4.0 ENVIRONMENTAL RESOURCES

This section summarizes existing conditions in the study area, discusses potential impacts associated with implementation of the Recommended Alternatives, identifies potential mitigation, and begins to define what steps will be needed when a NEPA process is undertaken. Please note that the impacts discussed for each resource are based on very high-level, conceptual-level design. As the design is advanced and refined during the subsequent NEPA process, some impacts could change.

For more information on environmental resources, refer to Appendix H, pages 30 to 85 of the *PEL Study Existing Conditions Report*.

4.1 Primary Findings Summary

The primary findings from the environmental analysis are summarized in Table 4-1.

The *PEL Study Existing Conditions Report* in Appendix H and the FEIS/ROD plus the Technical Reports supporting these documents were primary sources of information.

Table 4-1. Primary Findings

Resource	Methodology/ Data Source Used	Present in Study Area?/Impacts	Next Steps
Floodplains	Secondary data from the Federal Emergency Management Agency	Yes/Yes	• Finalize impact assessment. • Coordinate with Douglas County for floodplain permitting. • Prepare technical report in compliance with Executive Order 11988.
Wetlands and other Waters of the U.S.	Secondary data from FEIS/ROD plus high-level field review	Yes/Yes	• Conduct wetland delineation and wetland functional assessment. • Examine practicable alternatives to avoid or minimize wetland impact. • Prepare full impact assessment, followed by Wetland Finding and FACWet analysis if needed. • Coordinate with USACE.

Table 4-1. Primary Findings

Resource	Methodology/ Data Source Used	Present in Study Area?/Impacts	Next Steps
Vegetation and Noxious Weeds	High-level field review	Yes/Yes	• Conduct more detailed field review plus survey of riparian vegetation. • Prepare Noxious Weed Management Plan. • Coordinate with Colorado Parks and Wildlife (CPW) for SB 40 impacts and mitigation.
Threatened and Endangered Species and Other Wildlife	Secondary data from the U.S. Fish and Wildlife Service (USFWS) plus high-level field review Used CPW data for mapping of Preble's habitat, coordinated with CPW relative to Chatfield State Park impacts and wildlife connectivity issues	Yes/Yes	• Conduct full field survey. • Work with engineering team to incorporate recommendations for wildlife crossings (see Appendix D). • Prepare full impact assessment. • Prepare Biological Assessment. • Coordinate with USFWS and CPW. • Enter into Section 7 consultation if needed.
Cultural Resources	Secondary data from State Historical Preservation Officer (SHPO) and high-level field review	Yes/Yes	• Conduct full field survey. • Obtain agreement from SHPO on the Area of Potential Effects. • Determine effects and submit to the SHPO for concurrence. • If adverse effects, work with SHPO to resolve mitigation through a Memorandum of Agreement.
Hazardous Materials	Secondary data from federal and state environmental databases (Geosearch) and historical records, plus field survey	Yes/Yes	• Prepare Modified Environmental Site Assessment (MESA).

Table 4-1. Primary Findings

Resource	Methodology/ Data Source Used	Present in Study Area?/Impacts	Next Steps
Recreational Resources	High-level field survey	Yes/Yes	• Finalize site surveys. • Finalize impact assessment. • Determine if feasible and prudent alternatives exist, if necessary. • Determine Section 4(f) documentation requirements. • Coordinate with CDOT and FHWA to finalize Section 4(f) Evaluation.
Pedestrian and Bicycle, Traffic and Transit	Secondary data from CDOT traffic data, the *Preliminary Safety Report for US 85*, SH 67 – North (DiExSys, LLC 2015), and DRCOG, plus field data	Yes/Yes	• Redo traffic analysis using most recent model from DRCOG. • Determine how each NEPA project will accommodate transit and pedestrian/bicycle facilities. • Develop mitigation for any impacts identified.
Farmland	Review of Natural Resources Conservation Service mapping	Yes/Yes	• Map farmland. • Determine impacts. • Fill out National Resources Conservation Service (NRCS) form and coordinate with NRCS, if necessary.
Noise	Secondary data from the *C-470 Corridor Revised Environmental Assessment, Kipling Parkway to I-25* (CDOT 2015b)	Yes/Yes	• Conduct FHWA Traffic Noise Model (TNM) using new plan and profile plus new future year traffic volumes. • Conduct feasibility and reasonableness analysis for noise abatement. • Coordinate with CDOT and FHWA for review of Noise Technical Report.

Table 4-1. Primary Findings

Resource	Methodology/ Data Source Used	Present in Study Area?/Impacts	Next Steps
Air Quality	Secondary data from EPA Airdata database EPA Airdata Database: http://www.epa.gov/airdata	Yes/Yes	• Review volumes and future LOS data for all intersections. • Coordinate with CDOT and Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division to conduct hot spot modeling, if necessary. • Submit Air Quality Technical Report to CDOT, FHWA and CDPHE Air Pollution Control Division for review and sign-off.
Water Quality	Secondary data from CDOT's *Erosion Control and Stormwater Quality Guide*	Yes/Yes	• Finalize location of permanent water quality facilities. • Determine impacts. • Prepare Water Quality Technical Report for review by CDOT and FHWA.
Land Use	Secondary data from the *Douglas County 2035 Comprehensive Master Plan* (Douglas County 2014), plus high-level field review	Yes/Yes	• Confirm impact assessment.
Visual	High-level field review	Yes/Yes	• Conduct visual impact analysis. • Review CDOT's *US 85 Corridor C-470 to Castle Rock Aesthetic Study and Design Guidelines* (CDOT 2002).
Social and Environmental Justice	Census data plus high-level field review	Yes/Yes	• Prepare impact assessment. • Determine if any impacts are high and adverse for Environmental Justice populations. • Conduct targeted outreach to low income and minority populations.
Right-of-Way and Economic	Secondary data from CDOT, plus high-level field review	Yes/Yes	• Prepare impact assessment. • Develop mitigation for any right-of-way impacts.
Cumulative	Secondary data derived from all resources	Yes/Yes	• Prepare impact assessment.

