



Partnering for Progress

U.S. 50 Corridor East



U.S. 50 Corridor East Tier 1 Draft Environmental Impact Statement

Cumulative Effects Technical Memorandum

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1. Project Overview

The U.S. 50 Corridor East Tier 1 Environmental Impact Statement (U.S. 50 Tier 1 EIS) was initiated by the project's lead agencies, the Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA). The purpose of the Tier 1 EIS is to provide, within the framework of the National Environmental Policy Act of 1969 (NEPA), a corridor location decision for U.S. Highway 50 (U.S. 50) from Pueblo, Colorado, to the vicinity of the Colorado-Kansas state line that CDOT and the communities can use to plan and program future improvements, preserve right of way, pursue funding opportunities, and allow for resource planning efforts.

The U.S. 50 Tier 1 EIS officially began in January 2006 when the Notice of Intent was published in the *Federal Register*. The U.S. 50 Tier 1 EIS project area (Figure 1-1) is the area in which U.S. 50 Tier 1 EIS alternatives were assessed. This area traverses nine municipalities and four counties in the Lower Arkansas Valley of Colorado. The nine municipalities include (from west to east) the city of Pueblo, town of Fowler, town of Manzanola, city of Rocky Ford, town of Swink, city of La Junta, city of Las Animas, town of Granada, and town of Holly. The four counties that fall within this project area are Pueblo, Otero, Bent, and Prowers counties.

The project area does not include the city of Lamar. A separate Environmental Assessment (EA), the *U.S. 287 at Lamar Reliever Route Environmental Assessment*, includes both U.S. 50 and U.S. Highway 287 (U.S. 287) in its project area, since they share the same alignment. The Finding of No Significant Impact (FONSI) for the project was signed November 10, 2014. The EA/FONSI identified a proposed action that bypasses the city of Lamar to the east. The proposed action of the *U.S. 287 at Lamar Reliever Route Environmental Assessment* begins at the southern end of U.S. 287 near County Road (CR) C-C and extends nine miles to State Highway (SH) 196. Therefore, alternatives at Lamar are not considered in this U.S. 50 Tier 1 EIS.



Figure 1-1. U.S. 50 Tier 1 EIS Project Area

2. Resource Definition

Cumulative effects are defined 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... or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects for the U.S. 50 Tier 1 EIS involve resources that are directly or indirectly affected by the Build Alternatives. If the alternatives have no direct or indirect effect on a resource, then it would not contribute to cumulative effects upon the resource.

The term “project counties” refers to the counties located partially within the U.S. 50 project area. These counties include Pueblo, Otero, Bent, and Prowers counties.

3. Applicable Laws, Regulations, and Guidance

This analysis adheres to NEPA and its regulations (23 Code of Federal Regulations [CFR] 771), the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500–1508), and the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21). No other laws, regulations, and guidance were used.

4. Methodology

The U.S. 50 Corridor East project is a Tier 1 EIS. “Tiering” for this process means that the work involved will be conducted in two phases, or tiers, as follows:

- Tier 1—A broad-based (i.e., corridor level) NEPA analysis and data collection effort. The goal of Tier 1 is to determine a general corridor location (not a roadway footprint). Data sources will include existing quantitative data, qualitative information, or both. Mitigation strategies (not necessarily specific mitigation activities) and corridor-wide mitigation opportunities will be identified. Additionally, the Tier 1 EIS will identify sections of independent utility (SIUs) and provide strategies for access management and corridor preservation.
- Tier 2—A detailed (i.e., project level) NEPA analysis and data collection effort. The goal of Tier 2 studies will be to determine an alignment location for each SIU identified in Tier 1. Data sources will include project-level data, including field data collection when appropriate. Tier 2 activities will provide project-specific impacts, mitigation, and permitting for each proposed project.

Resource methodology overviews were developed to identify and document which resource evaluation activities would be completed during the Tier 1 EIS, and which would be completed during Tier 2 studies. These overviews are intended to be guidelines to ensure that the Tier 1 EIS remains a broad-based analysis, while clarifying (to the public and resource agencies) when particular data and decisions would be addressed in the tiered process.

These overviews were approved by FHWA and CDOT in 2005, and they were agreed upon by the resource agencies during the project’s scoping process between February and April of 2006.

Each overview summarizes the following information for the given resource:

- Relevant data or information sources—the types of corridor-level data that will be collected and the sources of those data
- Data collection and analysis methodology—how the data collection and analysis will be completed
- Project area—defined as one to four miles wide surrounding the existing U.S. 50 facility beginning in Pueblo, Colorado, at Interstate 25 (I-25) and extending to the Colorado-Kansas state line (resources will be reviewed within this band, and it is the same for all resources)
- Effects—the type(s) of effect(s) to be identified
- Mitigation options—how mitigation will be addressed
- Deliverables—how the activities above will be documented
- Regulatory guidance/requirements—a list of applicable laws, regulations, agreements, and guidance that will be followed during the review of the resources

These overviews were used by the project’s resource specialists as guidelines to ensure that their activities were relevant to the Tier 1 decision (i.e., corridor location). As the resource specialists conducted their work, data sources or analysis factors were added or removed. The final actions of the resource specialists are described below. The resource methodology overview for cumulative effects has been attached to this technical memorandum as Appendix A for reference only. Additionally, abbreviations and acronyms used in this report are listed in Appendix B.

4.1. Relevant Data or Information Sources

Multiple sources of information and data were used to evaluate cumulative effects. Some of those sources are listed in the reference section of this document. Resource-specific sources are listed in the corresponding technical memorandum for that resource. All of these technical memoranda have been attached to the U.S. 50 Tier 1 EIS as appendices.

These sources were used to identify:

- Resources that have the potential to be affected by the Build Alternatives
- Effects from the Build Alternatives on those resources
- Past, present, and reasonably foreseeable future actions that have affected or could affect resources in the project area
- General trends in the project area that have affected or could affect resources

4.2. Data Collection and Analysis Methodology

This analysis compared potential effects resulting from the Build Alternatives to potential effects resulting from general trends and other actions occurring in the Lower Arkansas Valley (i.e., past, present, and reasonably foreseeable future actions). The general scale of each effect was determined to compare whether the Build Alternatives would substantially contribute to the cumulative effect on the resource. If a cumulative effect is expected, then the nature and size of that effect was identified. Where there was a relationship between effects, the cumulative results of those effects were discussed.

4.3. Project Area

The project area for the U.S. 50 Tier 1 EIS has been defined as one to four miles wide surrounding the existing U.S. 50 facility and extending from Pueblo, Colorado, at I-25 to the Colorado-Kansas state line (Figure 1-1). The project area encompasses the study area limits, which is where the Tier 1 corridor alternatives considered by this project would be located.

The study area is 1,000 feet wide centered on the corridor alternatives, beginning on or near the existing U.S. 50 at I-25 in Pueblo, Colorado, and extending to just east of Holly, Colorado, in the vicinity of the Colorado-Kansas state line. The limits of the project were approved by the lead agencies and other project stakeholders during the U.S. 50 Tier 1 EIS's scoping activities.

4.4. Effects

Effects to resources by the Build Alternatives were identified either quantitatively or qualitatively, depending on the nature of the resource. Because of the length of the project corridor, effects include considerations for human and natural systems that are complex and far-reaching; a comprehensive understanding of effects at the Tier 1 level of analysis is limited to overarching trends and assumptions. Additionally, this cumulative effects analysis is based upon impacts to key resources, rather than effects to specific resources. Key resources are those that are critical to the sustainability of the project area and potentially to the Lower Arkansas Valley as a whole. These include:

- Socioeconomic conditions—Settlement patterns and population change are related to the local farming industries of the area. Agriculture has been the primary economic generator for the communities of the region, and much of the culture of the area is based upon this characteristically rural livelihood. Other economic resources include sand and gravel mining and wind energy development. The area has potential for new economic resources in the way of industrial manufacturing and distribution.
- Natural environment conditions—The semi-arid climate of south-eastern Colorado increases the importance of water resources and wetland and riparian habitats. Cumulative impacts on these limited resources are potentially significant for the area.
- Transportation-related conditions—The transportation system within the Lower Arkansas Valley is particularly important for delivering agricultural products to market, providing safe and efficient travel for local motorists, and providing access to tourist destinations. The transportation system has other local and regional effects that include impacts to air quality, noise, and aesthetic conditions of the area.

4.5. Definition of Reasonably Foreseeable Actions

The analysis of cumulative impacts for U.S. 50 considered actions not directly related to project alternatives considered within the Tier 1 EIS. This included actions of other major federal, state, and private actions in the study area. Instead of including every possible foreseeable action within the study area, “reasonably foreseeable actions” have been limited to those actions that have an effect on key resources. Additionally, projects considered typically have received preliminary approvals or have advanced in project development. Other foreseeable actions include programmatic efforts by public or advocacy groups that affect key resources along the corridor (e.g., ongoing tamarisk reduction efforts to improve water quality and mitigate flooding). The full list of actions considered is included in Section 6, Reasonably Foreseeable Actions. Generally these include:

- Roadway improvement projects
- Major water projects within the Lower Arkansas Valley
- Freight plans and priority freight route designation for truck or rail traffic
- Regional Transportation Plans (RTPs)
- Major efforts to reduce or mitigate poor environmental conditions

4.6. Mitigation Options

Mitigation strategies for individual resources have been identified in the technical memoranda completed for each resource, which are attached to the U.S. 50 Tier 1 EIS as appendices. They also are documented by resource in Chapter 4 of the EIS.

