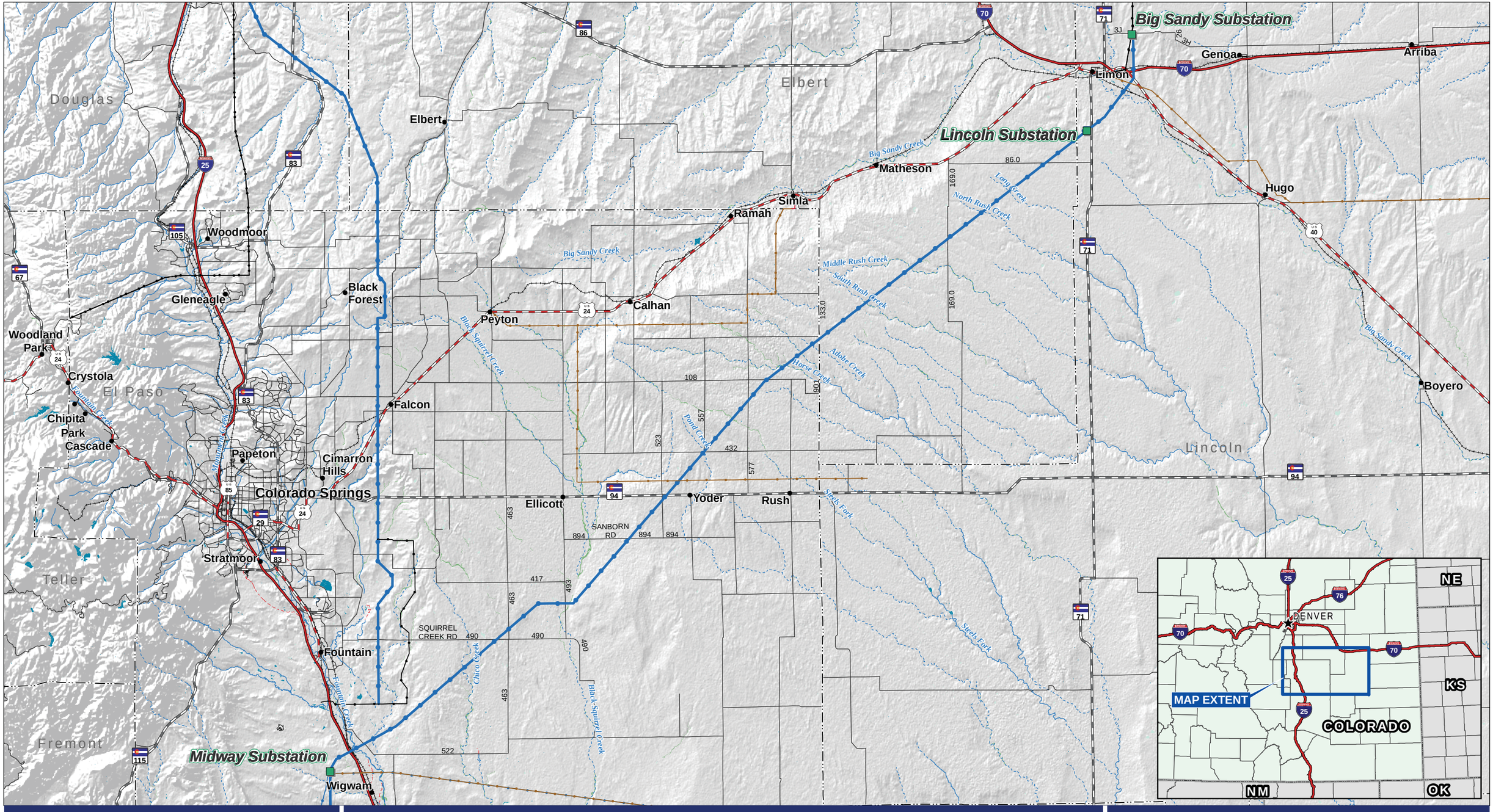
Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**shrink_swell.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\shrink_swell.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), NRCS (shrink swell)

Figure B-5 (Appendix B) Shrink Swell Potential



Surface Water

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Hydrology

- Perennial Stream
- Intermittent Stream
- Ditch
- Perennial Lake; Perennial Stream
- Intermittent Lake; Intermittent Stream
- Wash

Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

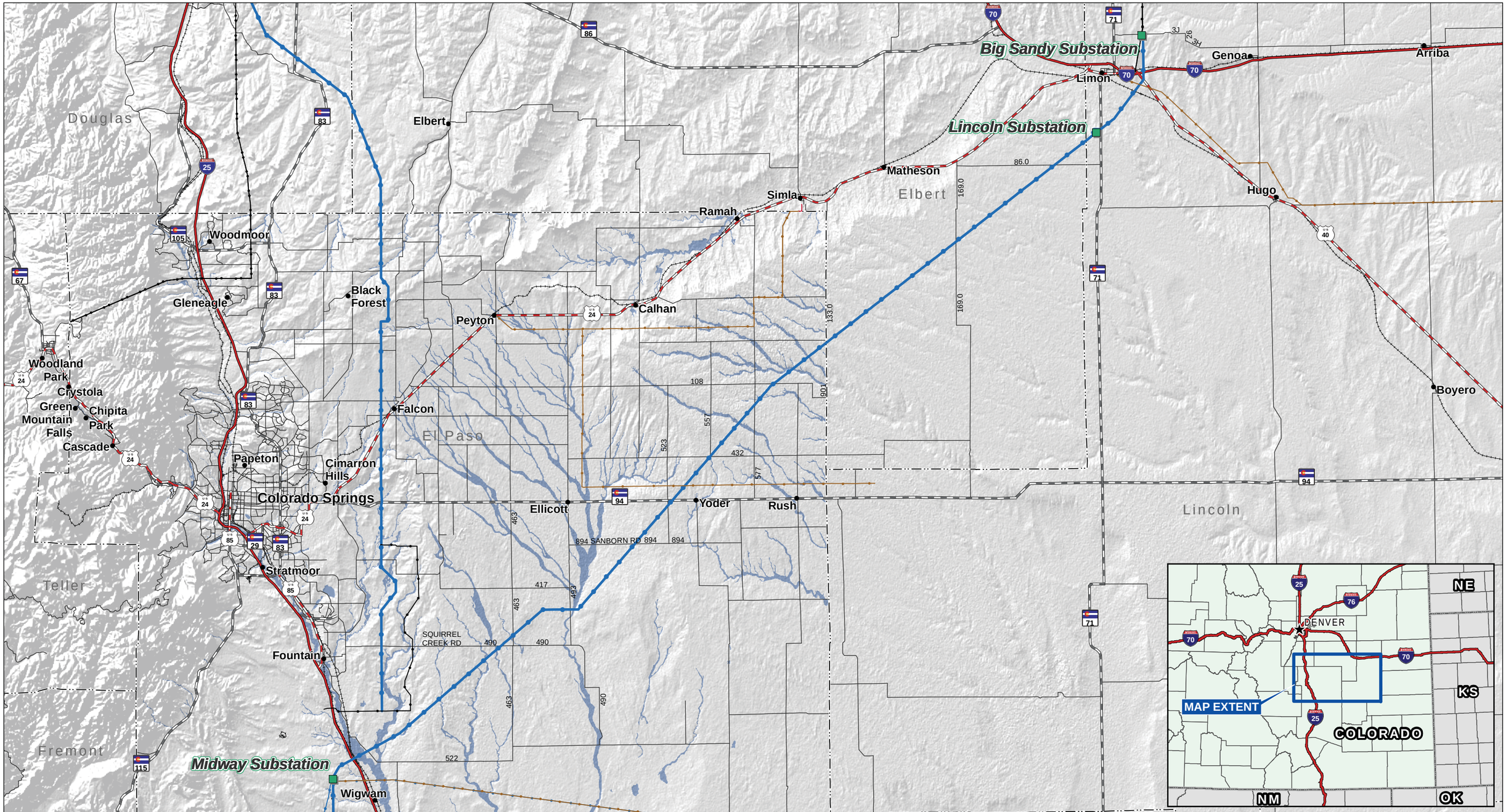
Last Revised: 07/26/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**surface_water.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\surface_water.mxd

Source Data:
ESRI (Cities, Rivers), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), CDOW (Surface Water)

Figure B-6 (Appendix B) Surface Water Crossings



Floodplain

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

FEMA Floodplain

100-year Floodplain

*Digital data exists for El Paso County only

Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

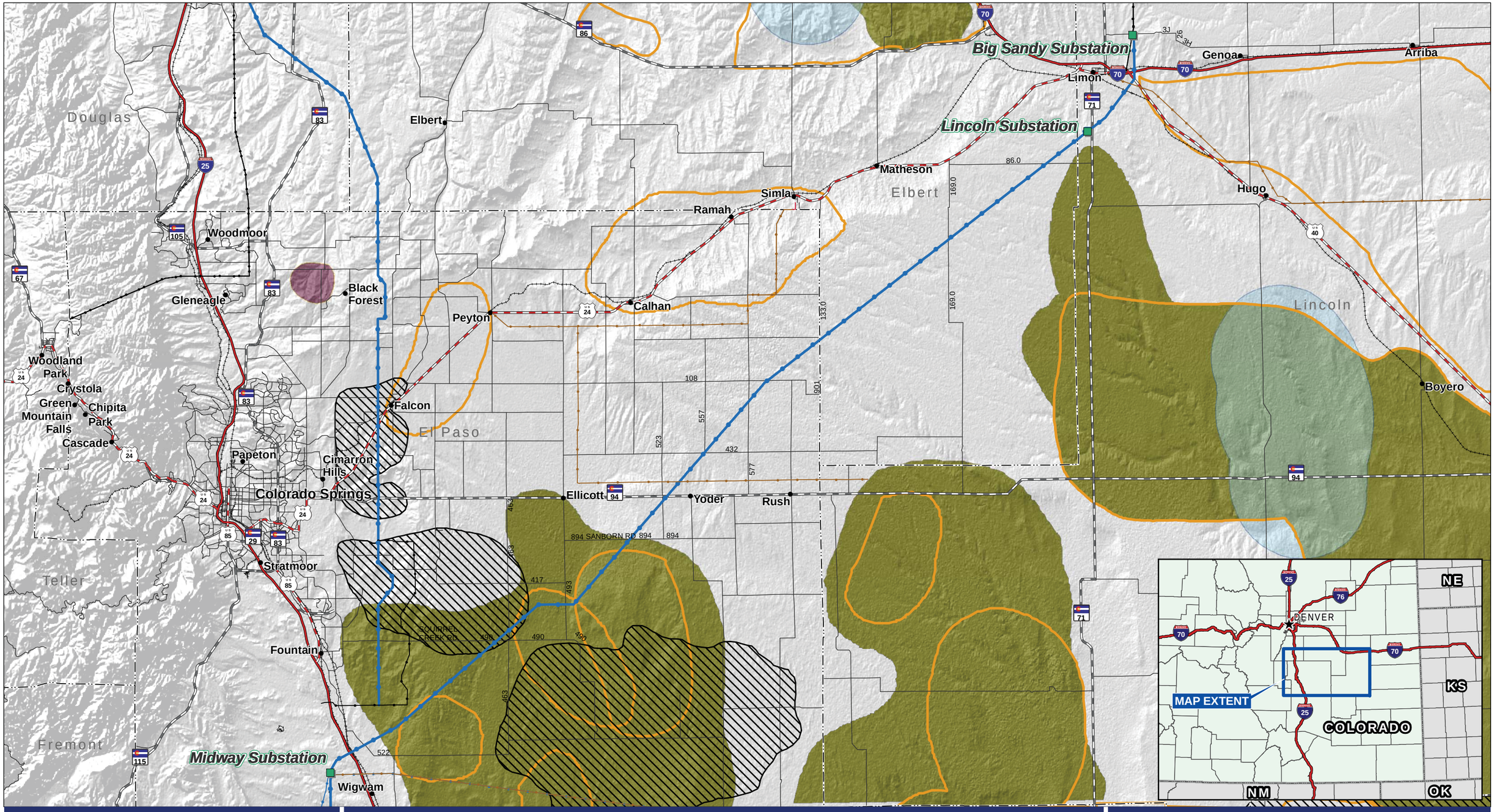
Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**floodplains.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\floodplains.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), FEMA (Floodplains)

Figure B-7 (Appendix B) Floodplains Map



Pronghorn Habitat

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Pronghorn Habitat

- Resident Population Area
- Concentration Area
- Winter Range
- Limited Use Area
- Perennial Water Usage Area

Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

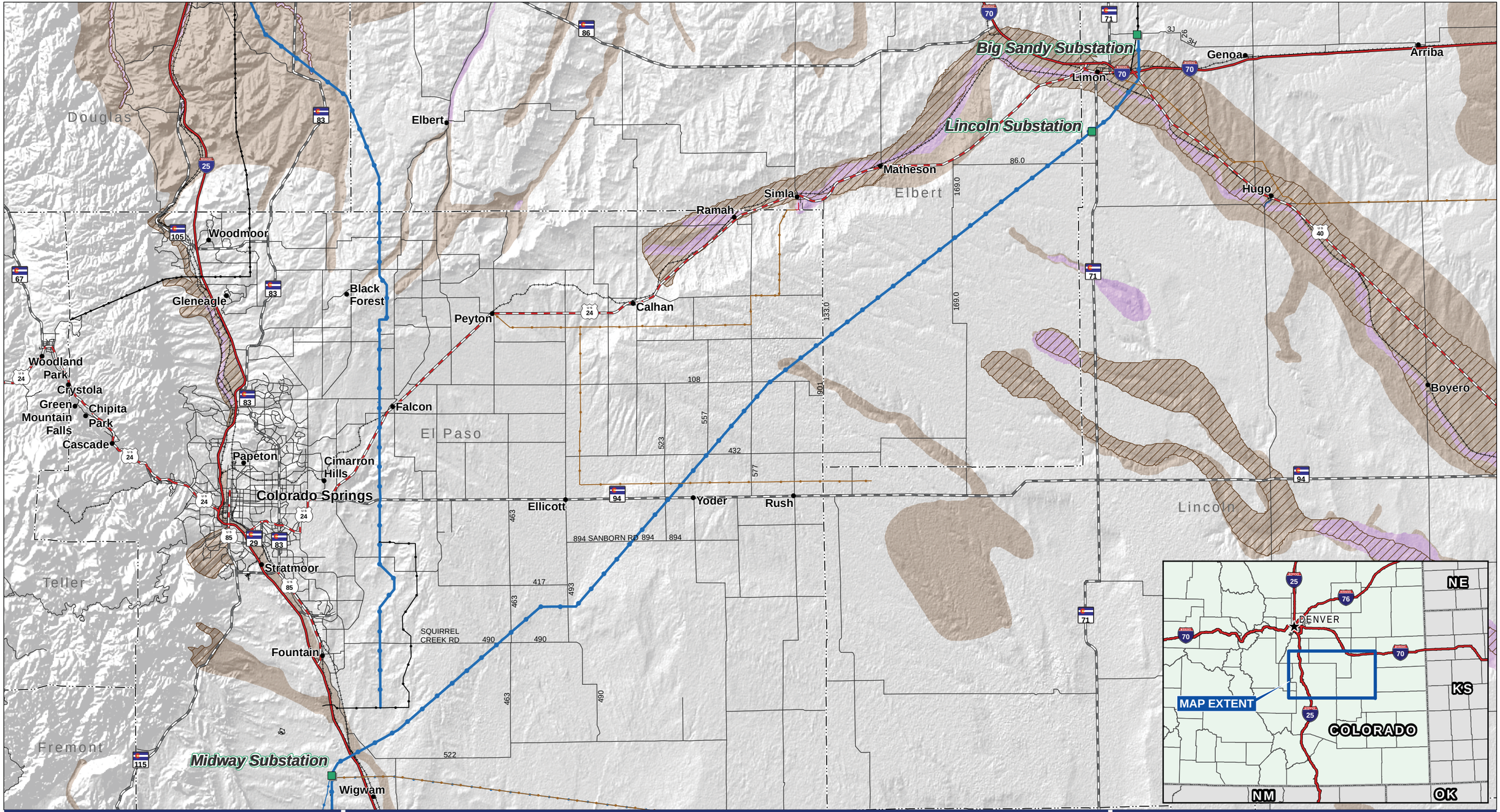
Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**pronghorn.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\pronghorn.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), CDOW (Pronghorn Habitat, 2009)

Figure B-8 (Appendix B) Pronghorn Habitat



White-Tailed Deer Habitat

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

White-tailed Deer Habitat
- Concentration Area
- Deer Highway Crossing
- Winter Range
- Overall Range

Transportation
- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines
- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

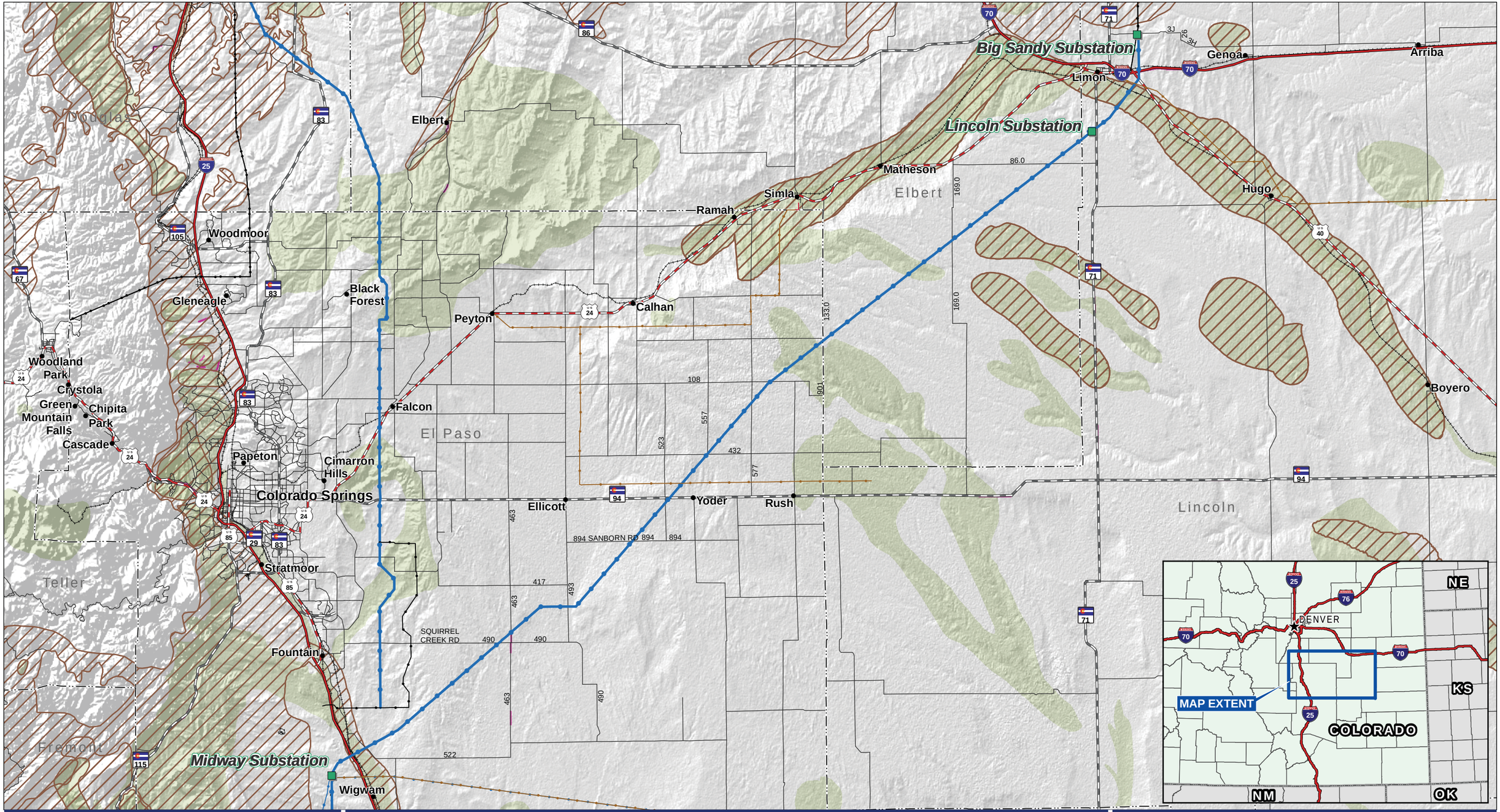
Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**WTD_habitat.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\WTD_habitat.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), CDOW (White-tailed Deer Habitat, 2009)

Figure B-9 (Appendix B) White-Tailed Deer Habitat



Mule Deer Habitat

Big Sandy - Lincoln - Midway Transmission Improvement Project

0 5 10 20 Miles

Mule Deer Habitat
- Mule Deer Highway Crossings
- Concentration Area
- Winter Range including Severe and Critical

Transportation
- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Railroad

Existing Transmission Lines
- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

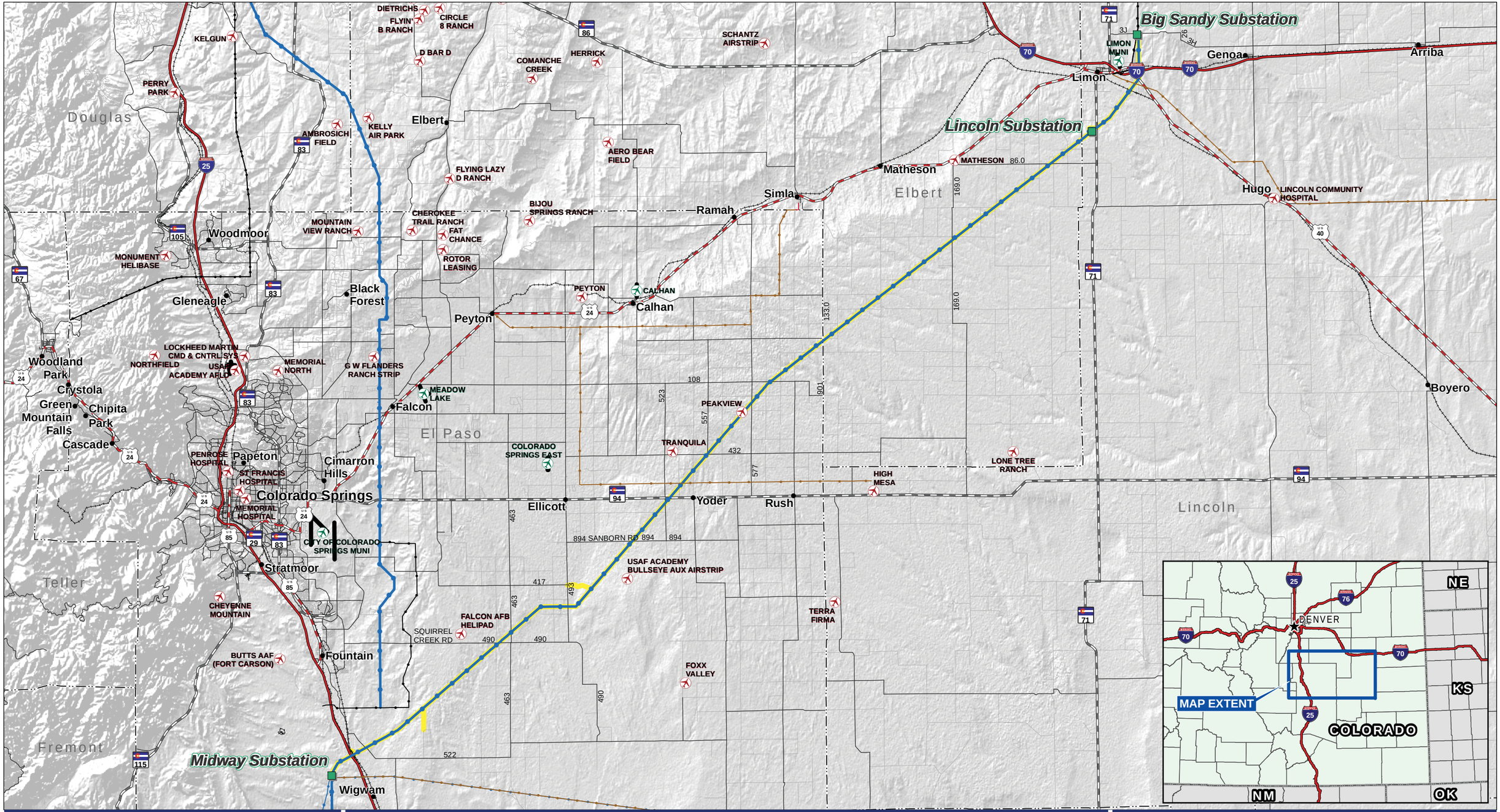
Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**mule_deer_habitat.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\mule_deer_habitat.mxd

Source Data:
ESRI (Cities), BTS (Highways), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission), CDOW (Mule Deer Habitat, 2009)

