



FRPR

***F R O N T R A N G E
P A S S E N G E R
R A I L***

Environmental Evaluation

Level 2 Alternatives Analysis

November 2020

Community and Environmental Impacts (Level 2 GIS Impact Summary)¹

Criterion	Measure	BNSF Alignment	BNSF + North I-25 Commuter Rail Alignment	I-25/E-470 Highway Alignment	Overview
Hazardous Materials	# of Superfund sites traversed by alignments	Crosses one NPL site (Denver radium - COD980716955) in 7 locations along I-25 in Metropolitan Denver.	Crosses one NPL site (Denver radium - COD980716955) in 7 locations along I-25 in Metropolitan Denver.	Immediately adjacent to one NPL site (Lowry Landfill - COD980499248).	The BNSF and BNSF + North I-25 Commuter Rail alternatives cross the same NPL sites in Metropolitan Denver. The I-25/E-470 Highway alternative routes around the Metropolitan Denver Area, avoiding these sites (and potentially other hazardous materials sites) that are associated with industry along the freight rail corridor. The Lowry Landfill NPL site is recorded because it is just outside but immediately adjacent to
Natural Environment	# of Stream Crossings Acres of Wetlands # of Floodplain Crossings Acres of Protected Species Habitat	158 stream crossings ² . 107 acres of NWI ³ wetlands within the 75-foot impact area. Crosses 263 100-year floodplains ⁴ . Incorporates 77 acres of critical habitat for the Prebles Meadow Jumping Mouse (FederallyThreatened).	149 stream crossings ² . 92 acres of NWI ³ wetlands within the 75-foot impact area. Crosses 214 100-year floodplains ⁴ . Incorporates 77 acres of critical habitat for the Prebles Meadow Jumping Mouse (FederallyThreatened).	131 stream crossings ² . 16 acres of NWI ³ wetlands within the 75-foot impact area. Crosses 162 100-year floodplains ⁴ . Incorporates 11 acres of critical habitat for the Prebles Meadow Jumping Mouse (FederallyThreatened).	The BNSF and BNSF + North I-25 Commuter Rail alternatives have the potential to impact larger quantities of natural and biological resources. Impacts are concentrated around major drainages in the north (Big Thompson River, Boulder Creek, St. Vrain Creek, and Fountain Creek in the South). Fountain Creek parallels all three alignments for approximately 20 miles in in the southern portion of the project area. The biggest difference between the alternatives is that there are a larger number of stream crossings in the northern portion of the project area where I-25/E-470 Highway alternative routes to the east, avoiding some water bodies, wetlands, and habitat. Acres of PMJM habitat are also lower for I-25/E-470 Highway alternative most likely because of variations in the southern most part of the alignment where it avoids one area of habitat that freight rail alignments do not.
Recreation	# of Parks and Open Space Areas along the Alignment	Adjacent to ⁵ 50 Park or Open Space Areas.	Adjacent to ⁵ 41 Park or Open Space Areas.	Adjacent to ⁵ 3 Park or Open Space Areas.	Impacts primarily occur in Boulder and Northwestern Douglas County. I-25/E-470 Highway alternative avoids most park and open space areas by routing east of these locations.
Community Disruption	Linear miles of residential, business, and commercial land uses adjacent to alignment	Adjacent to 43 miles of residential and 20 miles of business/commercial land uses.	Adjacent to 57 miles of residential and 20 miles of business/commercial land uses.	Adjacent to 42 miles of residential and 27 miles of business/commercial land uses.	Alignments disrupt communities in different locations. Linear miles of residential land uses are greater for the BNSF + North I-25 Commuter Rail alternative because it travels through residential neighborhoods in Thornton, where the BNSF and I-25/E-470 Highway alternatives avoid these areas.
	# of minority/low-income populations along alignment	Crosses through 63 block groups with low percentages of minorities, 78 block groups with moderate percentages of minorities, and 24 block groups with high percentages of minorities ⁶ .	Crosses through 45 block groups with low percentages of minorities, 70 block groups with moderate percentages of minorities, and 29 block groups with high percentages of minorities ⁶ .	Crosses through 36 block groups with low percentages of minorities, 60 block groups with moderate percentages of minorities, and 16 block groups with high percentages of minorities ⁶ .	Minority and low-income populations are concentrated within and around the City of Denver where populations are higher and block groups are smaller. This is reflected in the results for BNSF and BNSF + North I-25 Commuter Rail alternatives, which both run through Denver, while the I-25/E-470 Highway alternative routes around Denver's oldest neighborhoods east along E-470.
		Crosses through 49 block groups with low percentages of low-income households, 87 block groups with moderate percentages of low-income households, and 29 block groups with high percentages of low-income households ⁶ .	Crosses through 40 block groups with low percentages of low-income households, 77 block groups with moderate percentages of low-income households, and 27 block groups with high percentages of low-income households ⁶ .	Crosses through 50 block groups with low percentages of low-income households, 47 block groups with moderate percentages of low-income households, and 15 block groups with high percentages of low-income households ⁶ .	
Noise and Vibration	Linear miles of potentially sensitive receptors along alignment Number of sensitive open space or recreational receptors	Adjacent to 43 miles of sensitive residential receptors. Adjacent to ⁵ 50 Park or Open Space Areas.	Adjacent to 57 miles of sensitive residential receptors. Adjacent to ⁵ 41 Park or Open Space Areas.	Adjacent to 42 miles of sensitive residential receptors. Adjacent to ⁵ 3 Park or Open Space Areas.	All alignments run along sensitive residential receptors in various locations. The number of linear miles of sensitive receptors is greater for the BNSF + North I-25 Commuter Rail alternative because it routes through residential neighborhoods in Thornton that are avoided by the BNSF and I-25/E-470 Highway alternatives. Sensitive recreation areas are concentrated in Boulder and Northwestern Douglas County. The I-25/E-470 Highway alternative avoids most park and open space areas by routing east of these locations.
	Linear feet of trails adjacent to alignments	153 trail crossings ² .	157 trail crossings ² .	62 trail crossings ² .	

¹ All Impacts are reported for an impact buffer defined for each alignment as 75 feet of either side of centerline.

² Counts include individual crossings, meaning that one stream or trail that is crossed 5 different times would be counted as 5 crossings.

³ Wetlands delineated by CDOT/Consultants for roadway projects were also evaluated in GIS, but none were found to intersect any of the alignments.

⁴ Includes 100-year floodplains (A, AE, AH, AO)

⁵ Adjacent to is defined as intersecting with the 75-foot buffer; there are many other parks that are outside of this 75-foot area.

⁶ Low is defined as BGs that are 0-15% minority/low-income, Moderate is defined as BGs that are 16-50% minority/low-income, High is defined as BGs that are >50% minority/low-income.

Sources: Colorado Department of Public Health and Environment (NPL Database); CDOT OTIS (Hydrology); US Fish and Wildlife Service National Wetlands Inventory (Wetlands); FEMA via ESRI (Floodplains); CDOT NEPA Scoping Tool (Wetlands); CDOT OTIS Database (Hydrology); FEMA National Flood Hazard Layer (Floodplains); US Fish and Wildlife Service (Critical Habitat); County Park Data and Google Earth (Parks); Colorado Parks and Wildlife - Colorado Trail Explorer (Trails); Environmental Protection Agency (EJ Screen) via ESRI (minority and low-income statistics).

Hazardous Materials

Data Used	CDPHE, 2000 - based on link provided in CDOT NEPA Scoping Tool
Impact Files	NA
Source File	CDPHE_SuperfundNPL_NRD
Included in Zip	Yes - Source File
Method	ArcGIS select by location; select Superfund Sites that intersect the 75-foot buffer for each alignment; review attribute table for selected counts
Notes	Denver Radium Site is listed as one site on the NPL, but intersects in multiple alignment locations

More Information at: <https://www.epa.gov/superfund/national-priorities-list-npl-sites-state#CO>

Natural Environment - Streams

Data Used	CDOT, 2000 (OTIS) - Hydrology
Impact Files	FRPR_Alg3StreamImpacts_Level2.shp FRPR_Alg4StreamImpacts_Level2.shp FRPR_Alg6StreamImpacts_Level2.shp
Source File	FRPR_HydrologyStreams_CDOTOTIS_033020.shp
Included in Zip	Yes
Method	ArcGIS select by location; select hydrology that intersect the 75-foot buffer for each alignment; export to new impact dataset; review attribute table for counts
Notes	Crossings are treated separately (if the alignment crosses one stream 5 times, it is counted as 5 crossings) Datasets can be combined or merged, but this was not done for initial review and evaluation

Natural Environment - Wetlands

Data Used	US Fish and Wildlife Service, 2020 - National Wetlands Inventory
Impact Files	FRPR_Alg3NWImpacts_Level2.shp FRPR_Alg4NWImpacts_Level2.shp FRPR_Alg6NWImpacts_Level2.shp
Source File	FRPR_WetlandsEast_NWI_033020.shp
Included in Zip	Yes
Method	ArcGIS clip to impact buffer, export, and then calculate acreage for each alignment.
Notes	Datasets can be combined or merged, but this was not done for initial review and evaluation.
More Information at:	For more information: https://www.fws.gov/wetlands/Data/Mapper.html

Natural Environment - Floodplains

Data Used	FEMA, 2020 - National Flood HazardLayer (downloaded from ESRI)
Impact Files	FRPR_Alg3FloodplainImpacts_Level2.shp FRPR_Alg4FloodplainImpacts_Level2 FRPR_Alg6FloodplainImpacts_Level2
Source File	S_FLHD_HAZ_AR-100YRONLY
Included in Zip	Yes
Method	Selected 100-year floodplain categories and exported; ArcGIS select by location; select floodplains that intersect the 75-foot buffer for each alignment; export to new dataset; review attribute table for counts
Notes	Crossings are treated separately (if the alignment crosses one stream 5 times, it is counted as 5 crossings) Datasets can be combined or merged, but this was not done for initial review and evaluation.

Natural Environment - Critical Habitat

Data Used	USFWS, 2020 - Critical Habitat
Impact Files	FRPR_Alg3CritHablImpacts_Level2.shp FRPR_Alg4CritHablImpacts_Level2.shp FRPR_Alg6CritHablImpacts_Level2.shp
Source File	CRITHAB_POLY
Included in Zip	Yes
Method	ArcGIS clip to impact buffer, export, and then calculate acreage for each alignment.
Notes	Datasets can be combined or merged, but this was not done for initial review and evaluation.

Recreation - Open Space

Data Used	Countywide Open Space Files (Larimer County, Boulder County, Jefferson County, Arapahoe County, Denver County, Douglas County, El Paso County); Google Earth review for Weld County and Adams County.
Impact Files	NA
Source File	Google Earth and Countywide Datasets
Included in Zip	No
Method	Review Countywide datasets and select by location; review aerial; record results.
Notes	Only included parks and open space areas that intersected or fell within impact area - there were many other parks adjacent to alignments but outside of this area.

Community Disruption - Residential and Commercial Land Uses

Data Used	Google Earth; ESRI Aerial Review
Impact Files	FRPR_Alg3LandUseImpacts_Level2.shp FRPR_Alg4LandUseImpacts_Level2.shp FRPR_Alg6LandUseImpacts_Level2.shp
Source File	FRPR_Alg3LandUseLevel2_prj1.shp FRPR_Alg4LandUseLevel2_prj1.shp FRPR_Alg6LandUseLevel2_prj1.shp
Included in Zip	Yes
Method	Aerial review of Google Earth to evaluate land uses along alignment using ESRI aerial and Google Earth. Rough lines draws without care for presentation (goal was to get rough, sweeping, generalized measurements); Files exported from Google Earth, imported to GIS, exported to shapefile; additional measurements taken; data projected and miles of each type of use calculated.
Notes	Datasets are not high-quality and are for analysis purposes only. Should not be used in graphic display or shared with others without disclaimers as level of accuracy is likely low.

Community Disruption - Minority and Low-Income Populations

Data Used	EPA-EJ Screen Data (downloaded from ESRI)
Impact Files	FRPR_Alg3MinorityLowBGs_Level2.shp/FRPR_Alg3LowIncomeLowBGs_Level2 FRPR_Alg3MinorityModerateBGs_Level2.shp/FRPR_Alg3LowIncomeModerateBGs_Level2 FRPR_Alg3MinorityHighBGs_Level2.shp/FRPR_Alg3LowIncomeHighBGs_Level2
Source File	EPAEJScreen - available from ArcGIS Online
Included in Zip	Yes - Impact Files
Method	Sorted and grouped percentages in attribute table; exported into grouped files; select by location for each alignment; export to new dataset; review attribute table for counts.
Notes	At the level of detail required for Level 2 Screen, thresholds were not developed. Instead, CEQ guidance (greater than 50 percent or meaningfully greater than) was followed. Populations were grouped into low percentages (0-15%), moderate percentages (16-50%) and high percentages (>50%). Higher than 50 percent could be flagged by the Level 2 analysis as areas of particular concern. However, it is important to note that this high level approach risks missing protected populations. Since EJ is analyzed by effects and population size, NEPA should include a much higher level analysis and one that is informed by public involvement.
	Datasets can be combined or merged, but this was not done for initial review and evaluation.

Noise and Vibration - Sensitive Receptors

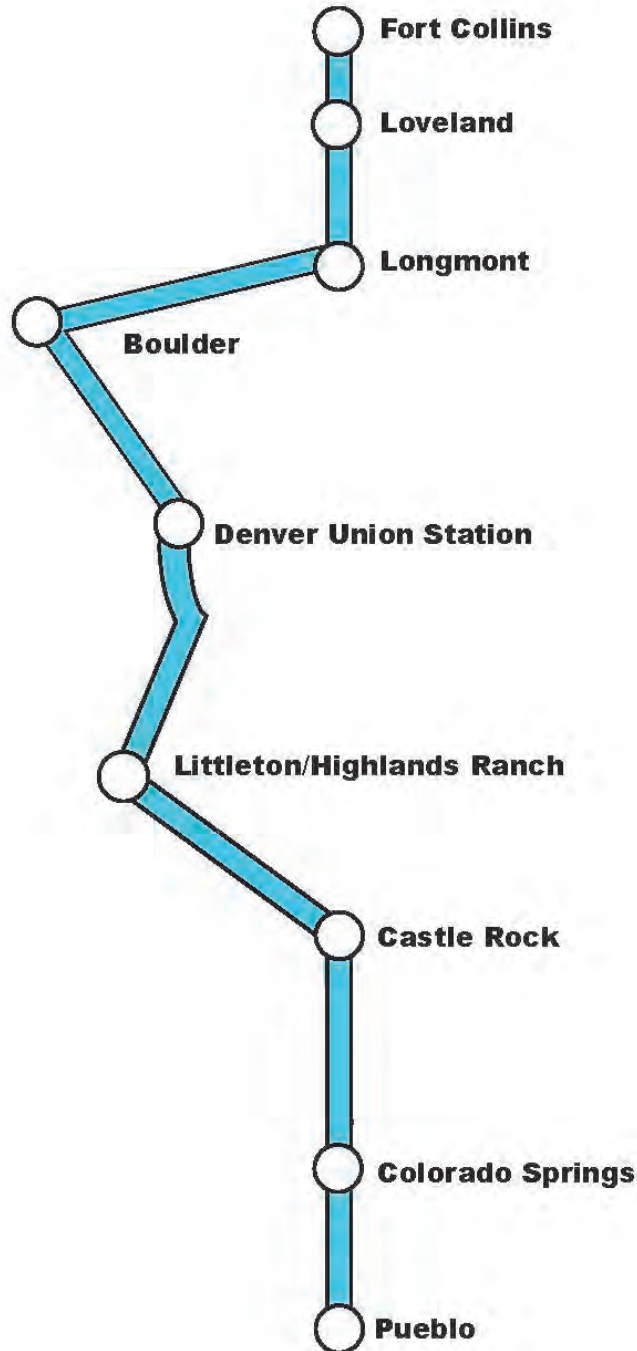
See Community Disruption - Linear Miles of Residential and Commercial Land Uses Adjacent to Alignment

Noise and Vibration - Sensitive Open Space or Recreational Receptors

See Recreation - Open Space

Noise and Vibration -Trails

Data Used	CPW, 2020- Colorado Trail Explorer (Trails)
Impact Files	FRPR_Alg3TraillImpacts_Level2.shp FRPR_Alg4TraillImpacts_Level2.shp FRPR_Alg6TraillImpacts_Level2.shp
Source File	FRPR_Trails_CPW_032020.shp
Included in Zip	Yes
Method	Selected Trails using ArcGIS select by location; select trails that intersect the 75-foot buffer for each alignment; export to new dataset; create new filed and calculate miles; summarize results using statistics.
Notes	Crossings are treated separately (if the alignment crosses one stream 5 times, it is counted as 5 crossings) Datasets can be combined or merged, but this was not done for initial review and evaluation.