4.7. Deliverables

This Cumulative Effects Technical Memorandum is the primary deliverable related to cumulative effects for the U.S. 50 Tier 1 EIS.

5. Existing Conditions and Trends

The existing condition of the project area is directly related to past human activities in the area and the ongoing impacts of those activities on the ecological systems of the Lower Arkansas Valley. Trends in the demographics and socioeconomics of the project area and quality of the natural environment are impacted by transportation activities that occur in the Lower Arkansas Valley, just as transportation activities in the region relate to the ecological and economic sustainability of those resources for the people that live and travel through the area. The following discussions identify broad-scale trends related to these resources in the project area.

Socioeconomic conditions include settlement patterns and population change as related to the local farming industries of the area. It also includes a discussion of other built environment trends, including trends impacting historic resources, archaeological resources, and land use. Natural environment conditions include trends related to water resources, wetlands, and riparian habitats. Transportation-related conditions include trends related to the transportation system and related resources, such as air quality and aesthetic conditions of the area.

5.1. Socioeconomic Conditions and Trends

The Homestead Act of 1862 had a substantial effect on the Great Plains—including the Lower Arkansas Valley. The Act gave willing settlers 160 acres of land for free, but in return settlers were required to make improvements to the land (i.e., build a house) and live there for at least five years. No single act had a greater effect on the Great Plains. It brought tens of thousands of settlers to the region. Settlers subsequently introduced farming and ranching as the region's primary economic activity.

The arrival of the railroad in the 1870s accelerated human settlement in the Lower Arkansas Valley and, along with it, accelerated land conversion activities. The railroad enabled more settlers to reach the region, and towns quickly sprang up along its route. As transportation systems modernized, and travel via automobile increased, the roadway between the largest communities of the Lower Arkansas Valley was established. U.S. 50 was among the first cross-country routes established within the National Highway System in 1926. These original settlement patterns established trends for future population and economic growth.

5.1.1. Population Trends

With the exception of Pueblo, the communities in the Lower Arkansas Valley generally are small, rural, and agricultural in nature. As mentioned above, the Homestead Act had significant effects on population and settlement in the Great Plains. Since construction of U.S. 50 in 1926, population growth in the project area has remained fairly stagnant—with a 21.1 percent increase in population between 1930 and 1990 (from 20,656 to 26,188 individuals, respectively) and, in some instances, actual decreases in population, as shown in Table 5-1.

Table 5-1. Historic Population Trends within the Project Area

Census Geography	1930	1940	1950	1960	1970	1980	1990	Percent Change	
								Overall	Annualized
Pueblo County	66,038	68,870	90,188	118,707	118,238	125,972	123,051	86.3%	1.4%
Pueblo	50,096	52,162	63,685	91,181	97,774	101,686	98,640	96.9%	1.6%
Otero County	24,390	23,571	25,275	24,128	23,523	22,567	20,185	-17.2%	-0.3%
Fowler	968	922	1,025	1,240	1,241	1,227	1,154	19.2%	0.3%
Manzanola	578	531	543	562	451	459	437	-24.4%	-0.4%
Rocky Ford	3,426	3,494	4,087	4,929	4,859	4,804	4,162	21.5%	0.4%
Swink	418	374	336	348	381	668	584	39.7%	0.7%
La Junta	7,193	7,040	7,712	8,026	7,938	8,338	7,637	6.2%	0.1%
Bent County	9,134	9,653	8,775	7,419	6,493	5,945	5,048	-44.7%	-0.7%
Las Animas	2,517	3,232	3,223	3,402	3,148	2,818	2,481	-1.4%	-0.02%
Prowers County	14,762	12,304	14,836	13,296	13,298	13,070	13,347	-9.6%	-0.2%
Granada	352	342	551	593	551	557	513	45.7%	0.8%
Holly	971	864	1,236	1,108	993	969	877	-9.7%	-0.2%

Between 2000 and 2010, the City and County of Pueblo had a growing population of more than 100,000 people and a diversified economy beyond agricultural activities. In contrast, populations in the communities east of Pueblo range from approximately 400 people to 7,800 people (2010 Census). These communities are not growing significantly, and between 2000 and 2010, the communities east of Pueblo actually experienced an average decline in population of 12.5 percent (2010 Census; Table 5-2).

Table 5-2. Recent Population Change

2010 Census Geography	2000 Population	2010 Population	Difference	Percent Change 2000–2010	
				Overall	Annualized
Pueblo County	141,472	159,063	17,591	12.4%	1.2%
Pueblo	102,121	106,595	4,474	4.4%	0.4%
Otero County	20,311	18,831	-1,480	-7.3%	-0.8%
Fowler	1,206	1,182	-24	-2.0%	-0.2%
Manzanola	525	434	-91	-17.3%	-1.9%
Rocky Ford	4,286	3,957	-329	-7.7%	-0.8%
Swink	696	617	-79	-11.4%	-1.2%
La Junta	7,568	7,077	-491	-6.5%	-0.7%
Bent County	5,998	6,499	501	8.4%	0.8%
Las Animas	2,758	2,410	-348	-12.6%	-1.3%
Prowers County	14,483	12,551	-1,932	-13.3%	-1.4%
Granada	640	517	-123	-19.2%	-2.1%
Holly	1,048	802	-246	-23.5%	-2.6%

Source: U.S. Census Bureau, Census 2010, Tables P001 (2000), P1 (2010), "Total Population"

Although in recent years the majority of the project area has seen a decrease in population, the Colorado State Demography Office projects some growth over the next 30 years within the project counties. Table 5-3 summarizes the 2040 forecasted population and the overall population change for the project counties.

Table 5-3. Forecasted Population Change in Project Area Counties

Census Geography	2010 Population	2040 Forecast Population	Percent Change 2010–2040	
			Overall	Annualized
Pueblo County	159,063	228,300	43.5%	1.5%
Otero County	18,831	21,821	15.9%	0.5%
Bent County	6,499	6,644	2.2%	<0.1%
Prowers County	12,551	15,102	20.3%	0.7%

Source: State Demography Office, Population Projections, 2010 to 2040 (2014)

5.1.2. Agricultural Resources and the Project Area Economy

The Lower Arkansas Valley has a long history of farming and ranching that dates back to the late 1800s. In fact, agriculture has been the foundation of the region’s economy for more than a century. Approximately 3.5 million acres of the land in the project counties is used for agricultural activities (Census of Agriculture 2007b), and 11 percent of employment in Otero, Bent, and Prowers Counties is provided by the agricultural sector (DOLA 2007). The most productive farming was, and continues to be, made possible by water sourced from the Arkansas River watershed. Approximately 200 miles of canals and ditches within the project area serve as man-made water sources for farming activity. These sources are viable due in part to major water management projects of the Fryngpan-Arkansas water project. Authorized in 1962, the Fryngpan-Arkansas water project resulted in the construction of reservoirs, pumping stations, and pipelines that divert water from Colorado’s Western Slope to the Arkansas River basin.

From approximately 1950 to 2007, there was a gradual decline in the amount of agricultural lands within the project counties. Some of this loss was the result of the transfers of water rights from the Lower Arkansas Valley to fast-growing municipalities along Colorado’s Front Range. Water sales can reduce the amount of irrigated farmland, since the water being sold can no longer be used to irrigate fields. Between 1950 and 2007, the project counties experienced a 0.5 million acre (or roughly 13 percent) decrease in farmland and ranch lands (Census of Agriculture 2007b).

Continuing recent trends, it is likely that the agricultural industry in the Lower Arkansas Valley will continue to decline. This situation is, in part, due to increasing demand for water supplies in Colorado metropolitan areas, as previously mentioned. Additional transfers of water rights will likely occur as metropolitan areas along Colorado’s Front Range search for water supplies, and farmers find it more profitable to sell their water than to plant crops. Additionally, a study by the Environment Colorado Research and Policy Center predicts that 484,000 acres of farm and ranch lands in the project counties will be converted to other uses by 2022. This figure represents a decline of 46 percent in Pueblo County, 3 percent in Bent County, 13 percent in Otero County, and 2 percent in Prowers County. In Pueblo, the losses are expected to result, in part, from urban development; however, development is not expected to cause substantial losses in the other project counties. The report also indicates that agricultural decline is not limited to the Lower Arkansas Valley, but is a statewide trend. These trends have the potential to reduce agricultural output in the region.

Even with this decline in agricultural activity, the Lower Arkansas Valley’s agricultural output remains substantial. In 2007, the total market value of agricultural production in the four project counties was approximately \$506 million. This is equivalent to 9 percent of the value of the state’s total agricultural production (CO AgInsights 2007). Some of the agricultural acreage was used to graze cattle and facilitated the sale of approximately 323,000 cattle and calves in 2007. This figure represented about 10 percent of all such animals sold in the state (Census of Agriculture 2007a).

Despite the project counties’ agricultural contribution to the state, these counties lag behind most other Colorado counties in economic activity. This has resulted in all four counties being located within Colorado Enterprise Zones (OEDIT 2009b). The State established these zones in 1986 to encourage job creation and capital investment in economically depressed areas (i.e., areas with high unemployment rates, low per

capita income, and slower population growth than the state average). Three of the counties (Otero, Bent, and Prowers) also were designated as Colorado Enhanced Rural Enterprise Zones for the 2009–2010 fiscal year (OEDIT 2009a)—a state-run program intended to support job creation in economically lagging rural counties.