4.2 Resources Not Reviewed

None of the resources received a NEPA-level analysis of existing conditions or impact assessment. Resources that were not considered even at a high level were paleontological, economics, and fisheries because they were not anticipated to be critical to the development or screening of alternatives.

4.3 Floodplains

4.3.1 Existing Conditions

4.3.1.1 Rivers and Other Waters of the U.S.

Water resources in the study area include Plum Creek, Marcy Gulch, Spring Gulch, and several unnamed tributaries of Plum Creek.

4.3.1.2 Floodplains

The study area is mapped in the Federal Emergency Management Agency

Digital Flood Insurance Rate program for Douglas County, with a small portion in Arapahoe County, effective date September 30, 2005. Plum Creek, Springs Gulch, and Marcy Gulch experience seasonal flooding. Plum Creek and Spring Gulch have experienced severe flood events in the past.

4.3.2 Impacts

It is likely that these floodplains would be directly impacted by the Recommended Alternatives.

4.3.3 Mitigation

Mitigation measures that could be considered include:

- Limiting the extent of the widening and earthwork done to avoid impacts into the adjacent floodplain.
- Possible modifications to the overbank areas to mitigate the impacts.

4.3.4 Next Steps

During the subsequent NEPA process, the limits of the impact on the floodplain will need to be determined. Per Executive Order 11988, Floodplain Management, the project will need to avoid adverse impacts associated with the occupancy and modification of the floodplains. If there are impacts, the project must follow the process as described in Executive Order 11988. Coordination with Urban Drainage and Flood Control District, Douglas County, CDOT, and the U.S. Army Corps of Engineers will be required for all permitting.

If there are impacts, the Flood Insurance Rate Map will need to be revised by a Conditional Letter of Map Revision prior to construction and a Letter of Map Revision after construction.

4.4 Wetlands and Waters of the United States

4.4.1 Existing Conditions

Waters of the U.S. include wetlands and streams with an ordinary high water mark delineated by flowing and/or standing water. The FEIS/ROD identified 33 wetlands totaling 3.9 acres and 17 streams. The high-level field review conducted in August 2015 for this PEL Study did not attempt to quantify wetlands except to note where they occurred (in 24 locations) and that areas identified in the previous FEIS process still appeared saturated (Photo 4-1). No wetland delineations were done.

4.4.2 Impacts

Direct and indirect wetland impacts would occur as US 85 is improved. As project plans are being developed, avoidance of wetlands and waters of the U.S. is recommended. If that is not possible, impacts should be minimized as much as possible.

Photo 4-1. Palustrine emergent wetland.

Looking south along US 85 at wetland W-5. Note the dominance of broadleaf cattail and narrowleaf willow, representative of vegetation growing within wetlands of the study area.

Source: HDR

4.4.3 Mitigation

Mitigation measures that could be considered include:

- Mitigate all impacts to wetlands, either by replacing them on site, creating a new wetland off site or by purchasing wetland credits.
- Using CDOT's standard mitigation techniques to protect wetlands during construction activities. These include such measures as fencing the edges of wetlands and protecting wetlands from pollutants generated during construction using erosion and sediment control best management practices (BMP).

4.4.4 Next Steps

During the subsequent NEPA process, wetlands in the study area will be fully delineated and a Functional Assessment of Colorado Wetlands (FACWet) analysis done. FACWet is CDOT's required analysis of functions for wetlands. A Wetland Delineation Report will be prepared and, if necessary, a Wetland Finding, to document compliance with Executive Order 11990, Protection of Wetlands. Documentation of the FACWet analysis is required if a project impacts 0.1 acre or more of wetland. Coordination is also required with the U.S. Army Corps of Engineers to review the Delineation Report and to issue any Section 404 permits, which could include amending the existing Individual Permit that was completed for the earlier implementation phases of the FEIS/ROD.

4.5 Vegetation and Noxious Weeds

4.5.1 Existing Conditions

The general habitat in the study area includes upland grassy/weedy roadside habitat (e.g., gambel's oak), riparian and wetland habitat, and landscaped areas (Photo 4-2). Noxious weeds are present throughout the study area. A full listing of vegetation and noxious weed in the study area can be found in the *PEL Study Existing Conditions Report* (Appendix H).

Photo 4-2. Typical right-of-way habitat containing a variety of noxious weeds.
Source: HDR

4.5.2 Impacts

The Recommended Alternatives would result in removal of vegetation to accommodate roadway widening. This would include riparian vegetation protected by Senate Bill 40 (SB 40). Construction activities would likely result in increased noxious weeds in the study area.

4.5.3 Mitigation

Mitigation measures that could be considered include:

- Use CDOT's standard mitigation requirements for vegetation, including seeding with a native grass seed.
- Use erosion and sediment control BMPs, such as implementing phased seeding and containing potential pollutants.
- Ensure that materials used for the project are inspected and determined to be weed free.
- Minimize the use of fertilizers.

4.5.4 Next Steps

During the subsequent NEPA process, the study area will be surveyed for the presence of noxious weeds and riparian vegetation. If impacts to riparian vegetation occur, coordination with Colorado Parks and Wildlife (CPW) relative to compliance with SB 40 will be needed, and replacement of trees and riparian vegetation will be required. A Noxious Weed Management Plan will be prepared or will be assigned to the contractor to complete prior to and during construction.

4.6 Threatened and Endangered Species and Wildlife

4.6.1 Existing Conditions

The U.S. Fish and Wildlife Service (USFWS) and CPW list numerous state and federally protected species that are known to occur in Douglas County.

