5.0 Cumulative Impacts

NEPA requires an assessment of potential cumulative impacts. Federal regulations (40 CFR 1500-1508) define cumulative impacts as:

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The same resources evaluated for Project effects (Chapter 3.0) are evaluated for cumulative effects. The cumulative impact discussion assumes that all environmental mitigation measures discussed in Chapter 3.0 would be applied to the Project as well as other reasonably foreseeable transmission lines proposed on federal lands in the same alternative corridors. It also is assumed that these and any other projects on federal lands would comply with the applicable BLM Land Use Plans and Forest Service Forest Plans, as well as applicable federal, state, and local regulations and permit requirements.

The structure and content of the cumulative impacts analysis in this EIS follows the guidance contained in the BLM NEPA handbook (BLM 2008) and the CEQ Guidance on Considering Cumulative Effects Under the National Policy Act (CEQ 1997).

5.1 Physical and Temporal Boundaries of Cumulative Impacts

In general, physical boundaries for cumulative impacts analysis vary by resource and would be identical to those analysis areas used in Chapter 3.0 to determine the context of project impacts.

Temporal effects are measured over the length of the effect to the resource, not the Project life. For example, certain desert vegetation communities would require more than 100 years to recover to a similar species composition and cover after surface disturbance as before disturbance. For the purposes of analysis, it was assumed that project operational life would be indefinite with a minimum of 50 years.

5.1.1 Overview of Related Actions

As described in Chapter 2.0, the Project primarily would convey electricity generated from existing and reasonably foreseeable renewable and non-renewable energy sources in central Wyoming to market in Southern Nevada. As a HVDC line, the Project would not interconnect with other electricity suppliers between Wyoming and Nevada. The Project would potentially interconnect with the Gateway West and Gateway South transmission lines near the north terminal.

The Chokecherry Sierra Madre Wind Energy Project Final EIS (BLM 2012a) and the Gateway West Transmission Project Final EIS (BLM 2013) described and evaluated past, present, and foreseeable projects within a region extending from the vicinity of the Medicine Bow River near Hanna (Aeolus substation) south and west to Sinclair and Rawlins, and west along the I-80 corridor to the vicinity of Wamsutter in Carbon and Sweetwater counties, Wyoming. The Project was included in the cumulative impacts section of both documents. Additionally, this Final EIS incorporates by reference their analysis of the cumulative impacts of past, present, and foreseeable actions that would impact the same resources as the Project. Although this Project potentially would transmit power generated by the Chokecherry project, it potentially also would transmit power from other sources. Similarly, in the event that this Project is not approved, the Chokecherry project would use other transmission options. Accordingly, these projects are not connected as either one could proceed without the other.

As a background document for regional energy development and transportation, the Gateway West Final EIS provides an extensive overview of the electrical power generation sources in Wyoming and Idaho, including fossil fuel power plants (coal and natural gas), wind energy, geothermal, and hydroelectric sources. The regional electrical transmission system requirements for transporting wind energy also are discussed. The existing and proposed Wyoming generation sources described in the Gateway West Final EIS (see Sections 4.2.1.4 and 4.2.2.5 of the Gateway West Final EIS) eventually could be potentially served by the Project if the demand arose.

In the Las Vegas region, several transmission lines have been proposed, but none have yet been approved or constructed. The NEPA analyses for these transmission lines were reviewed for project description information and they are discussed under the Region IV discussion below.

5.2 Past and Present, and Reasonably Foreseeable Future Actions

Past and present actions for the Project include existing land development, the results of which are described under the various resources in Chapter 3.0. The past and present actions are discussed in terms of regional distribution of land uses and activities. Maps of linear utilities within each region have been developed to provide the reader with the relative extent of aboveground facility development within the various corridors.

The following sections outline the past and present actions by the Project regions defined for analysis of alternatives, as well as reasonably foreseeable actions that may cause cumulative impacts.

Reasonably foreseeable projects that overlap with the Project in space and time are identified by project alternative and are illustrated on maps. Reasonably foreseeable projects include any projects that are actively proposed or planned and impact the same resources as the Project. The criteria for inclusion of reasonably foreseeable projects in the list for analysis are the following:

- A ROW application and associated preliminary project description have been filed with the BLM or other federal agency, and there is evidence that the project is being actively pursued by the proponent through the NEPA or other permitting process. Project construction activities may or may not overlap with those of the Project.
- The foreseeable project would be located where it would impact the same resources as the Project.

Cumulative impacts are estimated for each resource by Project region. The primary focus of the specific analyses are locations where cumulative projects and actions may conflict with the management of designated areas, private land uses, other industrial surface uses (e.g., oil and gas), and protection of habitats for special status species and other resources. In most cases, these cumulative impacts include past, present, and reasonably foreseeable actions that extend beyond the common corridor of the Project and other transmission lines to include the logical boundaries for a baseline for those resources impacted by the Project.

5.2.1 Region I

5.2.1.1 Past and Present Actions

- Agriculture. The majority of the land crossed by all alternatives is used for livestock grazing. Dryland wheat fields and irrigated pasturelands are located north and west of Craig in Moffat County, Colorado (**Figure 3.5-1**).
- Commercial, Residential, and Industrial Areas. Incorporated and unincorporated communities in Wyoming (in order of size) include Rawlins, Sinclair, Hanna, Wamsutter, and Baggs; in Colorado, Craig, Maybell, and Dinosaur; and in Utah, Vernal. A coal-fired power plant is located near Craig, and an oil refinery is located in Sinclair.

- Oil and Gas Field Development. An extensive area of oil and gas development is located from the vicinity of Rawlins westward to Wamsutter, and southward to the vicinity of Baggs (**Figure 3.2-3**). Example existing large fields include Atlantic Rim, Continental Divide-Creston, and Desolation Flats. These fields are composed of well pads, gathering pipelines, electrical distribution lines, buried pipelines, and access roads. Access roads are subject to daily traffic that includes light and heavy trucks, water trucks, truck and trailer rigs, and motor graders.
- Minerals. Active surface and underground coal mines are located north and south of Craig and north of Rangely (**Figure 3.2-3**).
- Renewable Energy. No operating renewable energy projects (wind, solar) overlap with Project alternative corridors.
- Linear Utilities. **Figure 5-1** provides an overview of the linear utilities associated with Project corridors in this region. The I-80 corridor includes a variety of linear utilities within a few miles of the interstate highway. These include a transcontinental railroad; multiple pipelines (oil, natural gas, natural gas liquids, and refined products); transmission lines; and fiber optic communication lines. Compressor stations and pump stations are associated with individual pipelines, depending on the type of product. Other state and federal highways that also serve as utility corridors include: U.S. Highway 287, and State Highways 30 and 789 in Wyoming, U.S. Highway 40 between Craig and Vernal in Colorado and Utah, and Highway 191 between I-80 in Wyoming and U.S. Highway 40 in Utah.
- Other Actions. Other facilities within Project corridors include a Wyoming state prison south of Rawlins.

An estimate of the Region Analysis Areas that have been disturbed from past and present activities was made by mapping historical vegetation conditions using the potential natural vegetation (PNV) dataset from the USFS General Technical Report RMRS-87 *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management*. This PNV dataset from this report is based on the Kuchler dataset developed in the 1960's (Kuchler 1975). This PNV was overlaid with current SWReGAP and NWReGAP land cover data (USGS 2008, 2004) and an estimate was made of the acreage of PNV in the Region I Analysis Area that has been converted to developed areas. A summary of these acreages by vegetation/habitat cover type is provided below in **Table 5-1**. The cumulative qualitative effect of these past actions on existing resources is disclosed through the description of the Affected Environment for each resource (Chapter 3.0 of this Draft EIS). Please note that these numbers differ slightly from the existing affected environment numbers expressed in **Table 5-1** because they were calculated from a different dataset. However, the discrepancy is very small and does not preclude comparison of the numbers in terms of estimating overall cumulative impacts. This is true for the identical information expressed for all of the regions.

Table 5-1 Estimated Cumulative Impacts from Past and Present Actions in the Region I Analysis Area

Vegetation/Habitat Cover Type	Region 1 Currently Disturbed (acres)	Region 1 Historic Vegetation/Habitat	Percent Disturbed from Past and Present Actions
Barren/Sparsely Vegetated	-	-	-
Conifer Forest	8,222	123,241	7
Desert Shrubland	3,292	430,857	<1
Grassland	162	1,979	8
Montane Shrubland	19,625	315,636	6
Open Water	-	771	-

Table 5-1 Estimated Cumulative Impacts from Past and Present Actions in the Region I Analysis Area

Vegetation/Habitat Cover Type	Region 1 Currently Disturbed (acres)	Region 1 Historic Vegetation/Habitat	Percent Disturbed from Past and Present Actions
Pinyon-Juniper	36,496	750,202	5
Sagebrush Shrubland	193,772	3,727,772	5
Total	**261,569**	**5,350,458**	**5**

5.2.1.2 Reasonably Foreseeable Actions

Figure 5-1 illustrates the geographic relationships of the Project alternatives and other RFFAs in Region I. **Table 5-2** provides a summary of the types of projects, estimated construction time frames, and their potential cumulative impacts relationships.

Table 5-2 Reasonably Foreseeable Future Actions in Region I

Type of Project	Construction Time Frame	Project/Description
Transmission Line	2015-2018	PacifiCorp Gateway West – 500-kV AC. Glenrock, Wyoming, to Melba, Idaho.
Transmission Line	2015-2018	PacifiCorp Gateway South – 500-kV AC. Aeolus, Wyoming, to Mona, Utah
Oil and Gas Field Development	2012 Ongoing	Proposed and ongoing development of oil and gas fields including Continental Divide-Creston, Hiawatha, Atlantic Rim, and Catalina Unit
Chokecherry-Sierra Madre Wind Energy Development	2013-2016	Power Company of Wyoming – Potential development of 1,000 wind turbines on private lands and lands managed by the BLM Rawlins.

Figure 5-2 identifies potential cumulative impact constraint areas in Region I, which are identified and discussed in greater detail, by applicable resource, in Sections 5.3.1 through 5.3.19.

A summary of the cumulative effects of RFFAs on the Region I Analysis Area are shown in **Table 5-3**.

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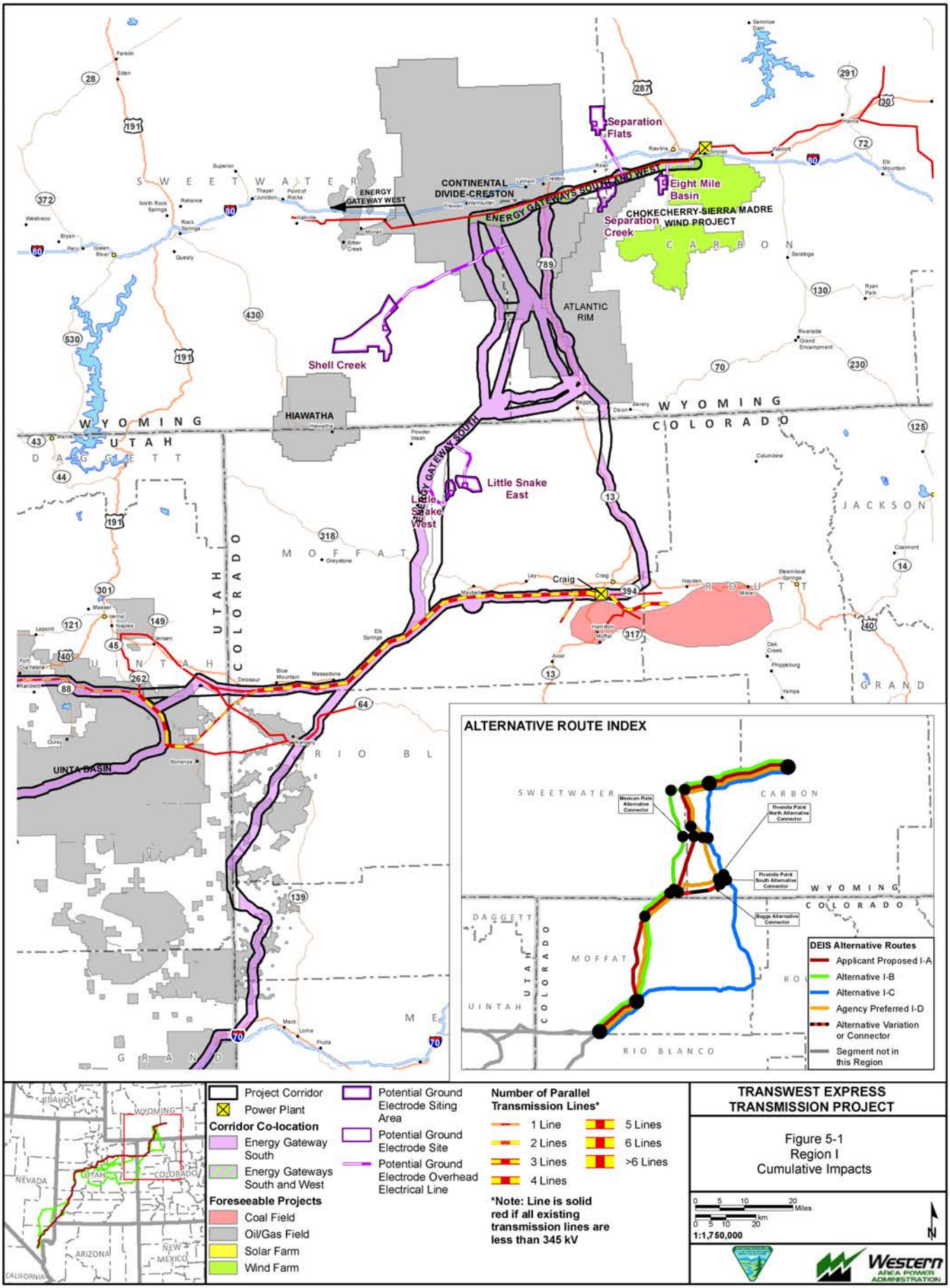

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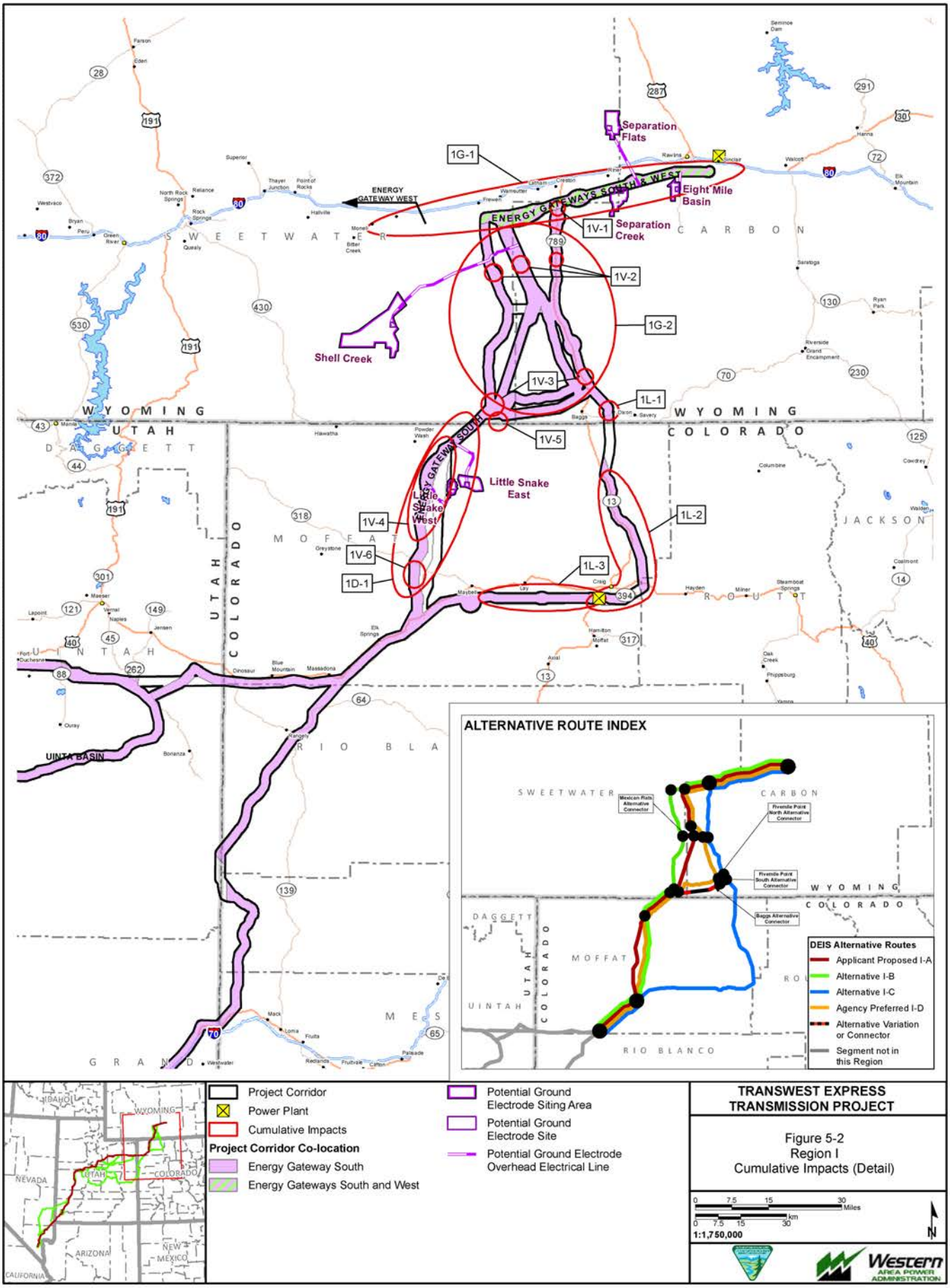
Separation Flats
Eight Mile Basin
Separation Creek
Shell Creek
Little Snake East
Little Snake West
ENERGY GATEWAY WEST
ENERGY GATEWAYS SOUTH & WEST
ENERGY GATEWAY SOUTH
1G-1
1V-1
1V-2
1G-2
1V-3
1L-1
1V-5
1L-2
1V-4
1V-6
1D-1
1L-3
UINTA BASIN
WYOMING
UTAH
COLORADO
SWEETWATER
CARBON
MOFFAT
JACKSON
ROUTT
RIO BLANCO
GRAND
MESA
DAGGETT
UINTAH
ALTERNATIVE ROUTE INDEX
Mexican Flats Alternative Connector
Fivemile Point North Alternative Connector
Fivemile Point South Alternative Connector
Baggs Alternative Connector
DEIS Alternative Routes
Applicant Proposed I-A
Alternative I-B
Alternative I-C
Agency Preferred I-D
Alternative Variation or Connector
Segment not in this Region
Project Corridor
Power Plant
Cumulative Impacts
Project Corridor Co-location
Energy Gateway South
Energy Gateways South and West
Potential Ground Electrode Siting Area
Potential Ground Electrode Site
Potential Ground Electrode Overhead Electrical Line
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
CALIFORNIA
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 5-2
Region I
Cumulative Impacts (Detail)
0 7.5 15 30 Miles
0 7.5 15 30 km
1:1,750,000
N
Western AREA POWER ADMINISTRATION
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Table 5-3 Estimated Cumulative Impacts from RFFAs in the Region I Analysis Area