Figure B-10 (Appendix B) Mule Deer Habitat



Transportation

- Interstate Highway
- State Highway
- U.S. Highway
- Major Road
- Local Road
- Railroad
- Runway
- Public Airport
- Private Airport
- Transmission Line Access Route

Existing Transmission Lines

- 69 kV Transmission Line
- 115 kV Transmission Line
- 230 kV Transmission Line
- 345 kV Transmission Line
- Existing Substation

Last Revised: 07/23/2010

File: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Maps\EA**transportation.pdf**

MXD Path: P:\4105_Tri_State_Misc\GIS\Big_Sandy\Layouts\EA\transportation.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel, (Existing Transmission)

Figure B-11 (Appendix B) Transportation and Access

Sheet Map 1

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-12 (Appendix B) Sheet Map 1

Sheet Map 2

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-13 (Appendix B) Sheet Map 2

Sheet Map 3

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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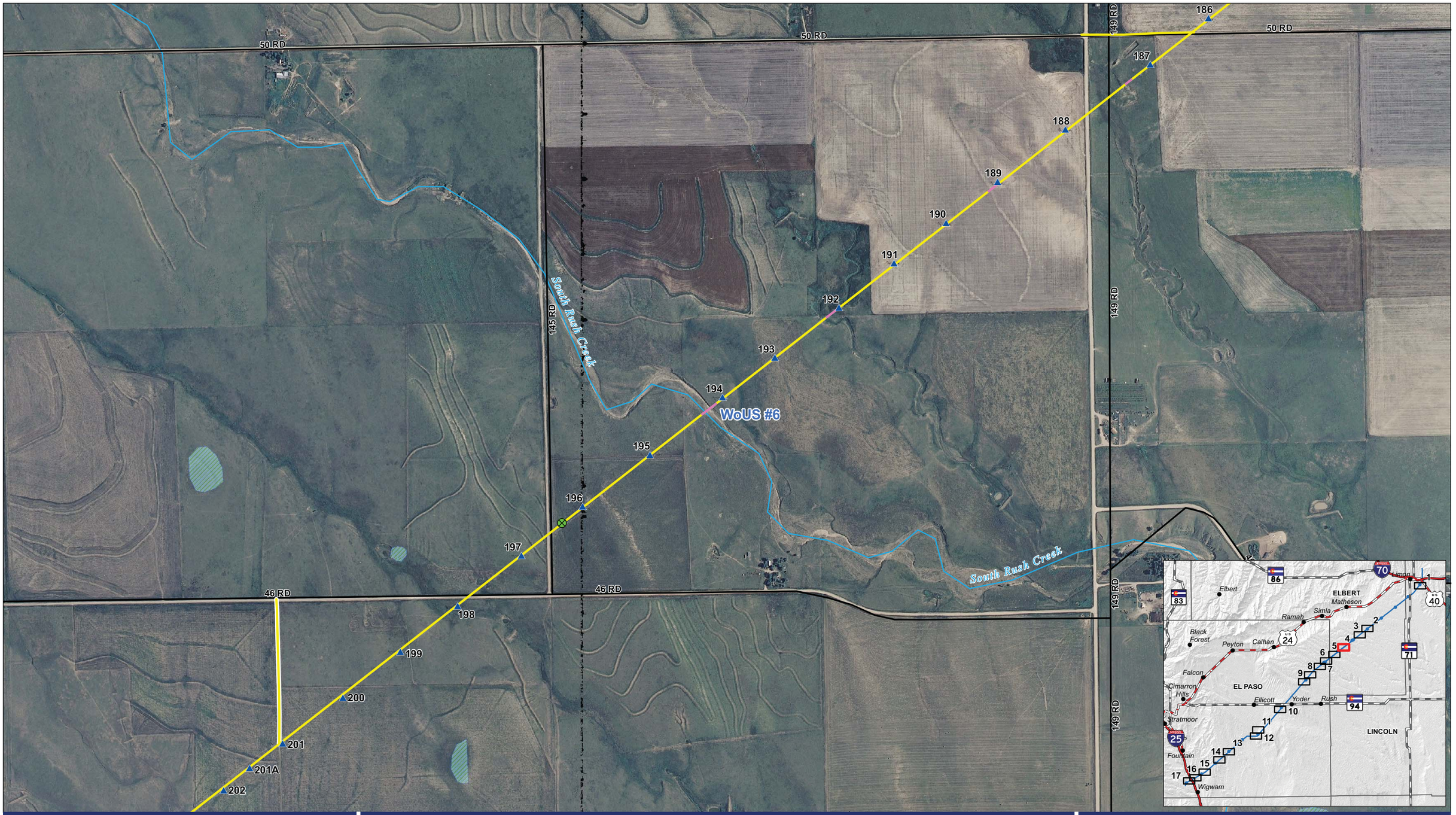
Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-14 (Appendix B) Sheet Map 3



Sheet Map 4

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

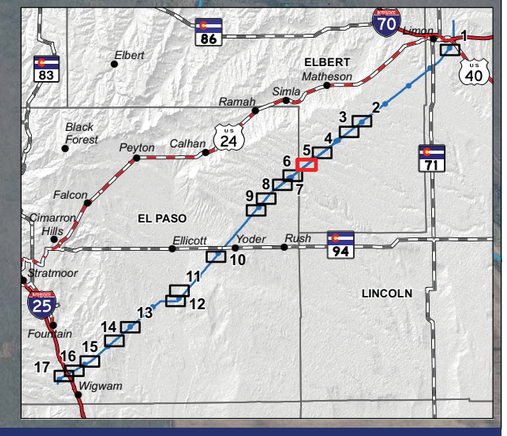
Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-15 (Appendix B) Sheet Map 4

HOLTWOOD RD
HOOT OWL RD
42 RD
137 RD
Mustang Creek
El Paso County
Elbert County
HOLTWOOD Rd
FUNK RD
301 RD
38 RD
137 RD
WoUS #7
WoUS #8
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220



Sheet Map 5

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added
- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

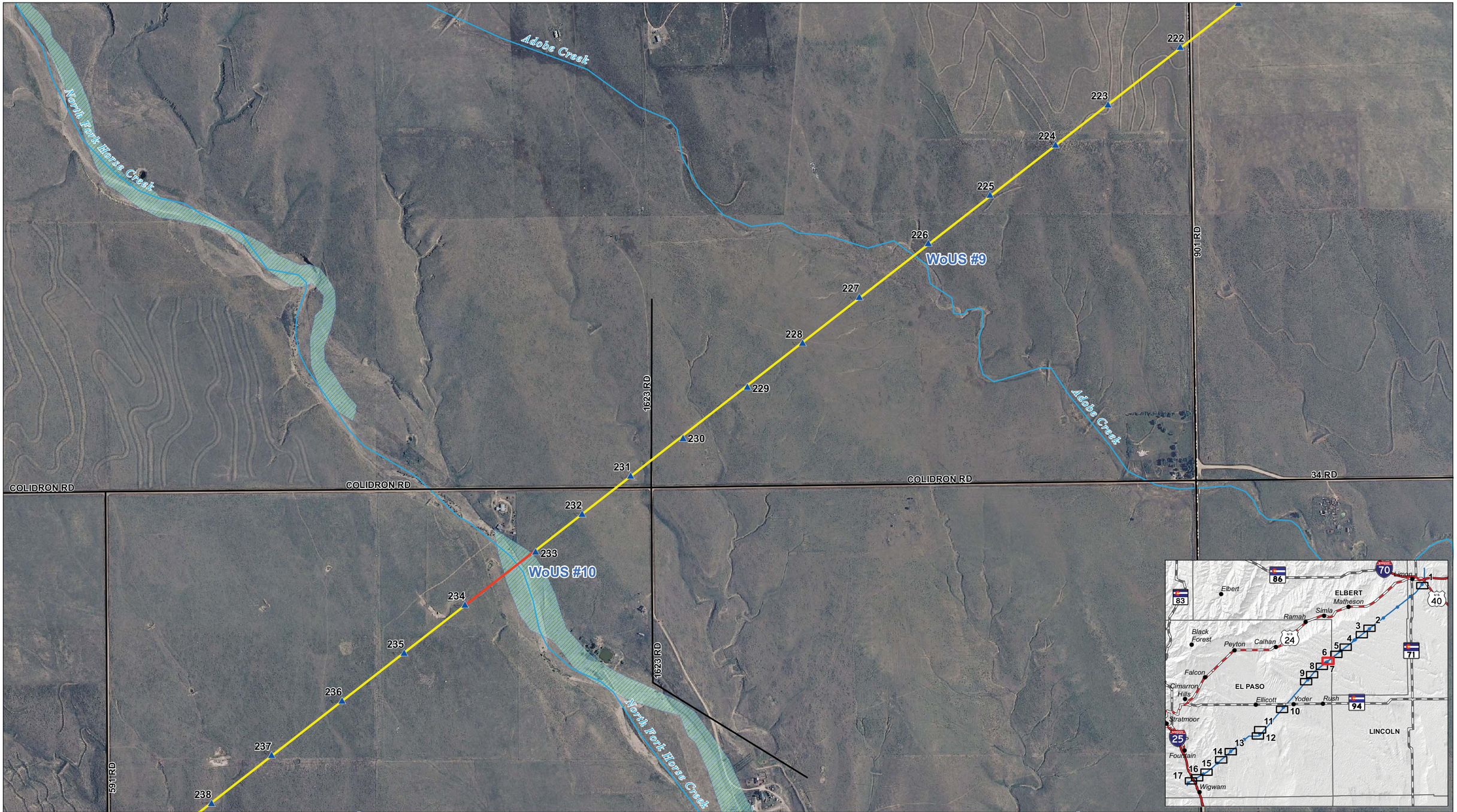
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-16 (Appendix B) Sheet Map 5



Sheet Map 6

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

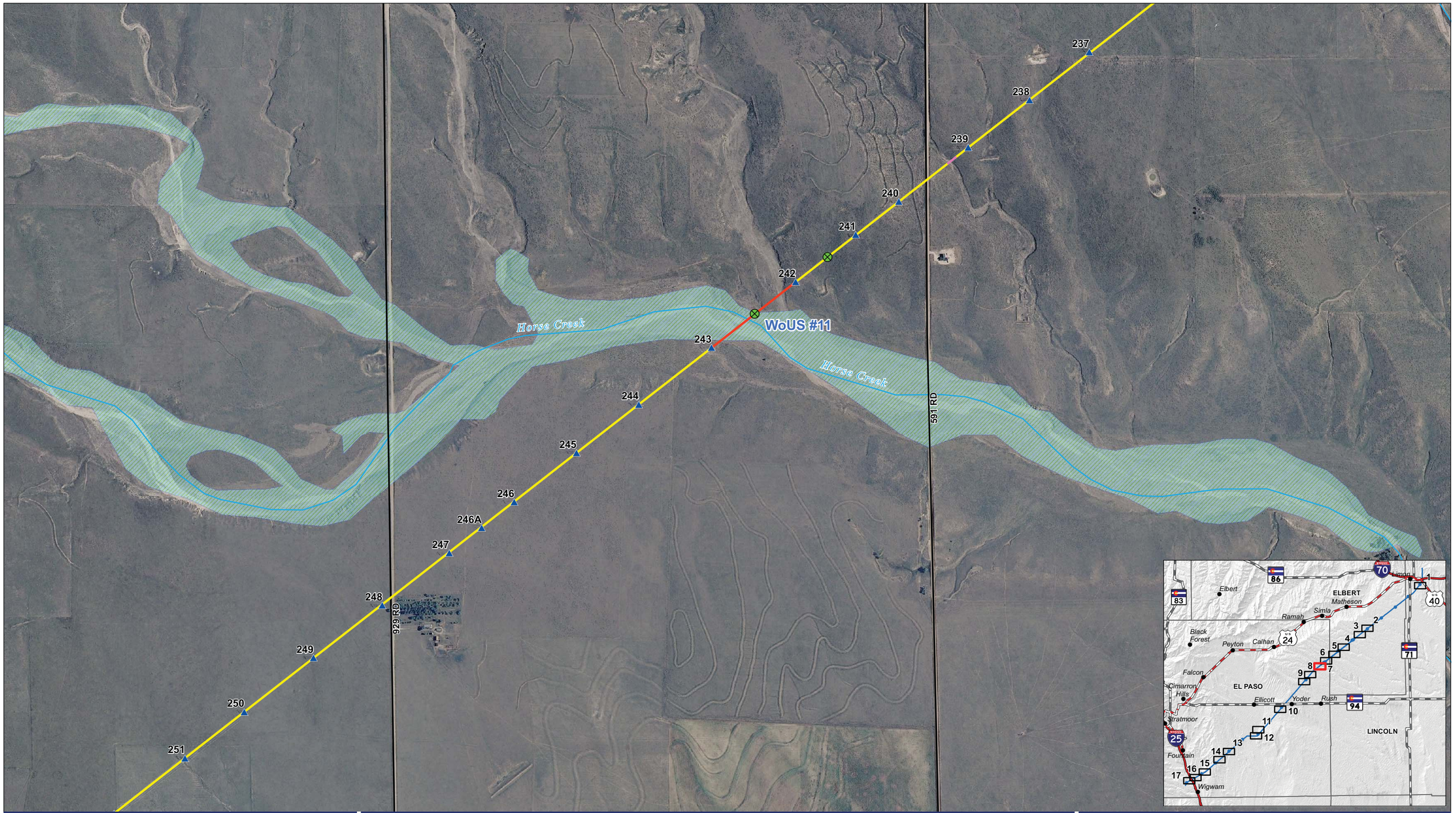
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-17 (Appendix B) Sheet Map 6