The counties east of Pueblo County recognize the need to diversify their economies, as Pueblo County has already done. However, recent economic trends in those counties reflect minimal growth or economic diversification. Some new businesses have established themselves in the Lower Arkansas Valley in recent years, including a private prison in Las Animas and a wind farm south of Lamar. Also, the Fort Lyon Veteran's Administration medical facility (located east of Las Animas near the John Martin Reservoir) was converted into a state correctional facility in 2002. However, two major employers went out of business in 2006, including a transit bus manufacturing plant in Lamar (Neoplan USA) and a food processing plant in La Junta (Bay Valley Foods).

Surface mining is another source of economic development in the Lower Arkansas Valley. There are 19 active mines, and all but one extracts gravel, sand, or both (Colorado Division of Reclamation, Mining, and Safety (CDRMS) 2009). These facilities are located throughout the project area, including eight mines in Pueblo County, six mines in Otero County, two mines in Bent County, and three mines in Prowers County.

The size of the communities east of Pueblo does not support the types of economic development activities found in more highly populated areas (e.g., big-box stores, commercial airports, etc.). Also, the current condition of U.S. 50 (having only two lanes in certain locations) makes the highway unattractive to businesses that require a fast, efficient transportation system to move goods from their locations to and from regional or long-distance destinations.

Residents and economic development agencies in the Lower Arkansas Valley have begun efforts to increase tourism to the region as a way to diversify local economies. Given that Colorado's population grew by 727,935 residents between 2000 and 2010, and it continues to grow, there is a large market of potential tourists who could visit the Lower Arkansas Valley if interesting attractions were made known (2010 Census). Different types of tourism are being considered in the Lower Arkansas Valley, including heritage tourism, ecotourism, and agritourism. Heritage tourism focuses on historic resources, while ecotourism focuses on natural resources (landscapes and wildlife), and agritourism focuses on agricultural activities.

5.1.3. Other Built Environment Trends

Because the construction of I-70 reduced the importance of U.S. 50 as a coast-to-coast highway, the resulting slower economic growth in these communities (when compared to fast-growing communities on the Front Range) has affected historic resources in two ways. First, it limits the amount of money available for preservation efforts. However, at the same time, this slower growth has required communities to continue to use older buildings, which often serves to maintain their historic characteristics.

Trends in the Lower Arkansas Valley have served to both preserve and destroy archaeological resources. Permanent settlement of the region resulted in development that has likely destroyed some of the archaeological resources located there. Examples of that development occurring after 1960 include new and expanded farming and ranching operations and construction of U.S. 50 itself. Additional resources may have been destroyed by periodic river flooding and by the creation of the John Martin Reservoir (near Las Animas).

More recently, that trend has reversed. The construction of I-70 reduced the importance of U.S. 50 as a coast-to-coast highway. Today, traffic volumes on U.S. 50 are much lower than on I-70. This condition has contributed to slower economic growth in these communities when compared with the fast-growing communities of the Colorado Front Range (those having at least one interstate highway running through them). This slower economic growth has helped preserve archaeological resources by reducing the rate of development and, therefore, the potential to impact buried cultural remains.

Most of the communities in the project area have not adopted comprehensive (land use) plans. Only five local governments have prepared planning documents that include portions of the project area: the City of

Pueblo, Pueblo County, Bent County, the Town of Fowler, and the City of Las Animas. Most of the municipalities do have zoning ordinances, and a few have additional plans focused on transportation or recreational trails. However, the low level of development that has occurred east of Pueblo in recent decades has not provided communities a reason to increase their planning activities. Additionally, all the municipalities in the project area identified future growth areas for their city or town. However, due to the existing trend toward slow growth in these communities, it is unclear when, or if, that development would occur.

5.2. Natural Environment Conditions and Trends

Human settlement of the region has resulted in substantial modifications to the natural environment within the project area. This has included the conversion of native grassland and wetland and riparian resources into farms, ranches, roads, cities, and towns. Human settlement also has resulted in the consumption and degradation of water resources. These modifications have affected the types of wildlife and plants that occupy the project area.

The settlement of the region into an agricultural-based economy drastically altered the native wildlife and plants in the Lower Arkansas Valley. Modern ecologists have identified an area of roughly 90,700 square miles in portions of seven contiguous midwestern and western states that is known as the central shortgrass prairie ecoregion (TNC 1998). This includes all of Colorado's eastern plains, encompassing more than 42,700 square miles, or about one third of the state. It also includes portions of Wyoming, Nebraska, Kansas, Oklahoma, Texas, and New Mexico. According to The Nature Conservancy, the majority of this ecoregion has been cultivated, with only 40 percent remaining in large, untilled landscapes (TNC 1998). The Nature Conservancy notes that "[g]rasslands are considered to be one of the most imperiled ecosystem types in North America and worldwide" (TNC 1998). The report states that the primary threats to the ecoregion are altered disturbance regimes (e.g., fire, grazing), agricultural conversion, residential development, water pollution, and groundwater withdrawal. To help stem further decline of more than 100 wildlife and plant species in this ecosystem, CDOT entered into a Memorandum of Agreement with The Nature Conservancy, the FHWA, the U.S. Fish and Wildlife Service (USFWS), and Colorado Parks and Wildlife (formerly the Colorado Division of Wildlife) in 2001. This agreement describes how the parties will work together for habitat conservation and how CDOT will use best management practices to avoid, minimize, and mitigate the impacts of highway maintenance and improvements within this ecoregion.

First delivered in 1975, diversion of waters from Colorado's western slope to support agricultural uses and other development also drastically changed the water quality, quantity, and seasonal flow patterns of the lower Arkansas River basin, resulting in changes to associated riparian habitat. These habitat changes occurred because the water diversion brought more water to the area than would naturally occur in this semi-arid region. Additionally, the use of dams allowed peak flows to be controlled, enabling the release of stored water during dry spells, which provided a more stable flow over time. This altered the natural flood-based scouring for which native riparian vegetation was adapted. About two million acre-feet of river water were diverted from the Arkansas River for irrigation in 1998 (CWCB 2002). The gross demand for water from the Lower Arkansas River is expected to increase by 800 acre-feet by 2030 (CWCB 2006).

Currently, U.S. 50 communities get roughly 75 percent of their drinking water from alluvial aquifer shallow wells, 11 percent from deep aquifer wells, and 14 percent from surface water resources (Black & Veatch et. al 2010). The water from the Arkansas River is considered suitable for agricultural use and drinking water, but the lower portion of the river (from Pueblo to the Colorado-Kansas state line) is officially listed by the Colorado Department of Public Health and the Environment as being impaired primarily due to high concentrations of selenium (CDPHE 2010). Selenium naturally occurs in shale formations, and water flow from surface runoff or irrigation return flows across shale causes selenium to leach out into creeks and rivers. Salinity is also a major impairment in the lower Arkansas River, and irrigation activities are a substantial contributor to that impairment.

In addition, settlers introduced noxious weeds to the region, which affected native plant species and water quality in the valley. Tamarisk generally was planted to serve as a wind break, create shade, or stabilize eroding stream beds. It also was planted as an ornamental shrub. However, planted tamarisk overwhelmed

native plant species, spreading quickly and extensively after its introduction to the region and reducing the availability of habitat for wildlife in the area.

Tamarisk is also a substantial contributor to poor water quality in the lower Arkansas River by consuming far more water than native species of the area. The higher water consumption results in substantial water loss within the basin and, in turn, increases the concentration of pollutants within it. Approximately 11,300 acres of tamarisk occurs throughout the project area, primarily near the Arkansas and Huerfano rivers (CDOW 2004, SWReGAP 2006). It has been estimated that tamarisk along the Arkansas River consumes 53,800 acre-feet of water per year (CWCB 2006b). Its ability to reproduce and grow quickly has enabled tamarisk to spread quickly and extensively along the Arkansas River and cause substantial harm to the quality of water resources in the basin.

Urban stormwater runoff also will increase with continued rapid growth in the Colorado Springs and Pueblo metropolitan areas, bringing increased sedimentation and other pollutants into the Arkansas River. Stormwater regulations are in place for both communities to minimize adverse stormwater effects associated with new development.

Lastly, the construction of U.S. 50 in 1926, and subsequent improvements on the roadway, has impacted the wildlife and habitat native to the Lower Arkansas Valley. The highway creates a substantial obstacle for wildlife to cross when accessing areas they use for feeding, getting water, sleeping, and other needs. Available data show that more than 40 animals, primarily deer, were reported killed or injured by vehicles on U.S. 50 in the project area in 2009 (CDOT 2009b). The locations wildlife select as crossings generally are determined by the habitat types (i.e., the environments they use for food and cover) and surface water that exists on either side of the road, as well as travel routes (e.g., stream corridors). Most crossings on U.S. 50 are found in areas where the highway crosses a water resource, such as the Arkansas River, or is adjacent to a state wildlife area. A total of 16 priority wildlife crossing locations were identified along U.S. 50 in the Lower Arkansas Valley.

5.3. Transportation-Related Conditions and Trends

As previously discussed, U.S. 50 was among the first cross-country routes established within the National Highway System. U.S. 50 is a coast-to-coast element of the National Highway System, extending from Ocean City, Maryland, to Sacramento, California. Construction of the interstate highway system, more specifically I-70 in northern Colorado, increased the emphasis on cross-country travel via this roadway, diminishing the attractiveness of U.S. 50 for this purpose. Thus, traffic volumes on U.S. 50 today are relatively low compared with those on roadways in the more urbanized portions of Colorado. However, because U.S. 50 is connected to multiple truck routes (i.e., primarily I-25 and U.S. 287) and continues to support a large amount of agricultural activities, this traffic is extremely diverse. It typically includes passenger vehicles, farm vehicles and equipment, recreational vehicles, and trucks hauling cargo (box trucks and 18-wheel vehicles). In many locations, U.S. 50 also serves as Main Street in the communities through which it passes and is the backbone of the local street system.