Vegetation Cover Type	RFFA Disturbance to Region I Analysis Area	Total Vegetation in Region I Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from Project Alternatives
Agriculture	98	230,482	<1	<1
Aspen Forest and Woodland	-	89,921	-	<1
Barren/Sparsely Vegetated	171	36,819	<1	<1
Cliff/Canyon	95	29,704	<1	<1
Conifer Forest	18	35,190	<1	<1
Deciduous Forest	-	39	-	<1
Desert Shrub	-	-	-	<1
Developed/Disturbed	123	107,794	-	<1
Dunes	685	85,276	1	<1
Grassland	526	210,626	<1	<1
Greasewood Flat	1,250	90,502	1	<1
Herbaceous Wetland	242	25,146	1	<1
Montane Grassland	-	3,788	-	<1
Montane Shrubland	-	117,240	<1	<1
Open Water	11	11,332	<1	<1
Pinyon-Juniper Woodland	111	303,173	<1	<1
Riparian	-	728	-	<1
Sagebrush Shrubland	36,332	3,038,971	1	<1
Saltbush Shrubland	13,461	885,851	2	<1
Tundra	-	-	-	-
Woody Riparian and Wetlands	766	47,858	2	<1
Total	**53,889**	**5,350,440**	**<1**	**<1**

5.2.2 Region II

5.2.2.1 Past and Present Actions

- Agriculture. The majority of the land crossed by all alternatives is used for livestock grazing. Irrigated pasturelands are located along rivers and streams that drain the south flank of the Uinta Mountains in Uintah and Duchesne Counties, Utah. Alternative corridors cross irrigated lands in intermountain valleys near Nephi, Mount Pleasant, Fairview, Salina, Castle Dale, and Delta (**Figure 3.5-2**).
- Commercial, Residential, and Industrial Areas. Incorporated and unincorporated communities in Colorado include Dinosaur and Rangely. Communities along U.S. Highway 40 near the Project corridors in the Uinta Basin of Utah include Vernal, Fort Duchesne, Roosevelt, Duchesne, and

Fruitland. Communities along the I-70 corridor include Green River and Salina. Communities located near alternatives extending from the I-70 corridor to Nephi include Castle Dale, Huntington, Mt. Pleasant, Fairview, and Fountain Green. Coal-fired power plants are located near Huntington in Emery County and Delta in Millard County.

- Oil and Gas Field Development. An extensive area of oil and gas development is located in the Uinta Basin from the Colorado/ Utah border to the vicinity of Fruitland. Example existing large fields south of U.S. Highway 40 include Red Wash, Horseshoe Bend, Blue Bell, Monument Butte, and Altamont (**Figure 3.2-8**).
- Minerals. Active underground coal mines are located on the Wasatch Plateau west of Huntington in Emery County and north of Rangely (**Figure 3.2-8**).
- Renewable Energy. No existing operating renewable energy projects (wind, solar) overlap with the Project's analysis area of potential impacts.
- Linear Utilities. **Figure 5-3** provides an overview of the linear utilities associated with the Project corridors in this region. The U.S. Highway 40 corridor includes a variety of linear utilities. These include multiple pipelines (oil, natural gas) and transmission lines. Other state and federal highways that also serve as utility corridors include: U.S. Highway 6 from Green River to Spanish Fork, and I-70 from the Colorado/Utah border to Salina.

A summary of the cumulative current disturbance from past and present actions in the Region II analysis area is shown in **Table 5-4**. The cumulative effect of these past actions on existing resources is expressed through the baseline description for each resource (Chapter 3.0 of this Draft EIS).

Table 5-4 Estimated Cumulative Impacts from Past and Present Actions in the Region II Analysis Area

Vegetation/Habitat Cover Type	Region II Currently Disturbed (acres)	Region II Historic Vegetation/Habitat	Percent Disturbed from Past and Present Actions
Barren/Sparsely Vegetated	18,704	942,442	2
Conifer Forest	6,214	1,099,061	<1
Desert Shrubland	506,989	3,142,774	16
Grassland	-	877	-
Montane Shrubland	36,213	498,817	7
Open Water	288	5,148	6
Pinyon-Juniper	172,668	4,568,083	4
Sagebrush Shrubland	145,379	863,083	17
Total	**886,455**	**11,120,285**	**8**

5.2.2.2 Reasonably Foreseeable Actions

Figure 5-3 illustrates the geographic relationships of the Project alternatives and other reasonably foreseeable projects in Region II. **Table 5-5** provides a summary of the types of projects, estimated construction time frames, and their potential cumulative impacts relationships.

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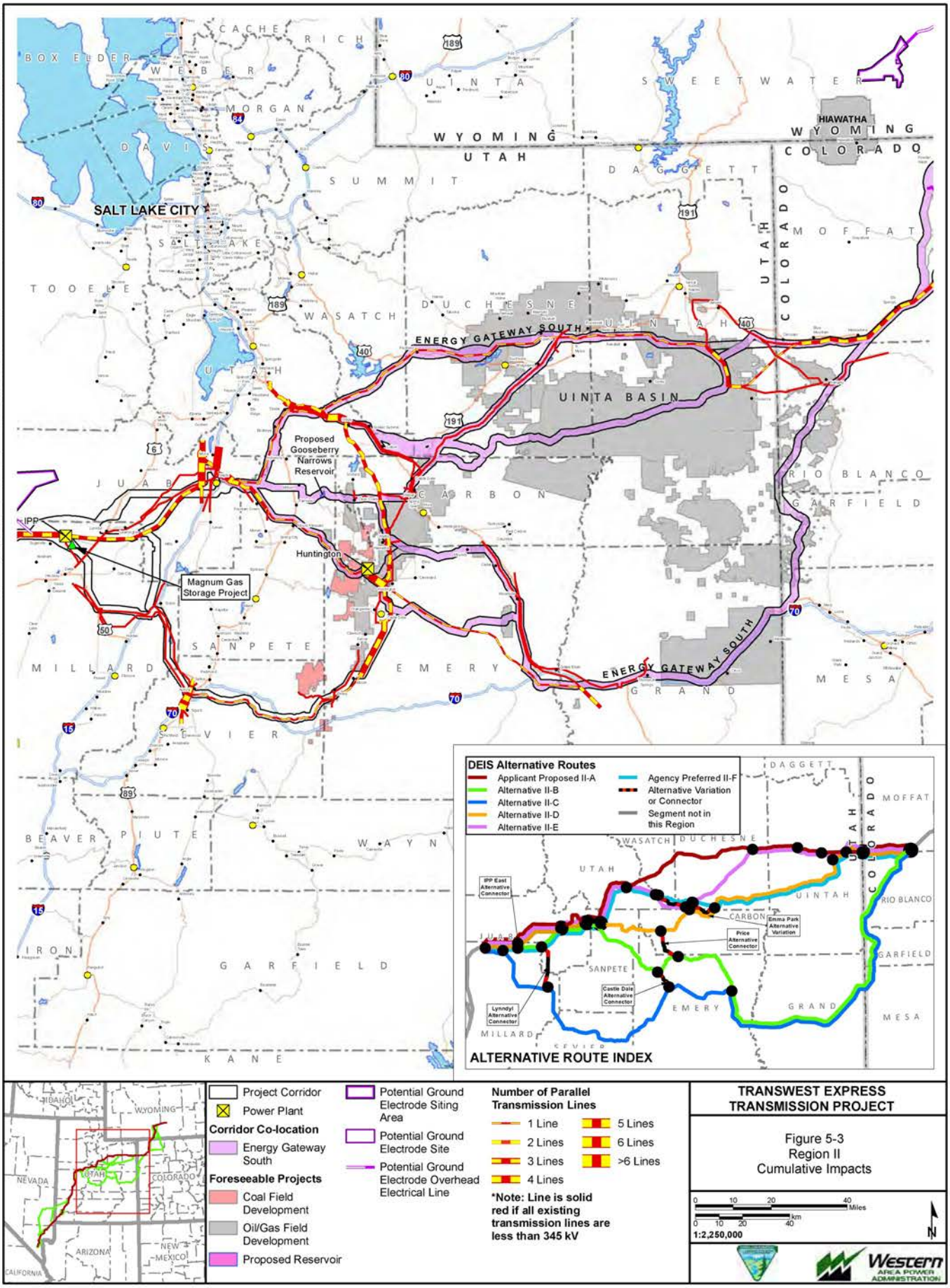

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Table 5-5 Reasonably Foreseeable Future Actions in Region II

Type of Project	Construction Time Frame	Project/Description
Transmission Line	2015 – 2018	PacifiCorp Gateway South – 500-kV AC. Aeolus, Wyoming to Mona, Utah
Transmission Line	2011 – 2013	PacifiCorp Mona To Oquirrh – 500/345-kV AC. Mona Substation in Juab County, Utah, to the Oquirrh Substation, the Terminal Substation in Salt Lake County, Utah, and the Clover Substation near Mona, Utah.
Pipeline	2012 – 2013	Mid America Pipeline – 16-inch pipeline from Dragon in Uintah County, Utah, to Thompson Station in Grand County , Utah
Oil and Gas Development	2012 – ongoing	Eleven new and infill natural gas projects located generally south of the White River, and east of the Green River in Uintah County, Utah. One oil field project in the Pariette drainage west of the Green River. Largest projects in terms of surface disturbance and well numbers: KMG Greater Natural Buttes, EOG Greater Chapita Wells, West Tavaputs, Newfield Monument Butte, Gasco Uinta Basin, and the Berry Petroleum Ashley South Unit development on Ashley National Forest.
Underground Coal	2012 – ongoing	There are lease modifications for Cottonwood, Deer Creek II Tracts on Manti-La Sal National Forest. Additionally, there is a submitted application for the Deserado Mine Coal lease.
Vegetation Treatments	2012 – ongoing	Both the USFS and the BLM have numerous fuels treatment and/or prescribed fire projects planned that would affect the same resources as the Project. These include the Pine Springs Fuels Treatment, Bottom Canyon Fuels Reduction, Moonshine Hazardous Fuel Reduction, Shalom Timber Harvest, Uinta Sheep Creek Project, and Millers Flat Timber Harvest.
Water Development	2013	Construction of a 17,000-acre-foot dam and impoundment on Gooseberry Creek in Sanpete County, Utah.

A summary of the disturbance impacts to the Region II Analysis area from the RFFAs described above is given in **Table 5-6**.

Table 5-6 Estimated Cumulative Impacts from RFFAs in the Region II Analysis Area

Vegetation Cover Type	RFFA Disturbance to Region II Analysis Area	Total Vegetation in Region II Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from TWE Alternatives
Agriculture	-	484,528	-	<1
Aspen Forest and Woodland	3,976	544,114	<1	<1
Barren/Sparsely Vegetated	1,045	222,948	<1	<1
Cliff/Canyon	702	565,493	<1	<1
Conifer Forest	19,410	477,815	4	<1
Deciduous Forest	-	13,869	-	<1
Desert Shrub	1,176	125,982	1	<1
Developed/Disturbed	478	459,785	<1	<1
Dunes	428	32,567	1	<1

Table 5-6 Estimated Cumulative Impacts from RFFAs in the Region II Analysis Area

Vegetation Cover Type	RFFA Disturbance to Region II Analysis Area	Total Vegetation in Region II Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from TWE Alternatives
Grassland	2,933	519,056	1	<1
Greasewood Flat	496	511,410	<1	<1
Herbaceous Wetland	122	80,634	<1	<1
Montane Grassland	134	65,241	<1	<1
Montane Shrubland	1,192	570,993	<1	<1
Open Water	-	61,376	-	<1
Pinyon-Juniper Woodland	6,735	2,483,995	<1	<1
Riparian	-	-	-	<1
Sagebrush Shrubland	20,205	2,307,131	1	<1
Saltbush Shrubland	5,869	1,468,576	<1	<1
Tundra	-	13,956	-	<1
Woody Riparian Wetlands	247	110,822	<1	<1
Total	**65,148**	**11,120,291**	**1**	**<1**

Figure 5-4 identifies potential cumulative impact constraint areas in Region II, which are identified and discussed in greater detail, by applicable resource, in Sections 5.3.1 through 5.3.19

5.2.3 Region III

5.2.3.1 Past and Present Actions

- Agriculture. The majority of the land crossed by all alternatives is used for livestock grazing.
- Commercial, Residential, and Industrial Areas. Incorporated and unincorporated communities in Utah from north to south include Delta, Milford, Newcastle, Enterprise, and Central. Nevada communities include Caliente and Alamo along the U.S. 93 corridor and Moapa along the I-15 corridor. Coal-fired power plants are located near Delta, Utah, and Moapa, Nevada. An industrial complex located near Apex, northeast of Las Vegas, includes the Harry Allen and Silverhawk natural gas power plants and a cement plant.
- Renewable Energy. First Wind's Milford Wind Corridor Project is located north of the community of Milford, in both Beaver and Millard counties, approximately 1 mile east of the Project alternative corridors. Phase I (Beaver County) and Phase II (Millard County) are constructed and operating. Phase III (Millard and Beaver County), which is located on private land, is on hold due to the expiration of production tax credits. Phase IV (Millard County), which is on BLM, private, and state land, currently is on a temporary hold by the Fillmore FO.

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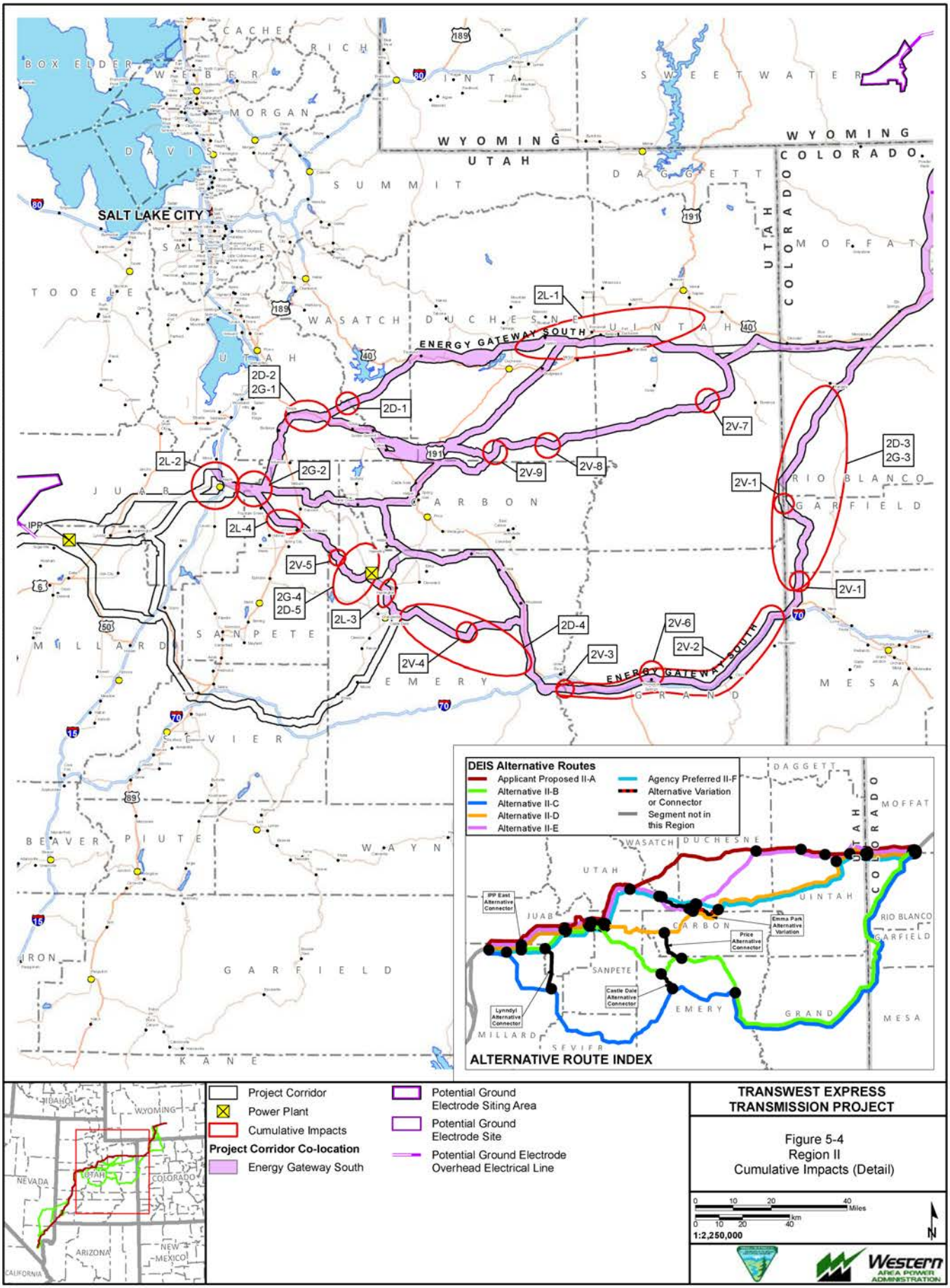

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- Linear Utilities. **Figure 5-5** provides an overview of the linear utilities associated with Project corridors in this region. From Delta, Utah, to Apex, Nevada, in Clark County, the Proposed Action would follow an existing utility corridor that includes multiple transmission lines, and pipelines. The Kern River natural gas pipeline is located within this corridor; the UNEV refined products pipeline was recently constructed in this corridor segment between Milford and Central. Alternative III-C in Utah (Segment 490) would parallel an active railroad, but no other utilities. From Caliente, Nevada, south to Apex, Nevada, Alternative III-C (Segment 520) would be located in the Lincoln County Conservation Recreation and Development Act (LCCRDA) utility corridor that was designated by the U.S. Congress. This corridor currently contains transmission lines and U.S Highway 93. Lincoln County Power District maintains 138- and 67-kV transmission lines that run parallel with and/or cross portions of the Project alternative corridors.

An estimate of the impacts to the Region III Analysis Area from past and present activities is provided in **Table 5-7**. The cumulative effect of these past actions on existing resources is expressed through the description of the Affected Environment for each resource (Chapter 3.0 of this Draft EIS).