Based on a preliminary review that did not identify exact locations, species with potential or suitable habitat in the study area include the Bald Eagle, Western yellow-billed cuckoo,

burrowing owl, ferruginous hawk, Preble's meadow jumping mouse, black-tailed prairie dog, northern pocket gopher, common shiner, northern redbelly dace, Iowa darter, northern leopard frog, Ute ladies' tresses orchid, and the Colorado butterfly plant. There is occupied habitat for Preble's meadow jumping mouse along Plum Creek. One inactive raptor nest (possible a red-tailed hawk) was documented during a field review in August 2015. This nest was located just south of the Spring Gulch Equestrian Facility, north of Highlands Ranch Parkway. Active cliff swallow nests were observed under the bridge near McLellan Reservoir. There are active prairie dog towns in the study area.

The study area was examined for existing impediments to the US 85 crossing of wildlife with the intent of improving wildlife connectivity for mule deer and elk where possible and reducing wildlife-vehicle collisions throughout the corridor. The findings from this study are included in Appendix D.

4.6.2 Impacts

The Recommended Alternatives would result in impacts to wildlife and potentially to threatened and endangered species and species of special status. Because new lanes are being added, US 85 would become a larger barrier to wildlife movement east and west. Impacts to riparian habitat along Plum Creek would be of most concern because that is likely habitat for Preble's meadow jumping mouse (Photo 4-3).

Photo 4-3. There is occupied habitat for the Preble's meadow jumping mouse along Plum Creek.

Source: USFWS

4.6.3 Mitigation

Mitigation measures that could be considered include:

- Installation of wildlife underpasses and fencing would minimize the barrier effect to large and small mammals. Figure 4-1 and Appendix D includes the recommendations for 8 specific locations for these mitigation measures. These recommendations should be included in all future projects along US 85.
- Use of BMPs during construction to minimize sedimentation.
- Revegetation of disturbed areas, including replacement of riparian vegetation.
- Avoidance of construction during nesting seasons, if occupied nests are observed.
- Compliance with the CDOT Black-Tailed Prairie Dog Policy.

4.6.4 Next Steps

During the subsequent NEPA process, a biological survey of special status species and riparian vegetation will be required. Coordination with the USFWS and CPW will be necessary.

If construction is planned to occur during the primary nesting season for migratory birds in Colorado (typically April 1 through August 31), a qualified biologist will resurvey the study area to verify if any active nests are present. If no active nests are present, then trees can be removed. However, if active migratory bird nests are identified and cannot be avoided by construction activities, the USFWS field office will be contacted to help determine the

appropriate mitigation action. This may include removing nests before egg-laying begins or ceasing construction until all nestlings have fledged.

A presence/absence survey will be required that must be scheduled to coincide with the blooming period of known nearby populations of Ute ladies'-tresses orchid and the Colorado butterfly plant. Suitable habitat may occur along Plum Creek wetlands and/or riparian areas. Coordination with the USFWS and CPW will be required to determine potential impacts and mitigation for impacted species and/or habitat.

If a future project is to receive federal funding administered by CDOT, impacts to downstream species will be managed through an existing programmatic agreement between CDOT and USFWS. If this programmatic agreement is unavailable for use, additional consultation with USFWS would be required.

The recommended wildlife crossings, as shown in Appendix D, will be examined further in the subsequent NEPA process. Coordination with the USFWS and CPW will be required to confirm the recommended crossing locations. Figure 4-1 shows the recommended wildlife crossings.

4.7 Historic, Archaeological, and Paleontological Resources

4.7.1 Existing Conditions

Based on a records search at the Office of Archaeology and Historic Preservation (OAHP), a windshield survey of the US 85 Corridor, and an on-line review of Douglas County Assessor's data, the study area contains 70 previously identified and evaluated historic built resources. The study area also includes 26 previously identified archaeological resources. The windshield survey identified a potential additional 67 properties not included in OAHP records that are 45 years of age or older (Photo 4-4).

Photo 4-4. View of High Line Canal on the Highlands Ranch Mansion Property, circa 1930-37.

Source: Douglas County History Research Center.

4.7.2 Impacts

Direct impacts to historic and archaeological properties from the Recommended Alternatives would be expected. These could include property acquisitions, rerouting or extensions of canals or ditches, visual impacts, impacts to the setting of a historic property, or noise impacts.

No official Section 106 determination of eligibility or effects to these properties have been made.

4.7.3 Mitigation

Mitigation measures that could be considered include:

- Route construction traffic away from historic properties to avoid or minimize temporary visual and noise effects to these properties during construction.
- Use retaining walls or other methods to minimize property acquisitions.
- Retain or replant trees may help avoid or minimize visual and noise effects.