BNSF Freight Rail Alternative

Level 2 Alternatives Analysis



COLORADO
Department of Transportation

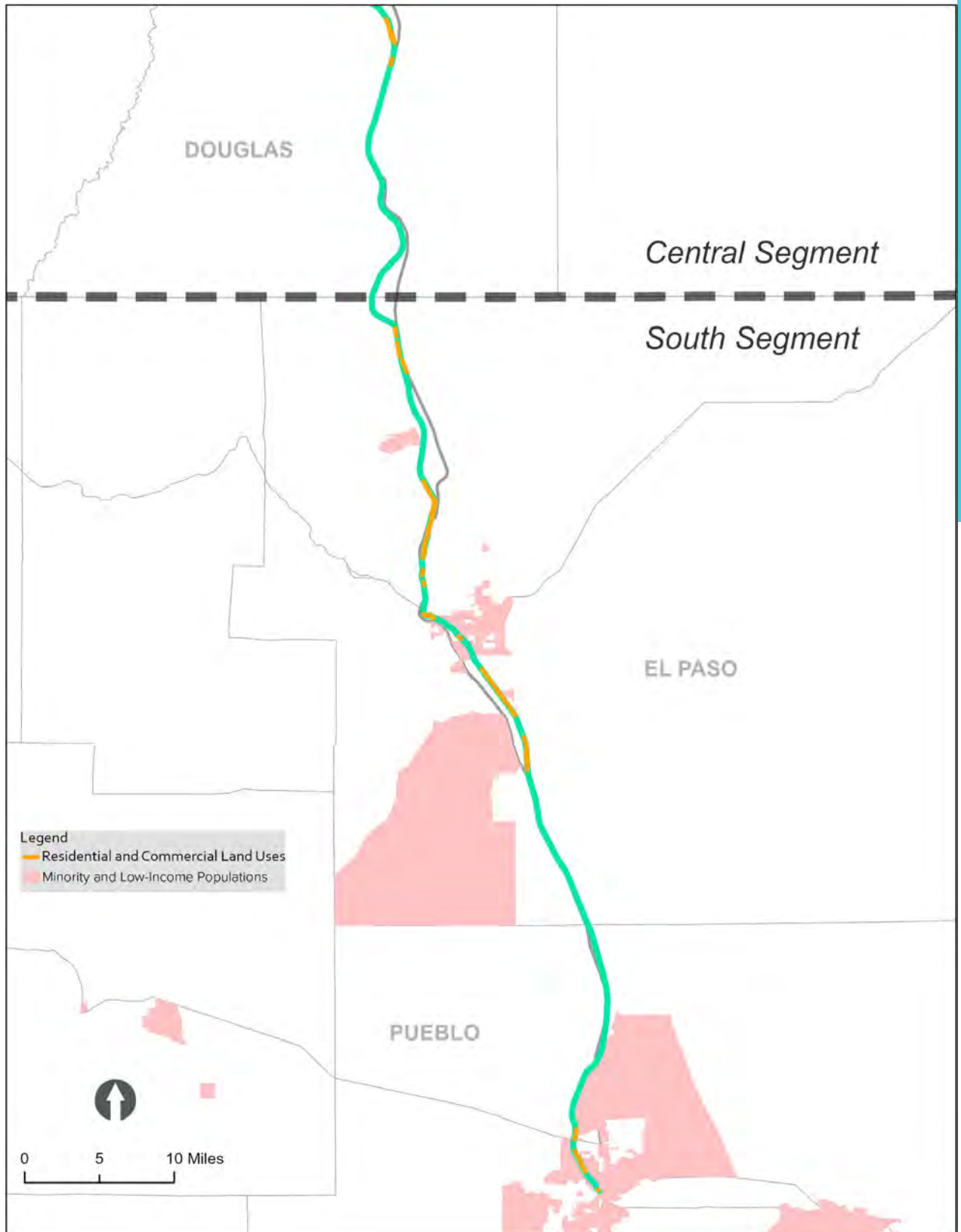
Community Disruption

Minority and Low-Income Populations

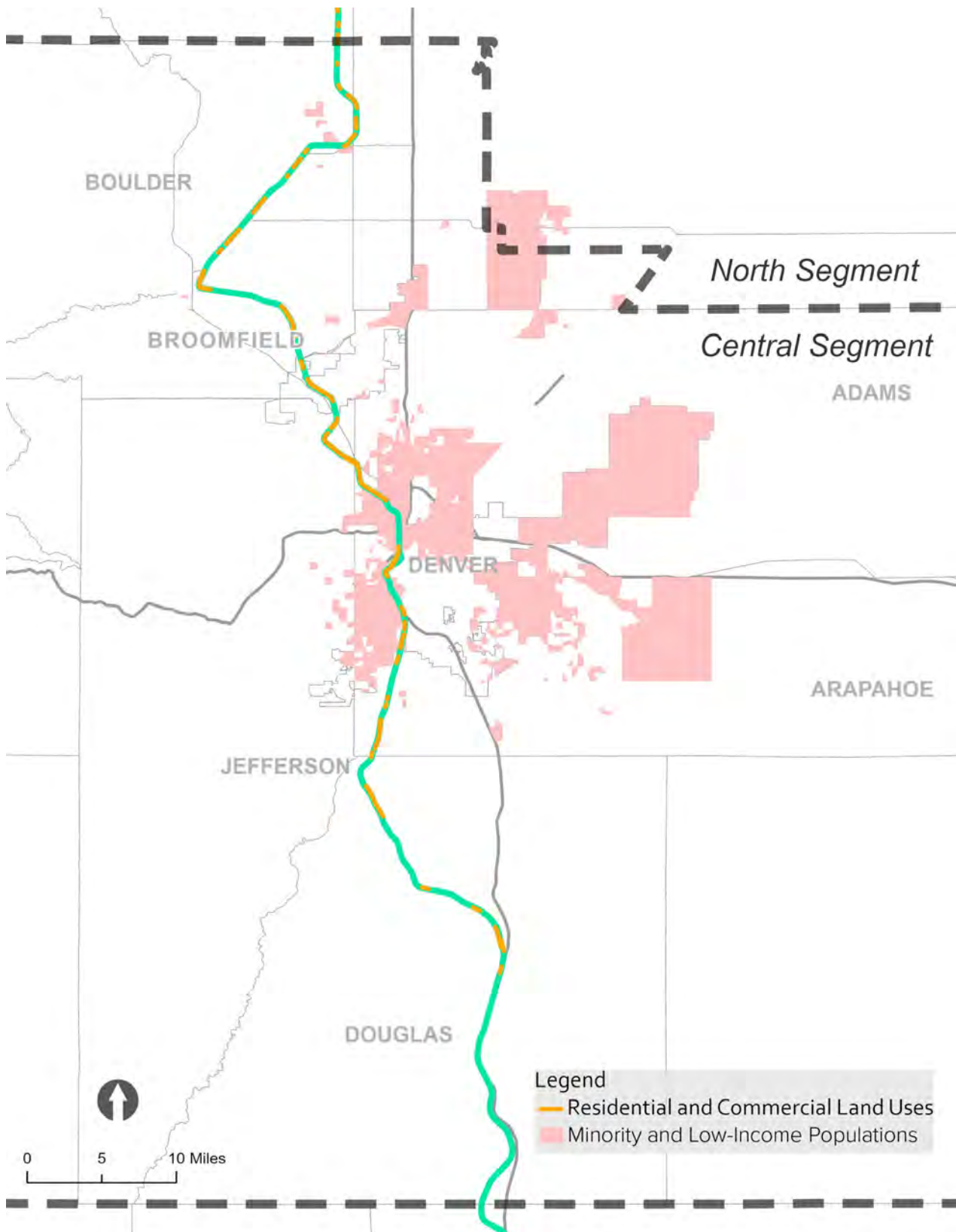
Adjacent Residential and Commercial Land Uses

Noise and Vibration

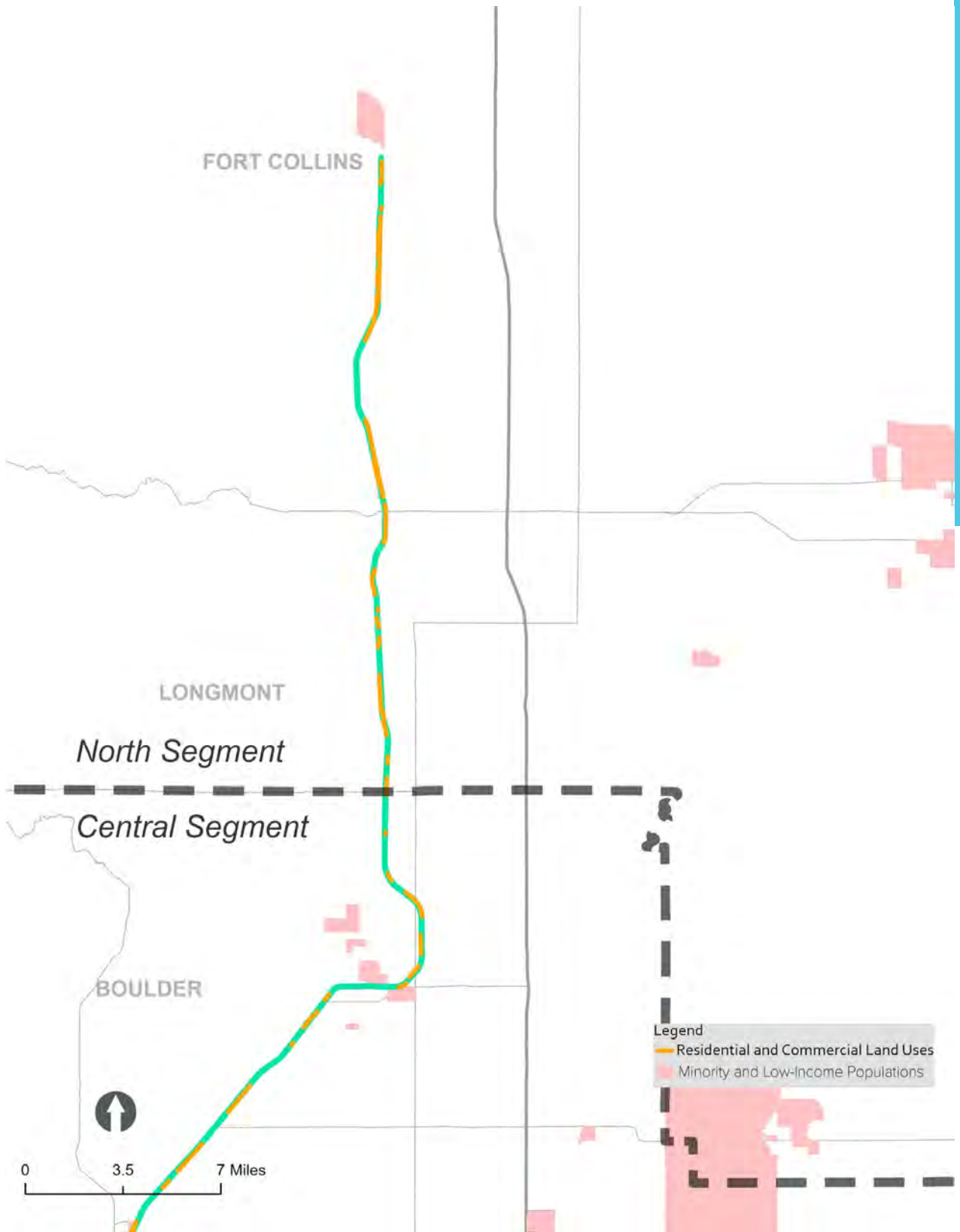
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Natural Resources