Table 5-7 Estimated Cumulative Impacts from Past and Present Actions in the Region III Analysis Area

Vegetation/Habitat Cover Type	Region III Currently Disturbed (acres)	Region III Historic Vegetation/Habitat	Percent Disturbed from Past and Present Actions
Barren/Sparsely Vegetated	5,065	1,336,583	<1
Conifer Forest	260	35,077	1
Desert Shrubland	115,375	3,047,504	4
Grassland	-	-	-
Montane Shrubland	-	4,946	-
Open Water	15,743	70,614	22
Pinyon-Juniper	17,033	2,086,763	<1
Sagebrush Shrubland	44,334	736,896	6
Total	**197,810**	**7,318,383**	**3**

5.2.3.2 Reasonably Foreseeable Actions

Figure 5-5 illustrates the geographic relationships of the Project alternatives and other reasonably foreseeable projects in Region III. **Table 5-8** provides a summary of the types of projects, estimated construction time frames, and their potential cumulative impacts relationships.

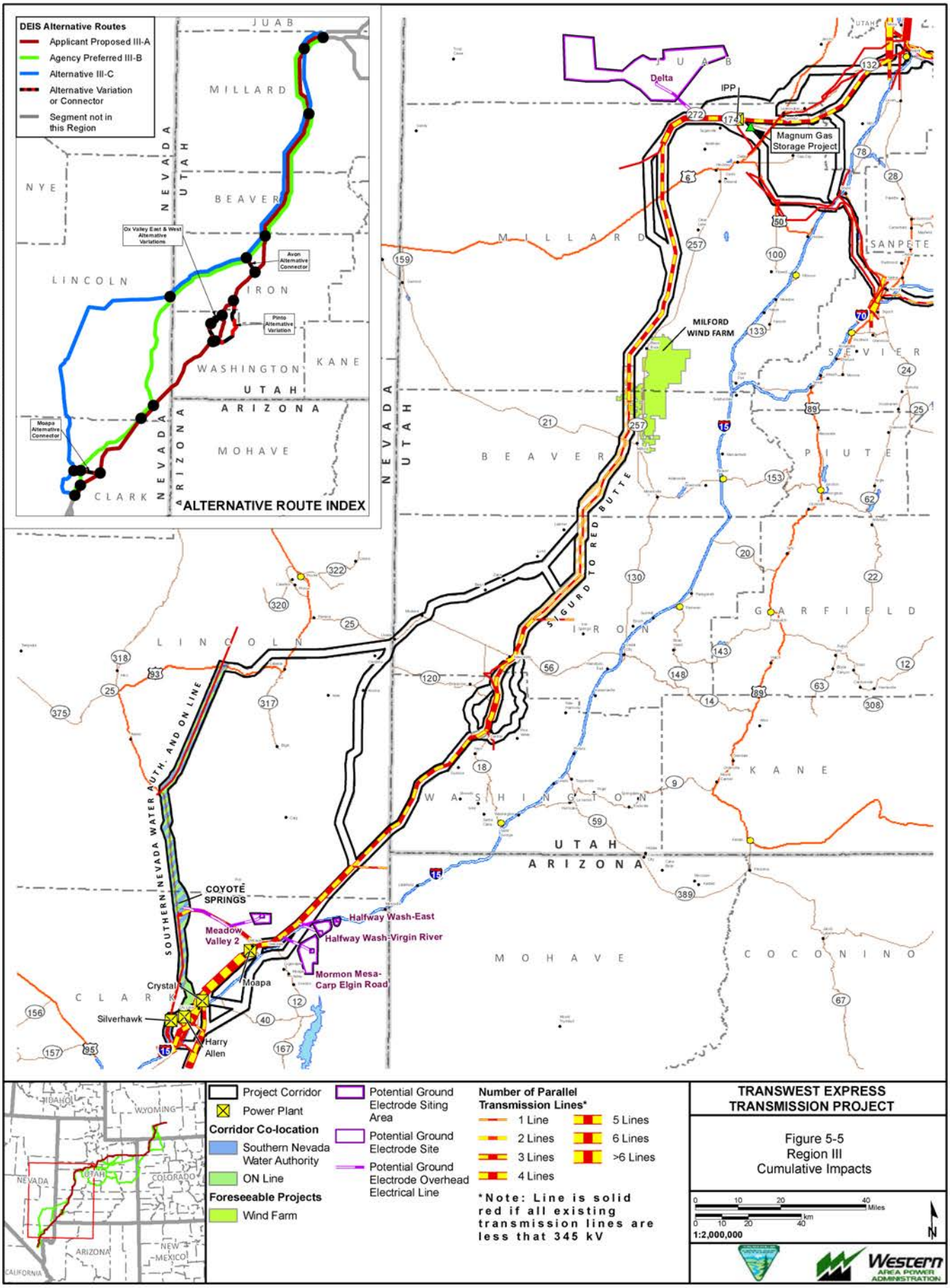
DEIS Alternative Routes
Applicant Proposed III-A
Agency Preferred III-B
Alternative III-C
Alternative Variation or Connector
Segment not in this Region
ALTERNATIVE ROUTE INDEX
Ox Valley East & West Alternative Variations
Avon Alternative Connector
Pinto Alternative Variation
Moapa Alternative Connector
Delta
IPP
Magnum Gas Storage Project
MILFORD WIND FARM
SIGURD TO RED BUTTE
SOUTHERN NEVADA WATER AUTH. AND ON LINE
COYOTE SPRINGS
Meadow Valley 2
Halfway Wash-East
Halfway Wash-Virgin River
Mormon Mesa-Carp Elgin Road
Crystal
Moapa
Silverhawk
Harry Allen
Project Corridor
Power Plant
Corridor Co-location
Southern Nevada Water Authority
ON Line
Foreseeable Projects
Wind Farm
Potential Ground Electrode Siting Area
Potential Ground Electrode Site
Potential Ground Electrode Overhead Electrical Line
Number of Parallel Transmission Lines*
1 Line
2 Lines
3 Lines
4 Lines
5 Lines
6 Lines
>6 Lines
*Note: Line is solid red if all existing transmission lines are less that 345 kV
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 5-5
Region III
Cumulative Impacts
1:2,000,000
Western AREA POWER ADMINISTRATION
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Table 5-8 Reasonably Foreseeable Future Actions in Region III

Type of Project	Construction Time Frame	Project/Description
Transmission Line	2013-2015	PacifiCorp Sigurd to Red Butte 345 kV AC from Sigurd Substation in Sevier County, Utah to Red Butte Substation in Washington County, Utah
Transmission Line	2011-2012	ON 500 kV AC transmission line (under construction in 2011) Southern Idaho to Harry Allen Power Plant near Apex, Nevada.
Transmission Line	2012-2015	K Road Solar. Tie in from solar facility to the BLM administered utility corridor on the Moapa Paiute Reservation to an interconnection at Crystal Substation.
Transmission Line	2012- 2013	Silver State Energy Associates Eastern Nevada Project 230 kV AC. Proposed from U.S 93 Gemmil Substation to Tortoise Substation on Moapa Paiute Reservation.
Water Pipeline and Transmission Line	2013-2050	Southern Nevada Water Authority Clark, Lincoln, and White Pine counties Groundwater Development Project. Proposed groundwater development in five hydrologic basins in Lincoln and White Pine Counties, and a pipeline system to deliver water to the Las Vegas urban area. Project terminates at a water delivery terminal west of Apex.
Natural Gas Storage	2012 - 2014	Magnum Gas Storage Project gas storage facility directly south of IPP. Includes four proposed underground salt caverns to store natural gas, Project also includes required above-ground facilities, including a 36-inch natural gas pipeline from Elberta, Utah to the proposed gas storage site.
Renewable Energy	Unknown	Bright Source Solar Energy Project, Coyote Springs Valley; Millford Wind Corridor Project Phase III (Millard and Beaver County), located on private land, is to be constructed this year. Phase IV (Millard County) is currently on a temporary hold by the Fillmore FO.

A summary of the disturbance impacts to the Region III Analysis area from the RFFAs described above is given in **Table 5-9**. The cumulative effect of these past actions on existing resources is expressed through the description of the Affected Environment for each resource (Chapter 3.0 of this Draft EIS).

Table 5-9 Estimated Cumulative Impacts from RFFAs in the Region III Analysis Area

Vegetation Cover Type	RFFA Disturbance	Total Vegetation in Region III Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from TWE Alternatives
Agriculture	79	69,423	<1	<1
Aspen Forest and Woodland	-	7,448	-	<1
Barren/Sparsely Vegetated	3	29,338	<1	<1
Cliff and Canyon	10	164,119	<1	<1
Conifer Forest	-	26,599	-	<1
Deciduous Forest	1	26	4	<1
Desert Shrub	7,806	2,227,441	<1	<1

Table 5-9 Estimated Cumulative Impacts from RFFAs in the Region III Analysis Area

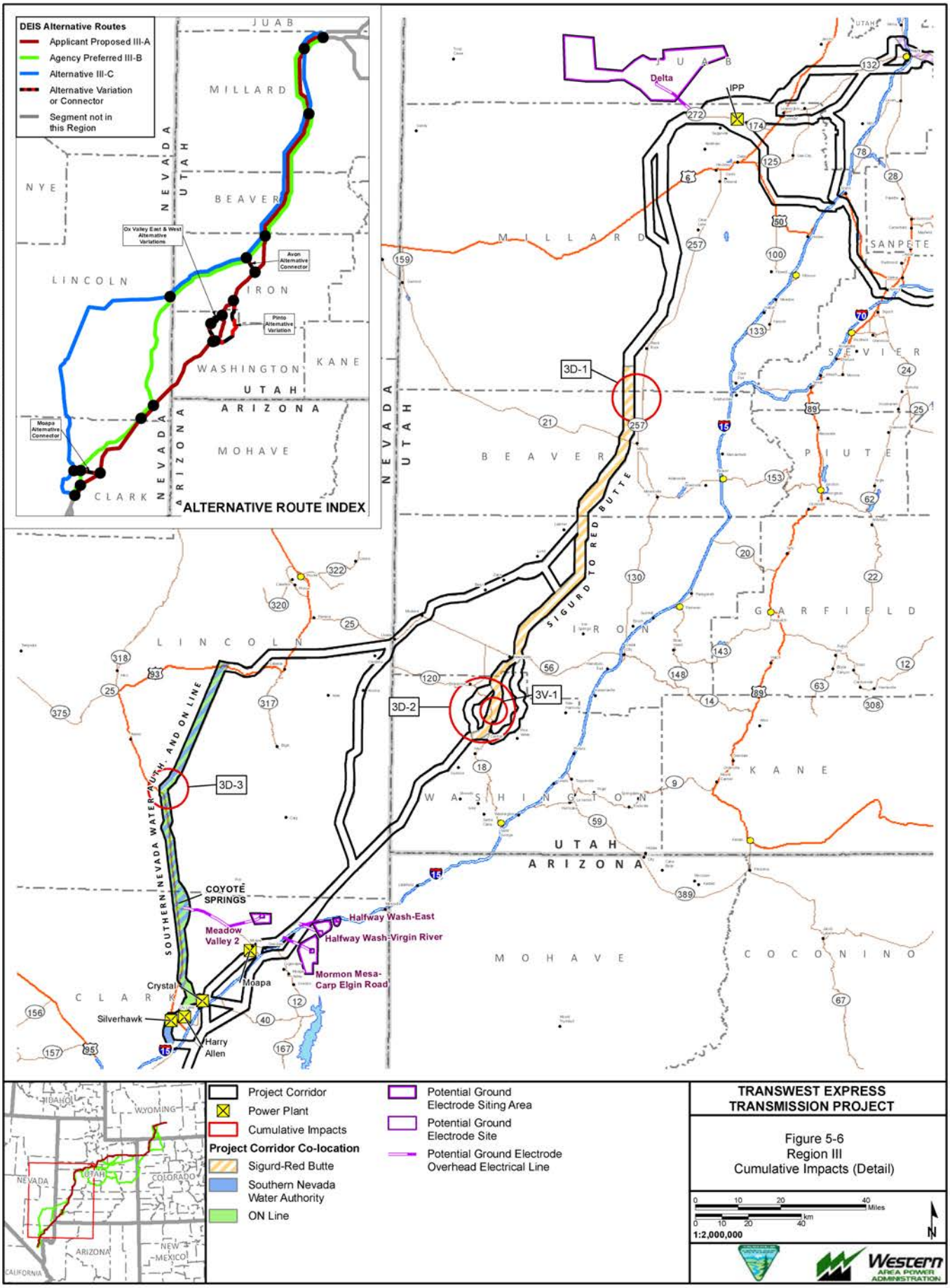
Vegetation Cover Type	RFFA Disturbance	Total Vegetation in Region III Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from TWE Alternatives
Developed/Disturbed	36	180,970	<1	<1
Dunes	-	15,313	<1	<1
Grassland	535	801,113	<1	<1
Greasewood Flat	75	274,079	<1	<1
Herbaceous Wetland	27	81,741	<1	<1
Montane Grassland	-	1,284	-	<1
Montane Shrubland	32	187,059	<1	<1
Open Water	-	12,281	-	<1
Pinyon-Juniper	534	1,292,483	<1	<1
Riparian	8	65,185	<1	<1
Sagebrush Shrubland	6,762	1,192,955	1	<1
Saltbush Shrubland	3,374	635,456	1	<1
Tundra	-	-	-	<1
Woody Riparian and Wetlands	8	54,368	<1	<1
Total	**19,290**	**7,318,681**	**<1**	**<1**

Figure 5-6 identifies potential cumulative impact constraint areas in Region III, which are identified and discussed in greater detail, by applicable resource, in Sections 5.3.1 through 5.3.19.

5.2.4 Region IV

5.2.4.1 Past and Present Actions

- Commercial, Residential, and Industrial Areas. Project alternatives (within existing utility corridors) would pass through and adjacent to residential and commercial areas in Lake Las Vegas and Henderson, Nevada. Other regional alternatives would pass through the Lake Mead National Recreation Area, and would bypass the community of Boulder City. A natural gas power plant is located adjacent to the Marketplace Substation in the Eldorado Valley.
- Renewable Energy. Two solar electric projects are located adjacent to the Marketplace Substation in the Eldorado Valley.
- Linear Utilities. **Figure 5-7** provides an overview of the linear utilities associated with the Project corridors in this region. The Mead, Marketplace, and Eldorado Substations represent major regional hubs for electrical energy distribution in the Southwest U.S. A very wide existing transmission corridor currently traverses the east side of the Las Vegas Valley to the Eldorado Valley. Transmission lines in this corridor primarily deliver power from interstate lines originating in the Rocky Mountain region. A second wide transmission corridor connects the hydropower facilities at Hoover Dam and regional power plants with the Eldorado Valley substations.


DEIS Alternative Routes
Applicant Proposed III-A
Agency Preferred III-B
Alternative III-C
Alternative Variation or Connector
Segment not in this Region
ALTERNATIVE ROUTE INDEX
Ox Valley East & West Alternative Variations
Avon Alternative Connector
Pinto Alternative Variation
Moapa Alternative Connector
Delta
IPP
3D-1
3D-2
3V-1
3D-3
COYOTE SPRINGS
Meadow Valley 2
Halfway Wash-East
Halfway Wash-Virgin River
Mormon Mesa-Carp Elgin Road
Moapa
Crystal
Silverhawk
Harry Allen
SIGURD TO RED BUTTE
SOUTHERN NEVADA WATER AUTH. AND ON LINE
Project Corridor
Power Plant
Cumulative Impacts
Project Corridor Co-location
Sigurd-Red Butte
Southern Nevada Water Authority
ON Line
Potential Ground Electrode Siting Area
Potential Ground Electrode Site
Potential Ground Electrode Overhead Electrical Line
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 5-6
Region III
Cumulative Impacts (Detail)
1:2,000,000
Western AREA POWER ADMINISTRATION
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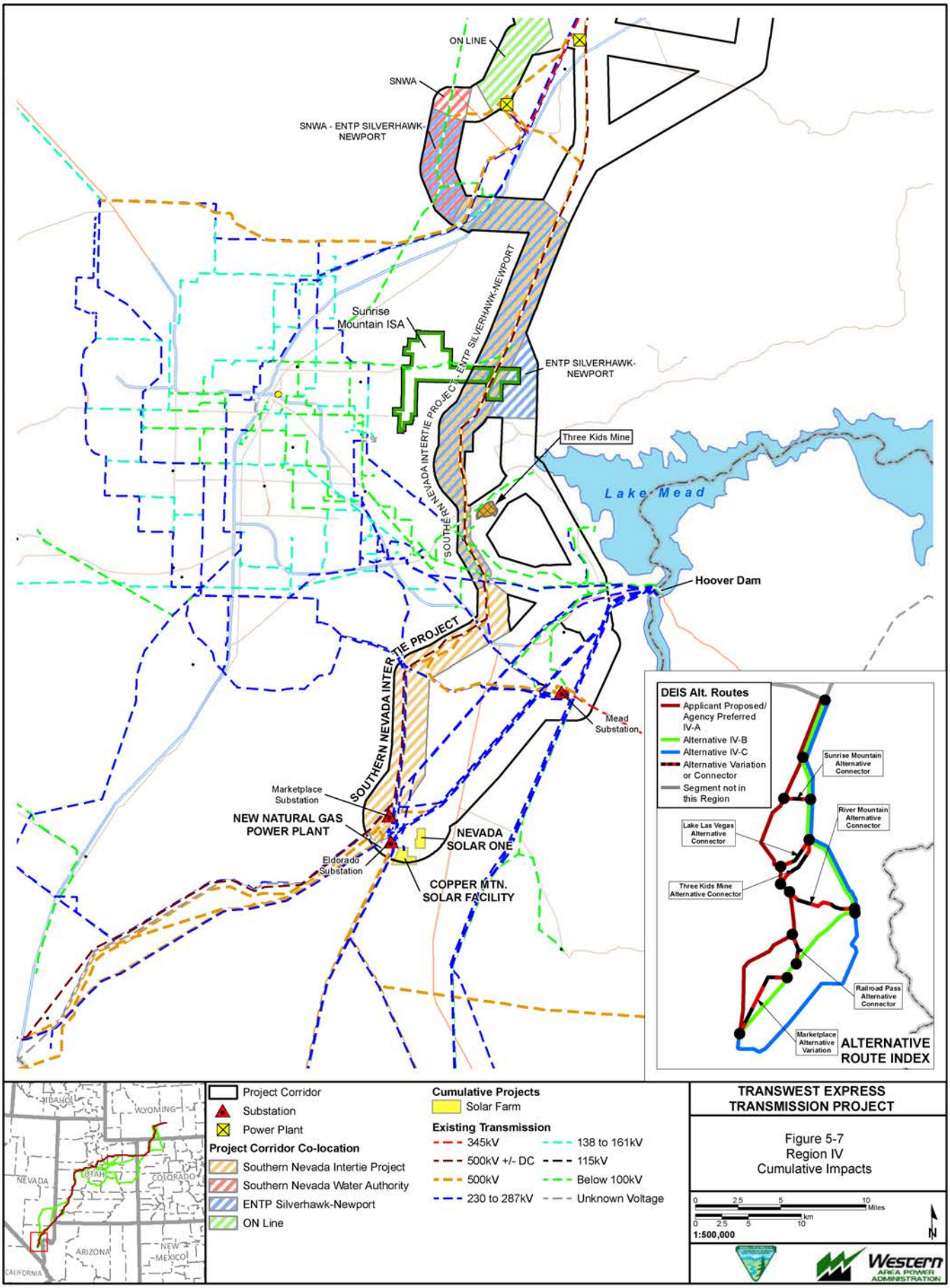

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Table 5-10 Estimated Cumulative Impacts from Past and Present Actions in the Region IV Analysis Area

Vegetation/Habitat Cover Type	Region IV Currently Disturbed (acres)	Region IV Historic Vegetation/Habitat	Percent Disturbed from Past and Present Actions
Barren/Sparsely Vegetated	8,445	793,928	1
Conifer Forest		-	-
Desert Shrubland	26,725	213,968	12
Grassland	-	-	-
Montane Shrubland	-	-	-
Open Water	293	114,412	<1
Pinyon-Juniper	-	12,329	-
Sagebrush Shrubland	-	-	-
Total	**35,463**	**1,134,637**	**3**

5.2.4.2 Reasonably Foreseeable Actions

Figure 5-7 illustrates the geographic relationships of the TWE Project alternatives and other reasonably foreseeable projects in Region IV. **Table 5-11** provides a summary of the types of projects, estimated construction time frames, and their potential cumulative impacts relationships.