Over time, national roadway design standards have evolved to make roads safer and more efficient. Each time changes were made to U.S. 50, design standards current at that time were used. Over many decades, this has resulted in a mixture of different roadway characteristics. Today, as a result, there are more than 170 roadway changes within the 150-mile U.S. 50 corridor (CDOT 2003b). These changes include posted speed limits changing by 10 mph or more in 28 instances and 60 road width changes due to variations in shoulder width, median width, and number of lanes. These frequent changes in the roadway's design reduce safety on U.S. 50. Drivers expect the design of a roadway to be relatively consistent over a reasonable distance (known as driver expectancy). National safety studies have shown that roads with frequent design changes, or a lack of driver expectancy, increase the risk of crashes (McGee et al. 1986, Ogden 1990).

Frequent changes in roadway design are of greatest concern to long-distance users, who pass through infrequently and are likely to be unfamiliar with the road. Regional and intercity users, who make frequent, moderate-length trips on the corridor, also may be affected. For these users, the problem is not their own driver expectancy but their greater frequency of being in harm's way when long-distance users encounter the

design changes. U.S. 50 serves long-distance, regional, and local transportation needs and accommodates a number of diverse users with different—and sometimes conflicting—travel needs. The conflicts created by the different types of users and their different needs hinder mobility and create safety issues along U.S. 50.

Mobility needs are different for the different users of U.S. 50. Inadequate mobility on U.S. 50 in the Lower Arkansas Valley has been cited as a factor that limits economic development in the area. According to City Manager Rick Klein of La Junta, poor mobility on U.S. 50 limits the area's ability to retain and attract transportation-dependent businesses. In 2006, two major employers along the corridor ceased their operations: the Neoplan bus manufacturing facility in Lamar and the Bay Valley Foods plant in La Junta. Transportation concerns were cited as one of the issues making these operations noncompetitive. Similarly, local efforts to attract a Wal-Mart distribution warehouse reportedly were rebuffed because U.S. 50 is not a four-lane highway. With agriculture in the Lower Arkansas Valley in a continuing decline, all communities along the corridor are seeking to diversify their economies. This will be difficult to accomplish with inadequate mobility on U.S. 50.

A study conducted near milepost 339 (west of Fowler) in November 2006 found that, on average, one out of every 20 vehicles on the road was traveling at a speed of 15 mph or slower (CDOT 2007b). During the active farming season, the percentage would likely be much higher. U.S. 50 is a two-lane highway in this area, with more miles of no-passing zones than miles where passing is allowed.

The safety and mobility issues, along with the user conflicts on U.S. 50, are expected to be compounded by increased traffic volumes in the future. While the overall population of the corridor east of Pueblo has generally decreased since 2000, traffic on this portion of U.S. 50 nevertheless has experienced modest growth (a 2.8 percent increase from 1995 to 2000) (CDOT 2007a). The population of Colorado as a whole has been growing rapidly and is expected to continue to do so. Even with minimal population growth in the Lower Arkansas Valley itself, the expected addition of nearly three million new residents in the state by 2040 will likely increase traffic on the U.S. 50 corridor (CDOT 2008a).

Based on projections of increased traffic over the next 25 years, the 2003 CDOT Safety Assessment Report for U.S. 50 estimated that the total crash frequency for the two- and four-lane segments is expected to increase by 81 percent and 50 percent, respectively, if the highway is not substantially improved (CDOT 2003c). Proposed improvements to U.S. 50 will allow the corridor to accommodate the varied needs of existing and future users.

Since designation of the Clean Air Act in 1970, and mandated continuous monitoring of air quality, there is no history of vehicle-related violations of air quality standards in the project counties. However, in Lamar, particulate matter was monitored at levels that violated pollutant standards in the 1980s, due to exceptional dust events. The most recent violations occurred in 2008, 2009, and 2011. The Attainment/Maintenance Plan for Lamar documents all the recorded exceedances of the EPA standards as Exceptional Events caused by high wind. Windblown particulate matter from agricultural fields generally is linked to disturbed soils. Future vehicular volumes are not expected to cause a violation in pollution standards in any of the communities along the U.S. 50 corridor despite increases in traffic.

Prior to construction of U.S. 50, views and viewsheds were increasingly affected by the growth of rural towns, expansion of rail lines throughout the Lower Arkansas Valley, and growing agricultural activity. The most significant aesthetic changes would have been natural prairie lands transitioning into cultivated farmland. Most views from U.S. 50 (of surrounding areas) and of U.S. 50 (from surrounding areas) have not changed dramatically since the highway was built. The exception is in the city of Pueblo where the pace of development has been greater than in the communities to the east.

Over time, views from U.S. 50 in Pueblo have become more urban, replacing views of ranch land and native vegetative cover with residential, commercial, and industrial development. Today, these views are dominated by this type of development. Closer to I-25, this development is relatively dense. Traveling east, it becomes less dense. Also, U.S. 50 has been improved in this area since it was built. Therefore, views of the highway include more pavement area (i.e., more travel lanes and other elements, such as turn lanes) than in the past.

East of Pueblo, the communities in the Lower Arkansas Valley have maintained their small, rural, and agricultural nature. Also, populations in these communities have been decreasing in recent decades (2010 Census). For these reasons, views from U.S. 50 in the Lower Arkansas Valley east of Pueblo have not changed substantially over the years. Views typically include agricultural or small town elements, such as farmland, ranch land, rural residences, and small town urban development. Because of the proximity of the Arkansas River, views from the highway often include the river as well as irrigation canals and ditches that carry its water to nearby farmland. The BNSF Railway also has tracks that generally run parallel to U.S. 50 through the Lower Arkansas Valley; therefore, views commonly include tracks and trains as well. U.S. 50 has not been substantially improved east of Pueblo since it was built. Therefore, views of the highway have remained relatively consistent over the years.

6. Reasonably Foreseeable Actions

The analysis of cumulative impacts for the U.S. 50 corridor considered direct and indirect impacts of the proposed Build Alternatives, as well as existing conditions and the actions of other major federal, state, and private agencies. Those projects considered to be “reasonably foreseeable actions” have typically received preliminary approvals, or are included in local or regional plans.

6.1. Projects

6.1.1. Southern Delivery System (SDS)

The SDS is a project to supplement existing municipal drinking water supplies in the communities of Colorado Springs, Fountain, Security, and Pueblo West by moving water from the Pueblo Reservoir through a pipeline to those communities. The environmental study evaluating proposed routes for the pipeline has already been completed. Construction began in 2011 and is ongoing.

6.1.2. Arkansas Valley Conduit (AVC)

The Arkansas Valley Conduit and Long-Term Excess Capacity Master Contract FEIS was published in August 2013. The purpose of the AVC is to deliver clean water from the Pueblo Reservoir to the communities between Pueblo and Lamar in southeastern Colorado. The communities intend to use this water to supplement or replace existing drinking water sources. Even though it was authorized nearly 50 years ago, the conduit was never built due primarily to the federal requirement that local communities and water districts repay 100 percent of the cost of the conduit (Black & Veatch et. al 2010). The AVC is projected to increase water delivery by 10,000 acre-feet by 2070 for the entire Arkansas Valley and will account for more than 80 percent of the future demand.

The preferred alternative identified in the FEIS would include updates to municipal water treatment systems and construct new pumping systems to maintain system pressure. Piping is planned to remain on the north side of the river for the majority of the route, minimizing impacts to the same areas as the existing U.S. 50 alignment, as well as the project area, at most locations along the corridor. According to the FEIS, east of Pueblo, the preferred alternative would have short-term negligible to minor impacts on the human environment [BOR 2013].

6.1.3. New Pueblo Freeway

The FEIS for the New Pueblo Freeway was published in September 2013 and the ROD was published in April 2014. In general, the New Pueblo Freeway is intended to improve I-25 through Pueblo. The preferred alternative widens and realigns sections of I-25 through Pueblo. The first phase of the project is anticipated to begin construction in the summer of 2014. This project will have impacts associated with its urban context, including socioeconomic and transportation effects as well as environmental effects, namely, moderate impacts to wetland/riparian areas and impacts to wildlife. The preferred alternative would impact 0.02 acre of open water, 2.54 acres of riparian habitat, 0.93 acre of wetland, and 9.49 acres of wooded upland habitat. (CDOT 2013a). As reported in the FEIS, CDOT will prioritize the replacement of wetland on a one-to-one basis within the project area, but the exact determination of locations for replacement wetland are not know at this time.

6.1.4. U.S. 287 at Lamar Reliever Route

Projects related to a planned alignment for U.S. 287 around Lamar will remove heavy truck traffic from the city’s downtown streets, improving local operations and access to businesses and services in the downtown business district on U.S. 287 Main Street, and accommodating future growth of freight traffic. Additionally, the project will address a range of safety issues, including improving traffic and pedestrian safety in downtown Lamar and rerouting large freight and hazardous materials away from the downtown business district and the at-grade crossing of the BNSF Railway route through downtown Lamar. The U.S. 287 at

Lamar Reliever Route Project is a realignment of the highway approximately one mile east of U.S. 50 that would remain contiguous with U.S. 287 along the new route around Lamar.

6.1.5. Wind Power Projects

Wind projects in the Lower Arkansas Valley include the 162-Megawatt-generating Colorado Green Wind Power Project 30 miles south of Lamar and the 75-Megawatt Twin Buttes Wind Project in south Bent County. Although the actual land use impacts of these projects is minimal, continued maintenance of wind farms occasionally requires transportation access for oversized loads.