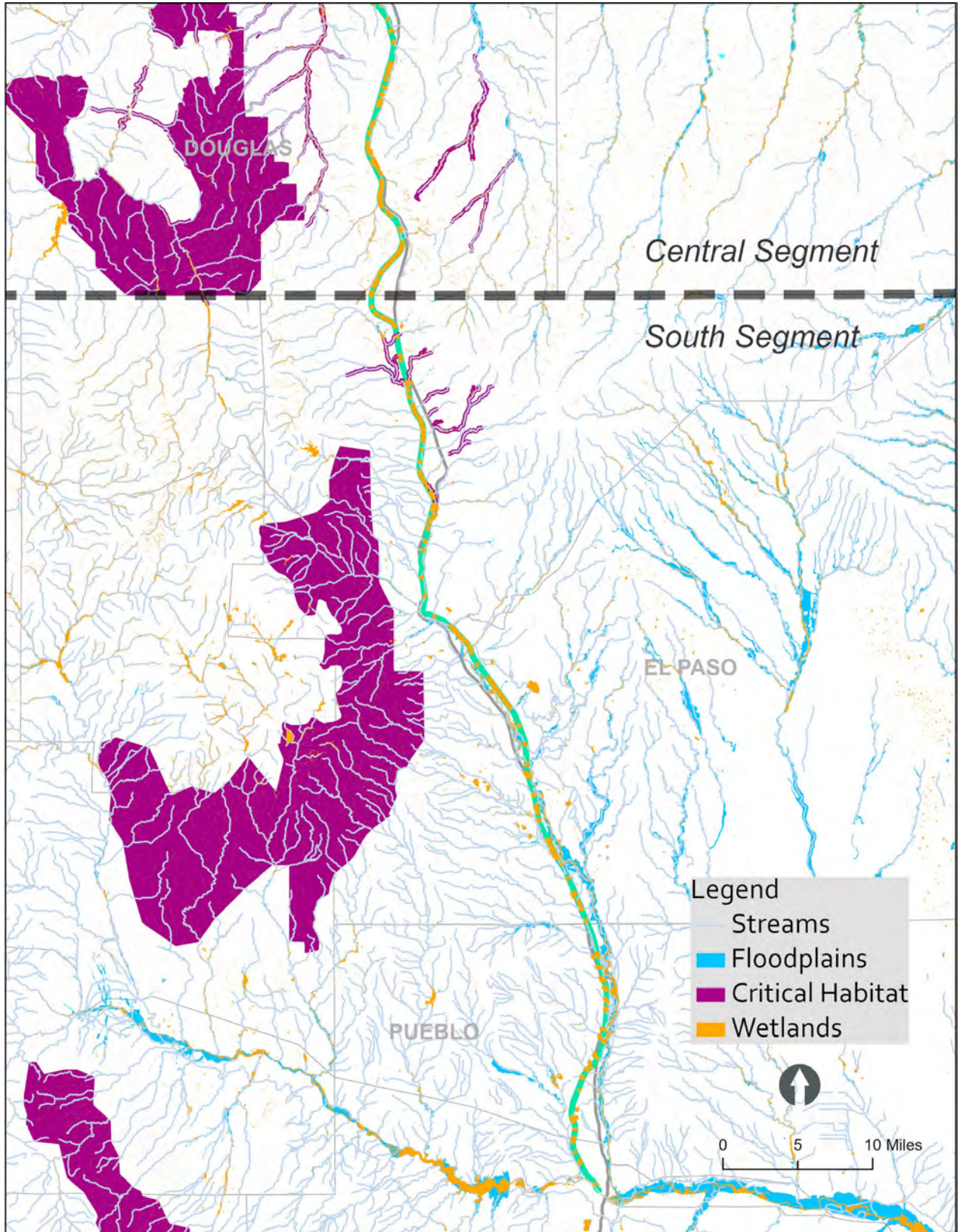
Streams

Wetlands

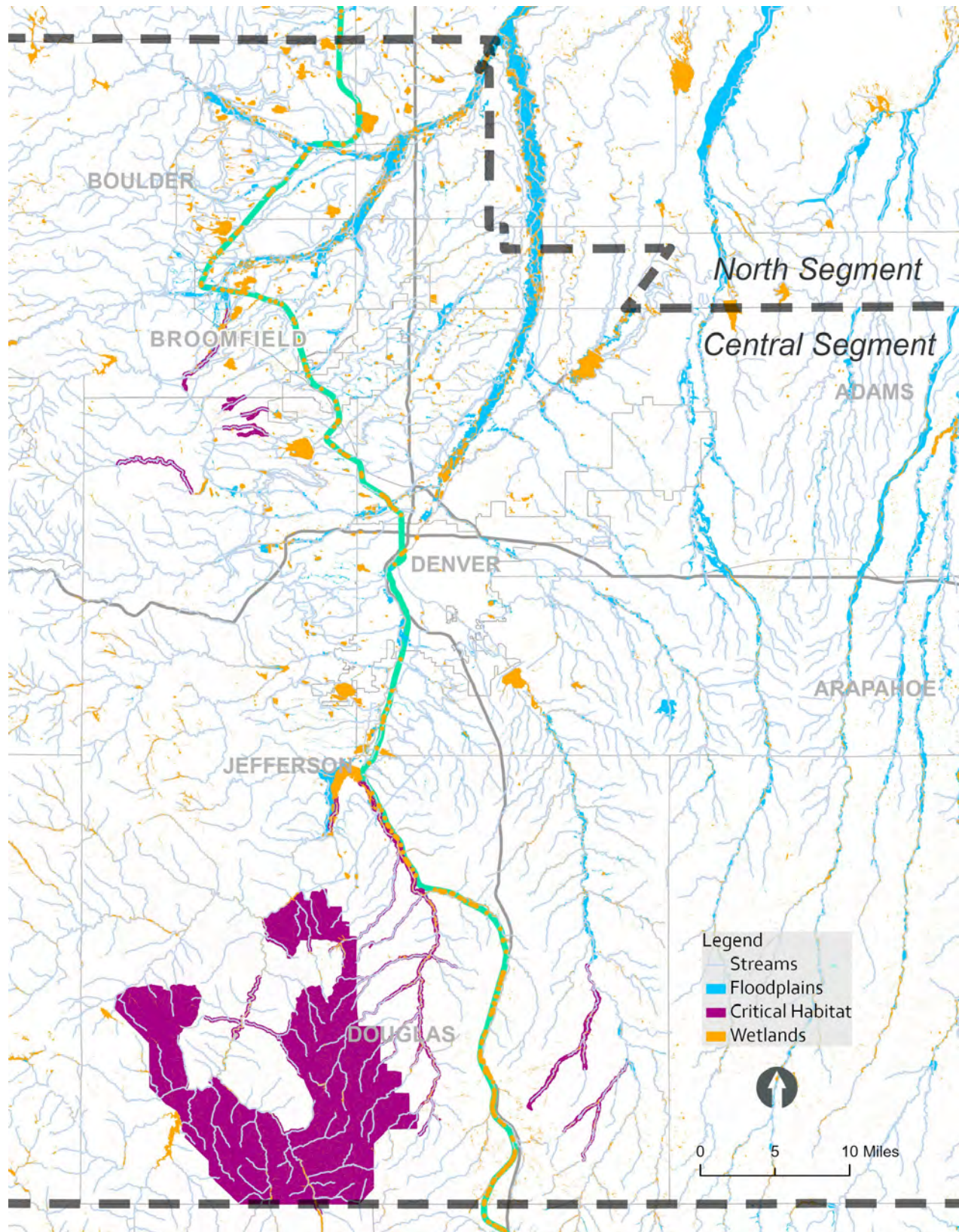
Floodplains

Threatened & Endangered Species Critical Habitat

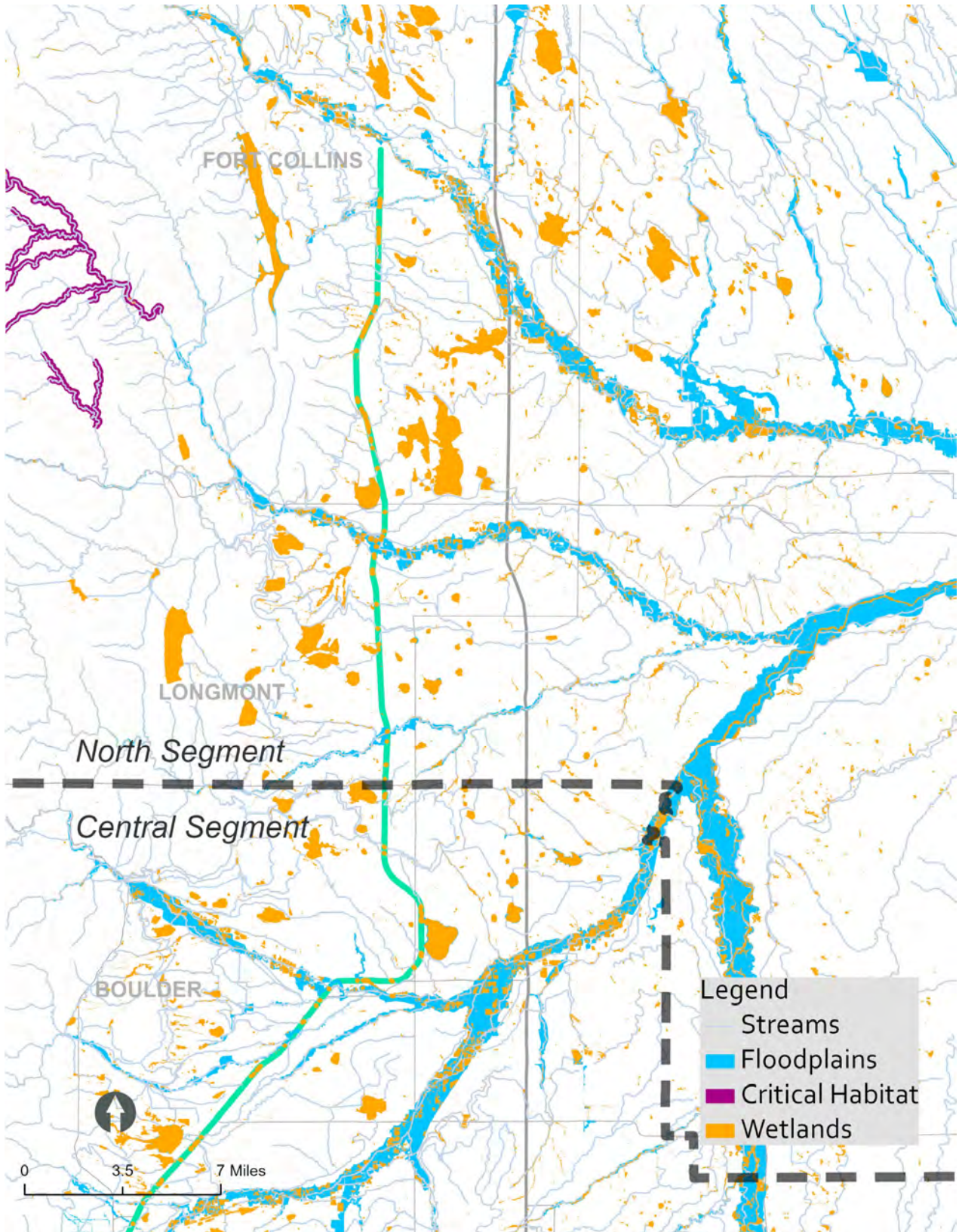
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Recreation

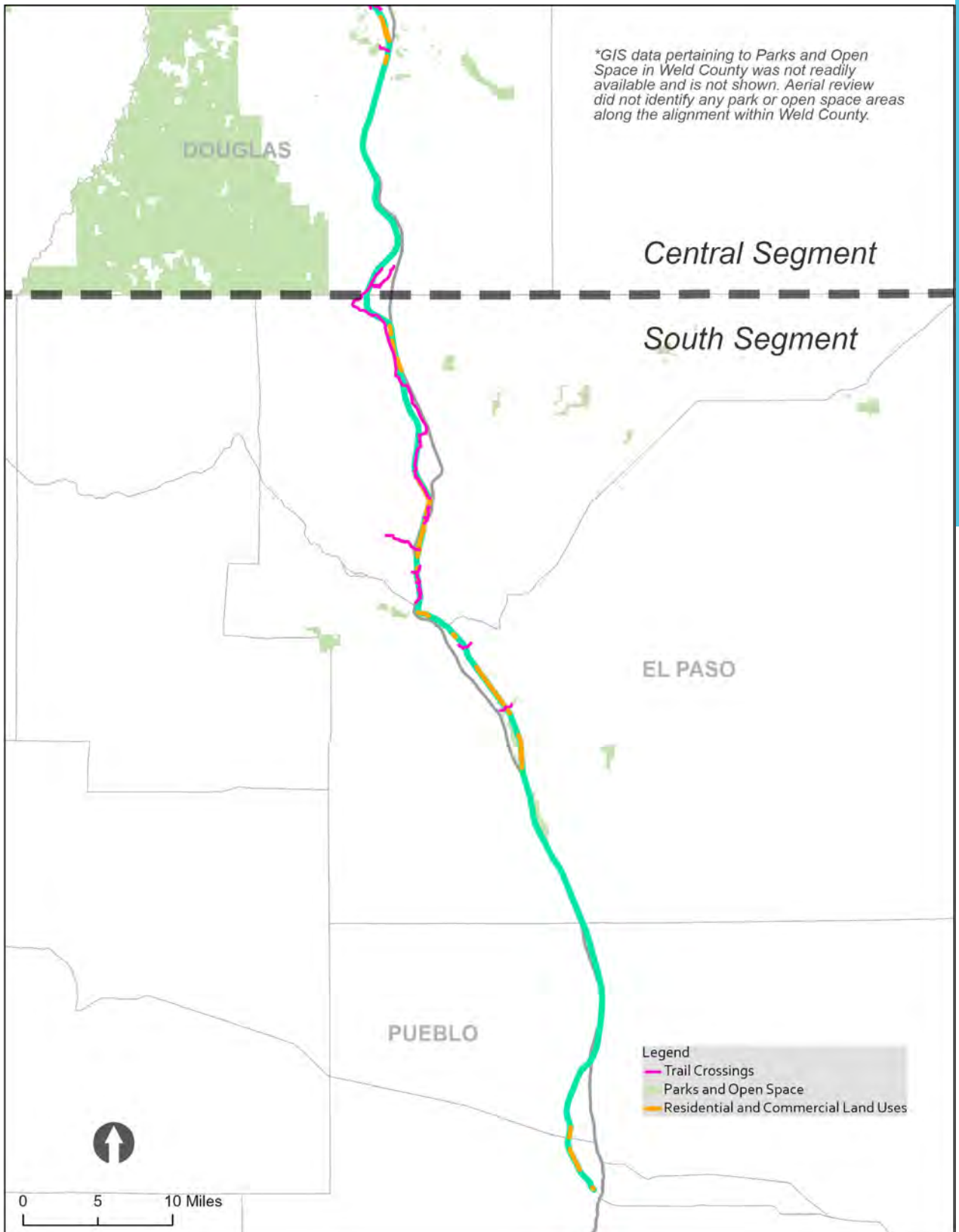
Parks

Trail Crossings

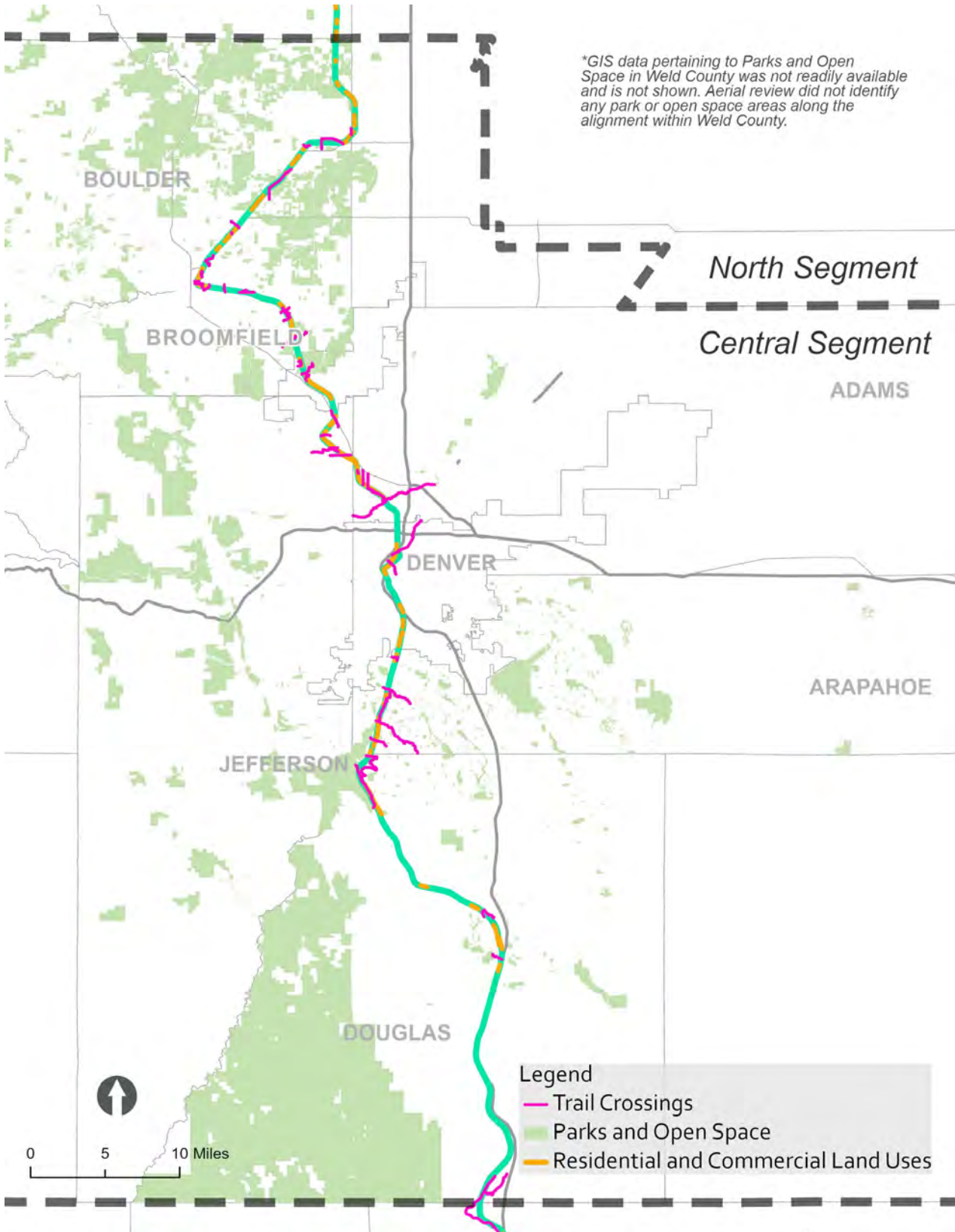
Threatened & Endangered Species Critical Habitat