Table 5-11 Reasonably Foreseeable Future Actions in Region IV

Type of Project	Construction Time Frame	Project/Description
Transmission Line	2012- 2013	Silver State Energy Associates Eastern Nevada Project 230-kV AC. Proposed from Silverhawk Power Plant to Newport Substation south of Henderson.
Transmission Line	2012-2014	Great Basin Transmission/ NV Energy Southern Nevada Interconnection Project
Centennial West Transmission Line	Unknown	Centennial West Clean Line 500-kV DC. New Mexico to California One alternative would interconnect at Marketplace Substation in the Eldorado Valley.
Fiber Optic Line	Unknown	Nevada Hospital Association, Nevada Broadband Telemedicine Initiative proposal to install fiber optic cable on existing Nevada Energy poles.
Renewable Energy	Unknown	Several of Nevada's Solar Energy Zones (SEZ) impact the same resources as the Project. These include the Dry Lake SEZ, Dry Lake North SEZ, Delamar Valley SEZ, and East Mormon Mountain SEZ. These areas are prioritized for the development of solar energy.

A summary of the disturbance impacts to the Region IV Analysis area from the RFFAs described above is given in **Table 5-12**.

Table 5-12 Estimated Cumulative Impacts from RFFAs in the Region IV Analysis Area

Vegetation Cover Type	RFFA Disturbance	Total Vegetation in Region IV Analysis Area (acres)	Percent Cumulative Disturbance from RFFA	Percent Additional Disturbance from TWE Alternatives
Agriculture	-	-	-	-
Aspen Forest and Woodland	-	-	-	-
Barren/Sparsely Vegetated	-	32,592	<1	<1
Cliff and Canyon	-	57,076	-	-
Conifer Forest	-	-	-	-
Deciduous Forest	-	-	-	--
Desert Shrub	6,140	720,701	1	<1
Developed/Disturbed	-	239,577	-	-
Dunes	-	-	-	-
Grassland	-	7,121	-	-
Greasewood Flat	-	-	-	-
Herbaceous Wetland	-	719	-	-
Montane Grassland	-	-	-	-
Montane Shrubland	-	-	-	-
Open Water	-	69,401	-	-
Pinyon-Juniper	-	1,888	-	-
Riparian	-	2,576	-	-
Sagebrush Shrubland	-	671	-	-
Saltbush Shrubland	-	1,912	<1	<1
Tundra	-	0	-	-
Woody Riparian and Wetlands	-	1,096	-	-
Total	**6,140**	**1,135,330**	**<1**	**<1**

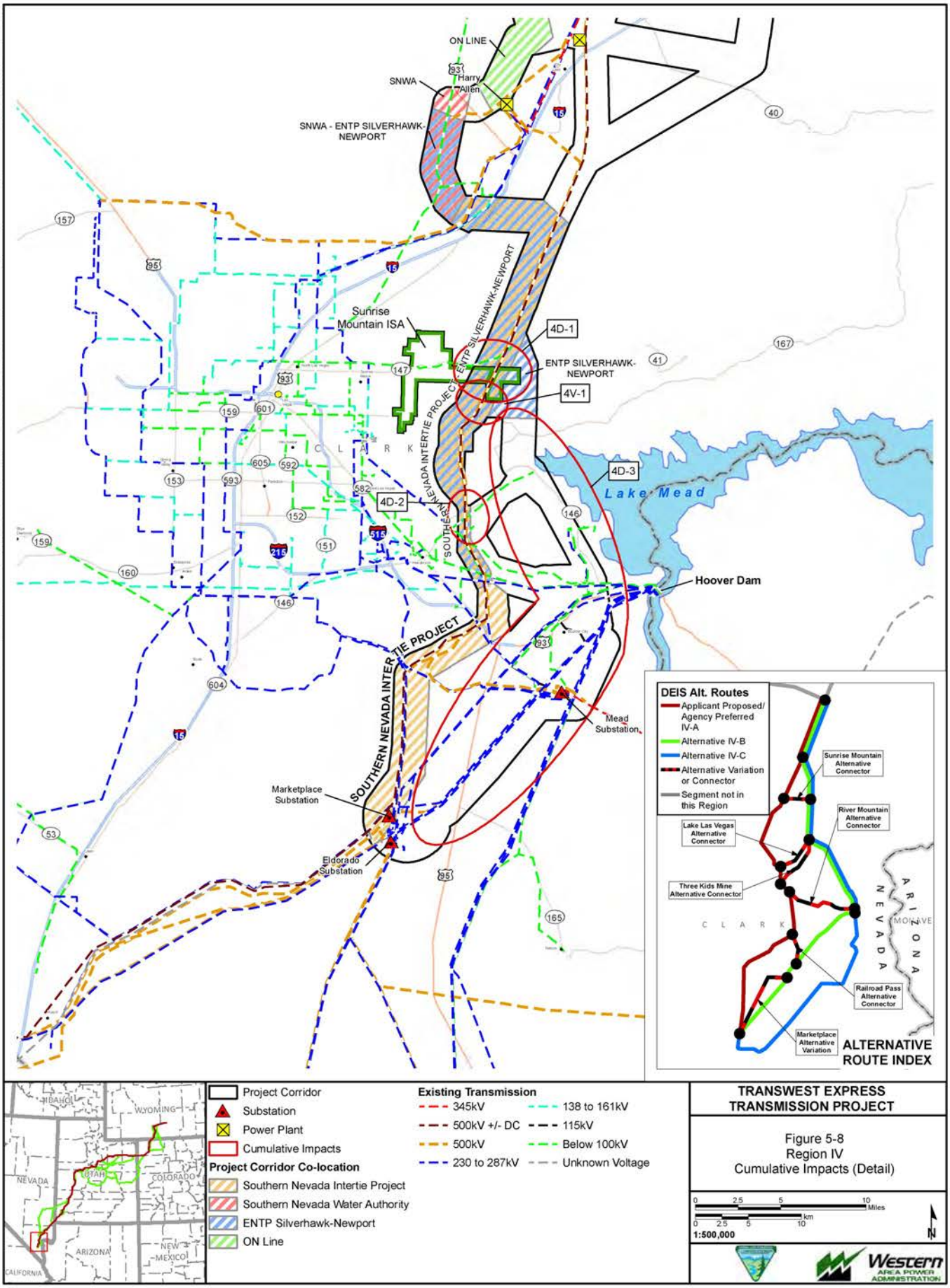
Figure 5-8 identifies potential cumulative impact constraint areas in Region IV, which are identified and discussed in greater detail, by applicable resource, in Sections 5.3.1 through 5.3.19.

5.2.5 Cumulative Impacts to Project Corridors

Many of the Project alternative corridors have the potential to be shared by reasonably-foreseeable transmission lines that propose similar or identical routes. This possibility for shared corridors was one of the criteria used by the BLM field offices for determining what plan amendments may need to be proposed and analyzed in this EIS. For specific resources where that co-location would result in unique cumulative impacts, those potential areas and/or extent of co-location are discussed below.

5.3 Cumulative Impacts

The following sections discuss the cumulative impacts study area and time frames for each resource; cumulative impacts common to all alternatives, and discussions of cumulative impact issues within regions by alternative.



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5.3.1 Air Quality

5.3.1.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – for regulated criteria pollutants – local air sheds (largely defined by surrounding high terrain); for greenhouse gas emissions – global.
- Temporal – Total project construction period (3 years) for construction activities; life of Project indefinite but assumed to be a minimum of 50 years for effects on greenhouse gases.

5.3.1.2 Cumulative Impacts

Criteria Pollutants

Existing regional air quality is in general compliance with NAAQS with the exception of the Las Vegas Valley, where air quality is considered to be nonattainment for ozone (8-hour) and PM_{10} (24-hour). The Project analysis found that, with implementation of fugitive dust and equipment emissions controls, there would be no predicted violation of ambient air quality standards by Project activities. Project construction activities would extend across a long, linear area over short periods of time (months). Because of differences in construction timing, it is unlikely that the Project emissions would overlap with those of other transmission projects undertaken in the same utility corridor.

Air quality monitoring data show that air quality in northwestern Colorado and northeastern Utah is considered to be in compliance with state and Federal ambient air quality standards. Cumulatively, current and reasonably foreseeable oil and gas development in this area (Regions I and II) creates the greatest potential risk to air quality in the Project analysis area. Cumulative air quality impacts from existing and foreseeable oil and gas development in Region I are unlikely to result in regional violations of NAAQS (see Section 5.1 of the Chokecherry Sierra Madre Wind Farm Final EIS; BLM 2012). Cumulative impacts of oil and gas development to air quality in the Uintah Basin are summarized below in **Table 5-13**.

Table 5-13 Cumulative Impacts of Oil and Gas Development to Air Quality in the Uintah Basin (Region I)

Pollutant	Averaging Time	Background and Existing Source Impacts (µg/m3)	Cumulative Sources Maximum Predicted Impact plus Background (µg/m3)	NAAQS (µg/m3)
NO_X	1-hour	20.0	157.2	188
	Annual	9.0	16.7	100
CO	1-hour	5,325	6,724	40,000
	Annual	3,910	4,161	10,000
SO_2	1-hour	21.7	24.3	197
	3-hour	16.7	18.6	1,300
	24-hour	5.9	6.8	365
	Annual	1.5	1.6	80
PM10	24-hour	18.0	22.5	150
PM2.5	24-hour	21.6	26.1	35
	Annual	12.3	13.1	15

Source: Greater Natural Buttes Final EIS (BLM 2012b).

However, based on recent monitoring, it is reasonably foreseeable the continued development in the area would result in future exceedances of NAAQS for certain criteria pollutants. Year-round ozone monitoring in the Uinta Basin have recorded numerous exceedances of the 8-hour ozone standard during the winter months (January through March). The most likely source of ozone precursors in the Uinta Basin are oil and gas operations in the vicinity of the monitors. Additionally, The Utah Division of Air Quality (UDAQ) conducted limited monitoring of $PM_{2.5}$ in Vernal, Utah, in December 2006. During the 2006-2007 winter seasons, $PM_{2.5}$ levels were measured at the Vernal monitoring station that were higher than the $PM_{2.5}$ health standard that became effective in December 2006. The most likely causes of elevated $PM_{2.5}$ at the Vernal monitoring station are probably those common to other areas of the western U.S. (combustion and dust) plus nitrates and organics from oil and gas activities in the Basin.

Air quality monitoring data show that air quality in the Region III analysis area is considered to be in compliance with state and Federal ambient air quality standards. Portions of the Region IV analysis are located in Clark County, where the air quality is considered to be nonattainment for ozone (8-hour) and PM_{10} (24-hour). The Project would not contribute to existing projects to the extent that it would cause exceedances of either ozone or PM_{10} (**Table 3.1-18**).

Conclusion

Contributions of the Project alternatives to cumulative emissions from existing and reasonably foreseeable future projects would not lead to exceedance of NAAQS for criteria pollutants.

Greenhouse Gas Emissions and Climate Change

Total greenhouse emissions from the proposed project and alternatives would range from 749 to 833 tons per year during construction. Total construction GHG emissions would be less than 3 percent of what would be considered a major source by USEPA. Although this project's construction would have negligible inputs on the global carbon emissions, it would still be contributing cumulatively in the short term to total global annual GHG emissions, which total an estimated 41 billion metric tons (Emissions Database for Global Atmospheric Research 2012). GHG emissions have been linked with accelerated climate change (National Research Council 2010; IPCC 2007).

Conclusion

Project alternatives short-term negligible contribution to cumulative GHG would be offset in the long-term by the Project's facilitation of the use of renewable energy resources, which would contribute much less long-term operational GHG emissions than conventional non-renewable energy sources such as coal or gas-fired power plants. Assuming the transmission line carries 80 percent renewable energy, there would be a net saving of 3000 megawatts of generation resulting in a savings of about 16,000 GWh of power production from fossil fuels on an annual basis. The USEPA Greenhouse Gas Equivalencies Calculator indicates that this would reduce CO_2e emissions by 12.2 $X10^6$ tons per year. Accordingly, in the long term, the Project and alternatives actually would decrease potential contributes to cumulative GHG emissions and global climate change.

5.3.2 Geologic Hazards, Paleontology, and Mineral Resources

5.3.2.1 Physical and Temporal Boundaries of Cumulative Impacts

Geologic Hazards – Landslides

- Physical – boundaries of recent landslide features based on geologic and geotechnical studies.
- Temporal – Indefinite (minimum of 50 years).

Paleontological Resources

- Physical – Extent of high yield fossil deposits within areas of Project surface disturbance.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years) for improved access for unauthorized fossil collections.

Mineral Resources – Oil and Gas Wells and Infrastructure

- Physical – Area of oil and gas fields with economically recoverable reserves.
- Temporal – Indefinite (minimum of 50 years).

Mineral Resources – Surface and Underground Coal or Other Mineral Mines

- Physical – Area of economically recoverable coal or mineral reserves.
- Temporal – Indefinite (minimum of 50 years).

5.3.2.2 Cumulative Impacts

Geologic Hazards. Engineering design to address geologic hazards would be specific to each project. In general, separation requirements between transmission lines (generally 1,500 feet or more) would be adequate to prevent cumulative impacts (one transmission line falling into another) as the result of earthquake ground shaking and soil liquefaction. Construction of access roads and structure foundations for one transmission project could affect slope stability for nearby projects located upslope or down slope. In many locations, resource concerns create the potential for project pinch points where reasonably foreseeable transmission lines may be approved only if they are built closer than 1,500 feet to each other. In some of these cases, it is possible that agencies will require them within 250 feet from each other in the same corridor. In these cases, there is a risk of transmission lines falling into each other if there is a major seismic event. It is not certain where this may occur and would depend on which alternative corridor and what degree of separation the lead federal management agencies would require. Potential pinch point areas include Segments 100, 101.10, 101.20, and 101.30 (all alternatives in Region I); Segments 218, 219.10, 219.50, 219.6, and 217.052 (Alternatives II-E and II-F); Segment 520 (Alternative III-C); and Segments 610, 620, 630, 640, 650, 660, 700, 720, 740 (Alternatives IV-A, IV-B, and IV-C). Also, it is possible that if the USFS approves multiple transmission lines across IRAs, they also may require a closer separation distance than 1,500 feet.

Areas of known landslides have been identified (Section 3.2). Specific areas where access road planning and geotechnical studies may be needed to address landslide hazards for multiple projects within the utility corridor are listed by region and alternative:

- Region II: Alternatives II-A, II-E, and II-F in Utah: Price River valley (U.S. Highway 6) to Nephi. Potential cumulative facilities: Two new parallel transmission lines (TWE, EGS), existing 500-kV transmission line (**Figure 5-4 – Area 2G-1**).
- Region II: Alternative II-B in Utah: Fountain Green to Nephi. Potential cumulative facilities: Two new parallel transmission lines (TWE, EGS), existing 345-kV transmission line (**Figure 5-4 – Area 2G-2**).

Paleontological Resources. Surface disturbance within high yield fossil areas likely would result in some irreversible loss of fossil material, regardless of the monitoring and fossil recovery programs implemented. It is anticipated that each project that would be constructed across high yield fossil areas would incrementally reduce the quantity of near-surface fossil resources as more of the ground surface is disturbed. The quantities of fossils recovered and contributed to scientific collections also would incrementally increase.

The risk of unauthorized collection of fossils would be increased by improved access and more bedrock exposure from construction activities.

Mineral Resources – Oil and Gas Wells. The Project has used a 250-foot offset from existing well pads as a planning criterion for routing the transmission line through active oil and gas fields. Similar offset requirements would be anticipated for other transmission projects traversing the same fields. Since well pad development is typically not regular (well pad site locations are optimized for favorable terrain, access, and interconnection options), the second transmission line must find an independent alignment to avoid existing and planned well pads. The consequence of this requirement is that the second transmission line project cannot maintain a standard distance from the first transmission line, usually resulting in greater separation distances. The well pad offset buffer may change the development pattern of the well field by requiring more directional drilling. In summary, it is unlikely that one or more transmission lines would preclude access to underlying oil and gas resources, but may increase the costs of drilling and production, as well as the transmission line costs because of additional length, and ultimately, a wider utility corridor. Areas where detailed transmission line routing would be required, with potential utility corridor width expansion within active oil and gas fields are listed below:

- Region I: Alternatives I-A, I-B, and I-C: I-80 Corridor, Sinclair to vicinity of Monell. Potential facilities: Three new parallel transmission lines (TWE, EGW, EGS); existing 230-kV transmission line (**Figure 5-2 – Area 1G-1**).
- Region I: Alternatives I-A, I-B, and I-C in Wyoming: I-80 Corridor to Wyoming/Colorado border. Potential facilities: Two new parallel transmission lines (TWE, EGS) (**Figure 5-2 – Area 1G-2**).
- Region II: Alternatives II-B and II-C in Colorado: Rangely to I-70 corridor. Potential facilities: Two new parallel transmission lines (TWE, EGS); existing natural gas liquids pipeline, Baxter Pass road (**Figure 5-4 – Area 2G-3**).