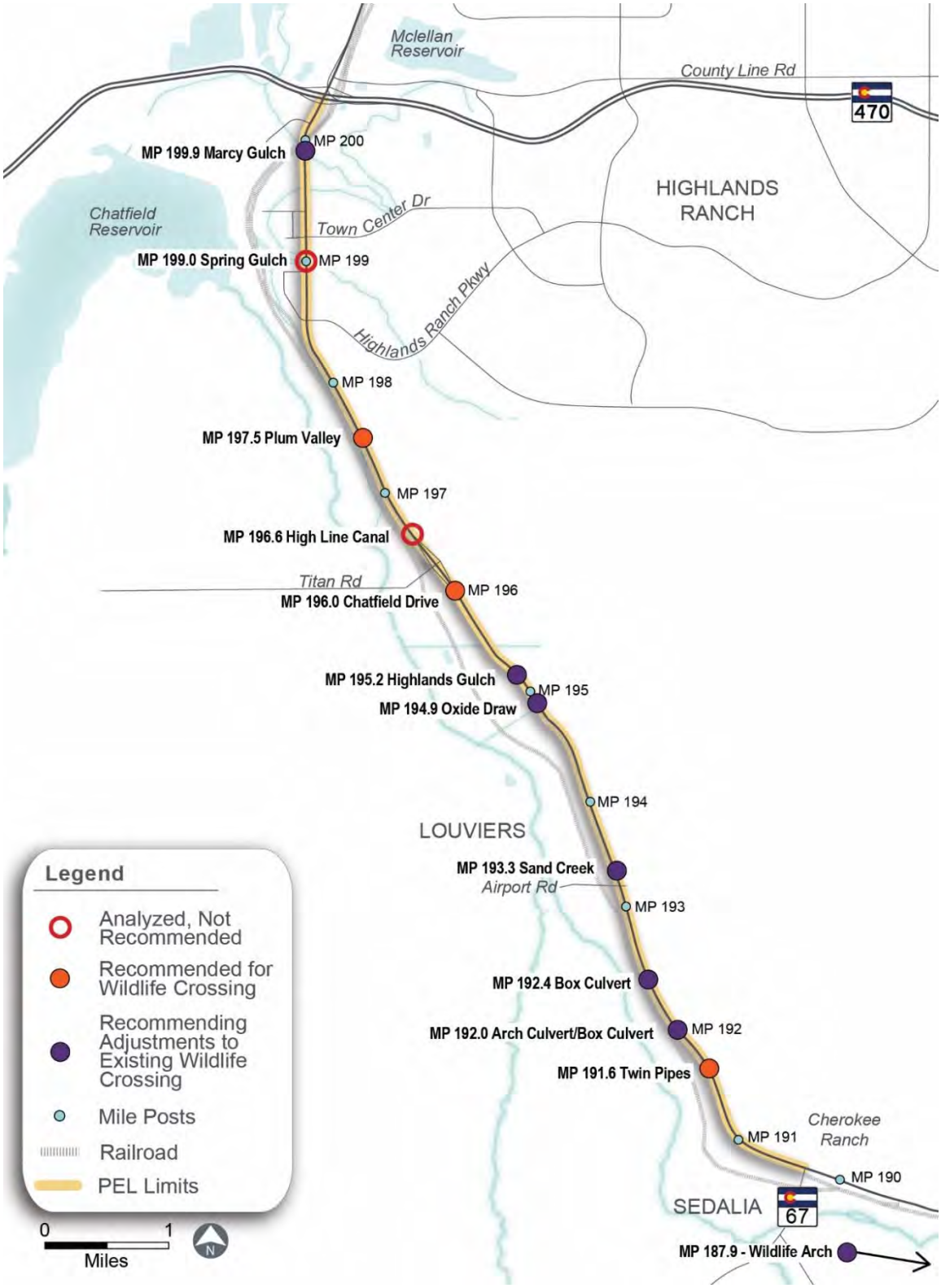

Figure 4-1. PEL-recommended Wildlife Crossings

Source: WSP Parsons Brinckerhoff

4.7.4 Next Steps

During the subsequent NEPA process, steps that need to be followed include defining the proposed Area of Potential Effects, resurveying the Area of Potential Effects, and submitting eligibility and effects determinations for any historic or archaeological properties to the State Historic Preservation Office (SHPO) for review. Through consultation with SHPO, any potential adverse effects to historic properties would need to be avoided, minimized, or mitigated.

Archaeological sites and associated artifacts or materials may be unearthed during construction. In the event of an inadvertent discovery, work at the discovery should be halted immediately and CDOT and SHPO/the OAHP should be notified. Work should remain halted until the discovery can be investigated by a qualified professional archaeologist. Additional archaeological work may be necessary, including testing and data recovery, before work may be resumed and only after CDOT grants clearance.

4.8 Hazardous Materials

4.8.1 Existing Conditions

Properties within the study area were evaluated to assess their potential to contain hazardous materials in the soil, groundwater, air, or building materials that could pose inhalation, dermal, or ingestion hazards to workers or the general public, or require special handling and disposal when removed from the property. The environmental database report identified 103 mappable listings and 3 unmappable listings.

Sites of greatest concern were identified in Table 8 of the *Existing Conditions Report* (HDR et. al. 2016). These sites include 5 Comprehensive Environmental Response, Compensation, and Liability Information System sites, 4 Resource Conservation Recovery Act sites, 4 hazardous waste sites, 27 LUST sites, and 18 solid waste facilities.

4.8.2 Impacts

The Recommended Alternatives would likely result in property acquisition and disturbance of the soil and groundwater at some of these sites of concern. Construction workers could be exposed to airborne contaminants.

4.8.3 Mitigation

Activities at sites containing hazardous materials are governed by Section 250 of the *2014 CDOT Construction Manual, Revised June 7, 2016* (CDOT 2016b). If complete avoidance of hazardous materials in the soil and groundwater is not possible, partial avoidance can minimize health risks.

Mitigation measures that could be considered include:

- Per the 2014 CDOT Construction Manual, the contractor is required to prepare an appropriate health and safety monitoring program to protect workers from exposure to the contamination at these sites during construction.
- If contaminants exceed safe worker exposure levels, workers must wear appropriate personal protective equipment.

- It is unlikely that contaminant levels from these sites would affect the general public, but this could be mitigated through measures designed by the contractor engineering controls.
- The contractor will additionally prepare a material management plan (MMP) to address the proper handling and disposal of hazardous materials and contaminants.

4.8.4 Next Steps

During the subsequent NEPA process, a Modified Environmental Site Assessment (MESA) should be undertaken.

4.9 Recreational Resources

4.9.1 Existing Conditions: Parks and Open Space

There are 11 parks within the study area, as shown in Figure 4-2. These parks include:

- Chatfield State Park
- Fly'n B Park
- Johnny's Pond
- Highlands Ranch Golf Club
- Redstone Park
- Spring Gulch Equestrian Area
- Frisbee golf course
- Plum Valley Park
- Chatfield East Park
- Wilderness area owned by Highlands Ranch Metropolitan District
- Cherokee Ranch and Castle (Photo 4-5)

Photo 4-5. Cherokee Ranch.
Source: cherokeeranch.org.