Noise and Vibration

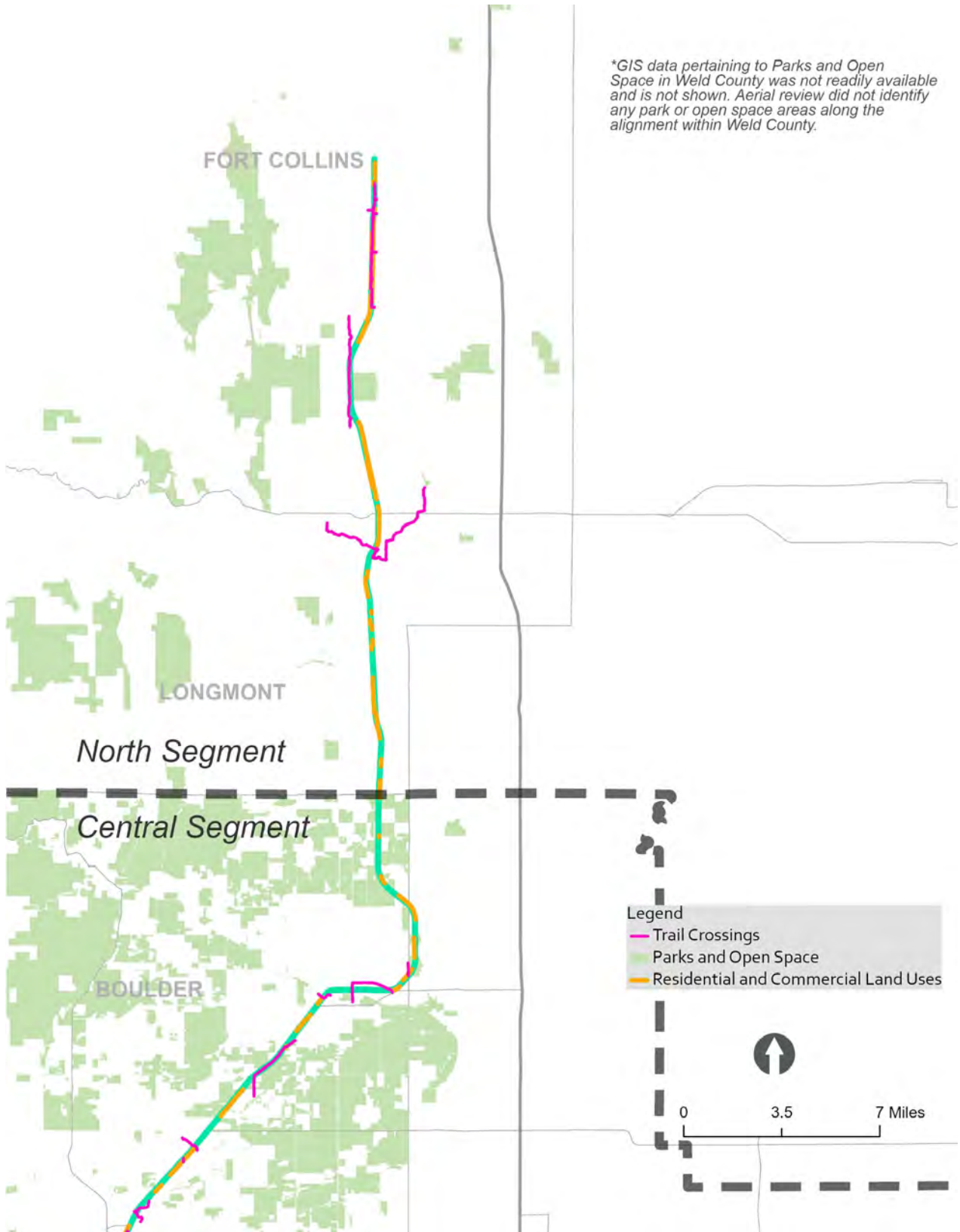
South Segment



Central Segment



North Segment



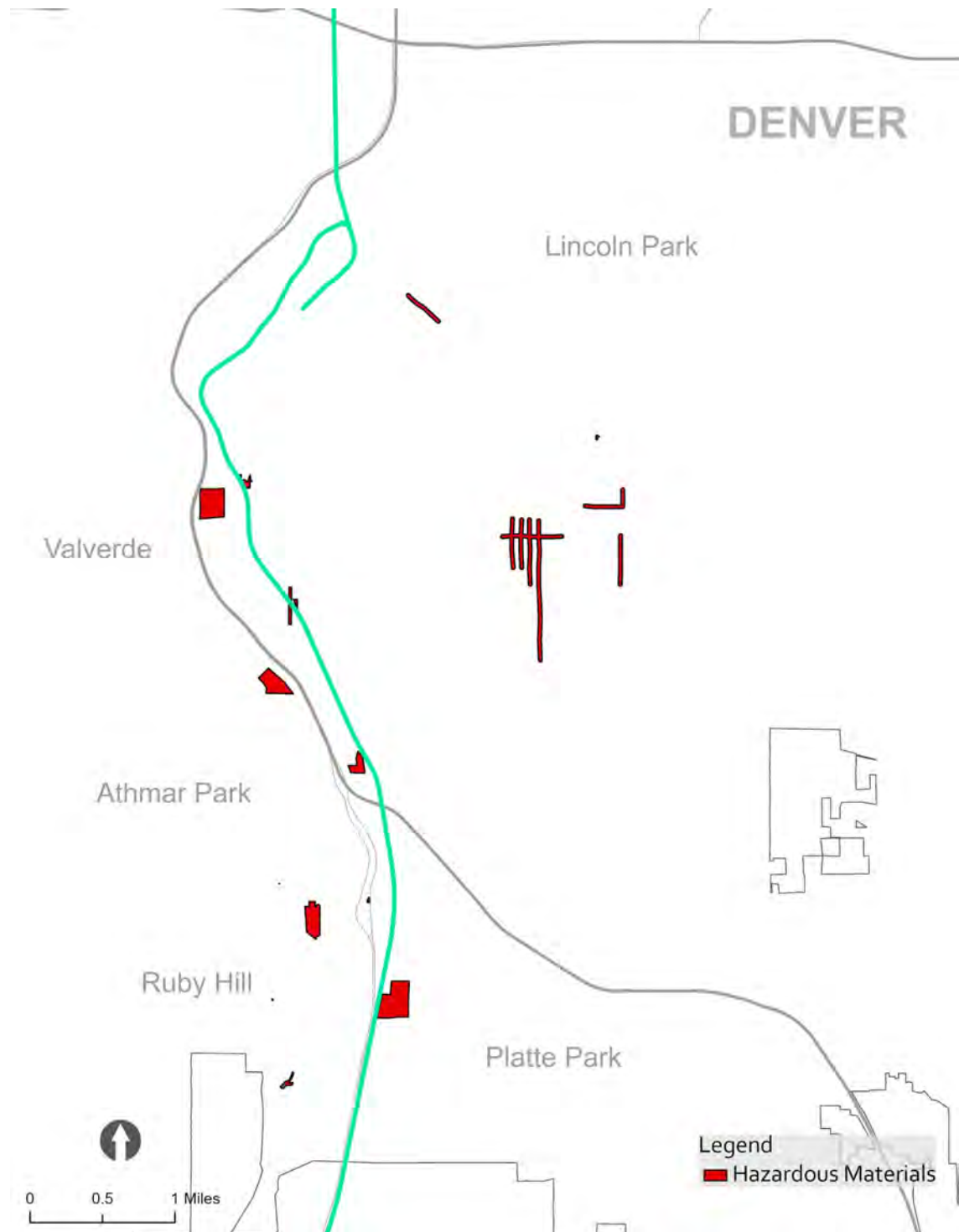


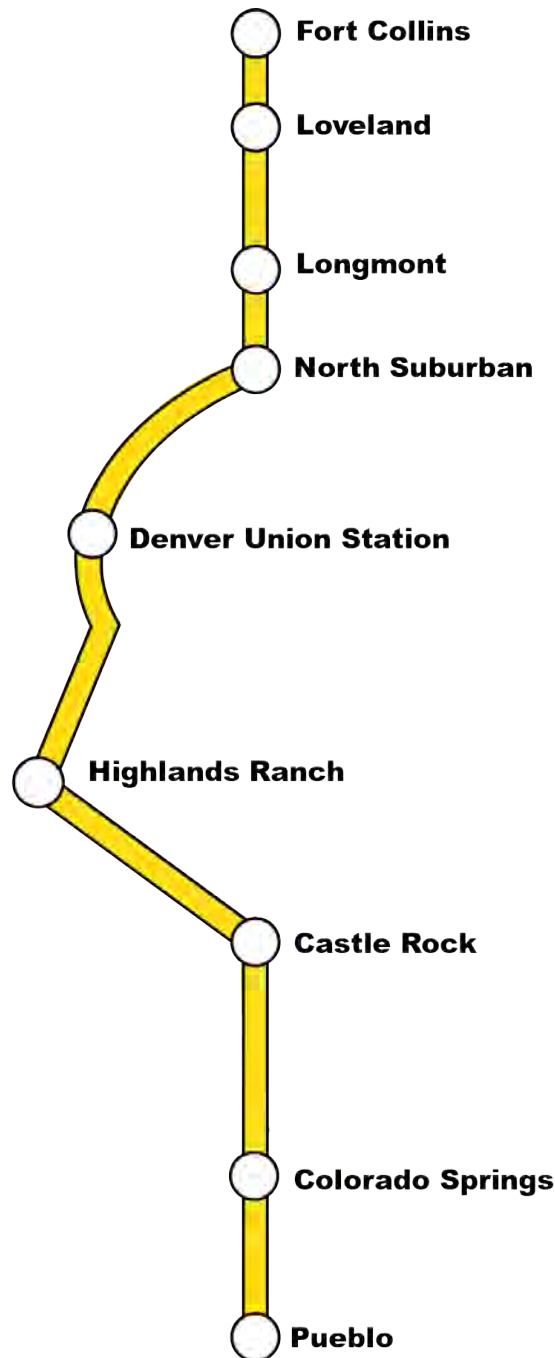
COLORADO
Department of Transportation

Hazardous Materials

Superfund Sites

Central Segment (no sites in South or North Segment)