6.2. Environmental Protection and Regional Transportation Policy

In addition to major projects anticipated to have direct and indirect effects to key resources in the study area, several plans and programs provide policies and guidance for regional transportation improvement and environmental mitigation. These plans and programs may not be considered to be “reasonably foreseeable actions,” but are included as a reference to the cumulative effects discussion.

6.2.1. Pueblo Area Council of Governments (PACOG), 2040 Long-Range Transportation Plan

The vision for U.S. 50 identified in the 2040 PACOG Long-Range Transportation Plan describes needs for the corridor that include mobility, safety, and system quality (PACOG 2015). This document recommends that U.S. 50 be made a statewide priority.

6.2.2. Southeast Transportation Planning Region, 2040 Regional Transportation Plan

The 2040 plan identifies U.S. 50 as a priority corridor for the region. Planning goals for the corridor include accommodating increases in freight and tourist/recreation traffic, increasing safety and local mobility, and supporting economic development while maintaining environmental quality.

6.2.3. Arkansas River Watershed Invasive Plants Plan (ARKWIPP)

This overarching plan for future riparian restoration efforts in the Arkansas Valley includes guidance for education, funding identification, and information sharing among agencies for the purpose of reducing invasive species, specifically tamarisk and Russian olive. Roadway design and mitigation efforts for projects on U.S. 50 will impact wetland and riparian areas where tamarisk thrives.

6.2.4. R2C2 Rail Relocation Implementation Study

In 2007, CDOT initiated a study to determine the feasibility of relocating existing freight rail lines along Colorado’s Front Range to locations on the eastern plains—the Rail Relocation Implementation Study (R2C2). Both alternatives studied would remove freight traffic from rail lines west of Las Animas and would take more direct routes northward. Passenger rail benefits were not included in the study. Ultimately, the study recommended more detailed engineering and additional environmental analysis be conducted in the future for both of the study’s alignments. To date, no additional studies have been initiated.

7. Effects

The following sections describe cumulative effects that may be caused by the No-Build Alternative and the Build Alternatives.

7.1. No-Build Alternative

Under the No-Build Alternative, only minor and isolated construction would occur. Routine maintenance and repairs would be made as necessary to keep U.S. 50 in usable condition, including standard overlays and repairs of weather- or crash-related damage. Additionally, smaller scale improvements may be undertaken, such as short passing lanes and other minor safety improvements. Because the No-Build Alternative only includes minor and isolated construction, any cumulative effects that may result from the alternative are expected to be discountable; therefore, cumulative effects as a result of this alternative are not discussed further in this section.

7.2. Build Alternatives

The Build Alternatives consist of constructing a four-lane expressway on or near the existing U.S. 50 from I-25 in Pueblo, Colorado, to approximately one mile east of Holly, Colorado. There are a total of 30 Build Alternatives. In Pueblo, three Build Alternatives are proposed that either improve U.S. 50 on its existing alignment and/or reroute it to the north to utilize SH 47. East of Pueblo, the remaining 27 Build Alternatives are divided into nine between-town alternatives and 18 around-town alternatives. The nine between-town alternatives improve U.S. 50 on its current alignment, with the exception of near Fort Reynolds, where there is an alternative to realign the roadway to the south. The 18 around-town alternatives propose relocating U.S. 50 from its current through-town route at Fowler, Manzanola, Rocky Ford, Swink, La Junta, Las Animas, Granada, and Holly. Figure 7-1 provides an overview of the Build Alternatives as proposed.

The remainder of this section discusses the potential for cumulative effects from the Build Alternatives to socioeconomic conditions (agricultural resources, diversification of local economies, land use conversion, parklands and recreational resources, historic resources, and archaeological resources), natural environment conditions (include water resources, wetlands, and riparian habitats), transportation related conditions (includes the transportation system, aesthetic conditions of the area, noise, and energy), and global climate change. At the Tier 1 level of analysis, cumulative effects are not discussed for geologic and paleontological resources, environmental justice, air quality, hazardous materials, or Section 6(f) resources.

7.2.1. Socioeconomic Conditions Cumulative Effects

Cumulative impacts to socioeconomic conditions include effects to resources that are important for the economic vitality and character of communities along the U.S. 50 corridor. Since agricultural activities make up the primary economic sector for the project area, the cumulative impacts of U.S. 50 and other projects in the Lower Arkansas Valley are significant. Reviewing the cumulative effects of economic diversification, land use conversion, and impacts to other cultural resources—including historic, archaeological, and aesthetic resources—is essential to maintain the character and legacy of people in the area.

Because the specific effects to environmental justice populations have not been identified, it is not possible to identify cumulative effects to that resource. Effects to environmental populations will be identified during Tier 2 projects.

First

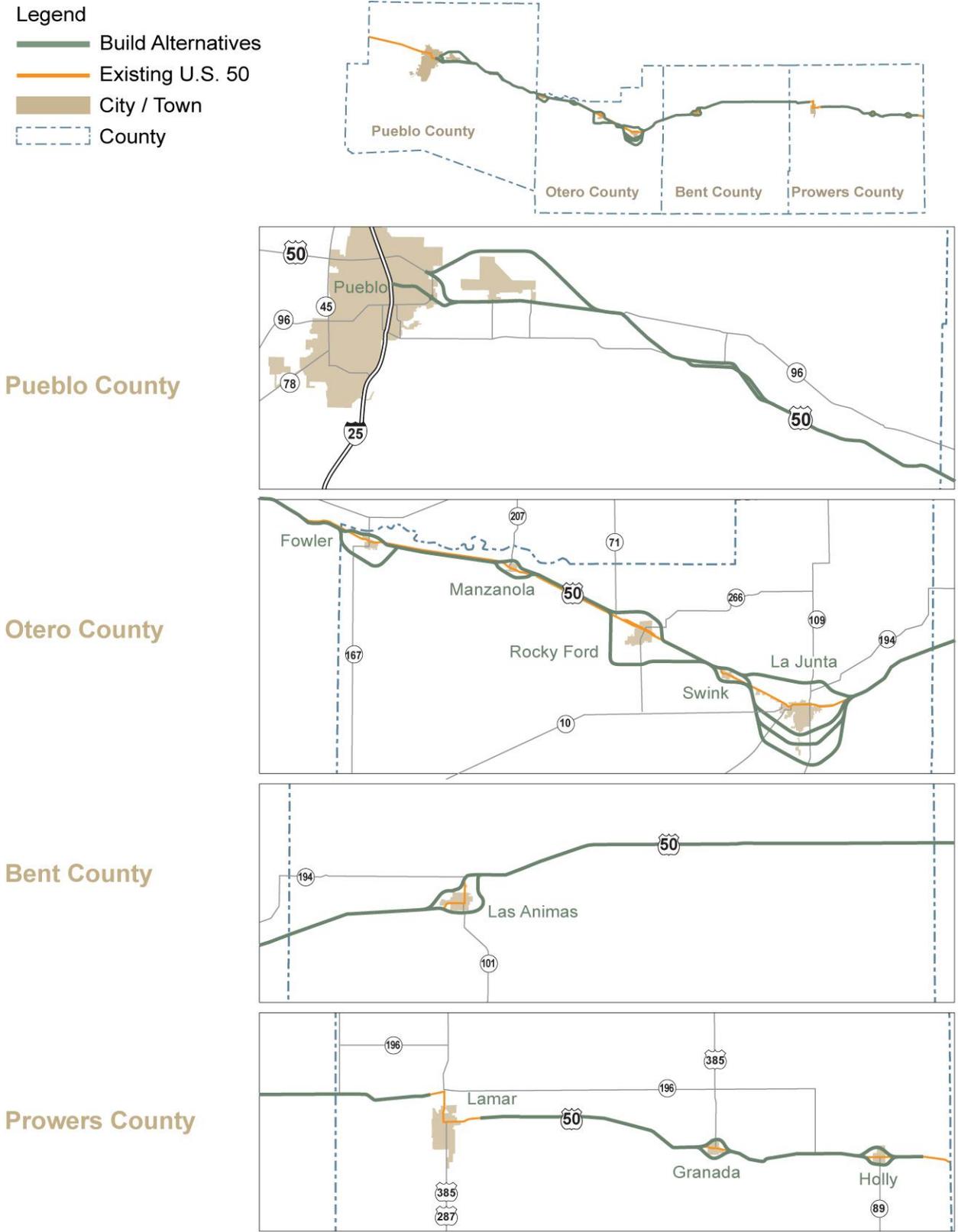


Figure 7-1. Build Alternatives Overview

Agricultural Resources

In addition to the direct effects of U.S. 50 on agricultural resources mentioned in Section 4.1 of the U.S. 50 Tier 1 EIS, the U.S. 287 at Lamar Reliever Route Project is expected to impact agricultural resources in the Lower Arkansas Valley. The proposed route is expected to impact approximately 365 acres of farmland of statewide importance and farmland considered prime under certain conditions. The U.S. 50 Build Alternatives would impact between 2,866 acres to 3,047 acres of farmland of statewide importance and farmland considered prime under certain conditions. The cumulative effect of this impact amounts to about 1 percent of the loss already predicted in the four project counties over the next two decades and 0.5 percent of the total value of agricultural goods produced by the four project counties in 2007, which was \$506 million. Although this loss is significant for the economic vitality of the communities along the U.S. 50 corridor, it is not anticipated to affect the general trend of decreasing agricultural activity in the Lower Arkansas Valley.

Water projects, such as the Arkansas Valley Conduit and Southern Delivery System, have the potential to reduce water available for agricultural activities (i.e., irrigation). These impacts are only anticipated to be noticeable during drought years and during the winter season. With less predictability, there is the chance of this resulting in more land being removed from productive agricultural use.