Minerals – Underground Coal Mines. Project alternative corridors would cross the surface of underground coal leases. These areas could experience subsidence from long wall mining in the future. Any other transmission project that crosses the same underground coal leases would likely experience the same subsidence risks. Cumulatively, these transmission lines could restrict access to some of the coal resources underneath the transmission lines, depending on how those resources are mined.

- Region II: Alternative II-B in Utah: Wasatch Plateau, west of Huntington Power Plant. Potential facilities: Two new parallel transmission lines (TWE, EGS); existing 345-kV transmission line (**Figure 5-4 – Area 2G-4**).

Conclusion

Cumulative construction of multiple transmission lines in the same corridor increases the risk to paleontological resources. However, the required mitigation measures associated with potential impacts to paleontological resources required in BLM RMPs would largely preclude those impacts from being significant. Oil and gas development would not experience significant cumulative effects from multiple transmission lines due to the ability to directionally drill to access subsurface resources. Underground coal operations would not be affected by overhead transmission lines; however, those lines could be at risk of subsidence and would need to be planned accordingly. Cumulative addition of multiple transmission lines in coal leases could impact the ability to surface mine those areas in the future.

5.3.3 Soils

5.3.3.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – HUC 10 watersheds impacted by the proposed project.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.3.2 Cumulative Impacts

The majority of the soils crossed by the Project alternatives underlie native rangelands. Many of these soils are erodible by wind and water, and vegetation cover is sparse because of aridity. Existing actions that affect soil stability and quality include livestock grazing, agricultural production on irrigated lands, ROWs for roads, pipelines, oil and gas developments, and vegetation treatments. The most prevalent indicator of cumulative soil loss throughout the analysis area is proportional disturbance to the soils surface. A summary of the total estimated proportional disturbance to soils throughout the HUC 10 watersheds in the analysis area is shown in **Table 5-14**.

Table 5-14 Estimated Cumulative Disturbance to Soils in Analysis Area

Region	Total Acreage of Existing Soils in Analysis Area	Total Acreage of Surface Disturbance from Past and Present Actions	Total Disturbance from RFFAs	Percentage of Analysis Area Disturbed
I	5,350,458	261,550	53,889	5
II	11,120,289	786,455	65,148	8
III	7,318,681	197,809	19,291	3
IV	1,135,330	35,464	6,140	3
Total	**24,924,758**	**1,281,278**	**144,468**	**6**

Conclusion

Both the BLM and the USFS require soil protection BMPs that would be applicable for all reasonably foreseeable project disturbances that are likely to occur in the analysis area (**Appendix C**). However, cumulative surface disturbance ranging from 3 to 8 percent at the region watershed level, with an average of 6 percent throughout the analysis area, would result in continued soil erosion and loss of soil productivity throughout the project area. Additional disturbance from the Project alternatives would proportionally contribute very little cumulatively to these impacts (<1 percent).

5.3.4 Water Resources

5.3.4.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Project surface disturbance to HUC10 impaired watersheds impacted by the Project.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.4.2 Cumulative Impacts

As with soil resources, a reliable indicator of potential cumulative impacts to water quality throughout the analysis area is proportional surface disturbance and loss of vegetation cover, particularly in existing impaired watersheds. A summary of the total estimated cumulative loss of vegetation for impaired HUC 10 watersheds in the analysis area is shown below in **Table 5-15**.

Table 5-15 Estimated Cumulative Impacts from RFFA on Impaired Watersheds

Impaired Watershed	Total Impaired Watershed Acreage (acres)	Cumulative Disturbance from Past, and Present Actions	Cumulative Disturbance from RFFA (acres)	Percent of Analysis Area Disturbed
Antelope Creek	127,072	5,097	1,277	5
Upper Muddy Creek	135,362	2,705	3,248	4
Cottonwood Creek	216,237	17,577	14,745	15
Soldier Creek	150,876	5,347	9,054	10
Deception Creek	136,566	12,162	-	9
Spring Creek – Yampa River	212,195	13,992	-	7
Hell's Canyon	242,708	4,742	-	2
Greasewood Gulch – Little Snake River	229,499	5,788	-	3
Outlet Douglas Creek	98,453	2,521	-	3
Evacuation Creek	184,097	2,370	-	1
Pigeon Water Creek – Lake Fork River	123,304	38,350	-	31
Coal Creek	161,019	27,217	-	17
Total	**2,017,388**	**137,868**	**28,324**	**8**

Conclusion

Disturbance

The impaired watersheds show a wide range of cumulative disturbance from past and present actions (1 to 31 percent). When combined with RFFAs, total disturbance in the impaired watersheds ranges from 5 to 31 percent. The high level of past and present cumulative disturbance in these watersheds presents an existing condition where erosion, sedimentation, and subsequent water quality impacts would continue to occur. The Project would contribute minimally to the disturbance in these watersheds (less than 1 percent).

Both the BLM and the USFS require soil protection BMPs that would be applicable for all reasonably foreseeable project disturbances that are likely to occur on federal lands in the analysis area (**Appendix C**). Additionally, both the BLM and USFS have best management practices and stipulations to address the avoidance and or minimization of impacts to perennial water bodies. These practices are described in detail in **Appendix C**, and the impacts of implementing these practices are summarized in the Section 3.4, Water Resources. Adherence to these BMPs would decrease the long-term contribution of the Project to the cumulative disturbances in these watersheds.

Water Use

TransWest proposes to obtain batch plant and dust control water from municipal or commercial sources, or from existing water rights. The use of existing water rights would avoid water reduction effects on other users, and would not change the surface water diversion pattern already in place. Assuming that other foreseeable transmission line projects in the same utility corridor would apply the same approach to construction water acquisition, no additive cumulative reductions in stream flows are anticipated.

5.3.5 Vegetation

5.3.5.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Disturbance to vegetation within HUC 10 watersheds impacted by the Project.
- Temporal
  - Construction – Approximately 1 year at any location before re-vegetation can be initiated.
  - Operation – Indefinite (minimum of 50 years).

5.3.5.2 Cumulative Impacts

Native vegetation communities predominate within the Project alternative corridors in all regions (Section 3.5, Vegetation). The majority of these communities are shrublands, with long recovery times after disturbance. Summaries of the cumulative vegetation impacts to the HUC 10 analysis from past, present, and reasonably foreseeable future actions, as well as the proportional additional impact from the Project alternatives, are found in **Tables 5-1**, **5-3**, **5-4**, **5-6**, **5-7**, **5-9**, **5-10**, and **5-12**.

Conclusion

Cumulative impacts on RFFAs on vegetation affected by the Project would be relatively low (averaging less than 1 percent disturbance of the analysis area). Past and present disturbance to vegetation is considerably higher, ranging from 3 to 8 percent of the analysis area. All Project alternatives would contribute less than 1 percent of long-term disturbance to this cumulative disturbance. This small proportional amount of cumulative disturbance would have a low impact on overall vegetation composition and health in the analysis area.

5.3.6 Special Status Plants

5.3.6.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – boundary of special status plant species habitat potentially impacted with the Project alternatives' 2-mile corridor.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.6.2 Cumulative Impacts

Suitable habitat has been identified for a variety of federal listed and candidate plant species, as well as BLM and USFS sensitive species for corridors where the Project and other reasonably foreseeable transmission could be constructed. Section 3.6, Special Status Plant Species discloses the acreage of sensitive plant species suitable habitat within the Project 2-mile corridors. It is reasonably foreseeable that there could be up to three transmission lines with 1,500 feet of separation in any one of these Project corridors that include sensitive plant habitat. In that case, total avoidance of that habitat or individual plant species would become very difficult and the acreage of sensitive species habitat disclosed for each region in Section 3.6, Special Status Plant Species, of this Draft EIS would be at risk of disturbance from cumulative disturbance from road construction, ROW clearing, and tower placement activities.

TransWest will conduct surveys for special status plants for any special status plant species habitat that it cannot avoid as outlined in mitigation measure **SS-1**. The results of these surveys would be used to route surface disturbance around plant individuals and populations. Based on mitigation measure **SSP-3**, surface disturbance would be located 300 meters from any special status plant species populations or individuals. It is highly likely that BLM and USFS plan requirements would require that other foreseeable projects within the Project alternative corridors conduct similar surveys. To the extent possible, sensitive plant species

individuals would be avoided on federal lands subject to ROW grant stipulations, including those stipulations required by the respective BLM field offices and USFS forests crossed by the Project (see **Appendix C**). However, in certain areas, the approval of two or more transmission lines in the same corridor would make total avoidance of special status plant habitat virtually impossible. As a result, the following species could be cumulatively impacted through the loss of suitable habitat and/or individuals: Maguire campion, clay phacelia, Ward beardtongue, Uinta Basin hookless cactus, clay reed-mustard, shrubby reed-mustard, Graham's penstemon, Duchesne greenthread, Goodrich blazingstar, Untermann daisy, Deseret milkvetch, Arizona willow, Elsinore buckwhat, and Sigurd townsendia. The location and extent of these species' habitats that would be subject to this risk are disclosed in detail in Section 3.6, Special Status Plant Species.

Conclusion

Cumulative disturbance to special status plant populations from multiple transmission lines in project corridors would be minimized through surveys and design and engineering to avoid individuals and populations. BMPs, including erosion controls, timber mats, helicopter-only tower installation (where appropriate), and limited surface travel would likely be required for all foreseeable transmission lines to minimize and prevent indirect impacts to these species. However, for those areas where avoidance is difficult, loss of some sensitive plants is inevitable. The exact location and extent of this loss cannot be ascertained until the lead agencies determine the number and location of transmission lines that would eventually be permitted in the same corridors.

5.3.7 Wildlife

5.3.7.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Big game – agency-designated habitat impacted by the proposed project; small game and waterfowl – habitat vegetation types with the HUC 10 watershed impacted by the proposed project.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.7.2 Cumulative Impacts

A variety of representative wildlife species have been identified as potentially present within the Project analysis area. The cumulative impacts to these species are summarized in **Tables 5-16** and **5-17**.

Table 5-16 Estimated Cumulative Impacts from RFFA on Big Game Habitat

Big Game Habitat	Cumulative Disturbance from RFFA (acres)	Total Big Game Habitat (acres)	Percent Disturbed from RFFA
Colorado Mule Deer – severe winter	1	856,837	<1
Colorado Pronghorn –severe winter	66	214,084	<1
Colorado Rocky Mtn. Elk – severe winter	-	1,122,742	-
Nevada – Desert Bighorn Sheep	404	822,392	<1
Nevada – Mule Deer	-	250,417	-
Nevada - Pronghorn	3,430	1,512,355	<1
Utah – Desert Bighorn Sheep	-	1,171,482	-
Utah - Moose	28,530	1,319,143	2
Utah – Mule Deer winter crucial	6,525	4,299,439	<1
Utah – Pronghorn year-long crucial	13,983	10,574,061	<1

Table 5-16 Estimated Cumulative Impacts from RFFA on Big Game Habitat

Big Game Habitat	Cumulative Disturbance from RFFA (acres)	Total Big Game Habitat (acres)	Percent Disturbed from RFFA
Utah – Pronghorn year-long substantial	449	935,283	<1
Utah – Rocky Mtn. Bighorn year-long crucial	4,647	1,781,886	<1
Utah – Rocky Mtn. Elk winter crucial	5,192	3,329,852	<1
Wyoming – Mule deer crucial winter	174	56,618	<1
Wyoming – Mule Deer crucial winter/yearlong	4,346	306,210	1
Wyoming – Pronghorn crucial winter/yearlong	5,975	485,710	1
Wyoming – Rocky Mtn. Elk crucial winter/yearlong	2,056	206,076	1
Total	**75,778**	**29,244,587**	**<1**

Table 5-17 Estimated Cumulative Impacts from RFFA on Small Game and Waterfowl Habitat

Habitat	Cumulative Disturbance from RFFA (acres)	Total Habitat (acres)	Percent Disturbed from RFFA
Small Game	143,771	23,782,225	1
Waterfowl	507	625,201	<1
Total	**144,278**	**24,407,426**	**1**

Conclusion

Cumulative impacts to big game, small game, and waterfowl species habitat are low (typically less than 1 percent) throughout the analysis area. This relatively low amount of cumulative impact is unlikely to impact the overall population viability of these species in the analysis area. However, the co-location of two or more transmission lines with 1,500 feet of separation in a given wildlife corridor may affect the ability of wildlife to cross the corridor. The level of impact depends upon the number of transmission lines allowed and the extent of clearing required in that segment. The extent of this impact depends upon the location and number of transmission lines approved.

5.3.8 Special Status Wildlife Species

5.3.8.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Federal listed, federal candidate, USFS Sensitive, and USFS MIS species – federal or state designated habitat impacted by the proposed project and/or potential habitat within HUC 10 watersheds impacted by the proposed project.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.8.2 Cumulative Impacts

Cumulative impacts for representative special status wildlife species were analyzed based on potential habitat identified through vegetation cover type, modeled habitat, or specific federal or state designated habitat. With the exception of desert tortoise and sage grouse, cumulative impacts to special status species are shown in **Table 5-18**. Desert tortoise and sage grouse cumulative impacts are presented separately in

Tables 5-19 and **5-20**, respectively. These latter two species are presented separately because they are analyzed by modeled or designated habitat that varies by state or model type.

Table 5-18 Estimated Cumulative Impacts from RFFA on Special Status Species Habitat

Habitat	Cumulative Disturbance from RFFA (acres)	Total Habitat (acres)	Percent Disturbed from RFFA
Federal Listed Species			
Black-Footed Ferret	3,459	729,682	<1
California Condor	7,819	2,420,898	<1
Canada Lynx	19,428	513,005	4
Gray Wolf	137,729	23,782,226	1
Mexican Spotted Owl	807	729,612	<1
Pygmy Rabbit	63,299	6,539,728	1
Northern Goshawk	23,404	1,181,087	2
Utah Prairie Dog	3,994	801,113	<1
Southwestern Willow Flycatcher	59	166,286	<1
Yellow-Billed Cuckoo	59	166,286	<1
Yuma Clapper Rail	27	82,460	<1
USFS MIS			
Yellow Warbler	35,081	7,928,961	<1
White-Tailed Ptarmigan	-	-	-
Warbling Vireo	12,181	4,937,166	<1
Song Sparrow	104,987	19,234,661	1
Lincoln's Sparrow	35,472	8,117,201	<1
Hairy Woodpecker	16,242	5,735,533	<1
Western Bluebird	58,840	10,875,161	1
MacGillivray's Warbler	35,104	7,942,895	<1
Brewer's Sparrow	63,299	6,539,728	1
Abert's Squirrel	19,454	553,538	4
American Beaver	1,031	368,534	<1
Wild Turkey	54,918	14,825,276	<1
Northern Flicker	12,989	6,463,377	<1
Three-toed Woodpecker	23,404	1,181,087	2
Total	**733,086**	**131,815,501**	**<1**

Table 5-19 Estimated Cumulative Impacts from RFFA on Desert Tortoise Habitat

Desert Tortoise Habitat	Cumulative Disturbance from RFFA (acres)	Total Desert Tortoise Habitat (acres)	Percent Disturbed from RFFA
USFWS Critical Habitat	2,095	958,353	<1
USFWS Potential Habitat (USGS Modeled 0.3)	10,982	2,812,620	<1
USGS Modeled Habitat (0.6 – 1.0)	10,907	2,679,923	<1
Total	**23,984**	**6,450,896**	**<1**

Table 5-20 Estimated Cumulative Impacts from RFFA on Sage Grouse Habitat in Colorado and Utah

Sage Grouse Habitat	Cumulative Disturbance from RFFA (acres)	Total Sage Grouse Habitat (acres)	Percent Disturbed from RFFA
Wyoming Core Habitat	4,599	712,257	<1
Colorado - PGH	507	800,993	<1
Colorado - PPH	374	1,261,030	<1
Utah – brood rearing	5,392	1,387,960	<1
Utah - occupied	6,635	1,708,028	<1
Utah - winter	1,519	992,175	<1
Total	**19,026**	**6,862,443**	**<1**

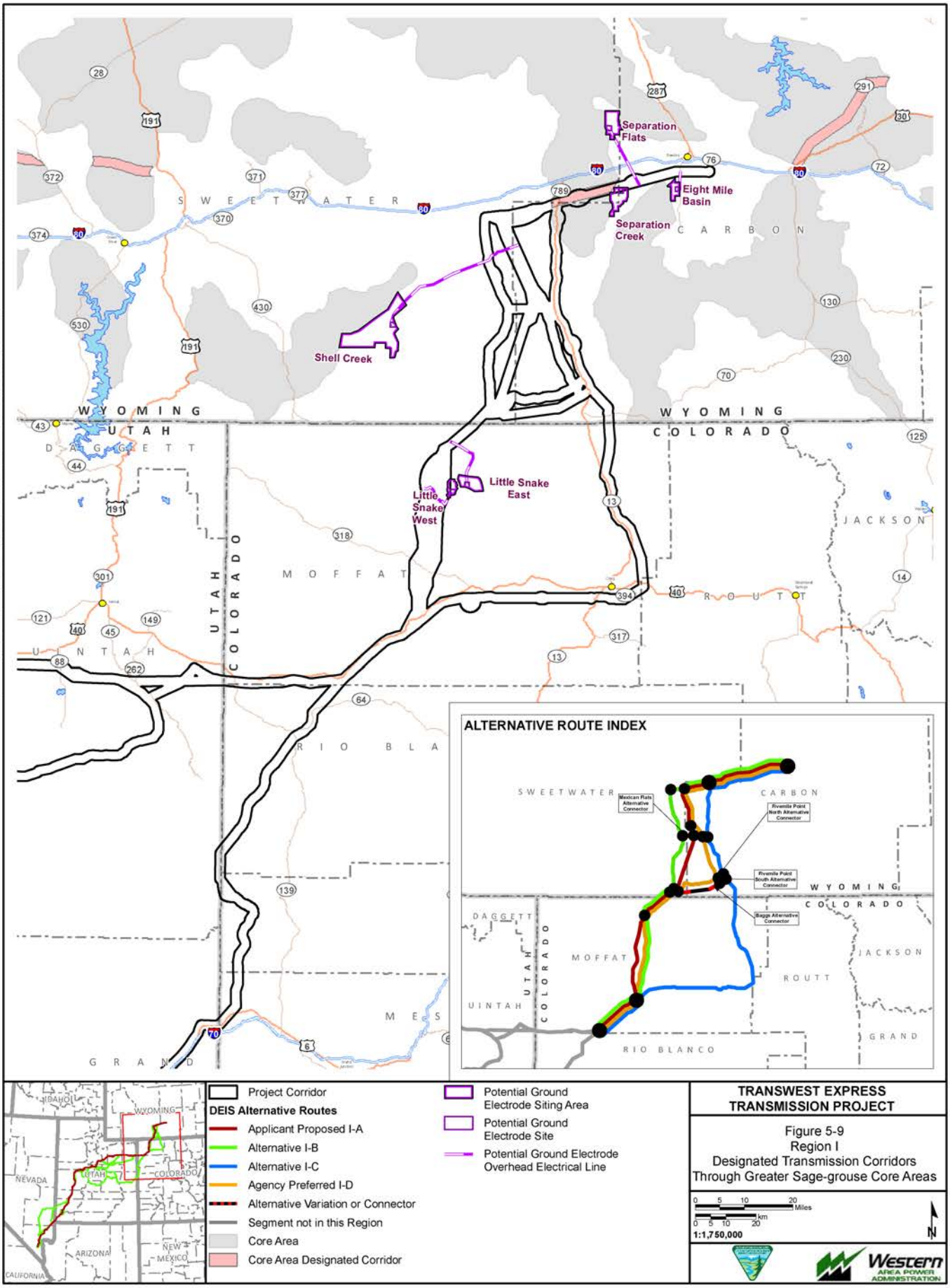
Cumulative impacts to greater sage grouse are disclosed by state to account for differences in how the BLM and/or state wildlife agencies in each state categorize greater sage grouse habitat. These impacts are summarized in **Table 5-20**.