Chatfield State Park used funding from the Land and Water Conservation Fund; therefore, Section 6(f) protection will apply to this parcel.

4.9.2 Existing Conditions: Trails

There are five trails that intersect US 85 or are adjacent to it. These trails include:

- High Line Canal Trail
- C-470 Trail (also called Centennial Bike Trail)
- Plum Valley Trail
- The East/West Regional Trail
- Chatfield State Park trail system, which includes the Turtle Pond Trail and the Plum Creek Trail

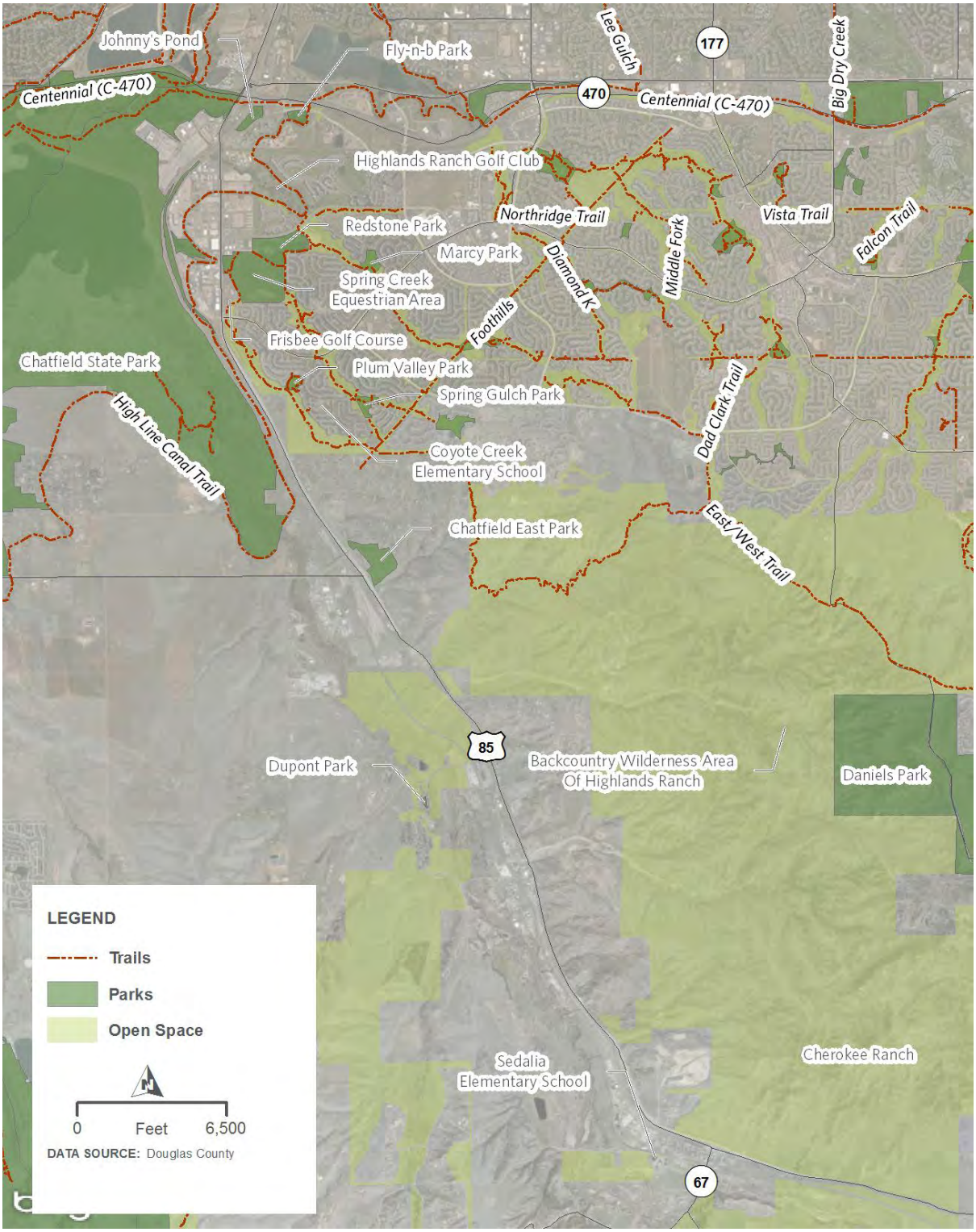

Figure 4-2. Recreational Resources in the Study Area

Source: HDR

4.9.3 Impacts

Direct impacts of property conversion from parks to transportation use could occur at any of the parks that are adjacent to US 85 or an access road that would be improved along with the Recommended Alternatives.

Indirect effects to parks and trails could include:

- Increased noise because traffic lanes moved closer to receptors in the parks and on the trails.
- Negative visual impacts of walls.
- Positive visual effects of enhanced landscaping.
- Enhanced access.
- Increased use because of improved access.

Temporary impacts during construction would occur to all recreation facilities.

4.9.4 Mitigation

Mitigation measures that could be considered include:

- Use BMPs during construction to reduce impacts from sedimentation and noxious weed invasions.
- Minimize property acquisition through the use of design techniques such as retaining walls.
- Provide trail detours during construction.
- Revegetate adjacent to parks and trails after construction.