Build Alternatives and other reasonably foreseeable actions have the potential to provide increased mobility for farm-to-market activities, making it easier for farmers and ranchers to get their products to market. For example, if the railroads decide to choose an alternative as proposed by the R2C2 Rail Relocation Implementation Study, this would increase access to reliable transportation of goods from farm producers in the Lower Arkansas Valley, particularly east of Las Animas. Despite the trend toward decline, agricultural activities are expected to remain an integral part of the economy of the region. Therefore, reducing farm-to-market transportation costs could enable farmers and ranchers to spend those dollars on new equipment or other technologies that could increase the productivity of their operations.

Diversification of Local Economies

The counties east of Pueblo County recognize the need to diversify their economies. Recent economic trends in those counties, however, reflect minimal growth or diversification. This may be due to the continuing productivity of farming and ranching in the area and the lack of petroleum resources that are present in other rural areas of Colorado. Nonetheless, some new businesses have relocated to the Lower Arkansas Valley, including a private prison in Las Animas and a wind farm south of Lamar. The Fort Lyon Veteran's Administration medical facility (located east of Las Animas near the John Martin Reservoir) was converted to a state correctional facility in 2002. The correctional facility closed in 2011 and, in September 2013, the facility opened as a rehabilitation center for homeless people. Two major employers went out of business in 2006: a transit bus manufacturing plant in Lamar (Neoplan USA) and a food processing plant in La Junta (Bay Valley Foods).

Residents and economic development agencies along U.S. 50 have begun efforts to increase tourism to the region as a way to diversify local economies. Given that Colorado's population grew by 16.9 percent from 2000 to 2010 and it continues to grow, there is a large market of potential tourists who could visit the Lower Arkansas Valley if interesting attractions were made known (Census 2010). Different types of tourism are being considered in the area, including heritage tourism, ecotourism, and agritourism. Heritage tourism focuses on historic resources, ecotourism focuses on natural resources (landscapes and wildlife), and agritourism focuses on agricultural activities.

The following reasonably foreseeable future actions would support tourism efforts in the Lower Arkansas Valley, which residents hope will increase economic activity in the area:

- FHWA is proposing a new access point to the Bent's Old Fort National Historic Site that would allow tourists to access the site directly from U.S. 50. Today, drivers must use either SH 109 in La Junta or SH 194 north of Las Animas to reach the site.
- The federal government has authorized \$38 million for the preservation of World War II relocation centers. Currently, the Granada Relocation Center National Historic Landmark is open to visitors, but there is minimal interpretive infrastructure on the site. Plans exist for a visitor's center, parking lot, and other infrastructure to educate visitors about the site.

- In 2005 and 2006, the Colorado Historical Society awarded grant monies to communities along U.S. 50 to preserve particular resources and promote heritage tourism along the highway. Grant recipients in 2006 included the Bent County Courthouse and Jail in Las Animas.
- Southeastern Colorado is part of North America's western Central Flyway. Therefore, it is home to the annual migration of snow geese and many other bird species in abundant numbers. Colorado Parks and Wildlife has developed birding trails that include segments of the flyway in the Lower Arkansas Valley. The division is constructing four kiosks related to the trail along U.S. 50 (in Fowler, La Junta, Lamar, and Holly).
- Farmers in the region are using agritourism activities, such as roadside produce markets and pick-your-own produce activities, to expand their businesses and profitability.
- The new around-town routes would reduce traffic in existing downtown areas. This could make these areas more pedestrian friendly. Since most of the identified historic resources (those known to be historic and potentially historic) are located within these downtowns, this type of change could help communities encourage heritage tourism within their jurisdictions.

The U.S. 50 Tier 1 EIS project has already made a contribution to the Lower Arkansas Valley's heritage tourism efforts by releasing a summary of the historic resources identified along U.S. 50, as well as a historic context overview to Section 106 consulting parties. This research may help residents and economic development agencies identify resources worthy of preservation and promotion.

When added to past, present, and reasonably foreseeable actions, the Build Alternatives' benefit of improved safety and reliability has the potential to have a cumulative benefit to the social and economic conditions in the project area by assisting in the diversification of the corridor economy. Further analysis will be conducted during Tier 2 studies.

Land Use Conversion

As discussed in other sections, through the 1950s, historic settlement patterns caused much of the change in landscape from natural prairie and wetland of the Arkansas River floodplain to agricultural and urban uses. With this general trend in urban development came the identification of private property, public lands, parks, open space, and transportation uses. Within the 150-mile-long project area, a total of 36 public lands and 27 conservation easements were identified (either in whole or in part). As development pressure slowed within communities, the conversion of farmland and ranch lands has diminished. Including U.S. 50, other foreseeable future projects in the Lower Arkansas Valley will transfer the land to a transportation use from some other use (primarily agricultural). This conversion of land use is significant for the area, but the cumulative effect is minimal considering the relative impacts of individual resources as identified in the U.S. 50 Tier 1 EIS.

Parklands and Recreational Resources

The Build Alternatives could affect up to 13 parkland or recreational resources over its 150-mile length. However, direct effects to these resources are localized. Reasonably foreseeable future actions are not anticipated to have a significant cumulative impact on these same resources, nor are the general effects to parkland and recreational resources of concern for the Lower Arkansas Valley. It should be noted that with improved mobility throughout the U. S. 50 corridor due to the Build Alternatives, the New Pueblo Freeway, and the U.S. 287 at Lamar Reliever Route, there are better opportunities for visitors to travel to and from parklands and recreational sites.

Historic Resources

Historic resources include homestead sites and transportation and irrigation infrastructure. Several of the reasonably foreseeable future actions discussed in Section 6.0 have the potential to affect historic resources. These include the AVC, the U.S. 287 at Lamar Reliever Route, and the New Pueblo Freeway (by acquiring the properties) or indirectly (by causing noise, visual, or other affects). The cumulative impacts to historic resources of the Lower Arkansas Valley are expected to be greatest where direct and indirect impacts of other urban activities are anticipated. The New Pueblo Freeway would have an adverse effect on 40 historic resources (CDOT 2013a). These impacts combined with the potential for induced growth could cause increasing development pressure on historic properties along U. S. 50 near to Pueblo. Impacts to

historic properties are likely to be less substantial east of Pueblo. The U.S. 287 at Lamar Reliever Route is not expected to have an adverse effect on historic properties (CDOT 2013b). Most of the direct effects to historic properties identified in the AVC FEIS are located near the Pueblo Reservoir, outside of the project area. However, it is likely that cultural deposits will be impacted along the route.

While the U. S. 50 Build Alternatives would not have a direct effect on Bent's Old Fort National Historic Site or the Granada Relocation Center National Historic Landmark, it may have indirect effects on these properties. These effects would be identified during Tier 2 studies when the roadway footprint (i.e., alignment) in these areas is determined.

The cumulative effect on historic properties in the Lower Arkansas Valley is minor. Because of the large scale and linear nature of foreseeable projects in the area, there are few opportunities for avoiding resources in certain circumstances. It is not anticipated, however, that U.S. 50 will impact the overall trend of ongoing minimal disturbances of historic resources in the area.

Archaeological Resources

Historic settlement trends have served to both preserve and destroy archaeological resources. Permanent settlement of the Lower Arkansas Valley resulted in development that likely has destroyed some of the archaeological resources located there. Examples of that development occurring after 1960 include new and expanded farming and ranching operations and construction of U.S. 50 itself. Additional resources may have been destroyed by periodic river flooding and by the creation of the John Martin Reservoir (near Las Animas).

More recently, that trend has reversed. The construction of I-70 reduced the importance of U.S. 50 as a coast-to-coast highway. Today, traffic volumes on U.S. 50 are much lower than on I-70. This condition has contributed to slower economic growth in these communities when compared with the fast-growing communities of the Colorado Front Range (those having at least one interstate highway running through them). This slower economic growth has helped preserve archaeological resources by reducing the rate of development and, therefore, the potential to impact buried cultural remains.

Within the Area of Potential Effects, 17 archaeological resources were identified. Most of these resources have been categorized as "needs data." This means that more information about the resource is needed before a determination of eligibility for the National Register of Historic Places can be made.

However, cumulative effects resulting from the Build Alternatives—when added to other past, present, and reasonably foreseeable future actions—are unlikely to be a significant detriment to the archaeological database of the Lower Arkansas Valley. This is because so few known resources have the potential to be affected by the Build Alternatives, and those resources directly adjacent to U.S. 50 (where most of the improvements would take place) have already been disturbed by human settlement, primarily by farming and ranching activities.

7.2.2. Natural Environment Cumulative Effects

The most significant impacts to resources of the Lower Arkansas Valley include those related to water, wetlands, wildlife, and wildlife habitat. These resources are limited in the region and particularly vulnerable to human activity. Other trends, such as Global Climate Change and meteorological phenomena such as drought, have the potential to compound the cumulative effects of human activity on the environment. Cumulative effects to natural resources are discussed below.

Wetland and Riparian Resources

Historically, the Fryingpan-Arkansas water projects of the 1960s had the most significant impacts to wetland and riparian resources of the Lower Arkansas Valley. However, reasonably foreseeable future actions—including the Arkansas Valley Conduit, Southern Delivery System, and the U.S. 287 at Lamar Reliever Route Project—in addition to impacts of the Build Alternatives, have the potential to temporarily and permanently impact wetland and riparian resources by acquiring land, thereby reducing the quantity and quality of these resources.