Sheet Map 7

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added
- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

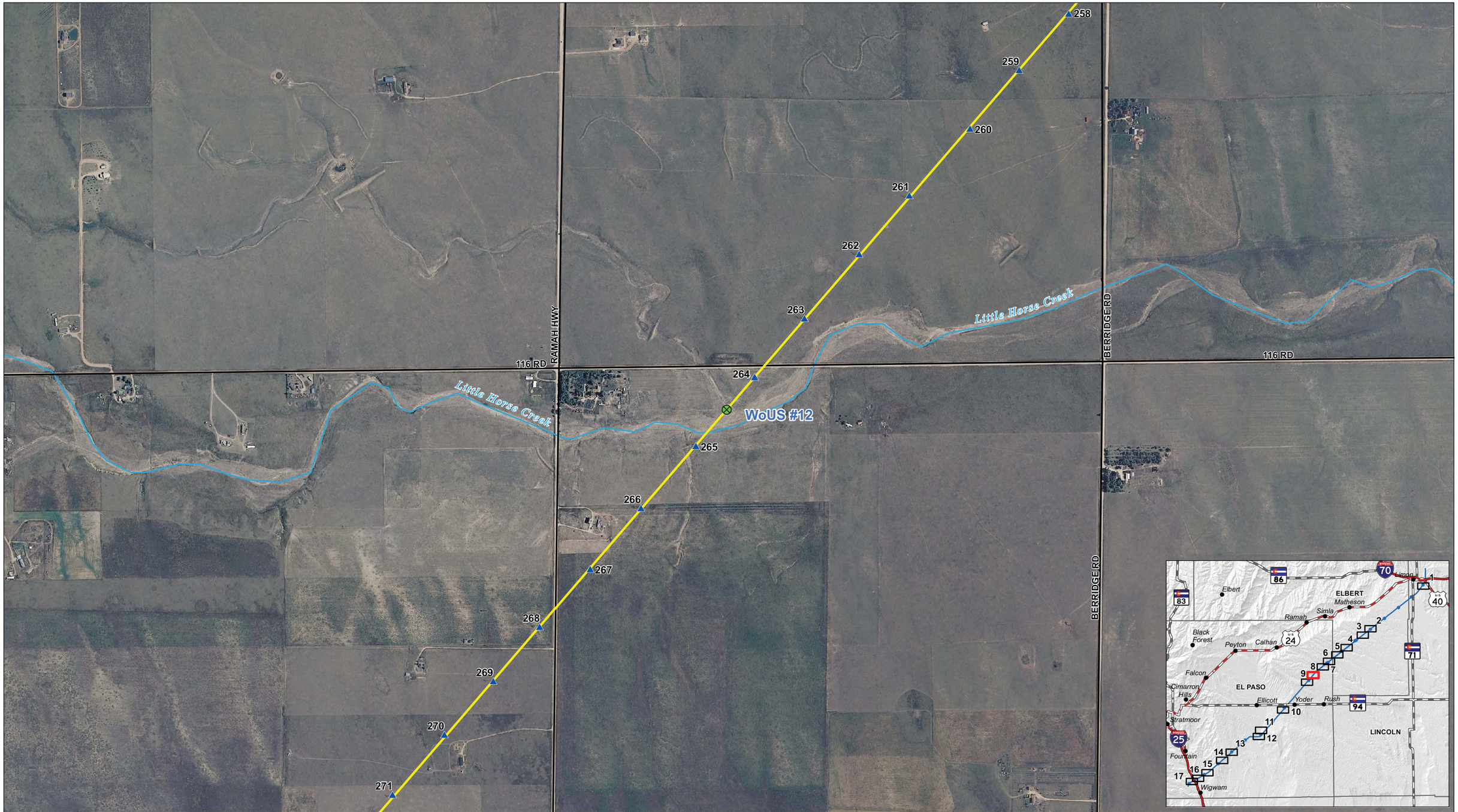
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-18 (Appendix B) Sheet Map 7



Sheet Map 8

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-19 (Appendix B) Sheet Map 8

Sheet Map 9

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-20 (Appendix B) Sheet Map 9

Sheet Map 10

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added

- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-21 (Appendix B) Sheet Map 10

Sheet Map 11

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
- Existing Transmission Structure
- Structure to be Replaced
- New Structure to be Added
- Non-Jurisdictional Water
- OPGW Pull Site

Wetlands
- Wetland Soil Pit
- Upland Soil Pit
- Delineated Wetland
- NWI Wetland

Access Routes
(Required Improvement Level)
- Level 1
- Level 2
- Level 3
- Level 4
- Level 5
- No Downline Access
- Existing Access
- New Culvert
- Armored Crossing

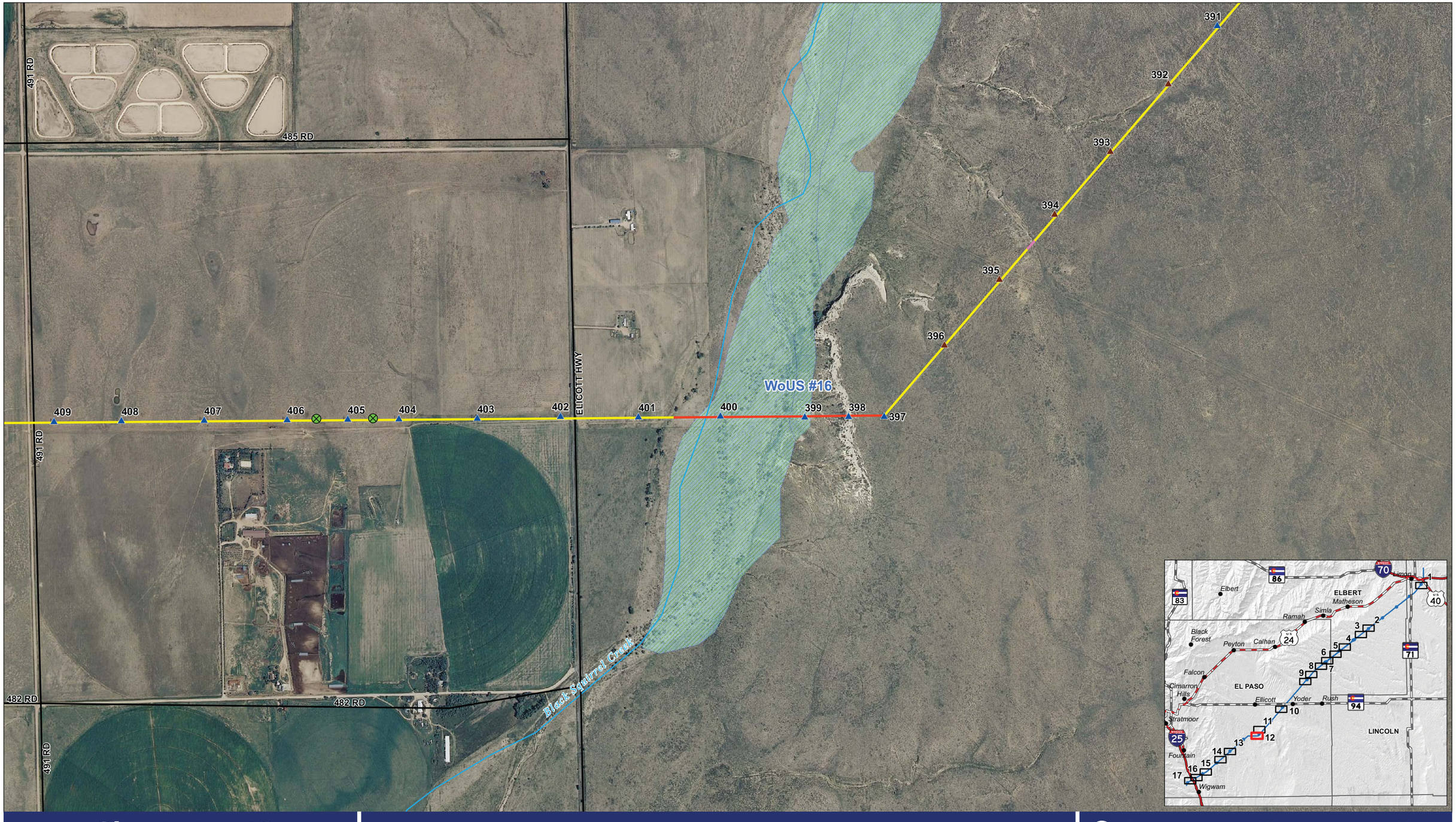
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-22 (Appendix B) Sheet Map 11



Sheet Map 12

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
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- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

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Last Revised: December 20, 2010

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Figure B-23 (Appendix B) Sheet Map 12

Sheet Map 13

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
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- 115-kV Transmission Line
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Existing Gas Line
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- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-24 (Appendix B) Sheet Map 13

Sheet Map 14

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
- Existing Substation

Existing Gas Line
- Natural Gas Pipeline

Structures
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- New Culvert
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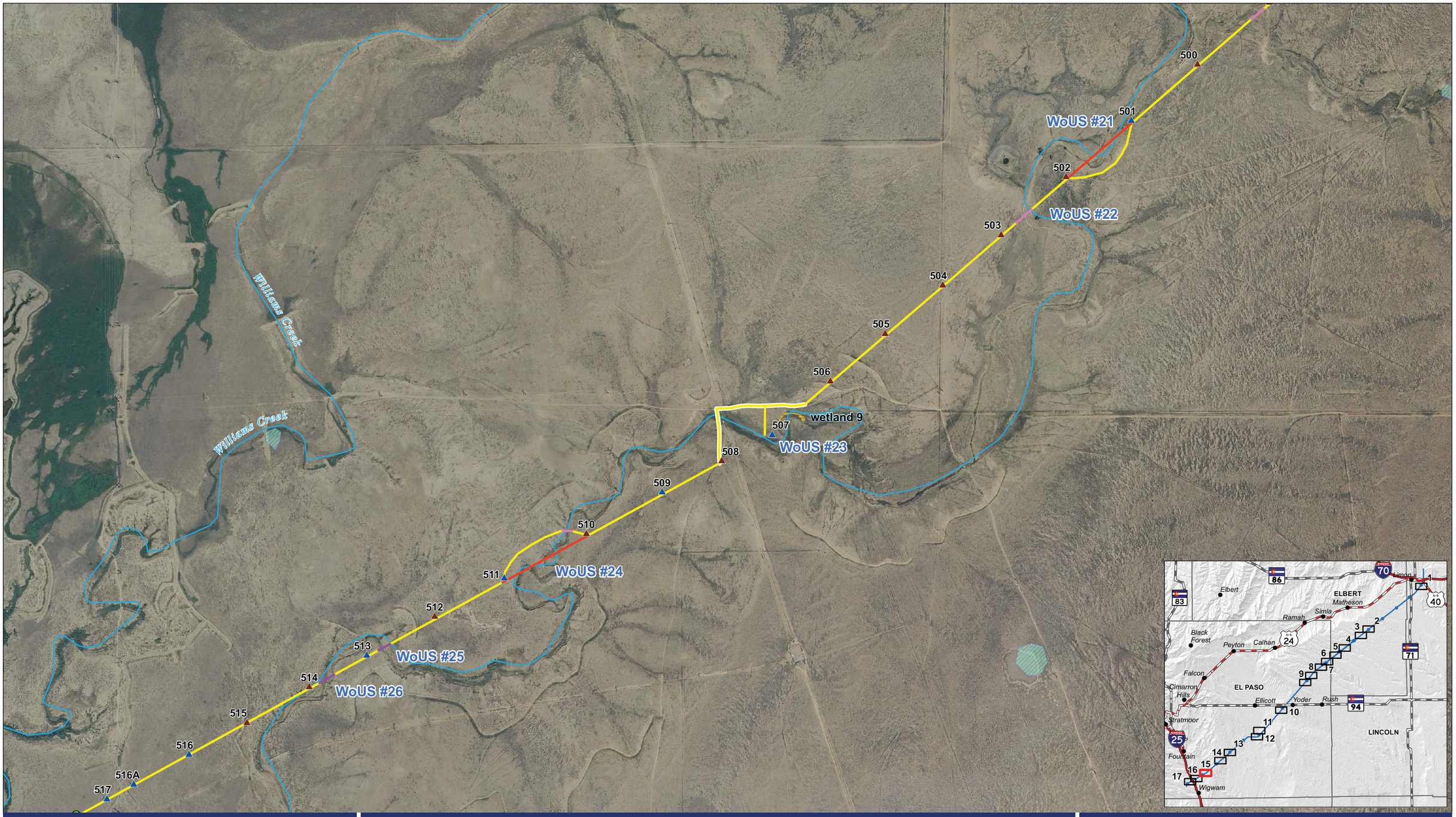
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-25 (Appendix B) Sheet Map 14