There are a large number of BLM sensitive species that would be cumulatively impacted by RFFAs and the Project. Cumulative impacts to these species are represented by the vegetation impacts for the habitat types they are associated with (see **Tables 5-1**, **5-3**, **5-4**, **5-6**, **5-7**, **5-9**, **5-10**, and **5-12**). A description of which habitat types are associated with which species is provided in Section 3.8, Special Status Wildlife Species, **Tables 3.8-25**, **3.8-36**, **3.8-43**, and **3.8-51**.

Conclusion

Cumulative impacts to the majority of the federally listed or candidate species from reasonably foreseeable future actions and the Proposed Action and alternatives are relatively low (less than 1 percent of available habitat) and are unlikely to contribute to a loss in population viability for the species. Note that federally listed species that rely on conifer habitat (i.e., Northern goshawk, Canada lynx, Abert's squirrel) would experience cumulative habitat loss of from 2 to 4 percent. Again, this relatively small amount of habitat loss is unlikely to lead to a loss of population viability for these species; however, it could represent a cumulative risk to populations of that species if that habitat is not restored or replaced over time. The relative contribution of all the Project alternatives to direct long-term impacts to these special status species would be less than 1 percent.

Based on requirements outlined in Wyoming Executive Order 2011-5, an evaluation of cumulative effects to greater sage grouse habitat is required where projects would traverse core area habitats in Wyoming (**Figure 5-9**). This evaluation requires consideration of surface disturbance from existing projects, as well as the Project. As stated in Wyoming Executive Order 2011-5, surface disturbance within core areas is limited to no more than 5 percent of suitable greater sage-grouse habitat per an average of 640 acres and 1 structure per 640 acres. Based on the *Density and Disturbance Calculation Tool* (DDCT) *Manual* (dated 7-13-11), greater sage-grouse habitat disturbance and density calculations were performed for alternative corridors affecting Wyoming core sage grouse habitat. The methodology for this evaluation is contained in the DDCT Manual. The results of those calculations indicated that for all Project alternatives in area habitat, impacts when considered with present disturbance would have a total cumulative proportional impact on core habitat ranging from approximately 2 to 3 percent and none of the alternatives would result in more than 1 structure per 640 acres.


Separation Flats
Eight Mile Basin
Separation Creek
Shell Creek
Little Snake East
Little Snake West
SWEETWATER
CARBON
WYOMING
UTAH
COLORADO
DAGGETT
MOFFAT
JACKSON
ROUTT
UINTAH
RIO BLANCO
GRAND
ALTERNATIVE ROUTE INDEX
Mexican Flats Alternative Connector
Riverside Point North Alternative Connector
Riverside Point South Alternative Connector
Bagge Alternative Connector
IDAHO
NEVADA
ARIZONA
NEW MEXICO
CALIFORNIA
Project Corridor
DEIS Alternative Routes
Applicant Proposed I-A
Alternative I-B
Alternative I-C
Agency Preferred I-D
Alternative Variation or Connector
Segment not in this Region
Core Area
Core Area Designated Corridor
Potential Ground Electrode Siting Area
Potential Ground Electrode Site
Potential Ground Electrode Overhead Electrical Line
TRANSWEST EXPRESS TRANSMISSION PROJECT
Figure 5-9
Region I
Designated Transmission Corridors
Through Greater Sage-grouse Core Areas
Miles
km
1:1,750,000
N
Western AREA POWER ADMINISTRATION
Exported On: 6/5/2013
X:\0Projects\12907_003_Transwest_Express\Figures\DocumentFigures\2013_DEIS_v3\CumulativeFig_5_09_SRI_GSG_CoreTlineCorridors.mxd

Direct long-term cumulative loss of sage grouse habitat from reasonably-foreseeable future actions and the Proposed Action are relatively low (less than 1 percent of available habitat) and are unlikely to contribute to a loss in population viability for the species. However, past impacts to sage grouse habitat, ranging from 5 to 17 percent in the analysis area, have undoubtedly decreased existing populations. The cumulative impacts of this Project and other RFFAs would continue to contribute cumulatively to these decreases unless effectively mitigated. Additionally, short-term construction noise from multiple transmission lines within alternative corridors, as well as increased long-term perching opportunities for potential raptor predators, would affect up to 20 percent of available sage grouse habitat within the analysis area. While this indirect impact would not remove that habitat, it would have short-term disturbance effects that could decrease occupancy of the area. It is possible that increased perching opportunities may increase predation risk on sage grouse using cumulatively impacted habitat. The requirement for anti-perching devices on proposed transmission structures may decrease this risk.

It is recommended that TransWest conduct pre-construction surveys, avoid habitat removal, and conduct monitoring surveys to reduce habitat loss and loss of individuals from construction activities. Similar measures likely would be required for other foreseeable projects requesting a federal ROW permit. Typically, avoidance of special status species habitat to the extent possible is required for all proposed projects crossing USFS and BLM land. For those instances where absolute avoidance is not possible, plan stipulations are designed to minimize project impacts on these species (**Appendix C**).

5.3.9 Aquatic Biological Resources

5.3.9.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – stream crossing locations within the transmission line construction ROW, and access road system.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.9.2 Cumulative Impacts

The risk of cumulative impacts to aquatic organisms can be assessed based on the total vegetation clearing and associated sedimentation risk disclosed in Section 5.3.4, Water Resources. Additionally, cumulative direct disturbance impacts could occur to a variety of aquatic invertebrate, amphibians, and fish that inhabit streams that would be crossed by the Project alternatives (Section 3.9, Aquatic Biology Resources), as well as other foreseeable transmission lines using the same corridors. These cumulative impacts are summarized below in **Table 5-21**.

Table 5-21 Estimated Cumulative Aquatic Habitat Alteration or Loss from the Project and Other Foreseeable Transmission Lines

Alternatives/Connectors	Habitat Loss (ft^2)
Region I	
I-A	0
I-B	0
I-C	7,200
I-D	0
Region II	
II-A	20,000

Table 5-21 Estimated Cumulative Aquatic Habitat Alteration or Loss from the Project and Other Foreseeable Transmission Lines

Alternatives/Connectors	Habitat Loss (ft^2)
II-B	39,200
II-C	44,000
II-D	14,400
II-E	30,400
II-F	14,400
Region III	
III-A	4,800
III-B	2,400
III-C	800
Region IV	
IV-A	800
IV-B	3,200
IV-C	2,400
Total	**175,200**

Conclusion

It is anticipated that similar design features and agency BMPs would be applied to the other foreseeable projects that may share the Project corridor. Based on implementation of these BMPs, as well as stream crossing design features, it is anticipated that cumulative impacts from construction and use of project water body crossings would not violate state water quality standards (Section 3.4, Water Resources). The Project proposes to use existing water rights and municipal sources for construction dust control and concrete batch plant water. This commitment would reduce the risk of stream dewatering that could cause short-term reductions in aquatic habitat. It is recommended that equipment cleaning programs be initiated to prevent the movement of aquatic invasive species from one drainage basin to another.

5.3.10 Special Status Aquatic Species

5.3.10.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – stream crossing locations within the transmission line construction ROW, and access road system.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.10.2 Cumulative Impacts

Based on species occurrence and habitat information, it has been estimated that 18 fish, four amphibians, and two invertebrates may occur within areas where Project construction could occur across all alternatives. The federally listed, candidate, and petitioned species include the following Colorado River system fish species: bonytail, Colorado pikeminnow, humpback chub, razorback sucker, and Virgin River chub. The

pallid sturgeon is a Platte River species. The northern leopard frog has been petitioned for listing, but was not found warranted.

The majority of these species have been affected by large-scale changes in flow regimes in the Colorado and Platte river systems as the result of reservoir development and downstream diversions. The northern leopard frog and other amphibians have diminished in abundance because of past development that has reduced habitat and increased disease exposure.

Summaries of the cumulative direct impacts to these species from TWE and other foreseeable transmission lines crossing the same habitat are provided in **Tables 5-22** through **5-24**.

Table 5-22 Cumulative Habitat Alteration or Loss to Special Status Aquatic Species in Region I

Species	Region 1 Alternative Corridor Habitat Loss (ft^2)			
	I-A	I-B	I-C	I-D
Colorado pikeminnow (acres of critical habitat crossed)	2	2	6	2
Colorado River Cutthroat Trout (habitat lost in ft^2)	0	0	1,600	0
Bluehead sucker (habitat lost in ft^2)	0	0	4,000	0
Flannelmouth sucker (habitat lost in ft^2)	0	0	5,600	0
Mountain sucker (habitat lost in ft^2)	0	0	3,200	0
Roundtail chub (habitat lost in ft^2)	0	0	4,000	0
Total (habitat lost in ft^2)	**0**	**0**	**18,400**	**0**

Table 5-23 Cumulative Direct Loss of Habitat for Special Status Aquatic Species in Region II

Species	Region II Alternative Corridors					
	II-A	II-B	II-C	II-D	II-E	II-F
Colorado pikeminnow (acres of critical habitat crossed)	4	8	8	8	4	8
Razorback Sucker (acres of critical habitat crossed)	4	6	6	6	4	6
Northern leopard frog (habitat lost in ft^2)	800	1,600	1,600	0	4,000	4,000
Columbia spotted frog (habitat lost in ft^2)	800	800	0	800	0	0
Boreal toad (habitat lost in ft^2)	1,600	0	0	0	0	
Bonneville cutthroat trout (habitat lost in ft^2)	5,600	2,400	0	2,400	6,400	6,400
Colorado River cutthroat trout (habitat lost in ft^2)	800	800	0	800	0	2,400
Southern leatherside chub (habitat lost in ft^2)	2,400	2,400	5,600	1,600	5,600	3,200
Bluehead sucker (habitat lost in ft^2)	5,600	800	2,400	0	2,400	0
Flannelmouth sucker (habitat lost in ft^2)	5,600	0	3,200	0	2,400	0
Mountain sucker (habitat lost in ft^2)	1,600	2,400	3,200	1,600	4,000	5,600
Roundtail chub (habitat lost in ft^2)	4,000	0	0	0	2,400	0
California floater (habitat lost in ft^2)	800	0	0	0	0	0
Southern Bonneville pyrg. (habitat lost in ft^2)	0	0	0	0	0	0
Total (habitat lost in ft^2)	**29,600**	**11,200**	**16,000**	**7,200**	**27,200**	**21,000**

Table 5-24 Cumulative Direct Impacts to Special Status Aquatic Species in Region III

Species	Region III Alternative Corridors		
	III-A	III-B	III-C
Acres of critical habitat crossed for federally listed aquatic species	0	0	0
Virgin River chub (habitat lost in ft^2)	1,200	1,200	0
Virgin River spinedace (habitat lost in ft^2)	3,600	0	0
Bluehead sucker (habitat lost in ft^2)	1,200	0	0
Roundtail chub (habitat lost in ft^2)	1,200	0	0
Meadow Valley Wash desert sucker (habitat lost in ft^2)	1,200	1,200	800
Meadow Valley Wash speckled dace (habitat lost in ft^2)	1,200	1,200	800
Moapa White River springfish (habitat lost in ft^2)	1,200	0	0
Arizona toad (habitat lost in ft^2)	2,400	800	800
Total (habitat lost in ft^2)	**13,200**	**4,400**	**2,400**

There would be no direct impacts to federally listed or sensitive aquatic species in Region IV; accordingly, there were no cumulative direct impacts analyzed for these aquatic species in Region IV.

Conclusion

The design features and protection recommendations for stream crossings described in Section 5.3.9 would be applied to any reasonably foreseeable transmission lines affecting special status aquatic species within the Project corridor. Accordingly, cumulative disturbance is unlikely to substantially reduce available habitat for these species within the Project corridors.

The Project plans to utilize existing water rights, thereby avoiding depletions in the Colorado and Platte systems. Other transmission lines, and other foreseeable projects may, or may not, entirely use existing rights, thereby triggering the need for consultation with the USFWS concerning depletion effects on listed fish species in these river systems (see discussion under Water Resources, Section 5.4.4).The potential cumulative impacts of these depletions, if they do occur, cannot be assessed until that consultation is completed.

5.3.11 Cultural Resources and Native American Concerns

5.3.11.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Archeological resources – Project-caused surface disturbance; Native American Concerns – Existing and foreseeable projects that are, or would be, located in landscapes and viewsheds containing traditional cultural properties, or other areas of concern. These areas typically would be located within 5 miles of a high voltage transmission line, but may extend to greater distances, depending on visibility (see Section 3.12, Visual Resources).
- Temporal
  - Construction – Less than 1 year at any location (disturbance to cultural sites).
  - Operation – Native American Concerns – Indefinite (minimum of 50 years).

5.3.11.2 Cumulative Impacts

Cultural resource file searches have been conducted for the Project alternatives. These searches included both historic and pre-historic sites. No field inventories will be conducted until after the agency preferred alternative is selected. The cultural research has indicated a wide variety of cultural resource features, including prehistoric Native American occupation, historic trails, and historic farmsteads and other structures. Federal agency, state agency, and tribal coordination is ongoing under the provisions of Section 106 of the National Historic Preservation Act. The lead agencies and collaborators are currently drafting a Programmatic Agreement, which will direct the interactions of the agencies and interested parties concerning the discovery and treatment of cultural resources during inventories and construction activities.

The only actions that would cumulatively impact the same cultural resources that the Project would are those reasonably foreseeable transmission line projects that have the potential to share the same corridors as the Project. These other projects would require approximately the same amount of ROW clearing, constructed roads, etc. as the proposed Project. Surface disturbance from these multiple transmission lines is expected to cause a cumulative reduction in the number of cultural resource sites in the area, including sites that are either eligible or not eligible for the National Historic Register.

Conclusion

Construction of one and the addition of more transmission lines across historic trails and other historically significant areas may cumulatively affect the integrity of these features (see Section 5.3.13). Accordingly, their construction and access would present the same direct disturbance impact and the same relative level of risk of indirect impacts (looting, etc.) as this Project. Even though that risk may not occur concurrently with the Project, it still represents a cumulative risk to any cultural resources in the Project corridor. Therefore, cumulative impacts and/or risk to cultural resources in Region I from reasonably foreseeable transmission lines would be approximately two to three times the direct impact or risk of indirect impact described in Section 3.11.6. Total risk of impacts to cultural resources in Region II would be approximately two times the risk described in Section 3.11.6. Total risk to cultural resources in Region III also would be two times the risk of impacts described in Section 3.11.6, with the exception of Alternative III-C, which has a total of four reasonably foreseeable transmission lines, and consequently, four times the risk. All alternatives in Region IV would represent two times the risk to cultural resources. Note that all of these transmission lines requiring ROWs across public lands would be subject to the same regulatory framework and protective actions as the Project.

5.3.12 Visual Resources

5.3.12.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Viewsheds of the Project reference lines or locations out to 20 miles where aboveground structures and associated ROWs are located in, or cross tree-covered landscapes, and out to 5 miles in shrub, grassland, and cropland landscapes (see Section 3.12).
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.12.2 Cumulative Impacts

The majority of the Project crosses developed landscapes. Forty percent of the lengths of Project alternative reference lines are located within 0.5 mile to mile of one or more existing transmission lines (**Figures 5-1** through **5-8**). Other human-made developments situated in proximity to the Project include agricultural fields and structures, commerce, oil and gas developments, pipeline ROWs, railroads, residences, and roads. A small portion of the Project alternatives traverse natural landscapes in viewsheds that contain no development beyond roads or trails. These include: viewsheds north and northwest of Baggs in Wyoming;

the Sand Wash Basin viewshed north of the Yampa River, the Texas Creek viewshed northeast of Baxter Pass in Colorado,and the areas west, north, east, and southeast of Caliente in Nevada.

The visual analysis for the Project has evaluated project compliance with BLM and USFS visual resource management classes. These findings are summarized in Section 3.13. The analysis determined that the Project would not conform to the visual resource management classes in a number of locations. These non-conformance areas were reviewed to determine if other transmission lines are proposed parallel to the Project in the same viewshed. In general, it was assumed that if the Project did not conform to visual management guidelines, then parallel and nearby transmission lines of similar size would not conform. Therefore, lead agency decision-making has to consider the visual resource impacts of individual projects within a broader utility corridor. **Figures 5-10** through **5-14** provides representative simulated cumulative condition of the three parallel transmission lines – EGS, EGW, and TWE as viewed from the following locations:

- The Outlaw Trail Scenic Highway/SH 789 in Wyoming;
- The Town of Pinto;
- The Town of Thompson;
- The Rainbow Gardens ACEC; and
- The Yampa River.