Combined with reasonably foreseeable future actions in the Lower Arkansas Valley, the impacts of the U.S. 50 Build Alternatives on wetland resources are moderate. The Build Alternatives would affect between 587 and 711 acres of wetland. The AVC project would have a temporary impact on 29 acres of wetland and four open water sources. (BOR 2013). The Southern Delivery System is expected to have a permanent impact on 13.4 acres of wetland, most of which are Category III (defined as more common than Category I or II wetlands and have less vegetative diversity; see page 4-30 for definitions of each category). The SDS also would impact eight miles of streambed. These are considered to be moderate temporary impacts, but minor effects in the long term.

The greatest threat to wetland and riparian resources in the project area is the invasion of salt cedar, commonly referred to as tamarisk. According to data from the Southwest Regional Gap Analysis Project (2006) and Colorado Division of Wildlife (now Colorado Parks & Wildlife; 2004), approximately 11,300 acres of tamarisk exist within the project area. The largest, contiguous blocks of tamarisk are located along the Arkansas and Huerfano rivers; however, smaller patches occur in other locations as well. This highly invasive, non-native shrub has become a major problem in southeastern Colorado. Tamarisk invades native wetland and riparian resources, reducing their ability to function (or provide benefits to the environment). Additionally, tamarisk also can change the formation of stream channels and thereby prevent native plant species from taking root. Consequently, the tamarisk in the project area is not only degrading existing resources, it also is preventing the creation of new ones. Left unmitigated, the potential is great for tamarisk to have significant negative impacts on wetland and riparian habitats. U.S. 50 Build Alternatives are not anticipated to affect this past trend negatively, and have the potential to support several existing efforts to slow and reverse the invasion of tamarisk to native wetland and riparian resources.

Currently, there are several projects to eradicate tamarisk in the area. The ARKWIPP, an overarching plan for wetland restoration, is working to establish guidelines and policies for eliminating invasive species in the area. If successful, this effort will significantly reduce the effects of tamarisk and will reduce the cumulative effects of projects on water resources. Additionally, the Conservation Reserve Program could help preserve wetland/riparian resources in the region. The program encourages the use of agricultural land for natural purposes instead of development. Because irrigation efforts bring additional water to this land, some of it may serve as wetland or riparian areas when it is not being actively farmed.

The U.S. 50 Tier 1 EIS project has already made a contribution to the conservation of wetland/riparian resources by developing the U.S. 50 Tier 1 EIS Natural Resources Mitigation Strategies Plan (attached as an appendix of the U.S. 50 Tier 1 EIS). This plan is intended to guide mitigation activities for natural resource impacts that occur during Tier 2 studies, primarily impacts to wildlife and their habitat. Since wetland/riparian resources serve as habitat to certain types of wildlife, they are discussed in this plan. While the mitigation strategies in the plan are tied to the roadway improvements, they also provide a framework for future, collaborative planning efforts by key stakeholders for natural resource related issues in the Lower Arkansas River Valley.

Because U.S. 50 and other reasonably foreseeable projects are implementing the policy of “no net loss” and would mitigate for permanent impacts to wetlands, the proposed project is not expected to have a permanent, negative effect on wetland and riparian resources when added to other past, present, or reasonably foreseeable future actions.

Wildlife and Wildlife Habitat

Approximately 194,700 acres of wildlife habitat were identified in the project area. The Build Alternatives would affect between 4,388 and 4,737 acres of it, which represents slightly more than 2 percent of this total. Also, the Build Alternatives could affect up to 25 special-status species that are either known to be present or are potentially present within the Build Alternatives.

Some of the reasonably foreseeable future actions discussed in Section 6.0 have the potential to affect wildlife and plants (i.e., habitat). These include energy-related activities and the U.S. 287 at Lamar Reliever Route Project. The U.S. 287 at Lamar Reliever Route Project would affect shortgrass prairie and wetland habitat, causing some fragmentation and removal of foraging areas and nesting sites, causing interference with behavioral activities, and increasing animal mortality. Wind energy projects south and east of Lamar

have the potential to increase bird mortality because of bird strikes or expenditure of additional energy to avoid wind farms.

However, these impacts—when combined with the effects of past, present, and reasonably foreseeable future actions—are unlikely to have a substantial cumulative effect on the Lower Arkansas Valley’s natural environment or the wildlife or plants found within it for the following reasons:

- The project generally occurs along the existing alignment of U.S. 50 or close to existing urban centers. As a result, any habitat affected by Build Alternatives would be located near areas that have already been disturbed by human settlement.
- Much of the corridor has already been converted from native plant communities into agricultural production, so construction of Build Alternatives is likely to occur on land that has already been disturbed by human settlement.

Water Resources

The Build Alternatives have the potential to adversely affect water quality by increasing the amount of pollutants that are carried from the surface of U.S. 50 along with stormwater into nearby water resources. This increase would occur in the portions of Build Alternatives where the highway is expanded from two lanes to four lanes and to a lesser extent in the areas where other improvements are added to the highway (i.e., wider shoulders, turn lanes, etc.). Also, additional crossings of water resources by U.S. 50 would be required, primarily over irrigation canals and ditches. These new crossings have the potential to increase the amount of pollutants that reach the surface water resource being crossed and eventually ground water resources. Some of the reasonably foreseeable future actions discussed in Section 6.0 have the potential to affect water resources. These include the Arkansas Valley Conduit, Southern Delivery System, New Pueblo Freeway Project, and the U.S. 287 at Lamar Reliever Route Project.

The preferred alternative identified in the Arkansas Valley Conduit EIS calls for water to be removed from the Arkansas River at the Pueblo Reservoir, reducing the amount of water flowing in the river downstream of that location. As a result, less water may be left in the river to dilute salt, selenium, and other pollutants. This may diminish water quality in the river. However, it is likely that the sponsor of the project, the Southeastern Colorado Water Conservancy District, will commit to mitigating any significant adverse water quality effects resulting from the construction or operation of the conduit. Those commitments would be outlined in an environmental study that evaluates proposed routes for the conduit. That National Environmental Policy Act study is just now beginning.

Similar to the conduit, the Southern Delivery System would remove water from the Arkansas River at the Pueblo Reservoir, reducing water flows downstream, which could negatively affect water quality in the river. However, the participating municipalities (i.e., those receiving the water) have made commitments to ensure that significant adverse water quality effects are mitigated. They have agreed that if the operation of the pipeline causes such effects, whether directly or by diminishing water levels, the municipalities would coordinate with appropriate federal and state agencies to evaluate and select measures to mitigate these effects (BOR 2009).

Three highway improvement projects have the potential to increase the amount of transportation-related pollutants that flow into the river at their locations. The New Pueblo Freeway Project, slated to make improvements to I-25 through Pueblo, includes expansion of the portion of U.S. 50 that crosses Fountain Creek. Additionally, the U. S. 287 at Lamar Reliever Route Project would reroute U.S. 287, which is also U.S. 50 in this area, around that city. The new alignment would require a new crossing of the Arkansas River by U.S. 287-U.S. 50 east of Lamar.

The water quality of the Arkansas River and its tributaries is largely attributable to agricultural practices and upstream development. Stormwater runoff from U.S. 50 contributes minimally to these conditions. Even with runoff from metropolitan areas, the water quality impairment in the lower portion of the Arkansas River is primarily due to selenium and salinity, which are not vehicle-related pollutants. The low traffic volumes on U.S. 50 (on average about 5,500 vehicles per day in 2011) are much less than the volumes found on even a single arterial street in the cities upstream (CDOT 2012). Therefore, while water quality issues are critical

concerns in the region, and it is important to understand how the Build Alternatives could affect them. The effect of the project when added to past, present, and reasonably foreseeable future actions is expected to be minimal.

7.2.3. Transportation Cumulative Effects

Several future actions would contribute to the cumulative impacts of transportation in the study area. These include the New Pueblo Freeway Project and the U.S. 287 at Lamar Reliever Route Project. Additionally, a potential shift of rail traffic as proposed in the R2C2 Plan would allow for rail traffic to serve more local constituents and transport freight.

Transportation

No negative cumulative effects related to transportation issues are expected from the Build Alternatives when added to other past, present, or reasonably foreseeable future actions. However, a cumulative benefit to transportation could occur along the corridor when the Build Alternatives are added to improvements related to the U.S. 287 at Lamar Reliever Route Project. The result could be a cumulative improvement to safety and mobility along the corridor.

Aesthetics and Visual Resources

Views from U.S. 50 (of surrounding areas) would be affected in different ways depending on the location of the traveler. Generally, in Pueblo and between communities, the Build Alternatives would improve U.S. 50 on its existing alignment. Therefore, the character of the views would not change, resulting in no effect. Moving the highway to around-town locations at eight communities would result in drivers who currently see views of urban development on both sides of the highway (driving through a city or town) would see urban development on one side (looking toward town) and rural views on the other (looking away from town) from the new around-town route. However, this change would only mean exchanging in-town views for more of the same views drivers already see between towns. Since the overall character of the new views would be consistent with what drivers see today on other portions of the highway, the result would be no effect to these views.

Some of the reasonably foreseeable future actions discussed in Section 6.0 have the potential to affect what drivers see while traveling on U.S. 50 (i.e., views of surrounding areas). For example, if energy transmission corridors are developed, these projects could add power lines to views from U.S. 50 at some locations. Additionally, large energy-producing projects (i.e., power plants, wind farms, etc.) would add elements associated with those facilities to views at those locations.

Changes to U.S. 50 could alter how residents view the highway (from surrounding areas). Especially where the existing two-lane sections of the highway would be expanded to four lanes, views of U.S. 50 would include more pavement area. This would result from the addition of new lanes, turn lanes, or other improvements.