BNSF + North I-25 Commuter Rail Alternative

Level 2 Alternatives Analysis



COLORADO
Department of Transportation

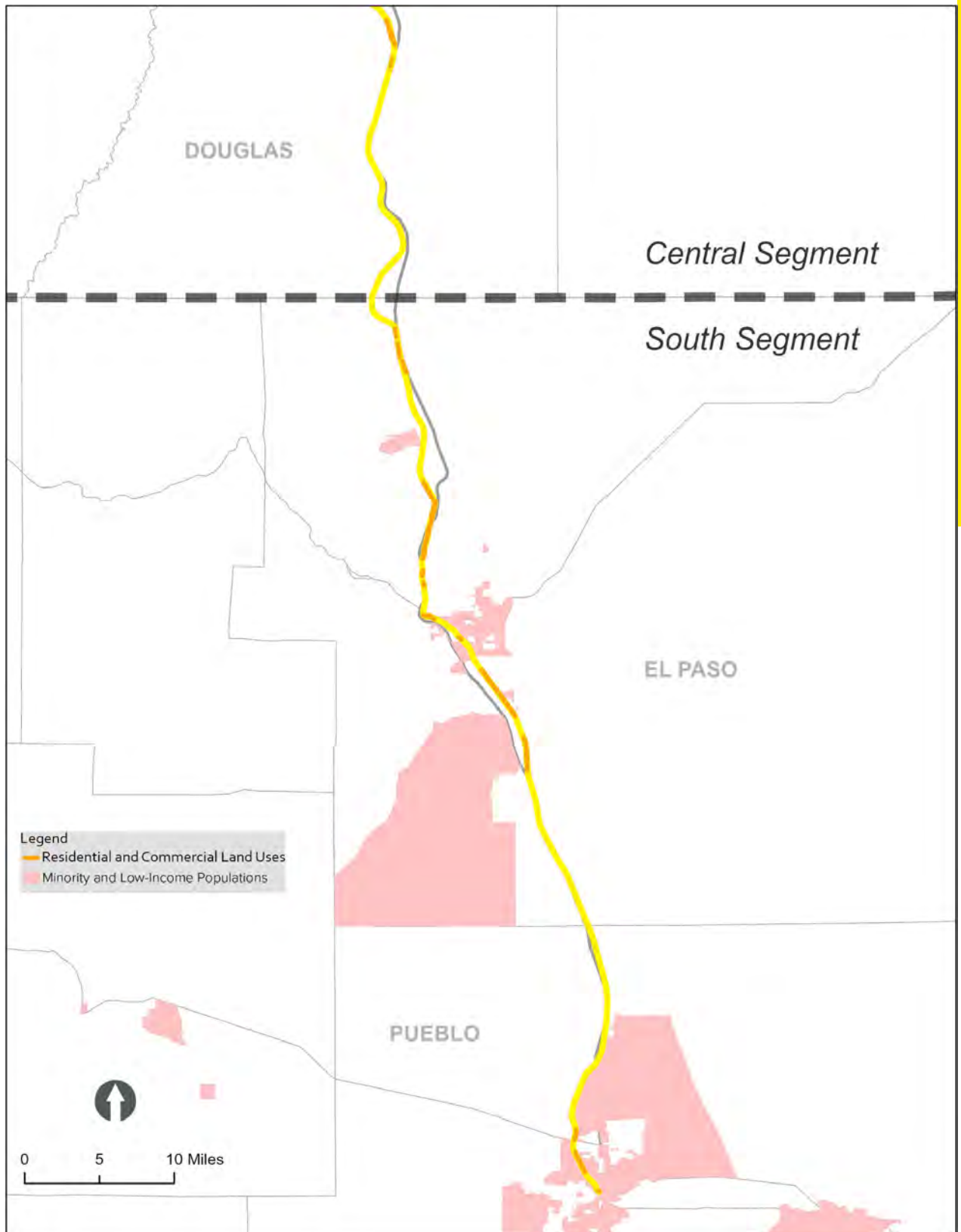
Community Disruption

Minority and Low-Income Populations

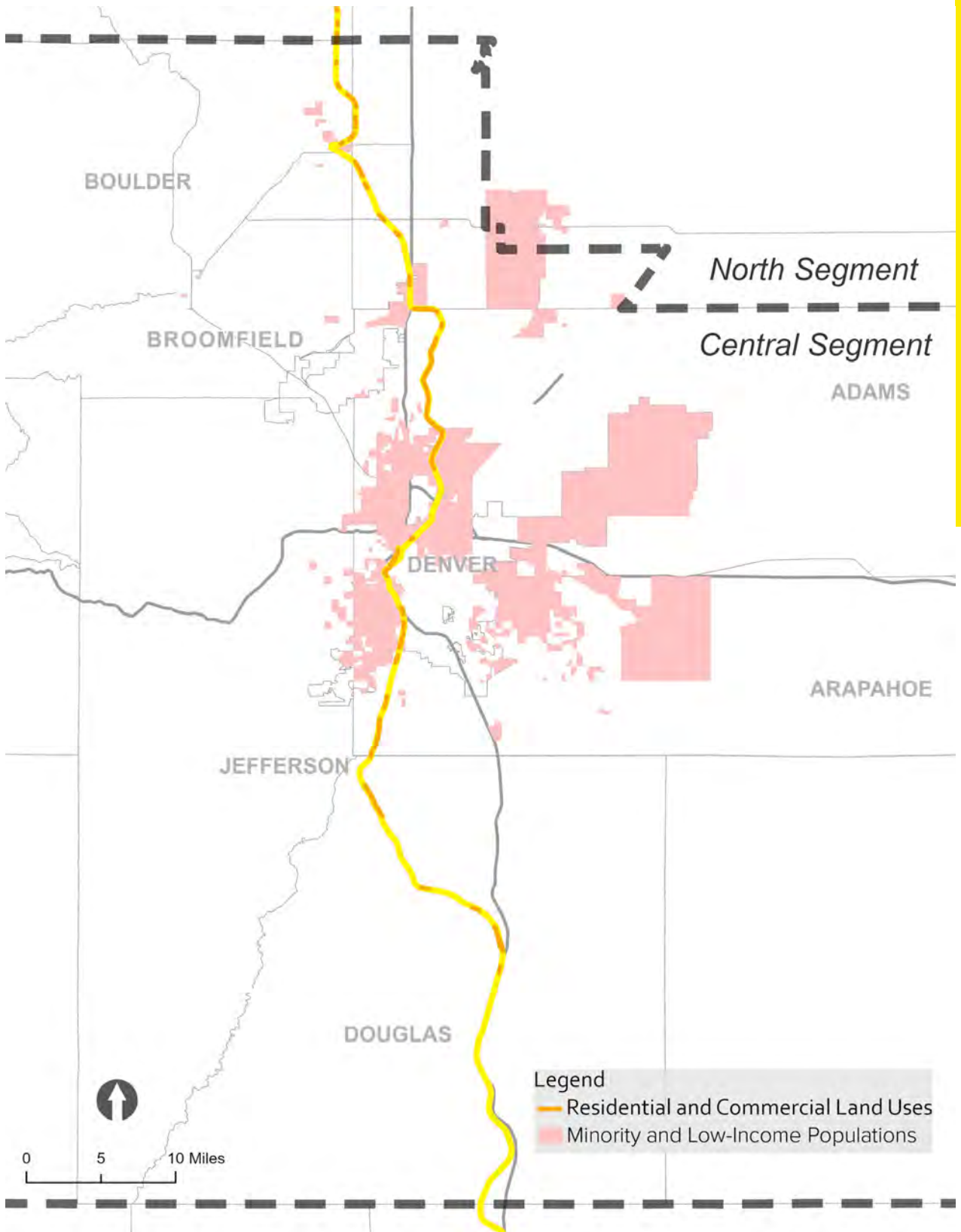
Adjacent Residential and Commercial Land Uses

Noise and Vibration

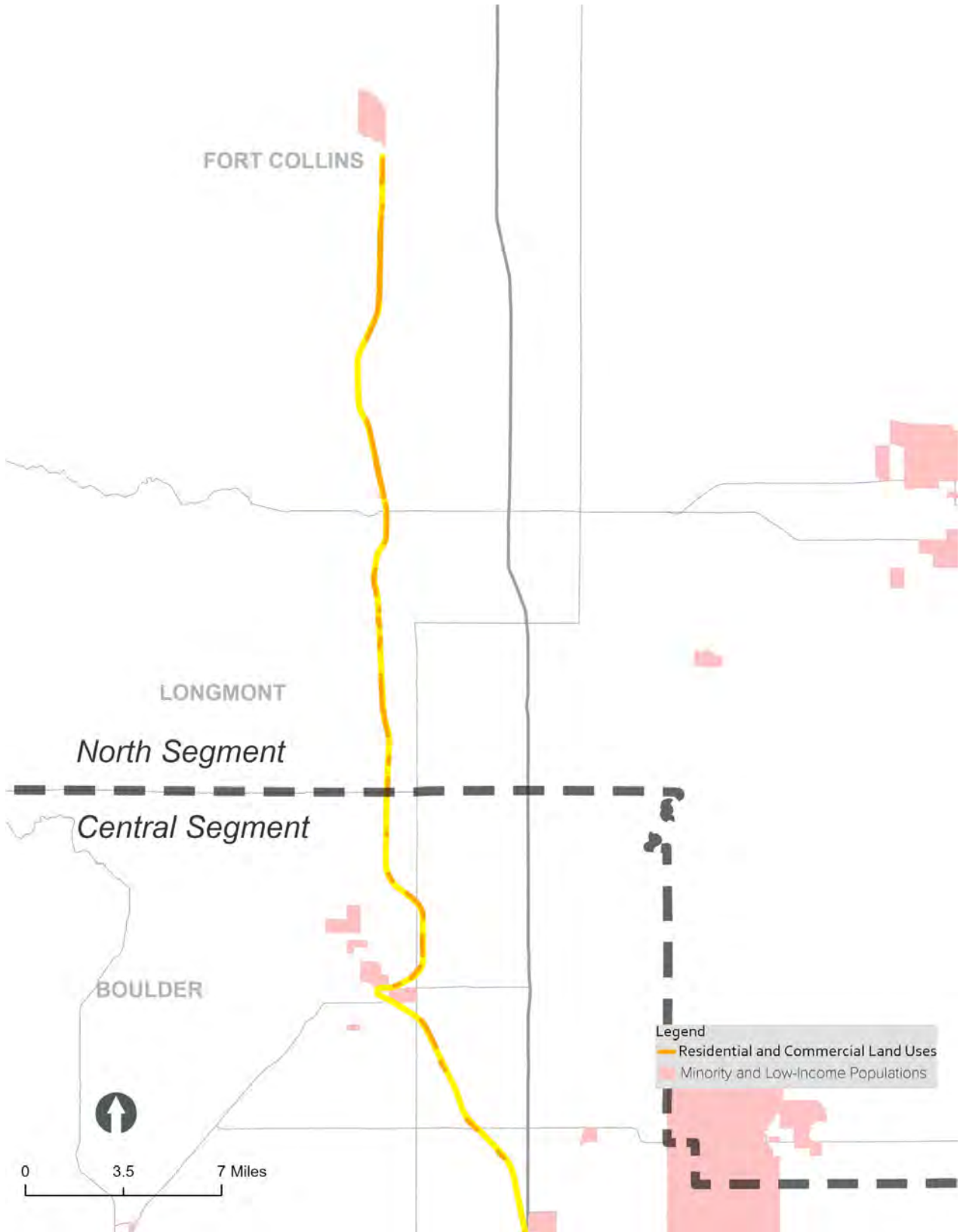
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Natural Resources