Sheet Map 15

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
- 345-kV Transmission Line
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(Required Improvement Level)
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- Level 5
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- Existing Access
- New Culvert
- Armored Crossing

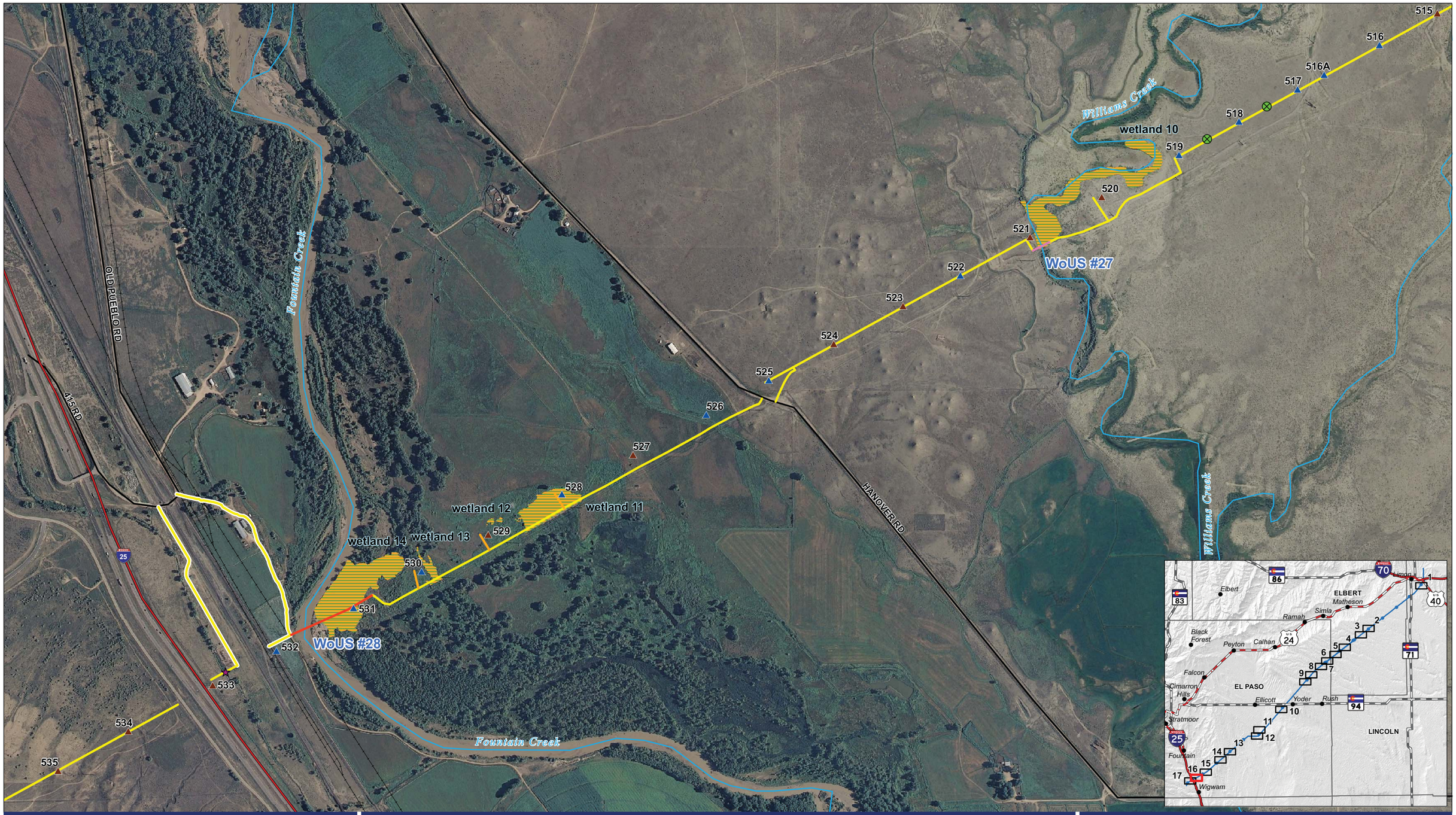
WoUS
- WoUS (Water of the United States)

Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
MXD Path: P:\4151_Midway_BigSandy\GIS\Layout\Wetlands_Report\101213_Wetlands_Report_Sheetmaps.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-26 (Appendix B) Sheet Map 15



Sheet Map 16

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
- 230-kV Transmission Line
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WoUS
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Last Revised: December 20, 2010

File: P:\4151_Midway_BigSandy\GIS\Maps\Wetlands_Report
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Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission), NWI (Wetlands), EDAW (GPS), CDOW, FCC, ACR, NatHisRegist, BTS, COGCC, Cultural Survery Data (Tri-State)

Figure B-27 (Appendix B) Sheet Map 16

Sheet Map 17

Big Sandy - Lincoln - Midway Wetland Delineation Report

0 0.25 0.5 Miles

Existing Transmission Lines
- 69-kV Transmission Line
- 115-kV Transmission Line
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- Existing Substation

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Appendix C:
Agency Consultation

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From: Adam_Misztal@fws.gov
To: Leiker, Diana
Subject: Re: Tri-State"s Big Sandy-Lincoln-Midway Transmission Improvement Project
Date: Monday, August 09, 2010 2:54:55 PM

Diana,

These comments are presented under the authority conferred to the U.S. Fish & Wildlife Service (Service) by the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.).

Based on the information provided the Service continues to concur that this project is not likely to adversely affect any listed or candidate threatened or endangered species. Please note that this clearance is valid for one year from the date of this letter. Should additional information regarding listed or proposed species become available, this determination may be reconsidered under the ESA. If the project has not started within one year, please contact the Colorado Field Office to request an additional clearance extension.

Adam Misztal
Fish and Wildlife Biologist
USFWS, ES, Colorado Field Office
P. O. Box 25486, DFC (MS 65412)
Denver, CO 80225-0486
303-236-4753; Fax 303-236-4005 cell 970-218-5452
(134 Union Blvd., Suite 670)
(Lakewood, CO)

"Leiker, Diana" <dleiker@tristategt.org> 08/06/2010 04:17 PM

To <adam_misztal@fws.gov>
cc
Subject Tri-State's Big Sandy-Lincoln-Midway Transmission Improvement Project

Hi Adam,
We met with you almost a year ago to discuss Tri-State's Big Sandy-Lincoln-Midway Transmission Improvement Project located in Elbert, Lincoln, and El Paso Counties. This is the 79-mile transmission upgrade project that entails the replacement of 30 year old structures in an

existing transmission ROW. The structures will be moved on average within 5-10 feet of the existing structures. The project description has not changed since you last reviewed it. You sent me an email (attached above) on August 11, 2009 to concur that the project would have no effect on federally listed species. Due to workload, the project was postponed and I am now working to finalize the EA for the Rural Utilities Service (RUS). It has been a year since we consulted with you and I wanted to make sure that your concurrence is still applicable for the project, or if you have any additional concerns. I have included our original correspondence, which includes a project description as well as a summary of species of concern analyzed for the EA.

You should have also received a scoping letter from Tri-State as part of the RUS scoping process back in March.

Please feel free to call me with any questions or concerns.

Thank you for your help!

Diana

Diana Leiker
Environmental Planner
Tri-State G&T
1100 W. 116th Ave.
Westminster, CO 80234
dleiker@tristategt.org
303-254-3565
[attachment "Overview_Fig1 FOR SCOPING.pdf" deleted by Adam Misztal/R6/FWS/DOI] [attachment "FW_ USFWS Response_ FA-0137 Tri-State's Big Sandy to Midway Transmission Line Thermal Upgrade Project.pdf" deleted by Adam Misztal/R6/FWS/DOI]

STATE OF COLORADO

Bill Ritter, Jr., Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER

Thomas E. Remington, Director
Southeast Region
4255 Sinton Road
Colorado Springs, Colorado 80907
Telephone: (719) 227-5200

For Wildlife-
For People

July 13, 2009

Diana Leiker
EDAW AECOM
1809 Blake Street, Suite 200
Denver, CO 80202
RE: Tri-State's Midway to Big Sandy Thermal Upgrade Transmission Project

Dear Diana:

After consulting with staff and reviewing the proposed project, we believe impacts to the wildlife resource to be negligible. There are no known sightings or populations of either Preble's meadow jumping mouse or lesser prairie chicken within the project area. Natural Diversity Information Source (NDIS) is available to you as a resource at: http://wildlife.state.co.us/Maps.

Through the Migratory Bird Treaty Act and the Eagle Protection Act, the U. S. Fish and Wildlife Service, in cooperation with the Edison Electric Institute, has developed Best Management Practices to minimize impacts to avian species. The Division recommends that both the "Suggested Practices for Avian Protection on Power Lines, the State of the Art in 2006" and the "Avian Protection (APP) Guidelines" document published in 2005, be consulted for proper design considerations, to minimize raptor electrocution. These documents can be ordered at the Edison electric Institute web site (www.eei.org) or can be downloaded at the Avian Power Line Interaction Committee web site (www.aplic.org).

We appreciate the opportunity to comment. Please feel free to contact District Wildlife Manager Warren Cummings at (719) 775-2025 should you have any questions or require additional information.

Sincerely,

Shaun Deeney
Area Wildlife Manager

xc: Regional file
DWM Jeromy Huntington
DWM Aaron Flohrs
DWM Sabrina Schnelker

HISTORY Colorado

February 1, 2011

Diana Leiker
Environmental Planner
Tri-State Generation and Transmission, Inc.
1100 W. 116th Ave.
Westminster, CO 80234

Re: Big Sandy-Lincoln-Midway 230 kV Transmission Line Improvement Project, Lincoln, Elbert, and El Paso Counties, Colorado (CHS #57470 and 57471)

Dear Ms. Leiker,

Thank you for your correspondence dated January 18, 2011 (received by our office on January 24, 2011) regarding the subject project.

Following our review of the documentation provided, we concur with your determination that sites 5EP6322 and 5EP6327 are **eligible** for the National Register of Historic Places (NRHP). We further concur that sites 5EL679, 5EP6324, 5EP6325, and 5EP6326 are **not eligible** for the NRHP.

We have reviewed the management recommendations provided in the cover letter and cultural resource inventory report. Assuming that these measures are implemented with specific respect to sites 5EP6322 and 5EP6327 and that all other eligible or need data sites within the project's area of potential effects (APE) are avoided by project-related activities, we concur that a finding of **no adverse effect** is appropriate for the proposed undertaking.

We request being involved in the consultation process with the local government and with other consulting parties, including Tribes, which as stipulated in 36 CFR 800.3 are required to be notified of the undertaking. Additional information provided by the local government, Tribes or other consulting parties may cause our office to re-evaluate our comments and recommendations. Please note that our comment letter does not end the 30-day review period provided to other consulting parties.

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 of Historic Places eligibility criteria (36 CFR 60.4) in consultation with our office.

Thank you for the opportunity to comment. If we may be of further assistance please contact Shina duVall, Section 106 Compliance Manager, at (303) 866-4674 or shina.duvall@chs.state.co.us.