4.9.5 Next Steps

Because the parks and trails are protected by the U.S. Department of Transportation Section 4(f) Act, there are very specific next steps to be followed:

- Confirm all Section 4(f) properties in the study area, both existing and planned.
- Define uses of these properties.
- If an individual Section 4(f) Evaluation is determined to be needed, determine if a feasible and prudent alternative exists. The definition of what constitutes a feasible and prudent alternative is contained in 23 CFR 774.17. If so, this will need to be selected.
- Identify all possible planning measures to minimize harm to the properties.
- Coordinate with the officials with jurisdiction over the property, CDOT, and FHWA.
- Determine together with CDOT and FHWA the correct type of Section 4(f) documentation to pursue. Options could include an Individual Section 4(f) Evaluation, a *de minimis* impact, an enhancement exception, or a net benefit (because of the improved access and safety associated with wider walks). If an Individual Section 4(f) Evaluation is needed, feasible and prudent alternatives to the use of the property will be developed. For a *de minimis* impact or an enhancement exception, the official with

jurisdiction will need to concur with the finding that the project does not adversely affect the attributes that qualify the properties for protection under Section 4(f).

- Prepare documentation of Section 4(f) Evaluation in accordance with 23 CFR 774.

4.10 Farmlands

The study area has pockets of land classified as prime farmland if irrigated.

Impacts to this land are likely, as the corridor is widened. Under the Farmland Protection Policy Act (FPPA), farmlands subject to FPPA requirements require a Farmland Conversion Impact Rating Form AD 1006 to be filled out with the quantity of the impacted farmland.

4.11 Noise

4.11.1 Existing Conditions

Identified noise-sensitive land uses located within and near the study area include residential areas, schools, parks and open space areas, and churches. More densely developed residences and commercial and retain businesses are located near C-470 and I-25.

The primary existing noise source in the study area is traffic noise from US 85; however, train noise and aircraft noise are also heard. Noise levels were not measured as a part of this study; however, existing noise levels were observed to be consistent with rural and urban areas located in close proximity to highways carrying high volumes of traffic.

Noise levels were a concern that was expressed during the public involvement part of this project, with concerns about increasing traffic levels on US 85 and side streets.

4.11.2 Impacts

CDOT has two ways of defining a noise impact. The first method compares future noise levels to CDOT's Noise Abatement Criteria (NAC) that are defined in the CDOT *Noise Analysis and Abatement Guidelines* (CDOT 2015b) Based on the guidelines, future noise levels for the Recommended Alternatives could result in a noise impact.

The second method compares existing noise levels to future noise levels. If the difference between the two is 10 decibels or more, an impact would occur. It is highly unlikely the analysis would show that the difference in noise levels will even be close to 10 decibels or more, because the noise levels from US 85 are already noticeable. (Table 4-2 lists the typical sound levels for different noise sources.)

Table 4-2. Typical Sound Levels

Sound Level (dBA)	Noise Source
120	Jet takeoff (at 200 feet)
100	Shout (at 0.5 feet)
80	Truck (at 50 feet)
70	Gas lawnmower (at 100 feet)
60	Normal construction (at 10 feet)
50	Traffic (at 50 feet)
40	Library
30	Soft whisper (at 15 feet)

Source: EPA 1971 and 1974

Travel lanes would be moving closer to residential areas than was analyzed for the FEIS/ROD. In addition, the PEL study predicts greater traffic volumes than what was used in the

FEIS/ROD. For these reasons, as NEPA projects are developed from the PEL recommendations, new noise analyses will be done. These new noise analyses will take into consideration the higher traffic volumes and the new horizontal and vertical location of the improved US 85. If future noise levels are predicted to be approaching or exceeding the CDOT NAC of 66 A-weighted decibels (dBA) or substantial increase threshold of 10 dBA over existing noise levels, these locations will be analyzed for noise abatement, such as noise barriers or berms. The effectiveness of these abatement measures, as well as their cost, will be taken into consideration. In addition, the opinions of the affected residents will be taken into consideration because, as one example, noise berms or barriers may cut off mountain views to the west. These studies will be shared with the public at future public meetings.

Traffic on side streets will increase in the future because of population and employment growth regardless of whether or not improvements are made to US 85. Because no widening of these side streets is planned, except perhaps where they intersect with US 85, it is unlikely noise at adjacent residential areas will increase noticeably. However, because existing noise is relatively loud, these future levels could approach or exceed the NAC. A doubling of traffic volumes results in noise increases of 3 decibels, which is barely perceptible by the human ear.

FHWA and CDOT do not recognize pavement type, in and of itself, as a noise abatement measure; therefore, is not a primary factor when selecting a pavement. This is because there are several components to the noise generated from a roadway facility, including tire-surface contact, engine brakes (including truck Jake brakes), and wind drag around vehicles. The application of quieter surface materials would only address one component of this spectrum. CDOT is tracking several ongoing research studies on quieter pavements that attempt to address concerns, including cost, placement temperature, safety, and long-term noise mitigation.

Property values are a function of many different variables, including, but not limited to, type of land use, location, exposure, visibility, access, demographics, market trends, the overall health of the national and local economy, and government policies. It is difficult to say with certainty that one factor in isolation will have a positive or negative impact on property values because property value is usually a result of the accumulation of these factors. For example, exposure, visibility, and easy access to roadways with high traffic volumes, which usually means exposure to higher noise levels, may be desirable attributes for the value of commercial properties. These same attributes may be undesirable for the value of residential properties. One example of this is that before E-470 was built, there were many very quiet farmlands that sold from $0.25 a square foot. After E-470 was added, even with all of its dust and noise, those same properties, especially at the freeway interchanges, are now valued at $30 to $40 a square foot.

4.11.3 Mitigation

The CDOT *Noise Analysis and Abatement Guidelines* (CDOT 2015b) clearly identify the steps to take to explore possible mitigation for noise impacts. These mitigation measures include:

- Examine strategies, such as altering the roadway alignment or vertical profile, adding buffers, adding berms, or adding noise walls.
- Evaluate the feasibility and reasonableness of

Photo 4-6. Noise wall example.
Source: fhwa.dot.gov

each mitigation technique, including the cost of the mitigation and the benefit to the affected receptors. Noise barriers (Photo 4-6) are generally cost-effective when residential areas are compact and located close to the highway facility.