While these actions would add new elements to views seen from U.S. 50 and views of the highway from surrounding areas, they would not change the rural character of those views substantially. The cumulative effects of these and other reasonably foreseeable future actions within the Lower Arkansas Valley are not expected to impact existing visual resources.

Traffic Noise

U.S. 50 is the primary east-west route through the communities in the Lower Arkansas Valley. Within these communities, many homes, businesses, and public facilities are located immediately adjacent to U.S. 50, and are, therefore, exposed to noise from U.S. 50 traffic today. The average traffic volume on the U.S. 50 corridor was approximately 5,500 vehicles per day in 2011 (CDOT 2012). This is a relatively low volume compared to other, more populated, highways along Colorado's Front Range. On average, traffic volumes are expected to rise by approximately 52 percent by 2040 along the U.S. 50 corridor.

Traffic volumes on U.S. 50 are relatively low today, and they are projected to remain that way into the future (at least until 2040). Both existing volumes and projected volumes are not sufficient to result in a level of

urban traffic noise where abatement measures are considered. Additionally, options that reroute traffic around communities will have the beneficial impact of reducing traffic noise in town, where there is the highest concentration of urban development and people (i.e., where most people hear it). A small number of homes and other noise receptors in the vicinity of the new around-town routes would experience increased noise levels. However, these volumes would not be significantly different than noise levels that are experienced in the portions of the corridor between communities today. For these reasons, the Build Alternative, when added to past, present, or reasonably foreseeable future actions, is expected to have a negligible cumulative effect on traffic noise. Without further analysis, it cannot be determined if that effect would be positive or negative, and that determination is likely to vary at each section of the corridor.

Energy Consumption due to Transportation

The average traffic volume on U.S. 50 in the project area was approximately 5,500 vehicles per day in 2011 (CDOT 2012). In comparison, the average traffic volume on I-25 through Pueblo was 47,846 vehicles per day in 2012 (CDOT 2012). In other words, traffic volumes on U.S. 50 in the region are roughly 12 percent of the volumes on I-25 through Pueblo. By the year 2040, traffic volumes are expected to increase by about 52 percent on U.S. 50 (CDOT 2012). The increase in energy consumption simply due to this increase in traffic is equal to an additional 27,000 gallons of gasoline used per day. U.S. 50 drivers are expected to consume more than 73,000 gallons of gasoline traveling through the Lower Arkansas Valley on an average day in 2040.

U.S. 50 drivers are expected to consume almost 71,500 gallons of gasoline traveling through the Lower Arkansas Valley on an average day in 2040. The additional distance added by the Build Alternatives (i.e., the new around-town routes) would increase this consumption by 3 percent to 6 percent (or 2,200 to 4,100 gallons of gasoline). However, this effect is minimal compared to other factors that are expected to affect energy consumption on U.S. 50 in the future. For example, increases in traffic volumes on the highway through 2040 are projected to increase energy consumption by 46 percent. This translates into an additional 22,500 gallons of gasoline used per day (DOE 2009, EIA 2007). As a result, no cumulative effects related to energy are expected from the Build Alternatives.

8. Mitigation Strategies

Mitigation strategies for individual resources have been identified in the technical memoranda completed for each resource, which are attached to the U.S. 50 Tier 1 EIS as appendices. They also are documented, by resource, in Chapter 4 of the EIS.

Additionally, the U.S. 50 Tier 1 EIS has developed a Natural Resources Mitigation Strategies Plan. This plan is intended to guide mitigation activities for natural resource impacts that occur during Tier 2 studies, primarily impacts to wildlife and their habitat (i.e., plants). The Natural Resources Mitigation Strategies Plan has been attached as an appendix to the EIS. All applicable laws and regulations will be followed, and mitigation measures would be applied as needed to offset identified impacts during Tier 2 studies.

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Appendices

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Appendix A. Resource Methodology Overview for Cumulative Effects

This resource methodology overview is attached to this technical memorandum for reference only. The lead agencies for the U.S. 50 Tier 1 EIS (i.e., CDOT and FHWA) drafted resource methodology overviews to identify and document which resource evaluation activities would be completed during the Tier 1 EIS, and which would be completed during Tier 2 studies. These overviews were intended to be guidelines to ensure that the Tier 1 EIS remained a broad-based analysis while clarifying (to the public and resource agencies) when particular data and decisions would be addressed in the tiered process. These overviews were approved by the lead agencies, and they were agreed upon by the resource agencies during the project's scoping process. They were subsequently used by the project's resource specialists as guidelines to ensure that their activities were relevant to the Tier 1 (i.e., corridor location) decision.

Table A-1. Resource Methodology Overview for Cumulative Effects

Methodology Overview	Cumulative Effects	
	Tier 1	Tier 2
Relevant Data/ Information Sources	<ul style="list-style-type: none"> • Past, present, and foreseeable future actions • Potentially affected resources, as concurred on by EPA • Land use/community-based factors, including neighborhoods, recreational facilities, socioeconomic resources, and potential impacts to low-income and/or minority populations • Historic and cultural resources, including historic buildings, districts, and archaeological sites • Ecological/natural resources, including wetlands, farmland, floodplains, streams, and wildlife habitat 	<p>Review Tier 1 data for significant changes and collect additional data required to complete the appropriate Tier 2 analysis</p>
Collection and/or Analysis Methodology	<ul style="list-style-type: none"> • Issues of concern established and available information identified through coordination with federal, state, and local resource agencies • Action and impact compilation created through review of NEPA; federal, state, and local land use and development plans; and other relevant documents • Resources characterized and baseline conditions determined through past evaluations, current studies, and new analysis as needed • Data evaluated through the use of analytical tools, including tables, matrices and system diagrams, trends analysis, maps and overlays, and GIS • Direct impacts of current project (potential order of magnitude) determined through NEPA process analysis for all alternatives • Environmental consequences of cumulative impacts determined on a preliminary basis • Field surveys are not proposed unless limited to the proposed corridors identified through the alternative screening process • Narrative on the past context of the Lower Arkansas Valley 	<p>Same as Tier 1, except that Tier 2 will develop and assess project-specific impacts based on project conceptual design. The cumulative effects analysis will utilize more detailed information collected in Tier 2 (see other methodology write-ups for the affected resources listed above). Also, if separated in time from the completion of Tier 1, the Tier 2 documentation will update any important information that may have changed during the interim.</p>
Project Area	<ul style="list-style-type: none"> • The initial records search will include the Tier 1 project area limits. • Boundaries will be coordinated with EPA to ensure acceptable limits beyond project area for certain resources. 	<ul style="list-style-type: none"> • Study area boundaries for Tier 2 sections of independent utility projects will be based on the area of direct and indirect effects (i.e., a 10-mile project will not have a 150-mile study area). Each project will develop the

Methodology Overview	Cumulative Effects	
	Tier 1	Tier 2
	<ul style="list-style-type: none"> Temporal scope includes looking back to approximately 1960, examining current time, and looking forward to the year 2050. 	<p>appropriate spatial scale for each affected resource.</p> <ul style="list-style-type: none"> The time frame for examining other past and future actions in Tier 2 will be the same as in Tier 1.
Impacts	<ul style="list-style-type: none"> Direct and indirect impacts will be identified only as a potential range or order of magnitude. Each resource specialist will provide input in regard to their area of expertise. 	Cumulative effects will be assessed based on project-specific information developed about individual Tier 2 studies in the context of overall trends developed in Tier 1.
Mitigation Options	Potential mitigation strategies will be identified in terms of the types of CDOT/FHWA actions appropriate at the Tier 2 project level and at the policy level (e.g., actions outside of CDOT authority). The degree to which project-level mitigation will be needed will be order-of-magnitude commensurate with the Tier 1 understanding of potential impacts.	Mitigation commitments for specific Tier 2 studies will be selected from the mitigation strategies identified in Tier 1 to ensure project-level mitigation efforts, for all resources, are integrated to achieve maximum benefit for the affected resource.
Deliverables	A Cumulative Effects Technical Memorandum will include all present available information and provide full disclosure of available data on baseline levels and cumulative impact, direct and indirect impacts from past, present and foreseeable future, compared to total accumulated action on each resource.	A Cumulative Effects Technical Report, as appropriate for Tier 2 sections of independent utility level of NEPA documentation, will reference the Tier 1 documentation and therefore need not explain again the entire corridor context. Tier 2 documentation will identify project-specific impacts, and mitigation that were not known during Tier 1 as well as compliance with strategies developed during Tier 1.
Regulatory Guidance/ Requirements	<ul style="list-style-type: none"> Council on Environmental Quality Cumulative Effects Handbook, January 1997 	

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Appendix B. Abbreviations and Acronyms

CDOT	Colorado Department of Transportation
CDOW	Colorado Department of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDRMS	Colorado Division of Reclamation, Mining, and Safety
CFR	Code of Federal Regulations
CPW	Colorado Parks and Wildlife
CR	County Road
CWCB	Colorado Water Conservation Board
DOLA	Department of Local Affairs
EA	Environmental Assessment
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
I-25	Interstate 25
NEPA	National Environmental Policy Act
OEDIT	Colorado Office of Economic Development and International Trade
RTP	Regional Transportation Plan
SDS	Southern Delivery System
SECWCD	Southeastern Colorado Water Conservancy District
SWReGAP	Southwest Regional Gap Analysis Project
SH	State Highway
SIU	Section of independent utility
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
U.S. 287	U.S. Highway 287
U.S. 50	U.S. Highway 50
U.S. 50 Tier 1 EIS	U.S. Highway 50 Tier 1 Environmental Impact Statement

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