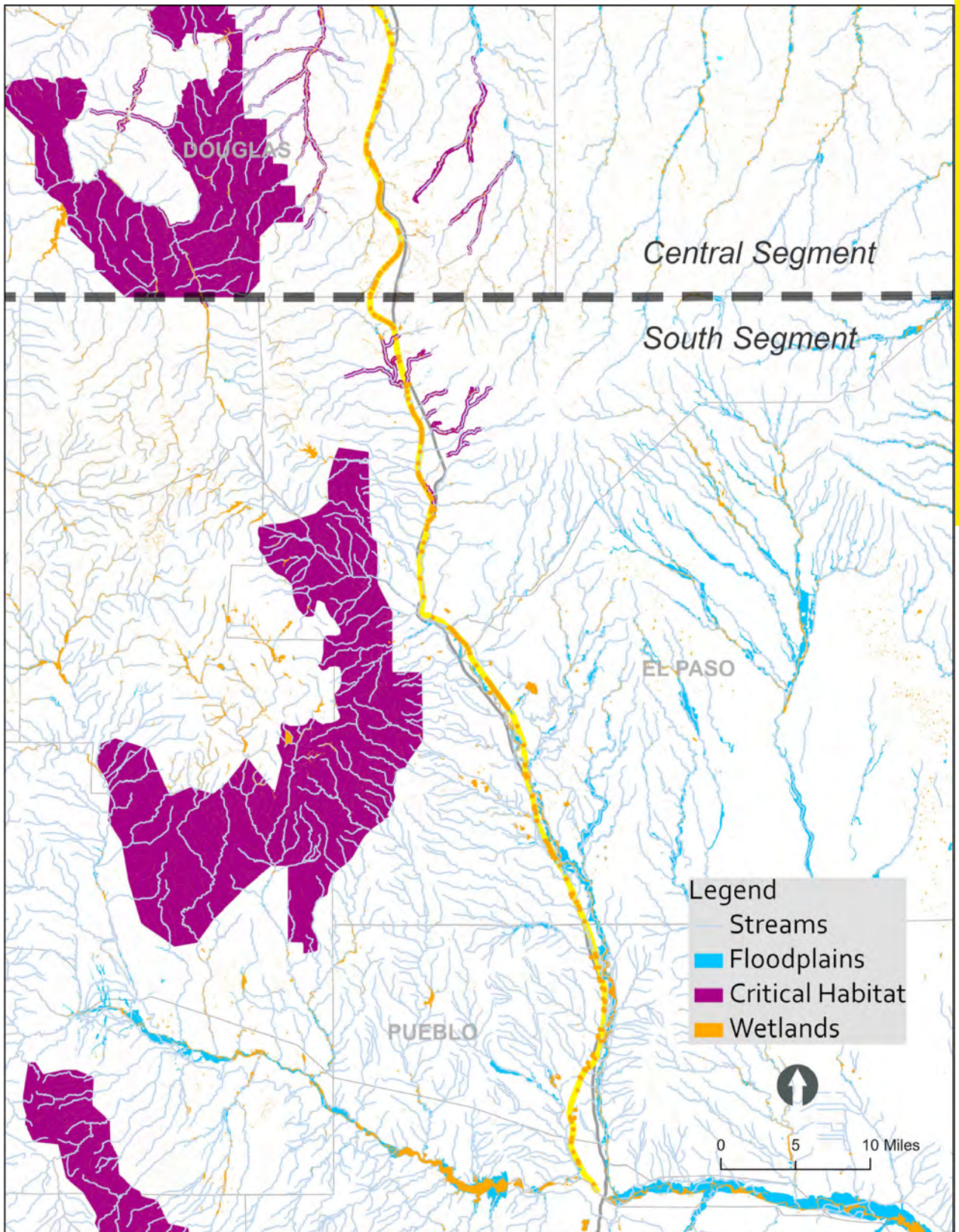
Streams

Wetlands

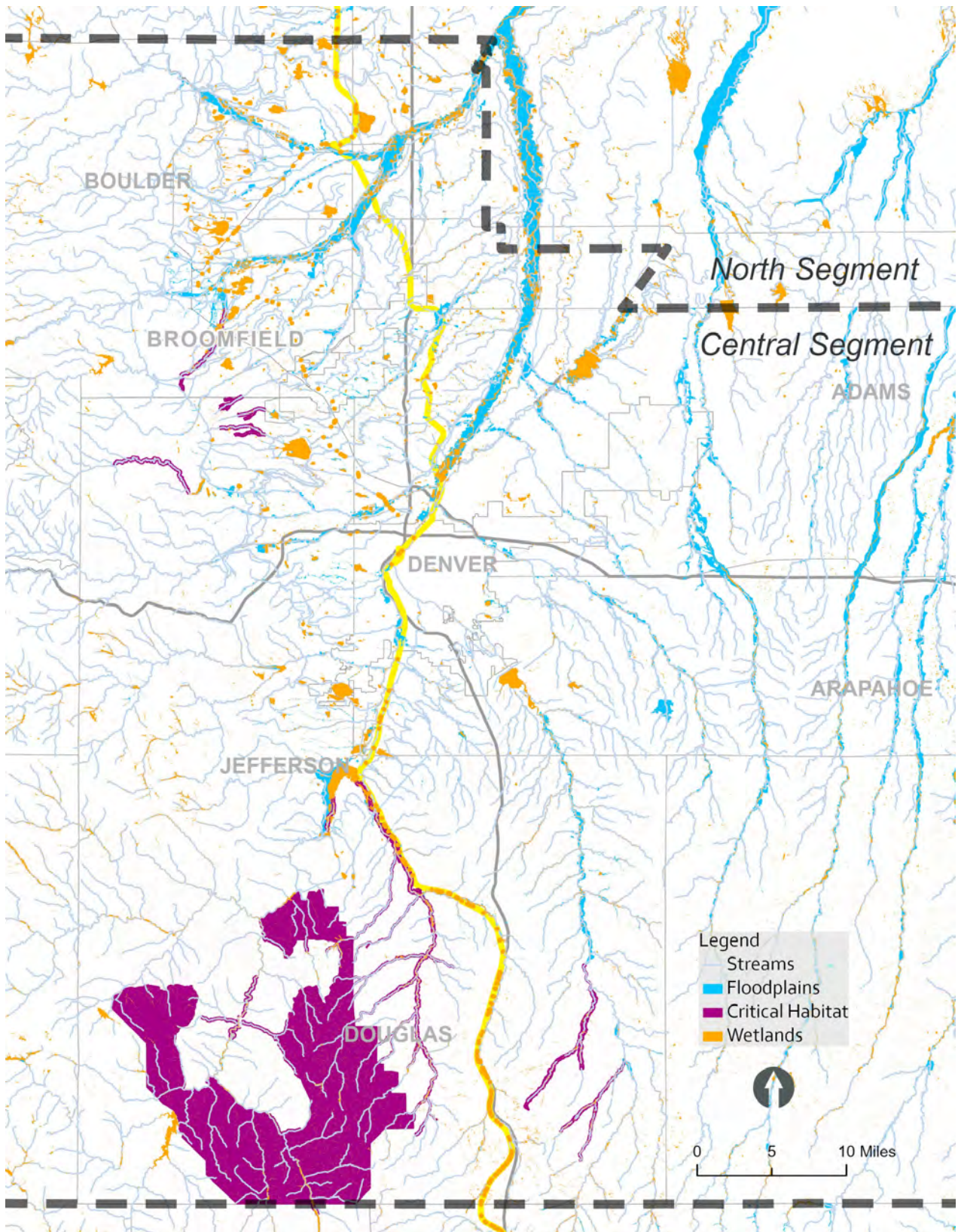
Floodplains

Threatened & Endangered Species Critical Habitat

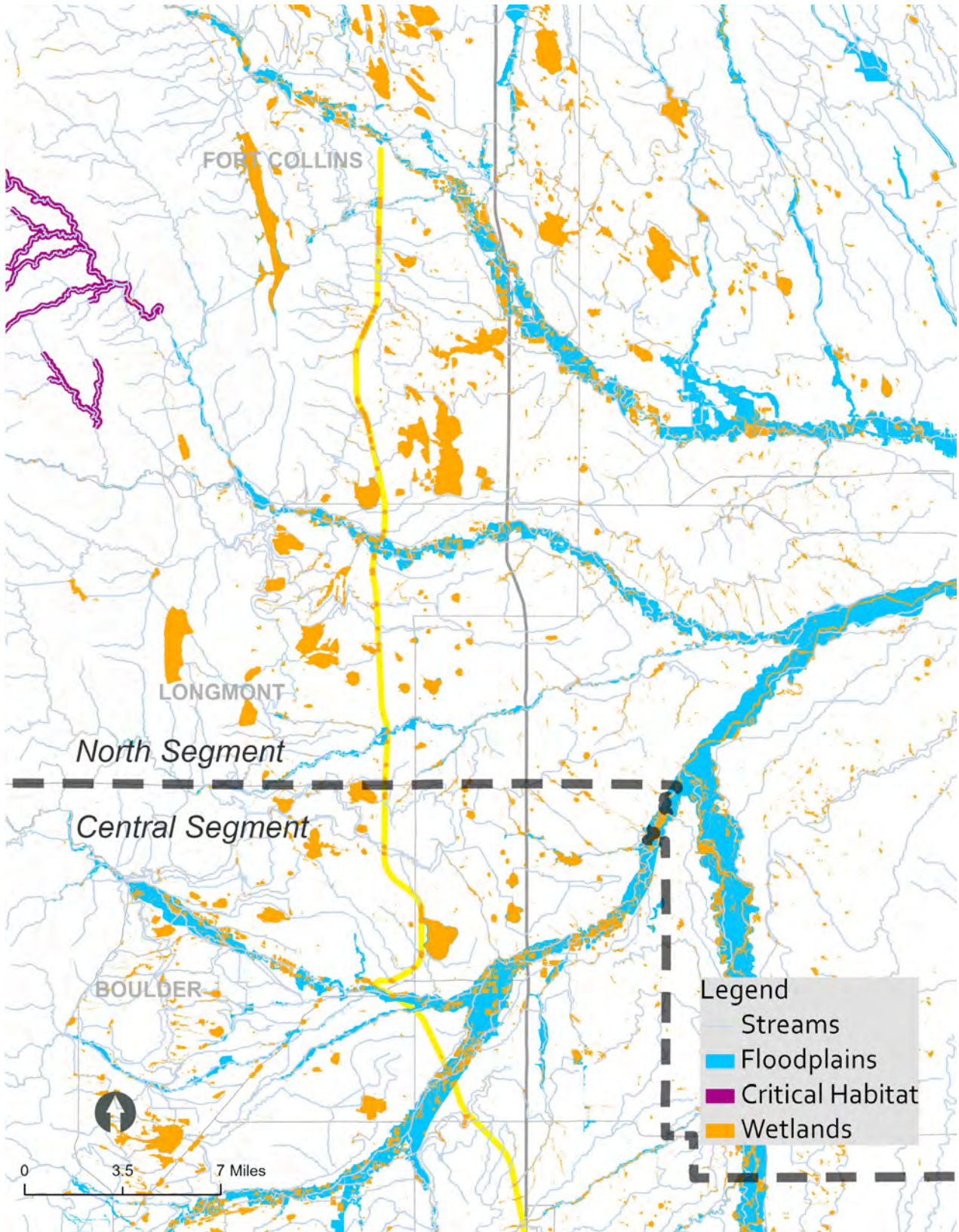
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Recreation

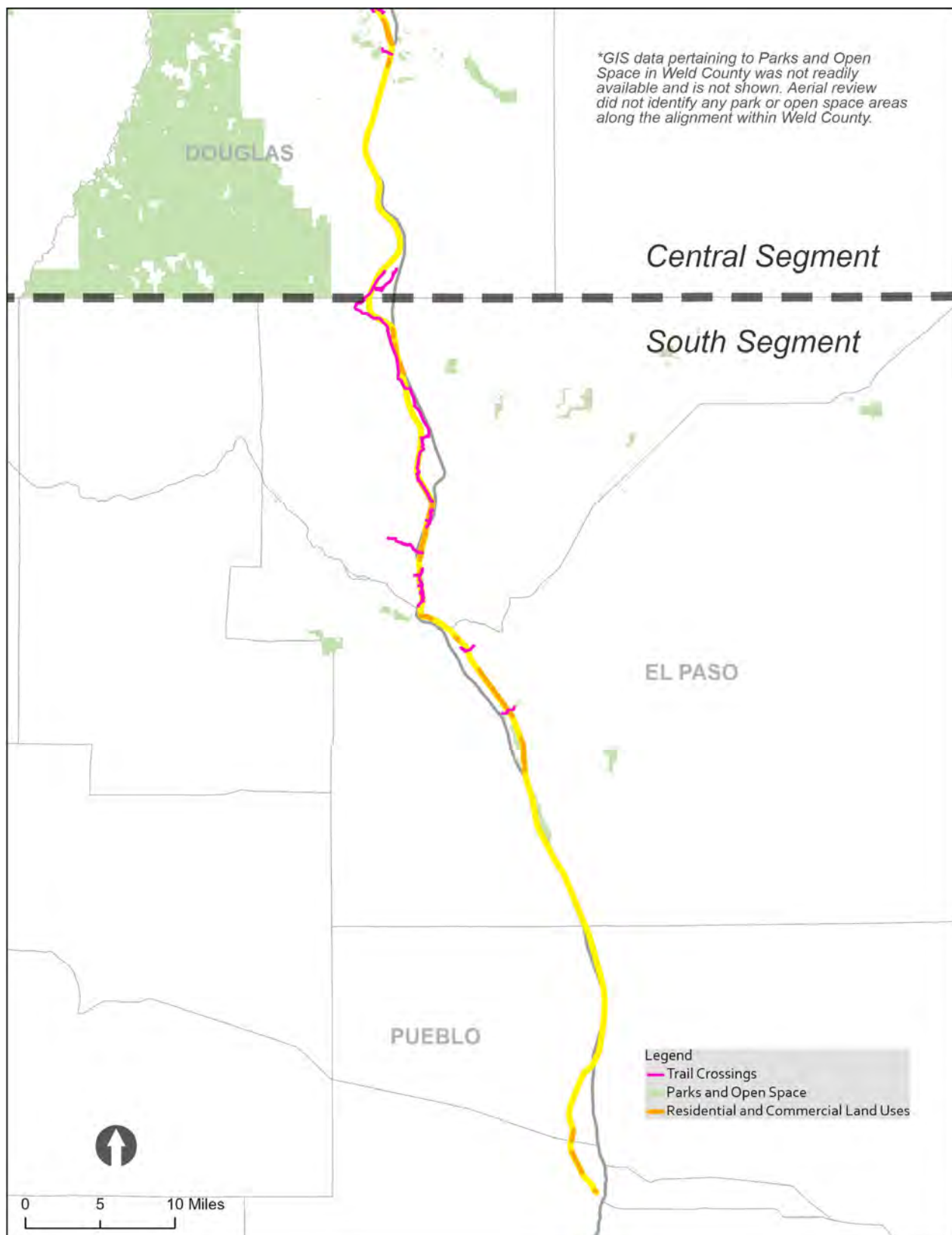
Parks

Trail Crossings

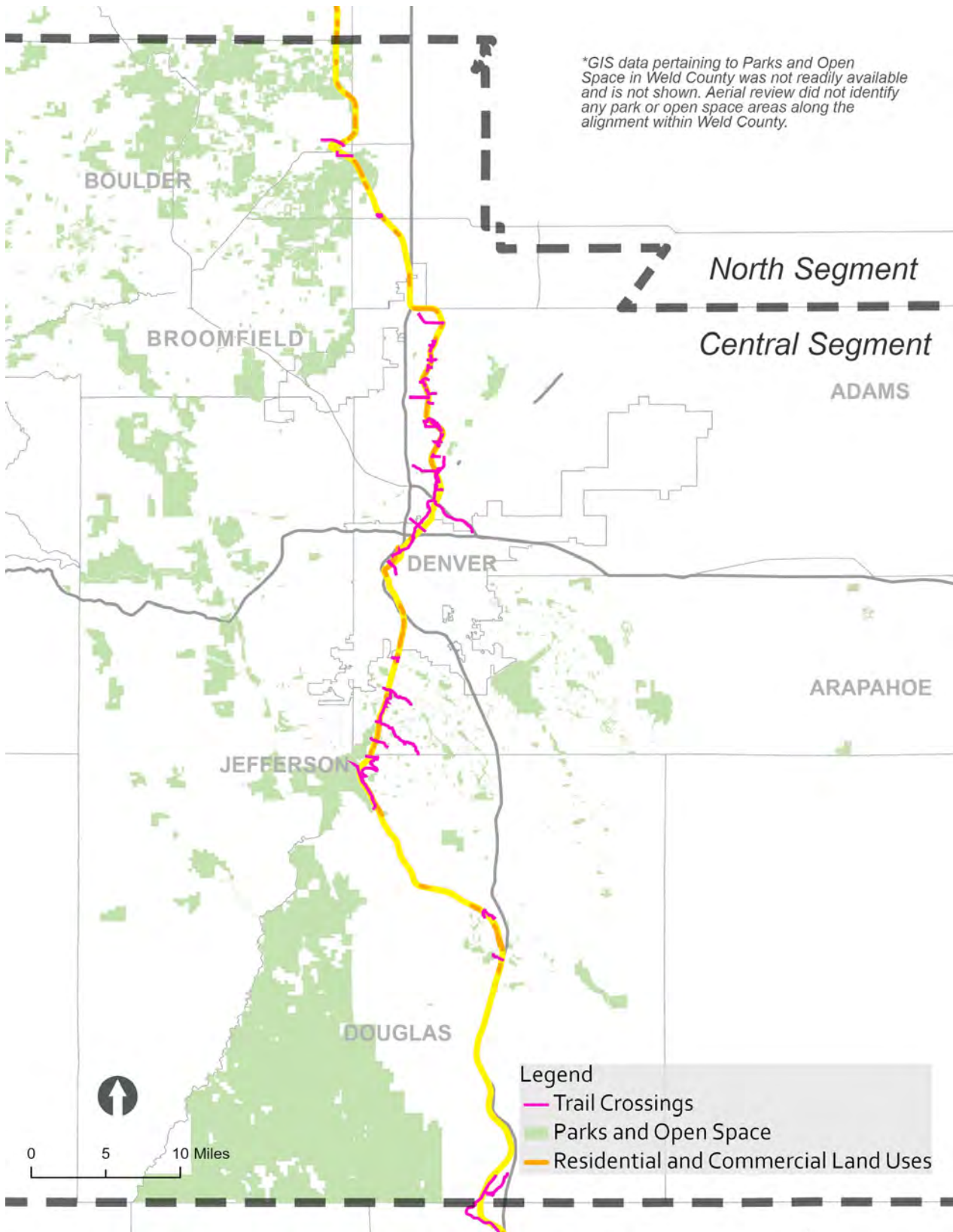
Threatened & Endangered Species Critical Habitat

Noise and Vibration

South Segment



Central Segment



North Segment

*GIS data pertaining to Parks and Open Space in Weld County was not readily available and is not shown. Aerial review did not identify any park or open space areas along the alignment within Weld County.