Construction noise will be subject to relevant local regulations and ordinances.

4.11.4 Next Steps

During the subsequent NEPA process, a full Type 1 noise analysis and noise mitigation study will need to be conducted in compliance with the *CDOT Noise Analysis and Abatement Guidelines* (CDOT 2015b). This will include building a noise model using FHWA's Traffic Noise Model (TNM) and analyzing the Recommended Alternatives using the TNM to determine how it will affect noise levels compared to the No-Action Alternative. It is likely this will show increases in noise because the travel lanes are moving closer to existing residences and recreation facilities. The output from this model will be used to determine if there is an impact; and if there is an impact, an analysis of the mitigation will be conducted as described above.

4.12 Air Quality

4.12.1 Existing Conditions

The study area is part of the Denver-Metro/North Front Range Region for air quality, which is considered a nonattainment area for ozone and a maintenance area for carbon monoxide (CO) and particulate matter less than 10 microns in diameter (PM_{10}). Since 2002, the region has complied with all National Ambient Air Quality Standards (NAAQS) except for ozone. Since the early 2000s the region exceeded the Environmental Protection Agency's (EPA) ozone standards and was formally designated a "nonattainment" area on November 20, 2007, for 8-hour ozone. On May 21, 2012, the EPA issued the final rule designating 8-hour ozone non-attainment areas, and again designated the region as a "marginal nonattainment" area. This means that in 2012 the area met the definition of being only slightly over the NAAQS.

Also included in the region are former areas of nonattainment, including the Denver metropolitan area CO and PM_{10} maintenance areas. However, air quality improvement plans were implemented for each of the communities in the Denver-Metro/North Front Range Region in an attempt to move back into attainment designation (CDPHE-Air Pollution Control Division 2012).

Representative monitored ambient air quality data for the study area are summarized in Table 4-3.

Table 4-3. Representative Ambient Air Quality Data (2014)

Pollutant	Monitor	Averaging Time	Highest Concentration	NAAQS
O3	11500 N. Roxborough Park Rd	8-hour	0.077 ppm	0.075 ppm
CO	2105 Broadway—Camp	1-hour	3.1 ppm	35 ppm
		8-hour	2.2 ppm	9 ppm
NO_2	2105 Broadway—Camp	1-hour	136 ppb	100 ppb
SO_2	2105 Broadway—Camp	1-hour	19 ppb	75 ppb

Table 4-3. Representative Ambient Air Quality Data (2014)

Pollutant	Monitor	Averaging Time	Highest Concentration	NAAQS
PM_{10}	2105 Broadway—Camp	24-hour	129 µg/m^3	150 µg/m^3
$PM_{2.5}$	11500 N. Roxborough Park Rd	24-hour	44.9 µg/m^3	35 µg/m^3
		Annual	5.6 µg/m^3	12 µg/m^3

4.12.2 Impacts

One of the significant reasons for improving the US 85 Corridor is that improvements would reduce congestion and, therefore, improves traffic flow. Improved traffic flow would reduce idling and, therefore, reduce CO emissions and improve air quality. Air quality impacts could occur because traffic lanes would be moved closer to sensitive receptors and because an increased amount of pavement would need to be sanded, which would result in increased PM_{10} emissions. Temporary impacts to air quality would occur during construction.

4.12.3 Mitigation

To address the temporary elevated air emissions during construction, standard mitigation measures that could be considered include:

- Keep engines and exhaust systems on construction equipment in good working order.
- Control excessive idling of construction vehicles.
- Implement strict dust control measures.

4.12.4 Next Steps

The study area is in a nonattainment area for ozone and a maintenance area for CO and PM_{10}. Therefore, the conformity requirements of the Clean Air Act apply. What this means is that the project is subject to regional and local conformity requirements. As the project proceeds to the subsequent NEPA process, regional and local conformity requirements will need to be satisfied. This includes placement of the project on the fiscally constrained Regional Transportation Plan and on the Transportation Improvement Program.

Local conformity requirements are to assess whether future traffic conditions may cause an exceedance of the NAAQS. Though this PEL is forecasting travel demand to 2050, it used the latest 2040 air quality model. This includes:

- Analyze future 2040 volumes and LOS at each of the study area's signalized intersections. If any of these are projected in the future to operate at LOS D, E or F, a hot spot analysis for CO will be needed. Based on current analysis, this situation is likely.
- Coordinate with the CDPHE Air Pollution Control Division.
- Commit to mitigation, if necessary.

4.13 Water Quality (including Groundwater and Surface Water)

4.13.1 Existing Conditions

There are five surface waters present in the study area:

- Plum Creek
- East Plum Creek
- Spring Gulch
- Marcy Gulch
- High Line Canal

There are no 303(d) listed waters in the study area.

4.13.2 Impacts

Because the Recommended Alternatives would add additional pavement to the study area, they would have water quality impacts. The Recommended Alternatives may increase the amount of impervious surface in the study area because of the widened roadway. The increase in impervious surface could increase the amount of sediment, heavy metals (such as zinc and copper), magnesium chloride or salt (used for winter maintenance), and oils and grease.

4.13.3 Mitigation

Mitigation measures that could be considered include:

- CDOT and Douglas County both have Phase II Municipal Separate Storm Sewer System (MS4) permits from CDPHE. This means that for any project that results in 1 acre or more of new pavement, permanent BMPs are required.
- Use CDOT requirements will be used.
- Design the project to include permanent BMPs.
- Use temporary BMPs during construction. These could include silt fences, erosion logs, inlet filters, concrete washouts, or other strategies.

4.13.4 Next Steps

During subsequent NEPA processes, water quality impacts will be evaluated and permanent BMPs will be developed in more detail and documented in a stormwater management plan. Temporary BMPs will be documented in erosion control plans.