Sincerely,

Richard H Nichols, for

Edward C. Nichols
State Historic Preservation Officer
ECN/SAD

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
200 SOUTH SANTA FE, SUITE 301
PUEBLO, COLORADO 81003-4270
PHONE (719) 543-9459
FAX (719) 543-9475

August 18, 2010

REPLY TO
ATTENTION OF:

RECEIVED AUG 23 2010

Regulatory Division
Southern Colorado Regulatory Office

SUBJECT: Permit Requirements for the Big Sandy–Lincoln–Midway 230-kV Transmission Line Improvement Project

Diana Leiker
Tri-State Generation and Transmission
Association, Incorporated
Post Office Box 33695
Denver, Colorado 80233-0695

Dear Ms. Leiker:

I am writing this letter in response to your pre-construction notification for the proposed Big Sandy–Lincoln–Midway 230-kV Transmission Line Improvement Project located in portions of El Paso, Elbert, and Lincoln Counties, Colorado. The activity involves the construction of 12 temporary access road crossings along the 79-mile corridor. Approximately 0.030 and 0.46 acre of permanent fill is proposed for armoring in Lake Creek and Black Squirrel Creek, respectively. To avoid delay, please refer to Action No. SPA-2010-00416-SCO in all future correspondence concerning this project.

Based on the information provided, it appears that Department of the Army permit requirements for the proposed work will be authorized by Nationwide Permit No. 12 for Utility Line Activities. A summary of this permit and the regional conditions for Colorado are available on our website at www.spa.usace.army.mil/reg/. To use this permit, you are responsible for ensuring that the work complies with the terms and conditions listed in the permit. Upon completion of the activity authorized by this Nationwide Permit, please fill out the enclosed certification of compliance form and return it to our office within 30 days of project completion. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being, or has been, accomplished in accordance with the terms and conditions of the nationwide permit.

Our verification for the construction of this activity under this nationwide permit is valid for two years from the date of this letter, unless prior to that date the nationwide permit is suspended, revoked, or modified such that the activity would no longer comply with the terms and conditions of the nationwide permit regionally or nationally. Activities that have commenced, or are under contract to commence, in reliance on a nationwide permit will remain authorized provided the activity is completed within 12 months of the date of the nationwide permits expiration, modification, or revocation.

Our review of this project also addressed its effects on threatened and endangered species and historic properties in accordance with general conditions 17 and 18. Based on the information provided, we have determined that this project will not affect any federally listed threatened or endangered species or any historic properties listed, or eligible for listing, in the National Register of Historic Places. However, please note that you are responsible for meeting the requirements of general condition 17 on endangered species and general condition 18 on historic properties.

This authorization was based upon a preliminary determination that there appear to be jurisdictional areas on the property subject to regulation pursuant to Section 404 of the Clean Water Act.

This letter does not constitute approval of the project design features, nor does it imply that the construction is adequate for its intended purpose. This permit does not authorize any injury to property or invasion of rights or any infringement of Federal, state or local laws or regulations. You must possess the authority, including property rights, to undertake the proposed work.

If we may be of further assistance in this matter, please contact me at (719) 543-6914 or by e-mail at Joshua.G.Carpenter@usace.army.mil. At your convenience, please complete a brief Customer Service Survey on-line available at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Joshua G. Carpenter
Project Manager

Enclosure

Certification of Compliance
with Department of the Army Nationwide Permit

Action Number: SPA-2010-00416-SCO

Name of Permittee: Tri-State Generation and Transmission Association, Inc.

Nationwide Permit: NWP 12 – Utility Line Activities

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Joshua Carpenter
Albuquerque District, U.S. Army Corps of Engineers
200 SOUTH SANTA FE, SUITE 301
PUEBLO, COLORADO 81003-4270
(719) 543-9459
FAX (719) 543-9475

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Please enclose photographs showing the completed project (if available).

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Date Work Started_____

Date Work Completed _____

_____ _____
Date Signature of Permittee

ENCL

Appendix D:
Ute-Ladies' Tresses Orchid Survey Report

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Rare Plant Survey Report for the Big Sandy-Lincoln-Midway Transmission Improvement Project—El Paso, Elbert, and Lincoln Counties, Colorado

Submitted to Tri-State Generation and Transmission Association, Inc.

Prepared by EDAW Inc.

Date: September 19, 2008

Introduction

Tri-State Generation and Transmission Association Inc. is conducting preliminary studies for thermal upgrades on the Midway to Big Sandy Transmission Line. The transmission line runs from the Midway substation in El Paso County south of Fountain, Colorado, to the existing Big Sandy Substation in Lincoln County northeast of Limon, Colorado. The transmission line would be approximately 78.3 miles long.

Tri-State is a non-profit wholesale electric power supplier owned by 44 member cooperatives that it serves in a 250,000 square-mile service area in Colorado, Nebraska, New Mexico, and Wyoming. Tri-State member cooperative consumers include rural residences, farms, ranches, towns, suburban communities, commercial businesses, and industry. The project is described in further detail below.

At the request of Tri-State, EDAW conducted biological field investigations for the project to determine the possible presence of federally protected plant species within the project rights-of-way (ROWs). The approximately 78.3-mile transmission line would extend from the existing Midway Substation in El Paso County, approximately 1 mile southwest of the city of Fountain, to the existing Big Sandy Substation, located in Lincoln County approximately 1 mile northeast of Limon, Colorado, on Route 60 and County Road 3J.

The federally threatened plant species with the potential to occur in the Big Sandy-Lincoln-Midway Project Area (project area) is the Ute ladies'-tresses orchid (*Spiranthes diluvialis*). Within the project area, the Ute ladies'-tresses orchid is only known to occur in El Paso County. EDAW biologists, trained in surveying for the Ute ladies'-tresses orchid, surveyed potential habitat for the two target species on August 28, 2008 (within the U.S. Fish and Wildlife Service survey window of July 20 to August 31).

Methods

Prior to surveying the project area, aerial maps, National Wetlands Inventory (NWI) data, floodplain data, and species habitat preferences were compared to determine locations within the project area that could potentially provide suitable habitat for the Ute ladies'-tresses orchid and the Colorado butterfly plant. Preliminary habitat assessments conducted in July 2008 showed that Fountain Creek is the only area that contained floodplain and wetland habitat that may be suitable habitat for Ute ladies'-tresses orchids. Suitable habitat was surveyed within the portion of the existing transmission ROW that occurs in the Fountain Creek floodplain (Figure 1, Photographs 1 2, 3).

Biologists walked within several feet of one another in a grid pattern to survey within the ROW. Dominant species present in the areas with potential habitat were recorded, site photographs were taken, and surveys were conducted in a grid pattern.

Findings

Fountain Creek is composed of multiple wetland communities. The riparian gallery forest is dominated by *Populus deltoides* (plains cottonwood), *Salix Amygdaloides* (peachleaf willow), and *Salix exigua* (sandbar willow) (Photograph 2). Other areas within this survey location include wetlands dominated by *Juncuc balticus* (mountain rush), *Carex spp.* (sedge), *Hyemale laevigatum* (smooth horsetail), and dense monotypic stands of *Schoenoplectus pungens*. (Common threesquare). Expansive upland areas were also present within this survey location and were dominated by dense stands of *Bassia sieversiana* (kochia) and *Toxicodendron rydbergii* (poison ivy). The entire transmission ROW at Fountain Creek has been heavily disturbed and noxious weeds, including Canada thistle and hoary cress, are found throughout the ROW.

No individuals of either Ute ladies'-tresses orchid or Colorado butterfly plant were observed within floodplain and wetland habitats in the project ROW.

Conclusion

The biological survey team investigated potential locations at which the Ute ladies'-tresses orchid or Colorado butterfly plant may occur within the project ROW. No occurrences of the Ute ladies'-tresses orchid were found within the project ROW.

Photograph 1: Fountain Creek Floodplain Looking West

Photograph 2: Fountain Creek Riparian Community

Photograph 3: Fountain Creek

Figure 1
Special Status Plant Survey Locations

Midway to Big Sandy Rare Plant Survey Report

0 500 1,000 Feet

Existing Features

- 230-kV Transmission Line
- Railroad

Project Features

- Rare Plant Survey Area
- Wetland
- Swale
- Access Road

Last Revised: 09/17/08

File: P:\2008\08180134.01\GIS\Maps\BigSandy\Big_Sandy_rare_plants.pdf

MXD Path: P:\2008\08180134.01\GIS\Layouts\BigSandy\Big_Sandy_rare_plants.mxd

Source Data:
ESRI (Cities), BTS (Highways, Airports), National Atlas (States, Counties), CDOT (CO Rail, Roads, Counties, City Boundaries), Tri-State, Western, and Xcel (Existing Transmission)

Appendix E:
Cultural History Summary

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Appendix E Cultural History Summary

Prehistoric cultures have inhabited the Arkansas River Basin for at least the past 11,500 years. Archaeologists divide these cultures into several temporal units based on variability in technological and subsistence patterns. The Paleoindian Stage is generally accepted to represent the first human occupation of the Americas and spans the time frame from 11,500 to 7800 years B.P. in the Arkansas River Basin (Zier and Kalasz 1999:69).

The earliest documented culture in North America is Clovis (11,500 – 10,950 B.P.). Clovis people utilized large fluted spear points to hunt Pleistocene megafauna such as mammoth, sloth, camel, and horse. The Hahn site, located northeast of Colorado Springs in El Paso County, is the only known Clovis site within the Arkansas River Basin, and is limited to a small number of surface artifacts (Zier and Kalasz 1999:80).

The Folsom period (10,950 – 10,250 B.P.) follows Clovis. The Folsom people were also big game hunters, but were limited to a now extinct form of Bison (*Bison antiquus*) because many of the Pleistocene megafauna had become extinct. Folsom points are characterized as being a finely-made fluted lanceolate projectile point that differed in form from the earlier Clovis points. Three sites containing Folsom-aged materials are located within the Arkansas River Basin; two sites are located within Las Animas County, and the other is located within El Paso County (Zier and Kalasz 1999).

The Plano period (10,250-7800 B.P.) is the last Paleoindian period. Two distinct adaptations have been recognized during this period: "classic" Plano or Plains traditions, and the Foothill-Mountain complex (Frison 1992). While finds from the Great Plains tend to represent a continued focus on bison hunting, contemporaneous sites from the mountainous regions indicate a focus on other subsistence sources. Plano sites are common on the eastern plains and along the Front Range. The numerous Plano complexes include Cody, Hell Gap, Agate Basin, and Alberta. The most notable site within the Arkansas River Basin that dates to the Plano period is the Olsen-Chubbuck site, which is located to the northeast of the current project area.

The Archaic Stage (7800 – 1850 B. P.) is divided into Early, Middle, and Late periods, and is differentiated from the Paleoindian stage both in terms of technology and subsistence practices. Sites attributed to the Archaic period are well-documented throughout the plains and within the current project area. The transition from the Paleoindian era to the Archaic is hypothesized to have occurred due to a climatic shift to hotter and drier conditions in the summer and cooler and drier in the winter

(Huckell 1996), known as the Altithermal (Antevs 1955). Some theories maintain that the plains were virtually abandoned during the Altithermal (Benedict 1979). Subsistence patterns shifted from concentrating almost solely on bison to also include a variety of smaller game animals. Ground stone implements (specifically manos and metates), which are present in low quantities on some sites of Paleoindian age, become far more common during the Early Archaic as plant resource use becomes more commonplace. Projectile point forms in the Archaic change substantially from the larger Paleoindian types to stemmed, smaller lanceolate, side-notched, and corner-notched forms.

Early Archaic sites on the plains of eastern Colorado are uncommon. This may be due to a number of circumstances including sampling error, the results of the theorized climatic/population shift during the Altithermal, or erosion and/or deposition patterns (i.e., site formation processes) inherent in the archaeological record. While the Arkansas River Basin has so far produced no dated sites from the Early Archaic, a few surface sites have been recorded, specifically at the Piñon Canyon Maneuver Site (Anderson 1989).

The Middle and Late Archaic Periods are distinguished from the Early Archaic by an increase in the number of sites, an increasing diversity in tool forms, and a return to bison hunting after the Altithermal gave way to cooler and wetter climatic conditions similar to the climate in the region today. In addition, Middle Archaic sites are also associated with abundant ground stone artifacts including manos, metates, mortars, and other grinding tools. Many of the tested and excavated Middle Archaic sites in the Arkansas River Basin are rockshelters. In addition, several open camp sites and rock art sites from the period have been investigated in Las Animas and El Paso Counties. The Late Archaic is characterized by an increase in the number of large open camp sites which are located throughout the plains, foothills and mountains (Eighmy 1984, Zier and Kalasz 1999). Late Archaic sites are more common in the Arkansas River Basin, with many appearing within the Purgatorie River drainage system (Tate 2003).