Figure 5-10 Simulated Cumulative Condition as Seen from the Outlaw Trail Scenic Highway/WY SH 789

Figure 5-11 Simulated Cumulative Condition as seen from Residences in the Town of Pinto across the Valley

Figure 5-12 Simulated Cumulative Condition as Seen from the Town of Thompson toward Sego Canyon

Figure 5-13 Simulated Cumulative Condition as Seen from the Recreational Road in the Rainbow Gardens ACEC

Figure 5-14 Simulated Cumulative Condition as Seen from Recreational County Road 23 Toward the Yampa River and Cross Mountain

Table 5-25 lists locations identified in the TWE Project visual analysis where: 1) the potential for high sensitivity viewers was identified; 2) the alternative would not comply with the applicable visual resource management class; and 3) another transmission line or other foreseeable projects are proposed in the same corridor and viewshed. These locations represent specific areas of concern for cumulative visual impacts.

Table 5-25 Areas of Concern for Cumulative Visual Impacts

Region	Figure/ Area	TWE Alt	Other Projects
Region I			
Outlaw Trail Scenic Highway/WY SH 789	**Figure 5-2 Area 1V-1**	A and C	EGS, EGW, oil and gas
Overland National Historic Trail	**Figure 5-2 Area 1V-2**	A, B, C, and D	EGS, EGW, oil and gas
Old Cherokee National Historic Trail	**Figure 5-2 Area 1V-3**	A, B, C, and D	EGS, oil and gas
Sand Wash Basin	**Figure 5-2 Area 1V-4**	A, B, and D	EGS
Little Snake River	**Figure 5-2 Area 1V-5**	A, B, and D	EGS
Yampa River and Cross Mountain Viewshed	**Figure 5-2 Area 1V-6**	A, B, and D	EGS
Region II			
Baxter Pass	**Figure 5-4 Area 2V-1**	B and C	EGS
Pony Express Trail	**Figure 5-4 Area 2V-2**	B and C	EGS
Green River/Crystal Geyser	**Figure 5-4 Area 2V-3**	B and C	EGS
Indian Creek and Potters Pond Campground	**Figure 5-4 Area 2V-5**	B	EGS
Skyline Drive Backway	**Figure 5-4 Area 2V-5**	B	EGS
Sego Canyon	**Figure 5-4 Area 2V-6**	B and C	EGS
Fantasy Canyon	**Figure 5-4 Area 2V-7**	D and F	EGS
Ninemile Canyon	**Figure 5-4 Area 2V-8**	D and F	EGS
Argyle Canyon	**Figure 5-4 Area 2V-9**	D and F	EGS
Region III			
Mountain Meadow Massacre Site	**Figure 5-6 Area 3V-1**	A	Sigurd-Red Butte
Region IV			
Rainbow Gardens ACEC	**Figure 5-8 Area 4V-1**	A	SWIP, ENTP

Conclusion

The cumulative visual impacts for reasonably foreseeable transmission lines would be very difficult to mitigate for in the aforementioned areas of concern. Cumulatively, each of these visually sensitive areas would have their viewshed unavoidably impacted by two or potentially three transmission lines, with resulting impacts to the visual experience to visitors to these areas. The locations and number of transmission lines would depend on the lead agencies' future decisions on if and where they choose to co-locate these lines.

5.3.13 Recreation Resources

5.3.13.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical Boundary – Developed and dispersed recreation; historic and recreation trails – The defined boundary of designated recreation areas, or the specific locations of historic and recreation trails within the viewsheds defined from visual resources (see 5.3.13).

- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.13.2 Cumulative Impacts

Existing recreation opportunities within the analysis area include dispersed recreation (hunting, fishing, hiking) that can be enjoyed across very large expanses of public land with limited restrictions on access (use of roads designated by the responsible federal and state land management agencies). Developed recreation includes campgrounds, picnic areas, access points for dispersed recreation, and pullouts for historic markers. That being said, the basis for both dispersed and concentrated recreational experience is tied to the relatively undeveloped landscape of the analysis area, which provides opportunities for outdoor recreation that is dependent upon either relatively undeveloped scenery (for non-consumptive recreationists) or intact habitat to support wildlife (for hunters). In both cases, the cumulative loss of native habitat to development provides an overall cumulative estimate of potential loss to recreational opportunity as well. This loss is summarized in **Table 5-26**.

Table 5-26 Cumulative Loss of Natural Habitat and Associated Recreational Opportunity

	Past and Present Development	RFFA Development	Total Available Natural Habitat	Percent of Cumulative Natural Habitat Loss in Analysis Area
Region I	416,881	46,149	7,266,195	6
Region II	797,587	44,442	9,251,491	9
Region III	162,965	26,584	7,136,217	3
Region IV	34,406	6,859	826,360	5

Conclusion

Table 5-26 illustrates a proportional loss in recreational opportunity associated with open undeveloped lands. This impact would not substantively reduce recreational opportunity for typical users on these lands as the proportion of lands still providing those opportunities is high. Additionally, many of those recreational users may not experience a significant loss in recreational experience as a result of this cumulative development (i.e., OHV users and hunters). However, this loss of natural habitat does represent an ongoing decrease in available open space that is being converted to development. This is particularly apparent in areas in Wyoming and Utah (Regions I and II) where large scale renewable and non-renewable energy projects continue to develop open space that is also used by recreationists.

5.3.14 Land Use

5.3.14.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Areas within the Project corridors; boundaries of irrigated land blocks and associated rural residences; boundaries of affected federal grazing allotments (BLM and USFS).
- Temporal – Indefinite (minimum of 50 years).

5.3.14.2 Cumulative Impacts

Ownership of the majority of the length of the Project alternatives is federal (primarily BLM and USFS). As a consequence, land management programs and designations represent the most important categories of land uses that affect the location of industrial facilities. Most state lands are leased for grazing or agricultural

purposes, or have been set aside as wildlife management areas. Recreational use is common throughout the project corridor with hunting representing the dominant recreational use. Boating, hiking, biking, and sight-seeing are other common recreational uses. Private lands are used for residential and agricultural purposes. The infrastructure support for all land uses includes highways, railroads, airports, water supply and electrical systems. Cumulative potential impacts to land use would be identical to those discussed in Section 3.14, Land Use, with the exception that those impacts would be increased as follows due to the potential for additional reasonably foreseeable other transmission lines to be located in the same corridor:

- Reference segments 20 and 30 for Alternatives I-A, I-B, I-C, and I-D would include the TWE, EGS, and EGW transmission lines (**Figure 5-1**).
- All other segments for Alternatives I-A, I-B, I-C, and I-D have the potential to have both the TWE and EGS transmission lines (**Figure 5-1**).
- All segments for Alternatives II-A, II-B, II-C, II-D, II-E, and II-F have the potential to have both the TWE and EGS transmission lines with the exception of Alternative II-C Segments 330.10 and 410 and the Lynndyl Alternative Connector (**Figure 5-3**).
- Segments 480, 500, 500.02, 500.05, 501, 503,504, 505, and 506 for Alternatives III-A, III-B, and III-C would have the potential to have both the TWE and SRB transmission lines. Segments of Alternative III-C also potentially could include the SRB, SWIP, and ENTP lines (**Figure 5-6**).
- Segments 610, 620, 630, 640, 650, 660, 700, 720, 740 for Alternatives IV-A, IV-B, and IV-C would have the potential to have both the TWE and either the SWIP or ENTP transmission lines (**Figure 5-7**).

Plan Amendments

An assessment of the need for plan amendments on BLM and USFS-administered lands affected by the Project is included in Chapter 4.0. Key considerations for plan amendments are conformance with existing land use plans and compatibility of the proposed projects with current land management categories. The previous cumulative impact discussions under the individual resources (especially visual resources and special designations under land use) have delineated areas where the additive impacts of past, present, and foreseeable projects (including the Project) may occur. These cumulative impacts will be considered by the land management agencies in developing plan amendments for both the Project and other foreseeable projects if they are approved.

Conclusion

Cumulative impacts on land use are most apparent where there are pinch points where one or more transmission lines would cause intrusion into areas that are managed for uses that may be incompatible with multiple transmission lines. These areas include the area where Segments 100, 101.10, 101.20, and 101.30 cross the Tuttle Conservation Easement. Although it may possible to fit one transmission line between the Tuttle Easement and the NPS lands for Deerlodge Road to Dinosaur National Monument, placement of more than one transmission line would require that one or the other cross either the NPS lands or the Tuttle Easement. Placement of a transmission line would be inconsistent with the management of either the easement or the NPS lands. Similarly, Segment 219.20 in the Emma Park area of Region II would allow only one transmission line without encroaching on either a USFS IRA or a 4-mile buffer for active sage grouse leks (see Section 3.8, Special Status Wildlife Species, for detailed description on potential impacts to sage grouse and Section 3.15, Special Designation Areas, for a detailed description on potential impacts to the IRA).

5.3.15 Special Designation Areas

5.3.15.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Area within the Project corridors that would be impacted by other development.
- Temporal – Indefinite (minimum of 50 years).

5.3.15.2 Cumulative Impacts

A detailed description of the SDAs that could be impacted by this project is provided in Section 3.15, Special Designation Areas. Cumulative impacts to the specific areas of these SDAs would be limited to those impacts caused by other potential transmission lines that potentially could share the utility corridor with the Project. These impacts would be similar to those described in Section 3.15, Special Designation Areas, with the exception that they would be proportionally greater based on having two or three transmission lines and associated construction disturbance with the potential to impact the same SDA. For the purposes of this cumulative analysis, it is assumed that there would be a 1,500-foot separation between all reasonably foreseeable transmission lines. Based on current proposals, it is reasonably foreseeable that up to three transmission lines could be placed in any one of these corridors crossing the SDAs. Accordingly, this analysis has estimated that the bulk of the 2-mile corridor would be impacted through clearing and/or visual impacts from the three transmission lines. A summary of SDAs where transmission lines have the potential to be co-located and the acreage of that SDA that would be impacted within that 2-mile corridor is given below in **Tables 5-27** through **5-32**.

Table 5-27 Region I: SDAs Within Shared 2-Mile Transmission Line Corridor

Special Designations Area	Alternative I-A Acres Within Shared 2-mile Corridor	Alternative I-B Acres Within Shared 2-mile Corridor	Alternative I-C Acres Within Shared 2-mile Corridor	Alternative I-D Acres Within Shared 2-mile Corridor
Dinosaur National Monument access road corridor (NPS)	16	90	90	90
Cherokee Divide NST SRMA	181	181	181	181
Total	**197**	**271**	**271**	**271**

Table 5-28 Region II: SDAs Within Shared 2-mile Transmission Line Corridor

Land Management Agency	Special Designation Area	Alternative II-A Acres Within Shared 2-mile Corridor	Alternative II-B Acres Within Shared 2-mile Corridor	Alternative II-C Acres Within Shared 2-mile Corridor	Alternative II-D Acres Within Shared 2-mile Corridor	Alternative II-E Acres Within Shared 2-mile Corridor	Alternative II-F Acres Within Shared 2-mile Corridor
BLM White River FO	Oil Spring Mountain WSA and ACEC	NA	1,241	1,241	NA	NA	NA
	White River Riparian ACEC	NA	143	143	NA	NA	NA
BLM Grand Junction FO	McInnis Canyons NCA	NA	1,925	1,925	NA	NA	NA
	Badger Wash ACEC	NA	310	310	NA	NA	NA
	Demaree WSA	NA	1,812	1,812	NA	NA	NA
BLM Vernal FO	Lower Green River ACEC	NA	NA	NA	1,239	NA	1,239
	Lower Green River WSR	NA	NA	NA	1,447	NA	1,447
	Lears Canyon ACEC	NA	NA	NA	489	NA	489
	Nine Mile Canyon ACEC	NA	NA	NA	1,453	NA	1,453
NPS	Dinosaur National Monument	3	NA	NA	3	3	3

Table 5-28 Region II: SDAs Within Shared 2-mile Transmission Line Corridor

Land Management Agency	Special Designation Area	Alternative II-A Acres Within Shared 2-mile Corridor	Alternative II-B Acres Within Shared 2-mile Corridor	Alternative II-C Acres Within Shared 2-mile Corridor	Alternative II-D Acres Within Shared 2-mile Corridor	Alternative II-E Acres Within Shared 2-mile Corridor	Alternative II-F Acres Within Shared 2-mile Corridor
Price FO	San Rafael Canyon ACEC	NA	NA	1,192	NA	NA	NA
	Rock Art ACEC	NA	NA	123	NA	NA	NA
Uinta National Forest	IRA 418008/ Chipman Creek	1,213	NA	NA	NA	NA	NA
	IRA 418009/ Willow Creek	5,605	NA	NA	NA	NA	NA
	IRA 418016/ Diamond Fork	40	NA	NA	NA	29	29
	IRA 418017/ Tie Fork	5,096	NA	NA	NA	2,732	2,732
	IRA 418021/ Hop Creek Ridge	4	NA	NA	4	4	4
	IRA 418028/ Golden Ridge	980	NA	NA	NA	980	980
	IRA 418029/ Nephi	14	NA	NA	4	4	4
	IRA 418015/ Strawberry Ridge	8	NA	NA	NA	NA	NA
Ashley National Forest	IRA 401009	NA	NA	NA	4,113	NA	4,113
	IRA 401010	NA	NA	NA	NA	7,601	NA
	IRA 401011	NA	NA	NA	NA	7,630	18
	IRA 401012	NA	NA	NA	NA	NA	734
	IRA 401013	NA	NA	NA	NA	NA	285
Manti-La Sal National Forest	Boulger-Black Canyon IRA	NA	1,414	NA	NA	NA	NA
	Cedar Knoll IRA	726	NA	NA	NA	726	726
	Coal Hollow IRA	1,713	NA	NA	NA	1,713	1,713
	San Pitch IRA	NA	1,262	NA	19	19	19
	East Mountain IRA	NA	1,902	NA	NA	NA	NA
	Nuck Woodward IRA	NA	NA	NA	51	NA	NA
	Oak Creek IRA	NA	NA	NA	786	NA	NA
Fishlake National Forest	North Pavant IRA	NA	NA	1,257	NA	NA	NA
	Oak Creek IRA	NA	13	NA	NA	NA	13
Total		**15,402**	**10,022**	**8,003**	**9,608**	**21,441**	**16,001**

Table 5-29 Region II: USFS Unroaded/Undeveloped Areas Within Shared 2-mile Transmission Line Corridor

National Forest	Unroaded/Undeveloped Areas	Alternative II-A Acres Within Shared 2-mile Corridor	Alternative II-B Acres Within Shared 2-mile Corridor	Alternative II-C Acres Within Shared 2-mile Corridor	Alternative II-D Acres Within Shared 2-mile Corridor	Alternative II-E Acres Within Shared 2-mile Corridor	Alternative II-F Acres Within Shared 2-mile Corridor
Ashley	Alkali Canyon	NA	NA	NA	1,856	NA	1,856
	Cottonwood	NA	NA	NA	NA	7,302	NA
	Sowers Canyon East	NA	NA	NA	NA	7,330	NA

Table 5-29 Region II: USFS Unroaded/Undeveloped Areas Within Shared 2-mile Transmission Line Corridor

National Forest	Unroaded/Undeveloped Areas	Alternative II-A Acres Within Shared 2-mile Corridor	Alternative II-B Acres Within Shared 2-mile Corridor	Alternative II-C Acres Within Shared 2-mile Corridor	Alternative II-D Acres Within Shared 2-mile Corridor	Alternative II-E Acres Within Shared 2-mile Corridor	Alternative II-F Acres Within Shared 2-mile Corridor
Fishlake	Browns Hole	NA	NA	5,230	NA	NA	NA
	Moroni Peak	NA	NA	100	NA	NA	NA
	Mount Terrill	NA	NA	984	NA	NA	NA
	North Pavant	NA	NA	2,054	NA	NA	NA
	Oak Creek	NA	191	NA	NA	NA	191
	Oak Ridge	NA	NA	2,655	NA	NA	NA
	The Rocks	NA	NA	325	NA	NA	NA
	Right Hand Fork	NA	NA	NA	NA	NA	422
	Mill Hollow	NA	NA	NA	NA	NA	172
	First Canyon	NA	NA	NA	NA	NA	NA
Manti-La Sal	Bulger-Black Mountain	NA	875	NA	NA	NA	NA
	East Mountain	NA	1,818	NA	NA	NA	NA
	Nuck Woodward –Gentry Mountain	NA	NA	NA	52	NA	NA
	Coal Hollow	1,754	NA	NA	NA	1,754	1,754
	San Pitch Mountains	66	1,617	NA	241	66	241
Total		**1,820**	**4,501**	**11,348**	**2,149**	**16,452**	**4,636**

Table 5-30 Region III: SDAs Within Shared 2-mile Transmission Line Corridor

Lead Management Agency	Special Designation Area	Alternative III-A Acres Within Shared 2-mile Corridor	Alternative III-B Acres Within Shared 2-mile Corridor	Alternative III-C Acres Within Shared 2-mile Corridor
BLM St. George FO, Utah	Beaver Dam Wash National Conservation Area	7,575	NA	NA
	Beaver Dam Slope ACEC	12,350	NA	NA
BLM Caliente FO, Nevada	Mormon Mesa Ely ACEC (Caliente FO)	10,720	10,615	NA
	Beaver Dam Slope ACEC (Caliente FO)	NA	306	NA
	Clover Mountains Wilderness	NA	545	NA
	Kane Springs ACEC (Caliente FO	NA	NA	6,340
	Delamar Mountains Wilderness	NA	NA	2,697
BLM Las Vegas FO, Nevada	Mormon Mesa ACEC (LVFO)	6,550	12,580	NA
	Coyote Springs Valley ACEC	NA	NA	24,327
	Arrow Canyon Wilderness	NA	NA	346
	Muddy River WSR	213	81	NA
	Meadow Valley Wash WSR	NA	374	NA

Table 5-30 Region III: SDAs Within Shared 2-mile Transmission Line Corridor

Lead Management Agency	Special Designation Area	Alternative III-A Acres Within Shared 2-mile Corridor	Alternative III-B Acres Within Shared 2-mile Corridor	Alternative III-C Acres Within Shared 2-mile Corridor
Dixie National Forest	Bull Valley IRA	313	NA	NA
	Moody Wash IRA	1,760	NA	NA
	Mogotsu IRA	3,734	NA	NA
	Atchison IRA	3,229	NA	NA
	Gum Hill IRA	NA	NA	NA
	Cove Mountain IRA	5,067	NA	NA
USFWS, Nevada	Desert National Wildlife Refuge	NA	NA	16,524
	Pahranagat National Wildlife Refuge	NA	NA	170
	Fish and Wildlife Proposed Wilderness #1	NA	NA	3,317
	Fish and Wildlife Proposed Wilderness #2	NA	NA	5,313
	Fish and Wildlife Proposed Wilderness #3	NA	NA	5,428
	Unit 2 Las Vegas Range Proposed Wilderness	NA	NA	243
	Unit 3 Sheep Range Proposed Wilderness	NA	NA	4,522
Total		**51,511**	**24,501**	**69,227**

Table 5-31 Region III: URUD Areas Within Shared 2-mile Transmission Line Corridor

Lead Management Agency	Special Designation Area	Alternative III-A Acres Within Shared 2-mile Corridor	Alternative III-B Acres Within Shared 2-mile Corridor	Alternative III-C Acres Within Shared 2-mile Corridor
Dixie National Forest	Bull Valley	436	NA	NA
	Moody Wash/Mogotsu	6,181	NA	NA
	Atchinson	4,217	NA	NA
	Cove Mountain	5,060	NA	NA
Total		**15,894**	**0**	**0**

Table 5-32 Region IV: SDAs Within Shared 2-mile Transmission Line Corridor

Special Designations Area	Alternative IV-A Acres Within Shared 2-mile Corridor	Alternative IV-B Acres Within Shared 2-mile Corridor	Alternative IV-C Acres Within Shared 2-mile Corridor
Sloan Canyon NCA (Las Vegas FO)	2,684	NA	NA
Black Mountain Wilderness (Las Vegas FO)	NA	NA	1,005
Sunrise Mountain ISA (Las Vegas FO)	1,312	532	532
Rainbow Gardens ACEC (Las Vegas FO)	10,563	2,590	2,590
River Mountains ACEC (Las Vegas FO)	3,127	73	NA
Lake Mead NRA (NPS)	25	12,871	14,482
Total	**17,711**	**16,066**	**18,609**

As noted for visual resources, the addition of one or more transmission lines in the same corridor may trigger inconsistencies with approved uses, requiring plan amendments, or other Project adjustments. The siting constraints for the Northern and Southern terminals, discussed individually in Section 3.15, do not impact resources affected by other reasonably foreseeable future actions.