4.14 Visual Characteristics

4.14.1 Existing Conditions

The study area varies in visual character from north to south. The northern portion has denser commercial, industrial, and residential lands use; the southern portion is more open and rural. This is anticipated to change as the population and employment growth occurs.

4.14.2 Impacts

The roadway improvements would change views of the road and views from the road. The larger expanse of pavement would be noticeable from the driver's perspective as well as from viewers on either side of US 85 looking at the widened roadway. Temporary visual impacts would occur during construction.

4.14.3 Mitigation

Mitigation that could be considered for visual impacts incudes:

- Selection of colors and treatments to blend with adjacent surroundings.
- Careful grading for new cut or fill slopes to blend with adjacent surroundings.
- Screening of material stockpiles used during construction.

4.14.4 Next Steps

During the subsequent NEPA process, a full visual impact assessment will be performed. This will begin with the scoping form included in the 2015 FHWA Visual Impact Analysis Guidelines.

4.15 Socioeconomic Characteristics and Environmental Justice

4.15.1 Existing Conditions

4.15.1.1 Businesses, Residences, and Community Resources

There are numerous businesses, community facilities, and residences within the study area. Page 79 of the *PEL Study Existing Conditions Report* in Appendix H discusses these in detail.

4.15.1.2 Environmental Justice and Protected Populations

The study area contains percentages of low-income and minority population that are greater than the percentages of Douglas County as a whole.

4.15.2 Impacts

The Recommended Alternatives would provide bicycle and transit facilities that would improve conditions for residents and businesses, improve mobility, and reduce the likelihood of accidents. The right-of-way needed from private property owners would be considered an adverse effect to these owners and renters.

The Recommended Alternatives would reduce congestion, which would improve conditions for emergency vehicles. Safety for schoolchildren would be improved because of consistent and widened sidewalks.

Impacts and benefits to the protected populations of low-income people in the study area would include:

- Full acquisitions affecting residential properties.
- Reductions in air pollution associated with congestion.
- Increases in traffic noise by minor amounts.

- Increases in safety because of reduced congestion and wider sidewalks.
- Improvements in quality of life for pedestrians and bicyclists because of better facilities.
- Improvements in mobility for all travelers, including emergency service providers.

4.15.3 Mitigation

Mitigation measures that could be considered include:

- Provide right-of-way and relocation benefits defined in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.
- Enhance bus stops for bus riders.
- Improve access to bus stops for bus riders.
- Revegetate disturbed areas.

4.15.4 Next Steps

During the subsequent NEPA process, a full environmental justice analysis will be undertaken to determine if the Recommended Alternatives would cause disproportionately high and adverse impacts to any of the low-income and minority populations along US 85. Mitigation will be incorporated in the Recommended Alternatives to reduce any impacts that are identified.

4.16 Land Use

4.16.1 Existing Conditions

The study area consists mostly of rural communities, parks, and open space with industrial and commercial uses closer to C-470 and I-25. Zoning and land use designations are identified in the *PEL Study Existing Conditions Report* in Appendix H.

4.16.2 Impacts

The Recommended Alternatives are consistent with land use plans and zoning. The increased capacity of US 85 would better handle the planned substantial increases of population and employment associated with Chatfield Basin development that has already been approved.

4.16.3 Mitigation

No mitigation is needed.

4.16.4 Next Steps

During the subsequent NEPA process, a full land use compatibility analysis will be performed.

4.17 Cumulative Impacts

The purpose of cumulative impacts analysis for a PEL study is to identify and analyze the direct, indirect, and cumulative impacts of a proposed action in sufficient detail to make an informed decision. Although no final NEPA decision is being made at this time, a cumulative impact analysis for a PEL study can be useful to flag any cumulative impacts that could be of

concern and that might warrant consideration for mitigation. Cumulative impacts result when the impacts of an action are added to or interact with the impacts of other actions, including past, present, and reasonably foreseeable future actions. The cumulative impacts can be viewed as the total impacts on a resource, ecosystem, or human community of that action and all other activities affecting that resource.

Past actions that have affected the resources in the study area include past expansions of US 85 in compliance with the FEIS/ROD, development of the Southwest Corridor light rail, development of Highlands Ranch and the industrial and commercial areas along US 85, and development south of the Chatfield Reservoir.

Present actions that affect resources in the study area include ongoing development in Douglas County (especially Chatfield Basin and recent/upcoming development on and near County Line Road), Arapahoe County, Littleton, and Englewood.

Reasonably foreseeable future actions that could affect resources in the study area include:

- The expansion of C-470, including adding one managed lane between I-25 and Kipling. In addition, the WestConnects PEL Study is currently underway to examine improvements along C-470 from Kipling to I-70 (and further north along SH 6 and SH 93 to the north end of Golden).
- The extension of the Southwest Corridor light rail to Lucent Boulevard.
- The approved development proposals in the Chatfield Basin.
- Redevelopment of the veterinary clinic or other parcels near County Line Road.

Resources in the study area that would be expected to be affected by ongoing transportation and land use development include natural resources (water quality, wetlands, floodplains, riparian vegetation, black-tailed prairie dog towns, Preble's meadow jumping mouse habitat, and wildlife habitat), air quality, and transportation. Increased population and employment from development would increase pressure on the existing and planned future recreational facilities in the study area.

When combined with past, present and reasonably foreseeable future actions, resources in the study area that could have cumulative impacts include water quality, air quality, and wildlife habitat. The primary influencer of impacts on these resources would be the Chatfield Basin developments. Improvements to US 85 would serve this development pressure. As the area develops, increased demand is likely to be placed on vehicular travel lanes, bicycle facilities, sidewalks, and transit facilities. The Recommended Alternatives accommodate this demand.

None of the cumulative impacts would rise to the level of a significant change to the resources in question. No mitigation is necessary.

4.17.1 Next Steps

These preliminary findings will be reassessed during the subsequent NEPA process, when full environmental surveys will be conducted and resource agency coordination will occur.