The Archaic Stage is followed by the Late Prehistoric Stage (1,850 – 225 B.P.). This stage is distinguished from earlier stages by the addition of several material culture traits. For example, the appearance of ceramic technology in the form of cord-marked pottery, the addition of cultigens (specifically corn and beans) to the hunting-gathering subsistence pattern, unique burial practices, the use of smaller projectile points with the introduction of the bow and arrow, and the construction and utilization of substantial domestic dwellings. The Late Prehistoric is also marked by an increase of

population, which is evidenced by the sharp increase in the number of radiocarbon dates that date to this period (Eighmy and Labelle 1996). The Late Prehistoric Stage in the Arkansas River Basin context area is divided into three periods: Developmental (1850-900 B.P.), Diversification (900-500 B.P.) (divided into the Apishipa Phase [900-500 B.P.] and the Sopris Phase [900-750 B.P.]), and the Protohistoric (500-225 B.P.) (Zier and Kalasz 1999).

The Protohistoric Period overlaps with the Historic Stage and with Euro-American occupation and settlement in Colorado and generally dates between A.D. 1350 to A.D. 1725 (Zier and Kalasz 1999). This stage is characterized by a fundamental shift in Native American technology (i.e., trade goods) and subsistence practices along with extensive demographic shifts and fluctuations. It is during this period that historically recognized tribes are documented in Colorado (i.e., Cheyenne, Arapaho, Comanche, Ute, and Apache) (Cassells 1997).

During the Protohistoric, European explorers, trappers, and settlers had a tremendous affect on many aspects of Native American life. Technologies shifted as metal and glass implements, especially firearms, were introduced. The acquisition of the horse changed subsistence patterns from hunter-gatherers traveling on foot to horse mounted hunters who followed bison herds over massive areas (Wedel 1963). Perhaps the greatest changes seen in Native American populations involved a dramatic reduction in their numbers caused in part by the introduction of disease and the increased competition with the incoming populations of European settlers (West 1998). Following the Athabaskan groups, the Comanche, Ute, and Arapaho peoples were all known to have visited and/or occupied the Arkansas River Valley during the Protohistoric Period (Cassells 1997, Crum 1996).

Protohistoric Period sites on the plains and surrounding areas typically include tipi rings accompanied by rock art and micaceous pottery. Several sites from this period are known from Las Animas County, however no major settlements have been found in the Arkansas River Basin (Zier and Kalasz 1999).

The history of the Arkansas River Valley is chronicled in the *Colorado Southern Frontier Historic Context*, (Mehls and Carter 1984), *Land of Contrast: A History of Southeast Colorado* (Athearn 1985), and in part in *Colorado History: A Context for Historical Archaeology* (Church et al 2007). The following is a brief history taken from these sources, as well as from Abbott et al. (1994), West (1998), Wedel (1963), and others. The Historic Stage begins with the arrival of Spaniards in the southwest in the early 1500's. In 1540, Coronado led an expedition into the northern reaches of what

was once Mexico searching for the legendary "Seven Cities of Gold." While the Coronado expedition passed to the south and east of Colorado, this expedition marked the start of Euro-American interaction with the local Native American groups through trade and the introduction of non-native diseases.

The Spanish began patrolling the Arkansas River area in 1719, spurred by rumors of the French selling guns to the Indians. In 1763, the French ceded their lands west of the Mississippi to the Spanish. However, the Comanche, whose territory included southeastern Colorado, prevented the Spanish from settling the area. The Spanish were finally successful in defeating the Comanche at the battle of Greenhorn Mountain near present day Pueblo, Colorado (Lecompte 1978). France regained control of its former lands west of the Mississippi and in 1800 and 1803 sold their lands to the United States in the Louisiana Purchase.

In 1806, Zebulon Pike explored the headwaters of the Arkansas River in an attempt to define the new boundary between Spanish possessions to the south and the newly acquired lands incorporated in the Louisiana Purchase. The boundary between Spain and the United States remained in dispute until 1819 when the Adams-Onis Treaty established the boundary at the Arkansas River. In 1821, Spain ceded their territory to the newly established Republic of Mexico. Almost immediately, American traders pushed into eastern Colorado using the Arkansas River as a travel corridor. This corridor had been established earlier by the Spanish and was known as the Santa Fe Trail.

Fur trappers and traders were the first Americans to spend time along the Arkansas River. In 1834, William Bent and his brother built Bent's Fort on the Arkansas River twelve miles above the mouth of the Purgatoire River. Settlement in the area was sporadic and the towns of Pueblo, Hardscrabble, Greenhorn, and Huerfano were abandoned by the mid-1850s. The city of Pueblo would be reestablished by 1859.

Four conditions led to the eventual permanent settlement of the area (Anderson 1989). These conditions included removal of the Native American populations to reservations, the Pikes Peak gold rush, the Homestead Act of 1862 and the Desert Land Act of 1877, and improved transportation, including stage and railroad routes. Initially, the area was settled by two groups. First, groups composed of mainly Hispanics from New Mexico began to settle the land bringing small herds of sheep and cattle to graze the short grass prairie and to practice subsistence farming. The second group to inhabit the area was Anglo-American homesteaders who tended to live in single-family

households in locations where they could control water resources and raise cattle. These ranching endeavors grew rapidly and eventually merged into larger cattle companies.

By the late 1860s, many of the Native Americans had either left or had been removed from the Arkansas River Basin, which marks the beginning of the Pike's Peak gold boom that brought more settlers into the area (West 1998). By 1872, the railroad entered Pueblo, and outlying areas shortly thereafter, which greatly facilitated growth and development of the area. Over the next 20 years most of the towns in southeastern Colorado were founded, and Pueblo became a major regional commercial center. In 1892, Pueblo became a steel-manufacturing center when the Colorado Coal and Iron Company built the Philadelphia Smelter, which later became the Colorado Fuel and Iron Company. Despite the industrial influence, an agricultural economy remains dominant in the southeastern regions of Colorado to this day.

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Appendix F:
Electric and Magnetic Fields (EMF) Report

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Big Sandy-Midway Transmission Line Project

Electric and Magnetic Fields and Audible Noise

Prepared for

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June, 2010

Big Sandy-Midway Transmission Line Project

Introduction

The Tri State Generation and Transmission Association, Inc. (Tri State) is increasing the rating of their 230 kilovolt (kV) single circuit electric transmission lines from Big Sandy to Midway. The project is called the Big Sandy-Midway Transmission Line Project.

This report describes the modeling of electric and magnetic fields and audible noise produced from corona for the Big Sandy-Midway Transmission Line Project.

Electric and Magnetic Fields from Big Sandy-Midway Transmission Line Project

Electric transmission lines produce EMF when they are in operation. EMF is a term that refers to electric and magnetic fields. These fields are caused by different aspects of the operation of a transmission line and can be evaluated separately.

Electric fields are produced whenever a conductor is connected to a source of electrical voltage. An example of this is the plugging of a lamp into a wall outlet in a home. When the lamp is plugged in, a voltage is induced in the cord to the lamp which causes an electric field to be created around the cord.

Magnetic fields are produced whenever an electrical current flows in a conductor. In the lamp example, if the lamp is turned on allowing electricity to flow to the lamp, a magnetic field is created around the lamp cord in addition to the electric field.

Modeling Methodology

The EMF for the Big Sandy-Midway Transmission Line Project was predicted using EMF Workstation: ENVIRO (Version 3.52), a Windows-based model developed by the Electric Power Research Institute (EPRI). It is a program that accurately predicts the electric and magnetic fields produced by linear transmission lines such as those in the Big Sandy-Midway Transmission Line Project.

To perform this modeling, detailed information was received from Tri State on the design of the line, which included projected electrical power flows, operating voltage, tower configuration, conductor size and type, the height and horizontal location of each conductor, conductor sag, and conductor phasing. The modeling was conducted with a maximum load power flow. Table A of Appendix A shows the transmission line characteristics used to perform this modeling.

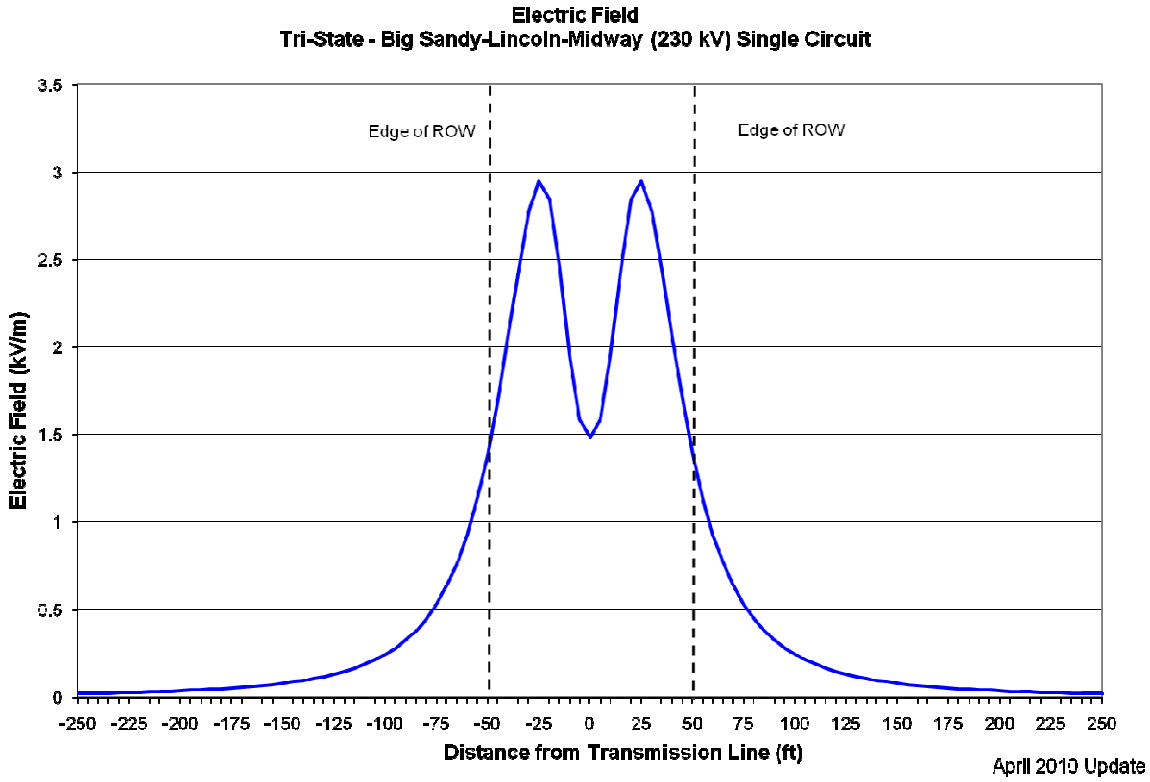
These data were input into the ENVIRO program which produced the lateral profiles of the electric and magnetic fields out to 250 feet on each side of the centerline. These profiles were then plotted to produce the graphs that are presented below. The profiles were calculated with the lowest phase conductor at 28 feet above the ground, the minimum ground clearance per the National Electrical Safety Code (NESC), which coincides with the lowest point of

conductor sag, providing the most conservative results. The calculations are computed at a height of 1 meter (3.3 feet) above the ground. The accuracy of the modeling is dependent on the accuracy of the input data (i.e., if the average phase current is higher than what was modeled, so will the resulting magnetic fields). The resulting field plots are within a few percent of the true value for the conditions modeled.

Modeling Results

The Big Sandy-Midway 230 kV transmission line was modeled as a single circuit steel monopole structure. The electric and magnetic field results are presented in Figures 1 and 2. The transmission line will be located on a 100 foot wide easement, 50 feet on each side of the centerline, which is shown as vertical dashed lines in Figures 1 and 2.