FORT COLLINS

LONGMONT

North Segment

Central Segment

BOULDER

Legend

- Trail Crossings
- Parks and Open Space
- Residential and Commercial Land Uses



0 3.5 7 Miles

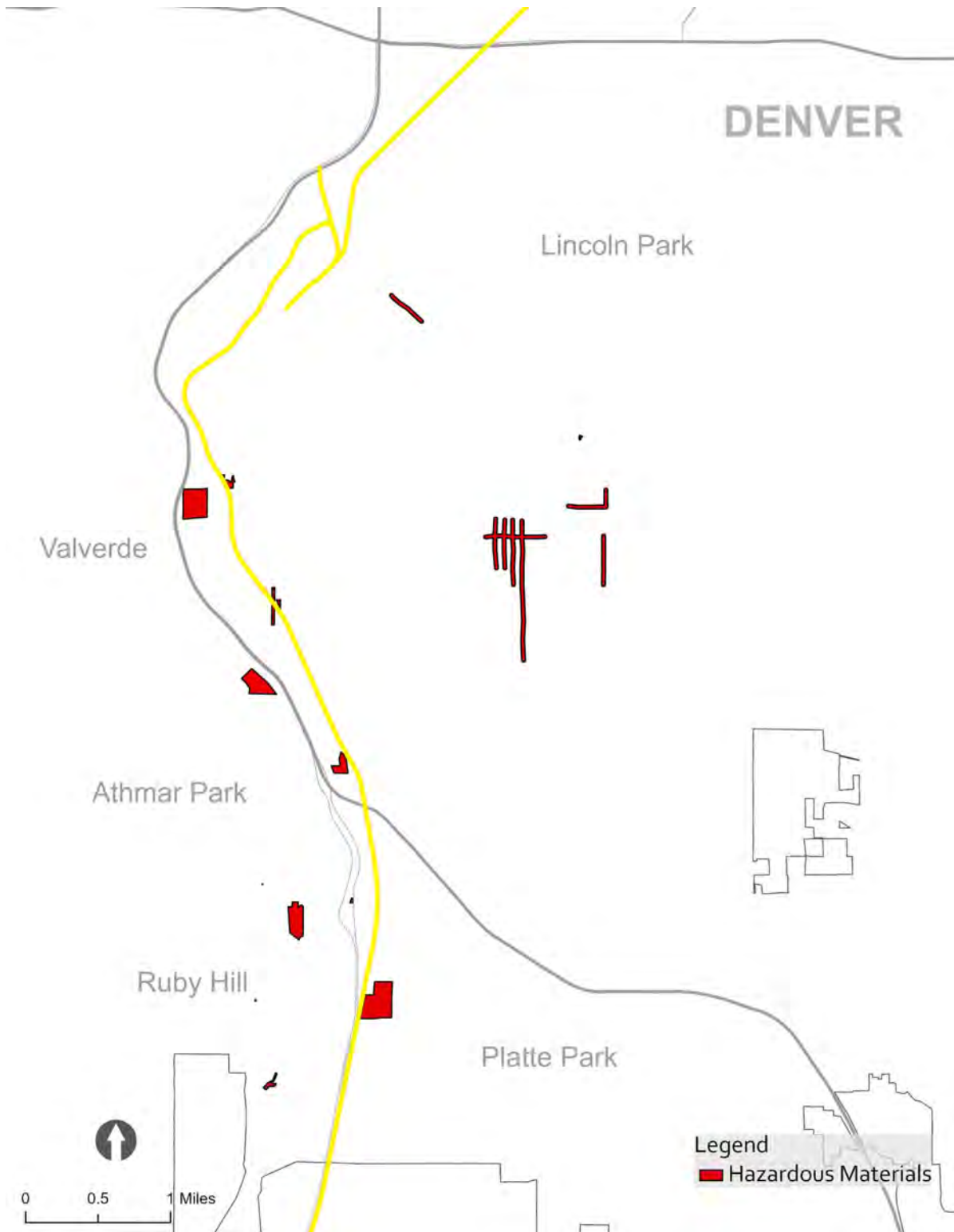


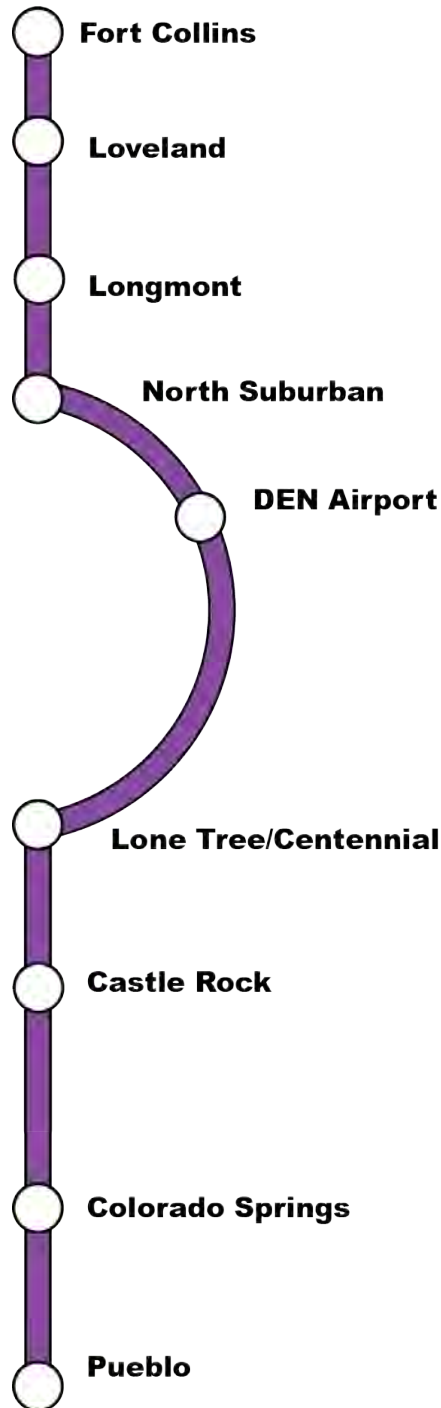
COLORADO
Department of Transportation

Hazardous Materials

Superfund Sites

Central Segment (no sites in South or North Segments)





I-25 + E-470 Highway Alternative

Level 2 Alternatives Analysis



COLORADO
Department of Transportation

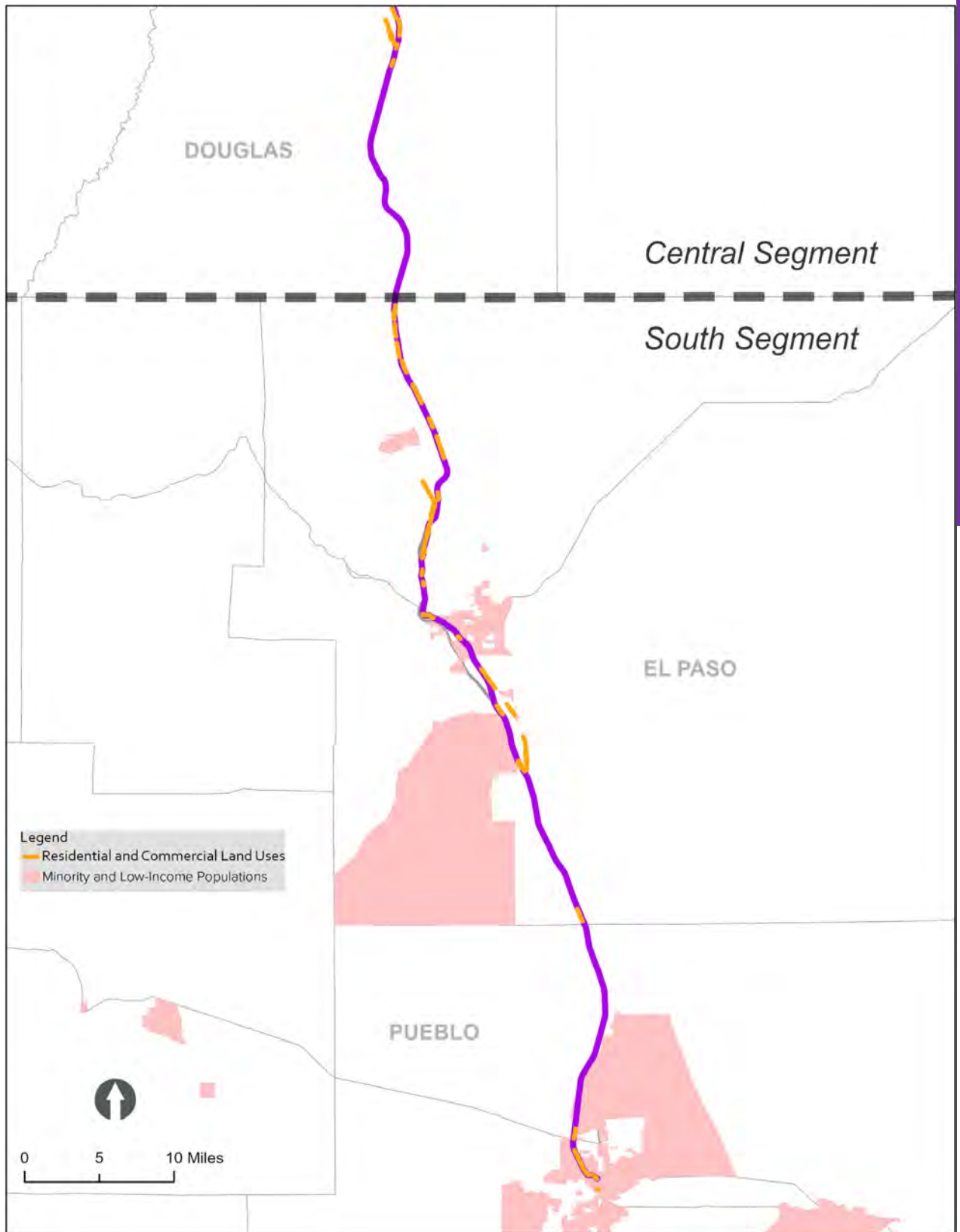
Community Disruption

Minority and Low-Income Populations

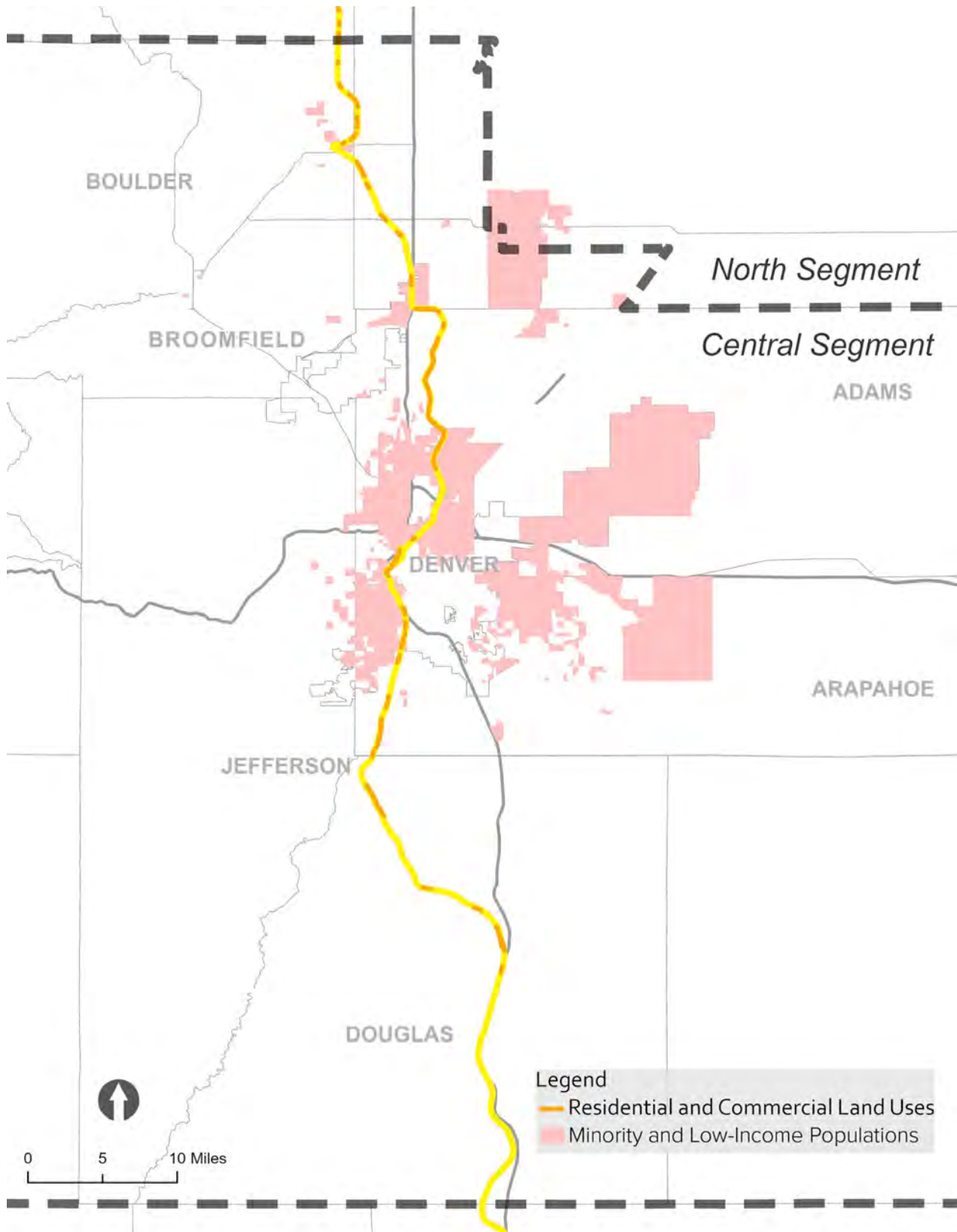
Adjacent Residential and Commercial Land Uses

Noise and Vibration

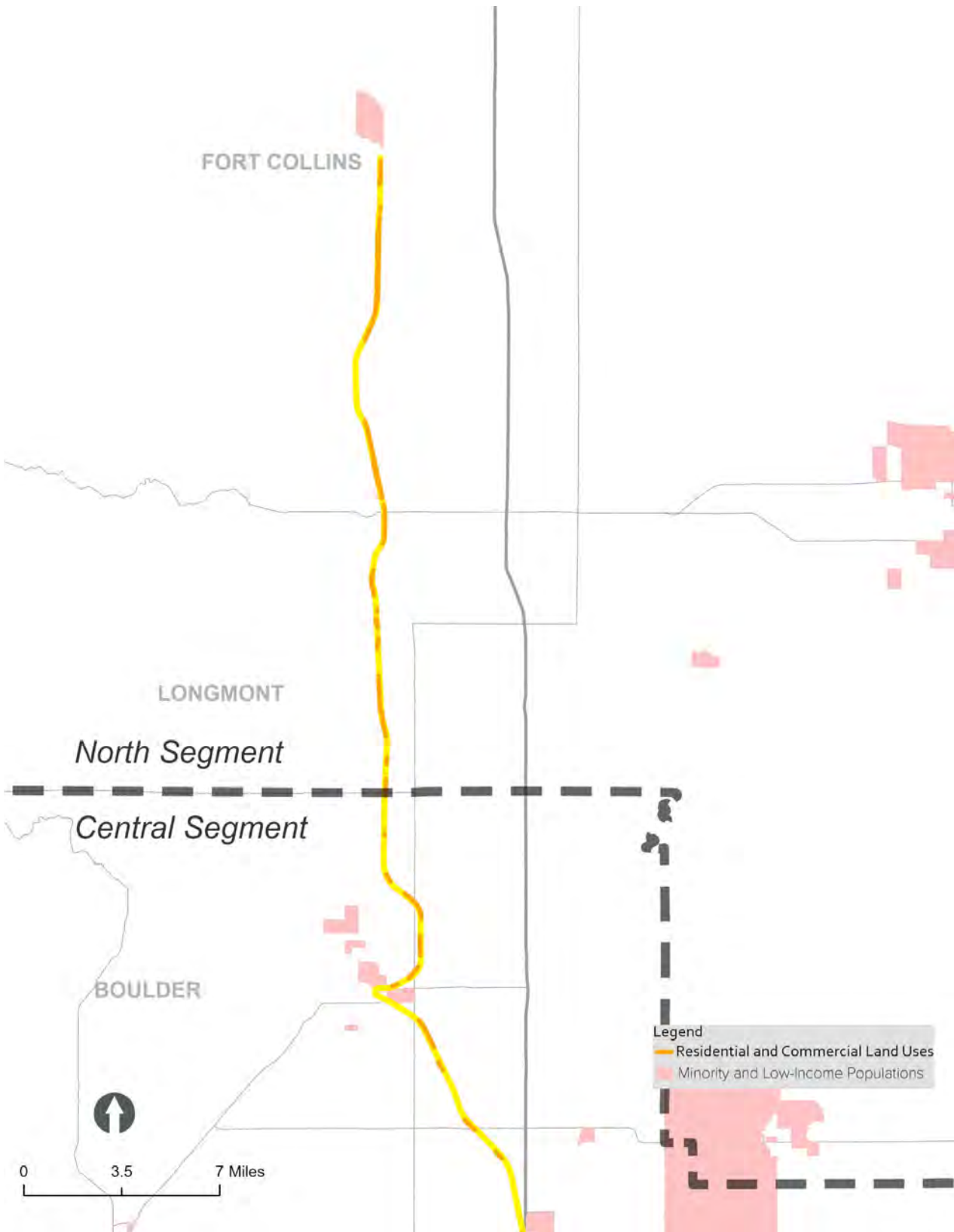
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Natural Resources