In addition to the cumulative impacts from potential shared corridors disclosed in **Tables 5-27** through **5-32**, key potential cumulative impacts and/or routing concerns related to SDAs include:

- Region III, Alternative III-A in Utah: Milford. Alternative routes for the Project share a corridor that overlaps with the Phase 3 expansion of the Milford Wind Corridor Project. The offset distances between the transmission line projects and the wind farm projects would influence the degree of cumulative impacts on project operations and land commitments (**Figure 5-6 – Area 3D-1**).
- Region III, Alternative III-A in Utah: Mountain Meadows Massacre Site (Enterprise to Central). Both the Project and the Sigurd to Red Butte Project propose alternative routes within an existing corridor that overlaps with the recently designated Mountain Meadows Massacre National Historic Site (**Figure 5-6 – Area 3D-2**). This corridor already contains two existing transmission line corridors, as well as the newly constructed UNEV products pipeline. As a result, the Project has moved its reference line further east of the site, with resulting impacts on a Dixie National Forest IRA (see Section 3.15, Special Designation Areas).
- Region III, Alternative III-C in Nevada: Delamar to Pahranagat Valley. The Project would share the congressionally mandated 2,640-foot-wide LCCRDA corridor with an existing 230-kV transmission line, the ON Line/SWIP 500-kV transmission line under construction, and the Southern Nevada Water Authority proposed water pipeline and its new 230-kV transmission line in an area of steep terrain between the Delamar and Pahranagat valleys south of Alamo. This corridor is bounded on the south by the Delamar Mountains Wilderness, which constrains transmission line routing options. The ON transmission line project considered two alternatives outside the LCCRDA corridor in this segment in the Final EIS (BLM 2010). The alternative selected in the ROS includes the segment within the LCCRDA corridor (BLM 2011). The major issues in this area are roadway access to support multiple projects and siting all facilities within the currently defined utility corridor, given the separation requirements for high voltage transmission lines (**Figure 5-6 – Area 3D-3**).
- Region IV, Alternatives IV-A, IV-B, and IV-C in Nevada: Sunrise Mountain Instant Study Area, east of Las Vegas. An approximately 300-foot-wide ROW is available for a future transmission line across this Instant Study Area that was approved by Congress. As indicated in the reasonably foreseeable projects, at a minimum, the proponents that could utilize this remaining corridor width include Great Basin/NV Energy, Silver State Energy Associates, TransWest, and possibly ATC/Duke. Because both AC and DC transmission lines propose to cross the ISA, a major challenge will be to address the needs of both types of projects within the remaining corridor width across the ISA (**Figure 5-8 – Area 4D-1**). A Project alternative has been proposed that would be located at the ISA/ National Recreation Boundary to avoid this constraint.
- Another difficult transmission line siting area, west of the Sunrise Mountain ISA, is the segment from Lake Las Vegas to the outer suburban limits of Henderson. This area is highly congested with existing transmission lines, with limited options for additional transmission lines. Near Lake Las Vegas, the Project proposes to stay north of the existing transmission lines, then cross over Lake Mead Drive and the existing transmission lines, and then stay south of the existing transmission lines to maximize distance from the residential areas (**Figure 5-8 – Area 4D-2**).
- Region IV, Alternatives IV-B and IV-C in Nevada: Lake Mead NRA to Eldorado Valley. These alternatives were developed as options for routing through the constrained Lake Las Vegas/ Henderson area. These alternatives would parallel existing transmission lines within the NRA, as well as areas with no existing transmission lines. As noted previously, the NRA management plan does not allow new high voltage transmission lines within the NRA boundary. These alternatives

also would bypass Boulder City within a wide and congested transmission line corridor across steep terrain until the floor of the Eldorado Valley is reached (**Figure 5-8 – Area 4D-3**).

Conclusion

In Region I, cumulative impacts in shared corridors would be similar and relatively low (less than 300 acres) for all alternative corridors. In Region II, cumulative impacts on special designations from shared corridors would be relatively high for all alternative corridors, ranging from 8,003 acres (II-C corridor) to 16,001 acres (II-F corridor). For Region III, use of the Alternative III-C corridor would have the greatest impact (69,227 acres), followed by III-A (51,511 acres), and III-B (24,501 acres). In Region IV, corridor impacts would be very similar for all alternative corridors, ranging from 17,711 to 18,609 acres. For all regions with the exception of Region I, the cumulative effects of three transmission lines in the alternative corridors would have substantial impacts on SDAs. The consistency of overhead transmission with the existing management of each of these SDAs is discussed in detail in Section 3.15, Special Designation Areas.

There is considerable overap between USFS IRAs and USFS URUD areas. Consequently, they are not additive and are summarized separately from the other SDAs. There would be no impacts on URUD areas in Regions I and IV. In Region II, cumulative impacts on URUD areas would range from 1,820 acres to 16,452 acres. Transmission lines in Alternatives II-A and II-D corridors would have similar impacts (1,820 and 2,149 acres, respectively). Similarly, II-B and II-F have similar cumulative impacts (4,501 and 4,636 acres, respectively). Alternatives II-C and II-E have the highest cumulative impacts (11,348 and 16,452 acres respectively). In Region III, only the Alternative III-A corridor would have impacts on URUD areas (15,894 acres).

Prohibition on the building of roads in IRAs and URUD areas would greatly reduce the long-term disturbance to those areas. However, it would not eliminate all the cumulative visual impact and loss of vegetation associated with the clearing and placement of multiple transmission lines within a single 2-mile corridor.

5.3.16 Transportation and Access

5.3.16.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – Highway and road ROWs that would be used for Project activities.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.16.2 Cumulative Impacts

Existing actions include federal highways, state highways, and county and secondary roads under the jurisdiction of the BLM and USFS that form a network across all Project regions. Segments of transcontinental railroads traverse the I-80 corridor in Wyoming, and between Salt Lake City and Las Vegas. Major air force bases include the Hill AFB near Salt Lake City, and the Nellis AFB near Las Vegas. Each air force base has designated areas for low-level training flights. The major transportation network is illustrated on **Figures 3.16-1** through **3.16-4**.

The Project would utilize the existing highway and road system to access the ROW for construction. The Project proposes to extend the existing road system to provide access to transmission line structures over the long term. Because of Project location within existing utility corridors in many areas, nearby existing secondary roads could be used in many cases. Cumulative roadway deterioration effects and resultant increased maintenance costs for the responsible agencies likely would be incurred as a result of heavy loads and equipment travel during construction of the Project and other foreseeable projects.

The foreseeable projects likely would utilize the existing road system to the extent possible to minimize the establishment and maintenance of new roads. Because of separation requirements, independent spur roads would be constructed for each project. As a consequence, there would be a cumulative expansion of the existing road system within utility corridors shared by more than one transmission line project and oil and gas development projects.

The Project may require traffic controls at highway and secondary road intersections to manage equipment and material deliveries to the construction ROW. It is expected that the construction spreads for the Project would extend for many miles at one time, limiting the likelihood of concentrations of turning vehicles at intersections. It is unlikely that other foreseeable projects would be constructing their facilities in the same time frame and locations as the Project. Cumulative traffic delays and decreased public safety during construction are not anticipated.

Construction of the Project would add new aboveground facilities that would have to be considered in Nellis and Hill AFB military training areas intercepted by the Project. A BLM plan amendment for Hill AFB may be required; other agreements with Nellis AFB for military operations and potential interference with navigational aids may be needed. Other foreseeable projects that incrementally add to existing transmission line corridors in southwestern Utah and southern Nevada may be subject to similar reviews and approvals. In general, the cumulative effects of new transmission lines would be less in existing transmission line corridors, as compared to new corridors, where adjustments in military training would have to occur.

Conclusion

The amount and extent of existing roads in the overall analysis area indicate that cumulative transportation impacts on the transportation resources affected by the Project would be low. However, cumulative addition of multiple transmission lines in the Alternatives III-C and III-B corridors do present potential cumulative impacts that could affect the scope of training operations from both Nellis and Hill AFBs.

5.3.17 Social and Economic Resources

5.3.17.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical – The counties crossed by TWE alternatives.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.17.2 Cumulative Impacts

Construction schedule and peak work force for the Project may overlap in time with the foreseeable projects such that the cumulative projects would impact housing and services within the counties affected. These projects include concurrent construction of other energy projects, transmission lines and pipelines, as well as those with ongoing oil and gas development that require temporary housing and services for many nonlocal workers, and where there is limited infrastructure to accommodate an influx of new workers. Counties with substantial oil and gas development activity include Carbon County, Wyoming; Rio Blanco, Moffat, and Mesa counties in Colorado; and Uintah and Duchesne counties in Utah. Counties potentially affected by energy projects and transmission line or pipeline construction include Carbon and Sweetwater counties in Wyoming; Moffat, Routt, Rio Blanco, Garfield and Mesa counties in Colorado; Daggett, Uintah, Duchesne, Grand, Emery, Carbon, Wasatch, Utah, Sevier, Sanpete, Juab, Millard, Beaver, Iron, and Washington counties in Utah; and Lincoln and Clark counties in Nevada. The exact extent of that overlap is impossible to predict as it depends upon the timing of construction and operation of many projects, much of which is unknown.

Cumulative fiscal effects, including both additional revenues and increases in public expenditures to serve demand for public facilities and services, also are foreseeable as the Project and other foreseeable projects are constructed, and then operate over their useful life. State and local sales tax revenues (primarily short-term) generally are higher during construction but then decrease, while ad valorem/property (long-term) taxes are primarily a function of the revenue generated from transmission charges once the project is completed and energized. The ad valorem tax revenues associated with transmission line facilities would accrue primarily to counties, school districts, the state and other districts, rather than to the municipalities in which most construction and operations workers live.

The potential for cumulative effects would not arise with all TWE alignment alternatives, but rather would vary depending on the TWE alignment being considered. Furthermore, many of the cumulative effects would be temporary and could be viewed as beneficial by some members of the communities. Challenges in assessing potential cumulative socioeconomic effects also arise in conjunction with the influence of other factors on decisions of whether to proceed, postpone, or continue operations of an activity. Two such factors include uncertainty regarding the timing of necessary regulatory approvals and changing economics of resource development and production in response to market prices. A delay or postponement of a project because of such factors can substantially increase or diminish the potential for cumulative socioeconomic effects with the Project.

Long-term cumulative effects on future land use development patterns could result from the development and operation of multiple linear facilities in close proximity to one another, the results of which could have unknown community and economic development effects on local social and economic conditions.

No adverse human health and environmental effects disproportionately affecting minority and/or low income populations were identified in conjunction with the Proposed Action or action alternatives. Consequently, the project would not contribute to any cumulative environmental justice effects.

Conclusion

In general, cumulative socioeconomic impacts from past, present and reasonably foreseeable development in the analysis area have been beneficial to local communities. All of the proposed project alternatives have the potential to contribute to short-term cumulative impacts on housing availability and existing infrastructure in areas that are already impacted by heavy oil and gas or other energy development in Regions I and II. However, the relative cumulative impact of all the alternatives on these services would be proportionally very small. Cumulative short-term adverse impacts on housing and infrastructure from construction of multiple transmission lines are remote due to the difference in construction timing for the separate lines at any given location.

5.3.18 Public Health and Safety

5.3.18.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical Boundary
  - Construction – Equipment noise – 1 mile on either side of the ROW where equipment is operating; Hazardous materials – 250-foot-wide ROW.
  - Operation – EMF, Corona noise (human hearing), Stray Voltage – 250-foot-wide ROW; corona noise – radio and TV interference within a 2-mile-wide corridor.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.18.2 Cumulative Impacts

The majority of the alternatives would cross rural, undeveloped areas where background noise levels would be in the range of 40 dBA. Background urban noise would be greater in the Las Vegas Valley and near busy highways.

Construction of the Project would require noise-generating equipment that would operate during daylight hours at dispersed locations along the construction ROW. Equipment noise would occur over a short interval (months) at any particular location. The number of residences potentially affected by cumulative noise from construction of this and other reasonably foreseeable future transmission lines in shared corridors is provided in **Table 5-33**.

Table 5-33 Residences within 500 feet of Reference Line for TWE in Shared Corridors

	Alternative I-A	**Alternative I-B**	**Alternative I-C**	**Alternative I-D**	
Residences within 500’	0	0	0	0	
	Alternative II-A	**Alternative II-B**	**Alternative II-C**	**Alternative II-D**	**Alternative II-E**
	53	5	4	6	35
	Alternative III-A	**Alternative III-B**	**Alternative III-C**		
	9	2	2		
	Alternative IV-A	**Alternative IV-A**	**Alternative IV-A**		
	3	2	1		

It is unlikely that other foreseeable projects would be constructing facilities during the same time frame and in the exact same location; therefore, construction noise would not be cumulatively greater as a result of multiple transmission lines in the same corridor. However, the cumulative impact of the multiple transmission lines would be that the overall duration when residences would be periodically subjected to noise would range from 3 to 12 years. Additionally, the short-term periods when noise would be generated near these residences would occur from 2 to 4 times more than from the Project alone.

The generation of EMF, corona noise perceptible to nearby human receptors and stray voltage concerns would be confined to the immediate vicinity (within 300 feet of the centerline) of each transmission line. Consequently, the overall width of the corridor that could be impacted by cumulative corona noise from multiple transmission lines could be from 2 to 4 times greater (600 to 1,200 feet) than that from a single transmission line.

A detailed discussion on potential impacts of both construction and corona noise on humans is found in Section 3.18, Public Health and Safety.

<u>Conclusion</u>

Due to noise attenuation and low number of residences in proximity to the transmission lines, cumulative impacts on public health and safety from multiple transmission lines in Project corridors would be minimal. However, there is a possibility for short-term nuisance noise on these residences, particularly for those corridors where multiple transmission lines will be sited in the same corridor.

5.3.19 Wild Horses

5.3.19.1 Physical and Temporal Boundaries of Cumulative Impacts

- Physical Boundary
  - Construction – It is assumed that construction noise would have no impacts on wild horses as they would be able to easily move away from disturbance.
  - Operation – Loss of habitat from tower and facility construction within designated HMAs impacted by the proposed project.
- Temporal
  - Construction – Less than 1 year at any location.
  - Operation – Indefinite (minimum of 50 years).

5.3.19.2 Cumulative Impacts

The cumulative impact acreage within designated HMAs is summarized in **Table 5-34**.

Table 5-34 Estimated Cumulative Impacts from RFFA on Wild Horse HMAs

HMA	Cumulative Disturbance from RFFA (acres)	Total HMA acreage	Percent Disturbed from RFFA
Adobe Town	19	477,622	<1
Salt Wells Creek	73	1,170,714	<1
Eagle	11	660,700	<1
Hill Creek	1	72,130	<1
Total	**104**	**2,381,166**	**<1**

Conclusion

Cumulative impacts on HMAs would total 104 acres. This represents well under 1 percent of the available habitat for wild horses available in those HMAs. Accordingly, cumulative impacts to wild horses would be negligible. The Proposed Action and alternatives also would contribute negligibly to this permanent loss of habitat. The cumulative effects of the Proposed Action and alternative could restrict the use of helicopters for horse gathers in these HMAs due to safety concerns. However, the relatively low amount of disturbed area would indicate that these restrictions would not substantively impact BLM management of these HMAs.

5.3.20 Lands with Wilderness Characteristics

5.3.20.1 Physical and Temporal Boundaries

- Physical – Boundaries of affected LWCs
- Temporal – Indefinite (minimum of 50 years)

5.3.20.2 Cumulative Impacts

The potential cumulative impacts to LWCs were estimated based on those potential projects affecting the same areas as those affected by the proposed project. These impacts would be similar to those disclosed for the proposed project as they would involve additional transmission lines in the same corridor affecting the same units. These acreages could vary based on which route is picked for which transmission line (see

Section 3.20, Lands with Wilderness Characteristics, for details on impacts of alternative routes). Impacts from past and present actions to LWCs are largely inferred based on the amount of remaining LWCs that is disclosed in Section 3.20, Lands with Wilderness Characteristics. The estimated cumulative impacts on LWCs are summarized in **Table 5-35**.

Table 5-35 Estimated Cumulative Impacts to Lands with Wilderness Characteristics

	Percentage of LWCs Potentially Impacted by RFFAs
Region I	15
Region II	2
Region III	3
Region IV	No LWCs impacted by Project routes shared with other reasonably foreseeable routes

Conclusion

Cumulative impacts to lands with wilderness characteristics by reasonably foreseeable projects occupying the TWE corridor would be relatively low (1 percent or less). This would be true regardless of which alternative route is picked for the proposed project. However, it should be noted that cumulative impacts to LWCs that are not affected by the proposed project but are in the same regional area would continue to occur. Of particular note are potential future impacts to LWCs from widespread oil and gas development in Regions I and II.