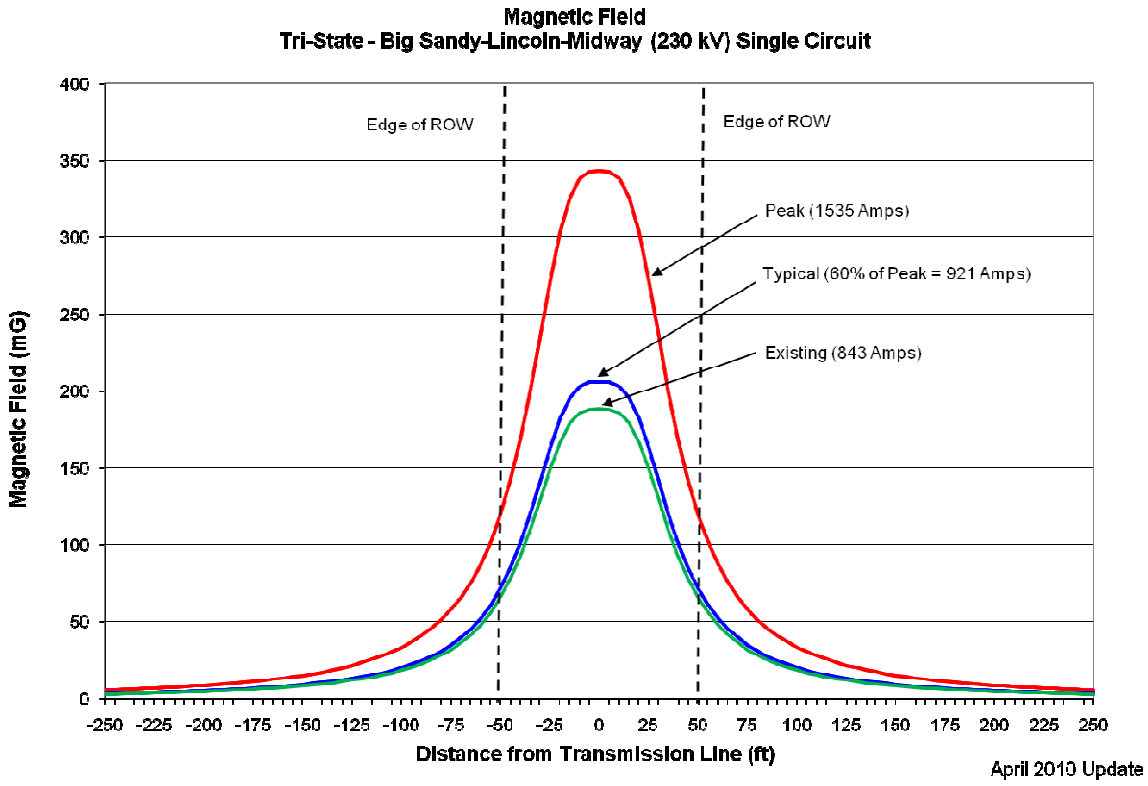
FIGURE 1



The results of the electric field modeling plotted in Figure 1 show that on both the left and right easement edge the electric field is approximately 1.4 kilovolt per meter (kV/m). The maximum electric field within the easement is approximately 2.9 kV/m.

Figure 2 presents the results of the magnetic field modeling for the existing power flow, peak power flow, and typical power flow, which is assumed as 60% of the peak power flow.

FIGURE 2



The results of the magnetic field modeling plotted in Figure 2 show that on both the left and right easement edge the magnetic field is approximately 119.4 milli Gauss (mG) for peak power flow, 71.6 mG for typical power flow, and 65.6 mG for existing power flow. The maximum magnetic field within the easement is approximately 343.2 mG for peak power flow, 205.9 mG for typical power flow, and 188.5 mG for existing power flow.

Corona Audible Noise from Big Sandy-Midway Transmission Line Project

Corona is the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware due to very high electric field strength. Corona may result in audible noise being produced by the transmission lines.

The amount of corona produced by a transmission line is a function of the voltage of the line, the diameter of the conductors, the locations of the conductors in relation to each other, the elevation of the line above sea level, the condition of the conductors and hardware, and the local weather conditions. Power flow does not affect the amount of corona produced by a transmission line. Corona typically becomes a design concern for transmission lines at 345 kV and above and is less noticeable from lines like these that are operated at lower voltages.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal.

Irregularities (such as nicks and scrapes on the conductor surface or sharp edges on suspension hardware) concentrate the electric field at these locations and thus increase the electric field gradient and the resulting corona at these spots. Similarly, foreign objects on the conductor surface, such as dust or insects, can cause irregularities on the surface that are a source for corona.

Corona also increases at higher elevations where the density of the atmosphere is less than at sea level. Audible noise will vary with elevation with the relationship of A/300 where A is the elevation of the line above sea level measured in meters (EPRI 2005). Audible noise at 600 meters elevation will be twice the audible noise at 300 meters, all other things being equal. The Big Sandy-Midway Transmission Line Project was modeled with an elevation of 5,000 feet.

Raindrops, snow, fog, hoarfrost, and condensation accumulated on the conductor surface are also sources of surface irregularities that can increase corona. During fair weather, the number of these condensed water droplets or ice crystals is usually small and the corona effect is also small. However, during wet weather, the number of these sources increases (for instance due to rain drops standing on the conductor) and corona effects are therefore greater. During wet or foul weather conditions, the conductor will produce the greatest amount of corona noise. However, during heavy rain the noise generated by the falling rain drops hitting the ground will typically be greater than the noise generated by corona and thus will mask the audible noise from the transmission line.

Corona produced on a transmission line can be reduced by the design of the transmission line and the selection of hardware and conductors used for the construction of the line. For instance the use of conductor hangers that have rounded rather than sharp edges and no protruding bolts with sharp edges will reduce corona. The conductors themselves can be made with larger diameters and handled so that they have smooth surfaces without nicks or burrs or scrapes in the conductor strands.

Modeling Methodology

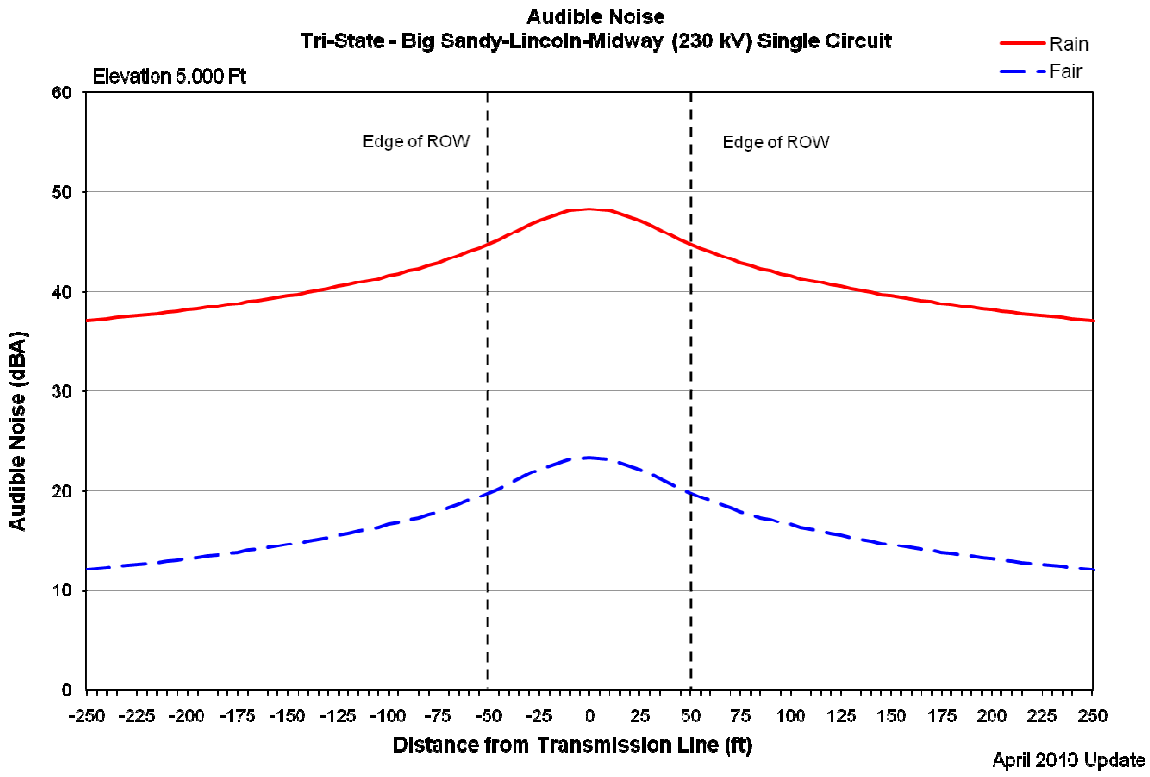
The audible noise for the Big Sandy-Midway Transmission Line Project was predicted using EMF Workstation: ENVIRO (Version 3.52), the same program used to predict EMF from the Big Sandy-Midway Transmission Line Project.

The data presented in Table A of Appendix A were input into the ENVIRO program to calculate the corona audible noise, with the addition of elevation of the line above sea level. The Big Sandy-Midway Transmission Line Project was modeled with an elevation of 5,000 feet. Because the equations that predict audible noise were created from empirical measurements, the accuracy of the model is as good as these measurements that produced the original equations. In addition, the model is as good as the accuracy of the parameters input to the model (e.g. the actual elevation of the transmission line at a particular location rather than the average elevation of the entire project). Therefore given these potential uncertainties, the resulting field plots are within a few percent of the true value for the conditions modeled.

Modeling Results

The Big Sandy-Midway Transmission Line Project was modeled as a single circuit wood H frame structure. The corona audible noise plot is presented in Figure 3. The transmission line will be located on a 100 foot wide easement, 50 feet on each side of the centerline, which is shown as vertical dashed lines in Figure 3. The figure show two conditions, fair and rain. This is to show the range in corona effects due to changing weather.

FIGURE 3



The results of the corona audible noise modeling plotted in Figure 3 show that on both the left and right easement edge the audible noise is approximately 19.8 dBA in fair weather and 44.8 dBA in wet weather. The maximum noise that occurs on the easement is 23.3 dBA in fair weather and 48.3 dBA in wet weather.

APPENDIX A

ENVIRO Modeling Inputs

TABLE A
Transmission Line Characteristics for Input to ENVIRO Modeling

Circuit	Voltage (kV)	Power Flows (Amps)			Conductor[1]	Phase (top to bottom/ right to left)	Horizontal Location (ft)	Vertical Location (ft)
		Existing	Peak	Typical				
Single	230	843	1535	921	1272 ACSR "Bittern" (1.345 inch diameter)	A	-19.5	28
						B	0	28
						C	19.5	28
						Ground (G0)	-9.75	37.5
						Ground (G0)	9.75	37.5

[1] 1272 kcmil ACSR "Bittern" conductor also used for diameters of two ground wires in ENVIRO.

Appendix G:
Tri-State's Position Statement on EMF Health Effects

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TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
HEADQUARTERS: P.O. BOX 33695 DENVER, COLORADO 80233-0695 303-452-6111

POSITION STATEMENT

Electric and Magnetic Field (EMF) Health Effects

Lights, appliances, computers, power lines and any other devices that carry or use electricity produce electric and magnetic fields (EMF). The Earth itself also creates natural EMF in varying amounts. Therefore, we are all continuously exposed to EMF as a result of living in a society that so heavily relies on the use of electricity as a source of energy.

In recent years, concerns have been raised that exposure to EMF might cause or contribute to adverse health effects, including cancer. We at Tri-State Generation and Transmission Association are aware of these concerns and we wish to express our position on EMF and our commitment to this matter.

Scientists agree that the answers to these concerns must come from well-conducted research studies. During the last three decades several thousand studies aimed at a better understanding of this issue have been conducted around the world. The consensus of scientists familiar with these studies is that no significant risk to humans from long-term exposure to EMF has been established.

In addressing this issue, Congress in 1991 asked the National Academy of Sciences to review the research literature on the effects from exposure to EMF and for the National Institute of Environmental Health Sciences (NIEHS) to conduct a scientific research program to evaluate the health risk to humans of EMF. The National Academy of Sciences formed the Committee to Review the Research Activities Completed Under the Energy Policy Act of 1992. The Committee issued their report in 1999 titled "Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992." In the report they state " the committee recommends that no further special research program focused on possible health effects of power-frequency magnetic fields be funded."

The NIEHS in May 1999 prepared their report to Congress on the results of their sponsored research and other research conducted to date around the world. In a letter accompanying this report, the NIEHS Director concluded, “the scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak”. He goes on to say “virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status.” While these scientific reviews were conducted some time ago and EMF research has continued since then, the overall conclusions of these newer studies remain about the same as before.

Tri-State recognizes its responsibility to provide wholesale electric service at the lowest possible cost in a manner that is safe, reliable and environmentally sound. This responsibility includes carefully designing and locating our facilities in strict accordance with the National Electric Safety Code and all applicable federal, state and local regulations. Despite the lack of clear evidence from reliable studies of any adverse effect EMF may have on human health, we will continue to construct and operate our facilities in a manner that minimizes, to the extent prudent and practical, the amount of EMF that is created.

Since there are still unanswered questions and opposing theories, Tri-State agrees that limited research should continue in a credible and objective manner even though the federal government has ceased funding all such research studies. Accordingly, we will continue to be a sponsor of the EMF research program of the Electric Power Research Institute, of which we are a member. We will continue to closely monitor the results of these and other scientific studies as they are completed. Our commitment is to keep our member systems, our employees and our electric consumers informed of the results of this research and promptly and knowledgeably respond to all inquiries with accurate and current information.

7/09