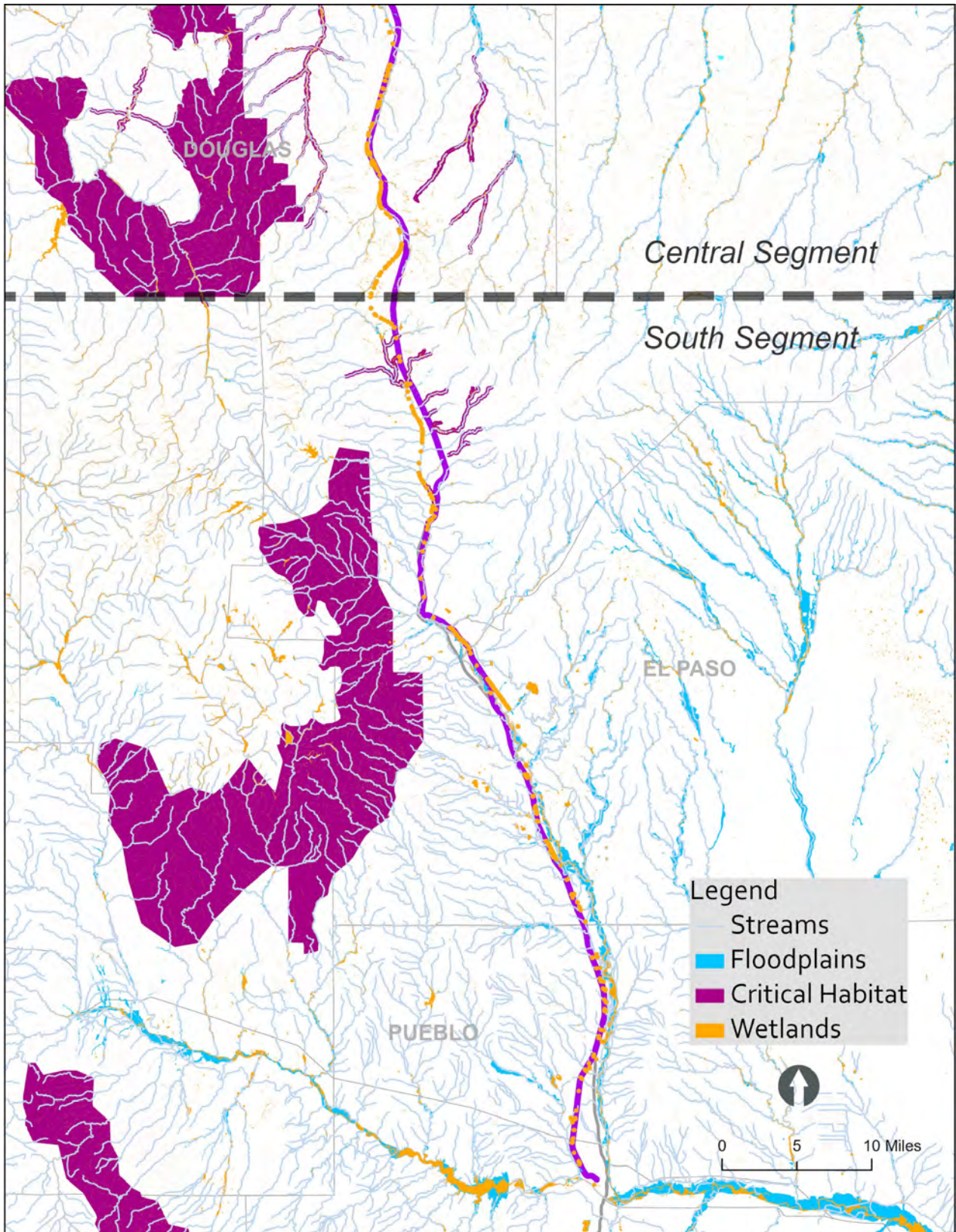
Streams

Wetlands

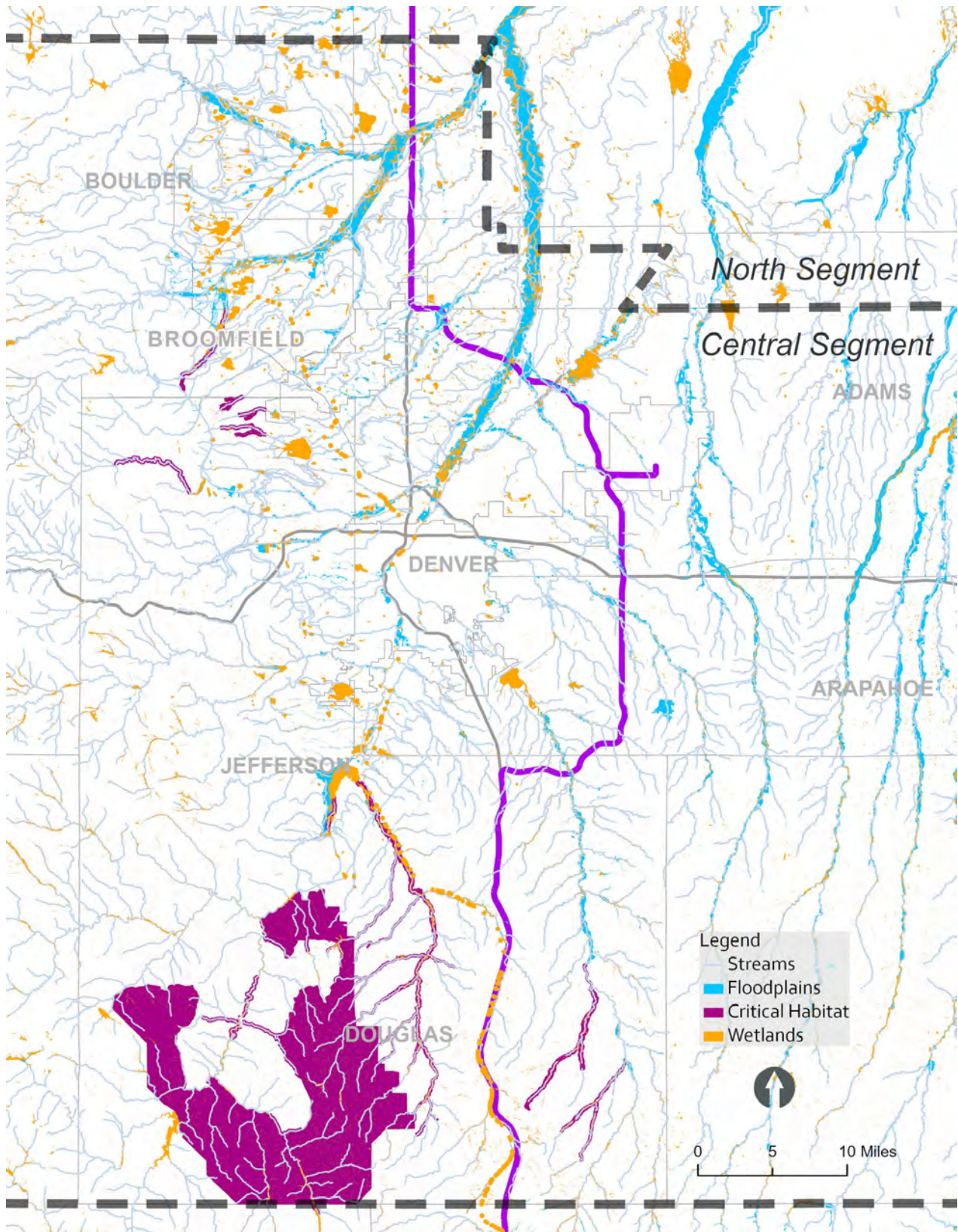
Floodplains

Threatened & Endangered Species Critical Habitat

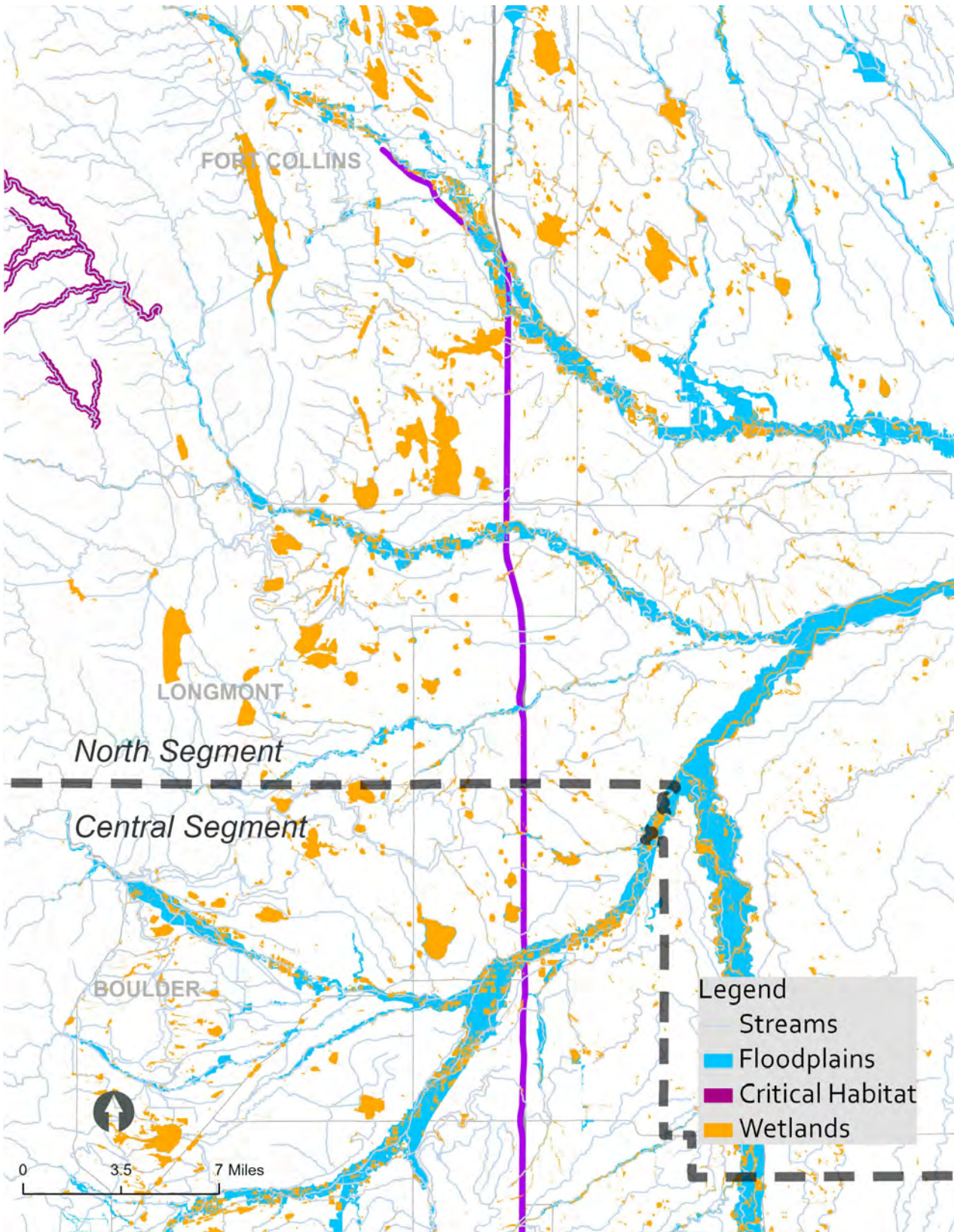
South Segment



Central Segment



North Segment





COLORADO
Department of Transportation

Recreation

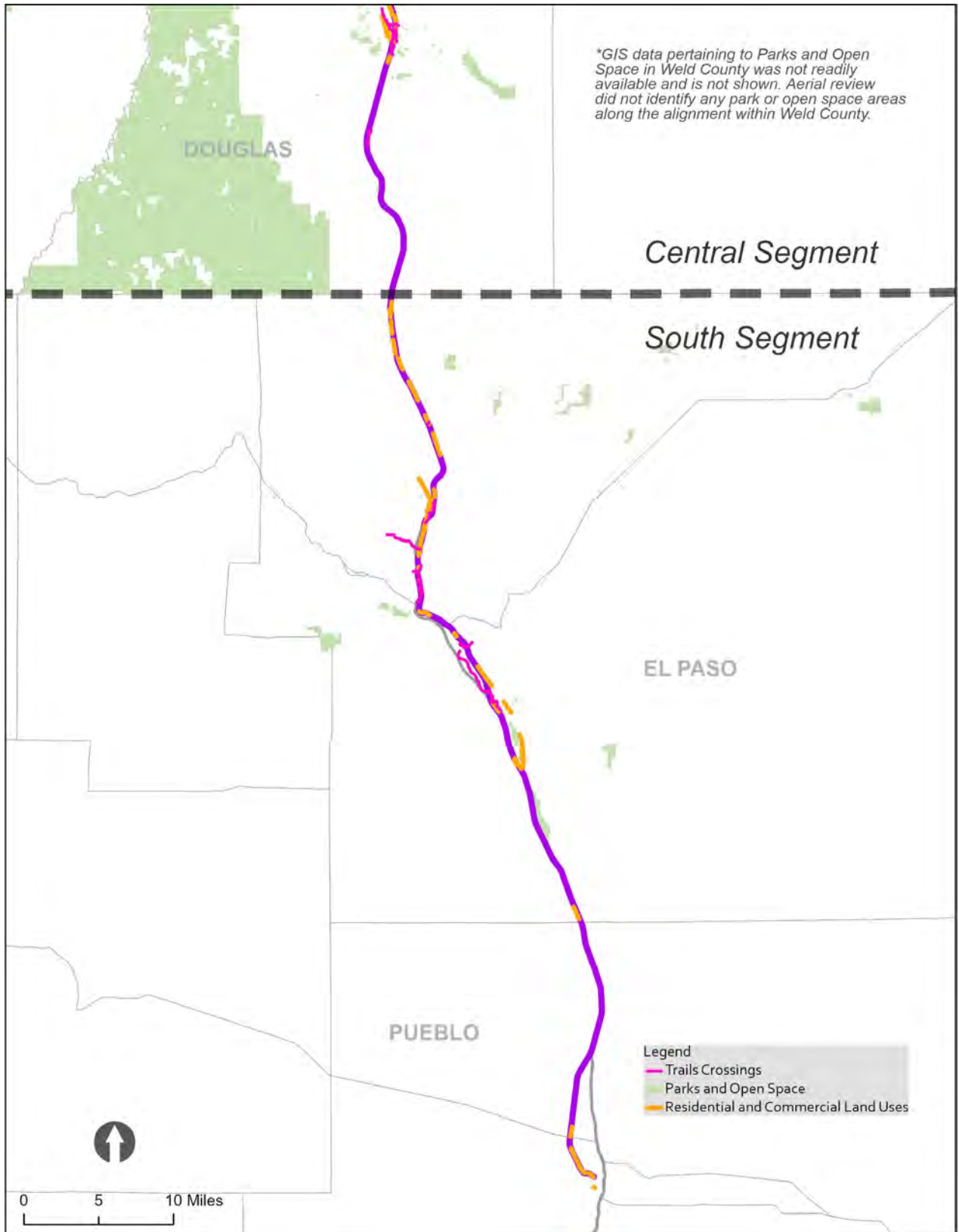
Parks

Trail Crossings

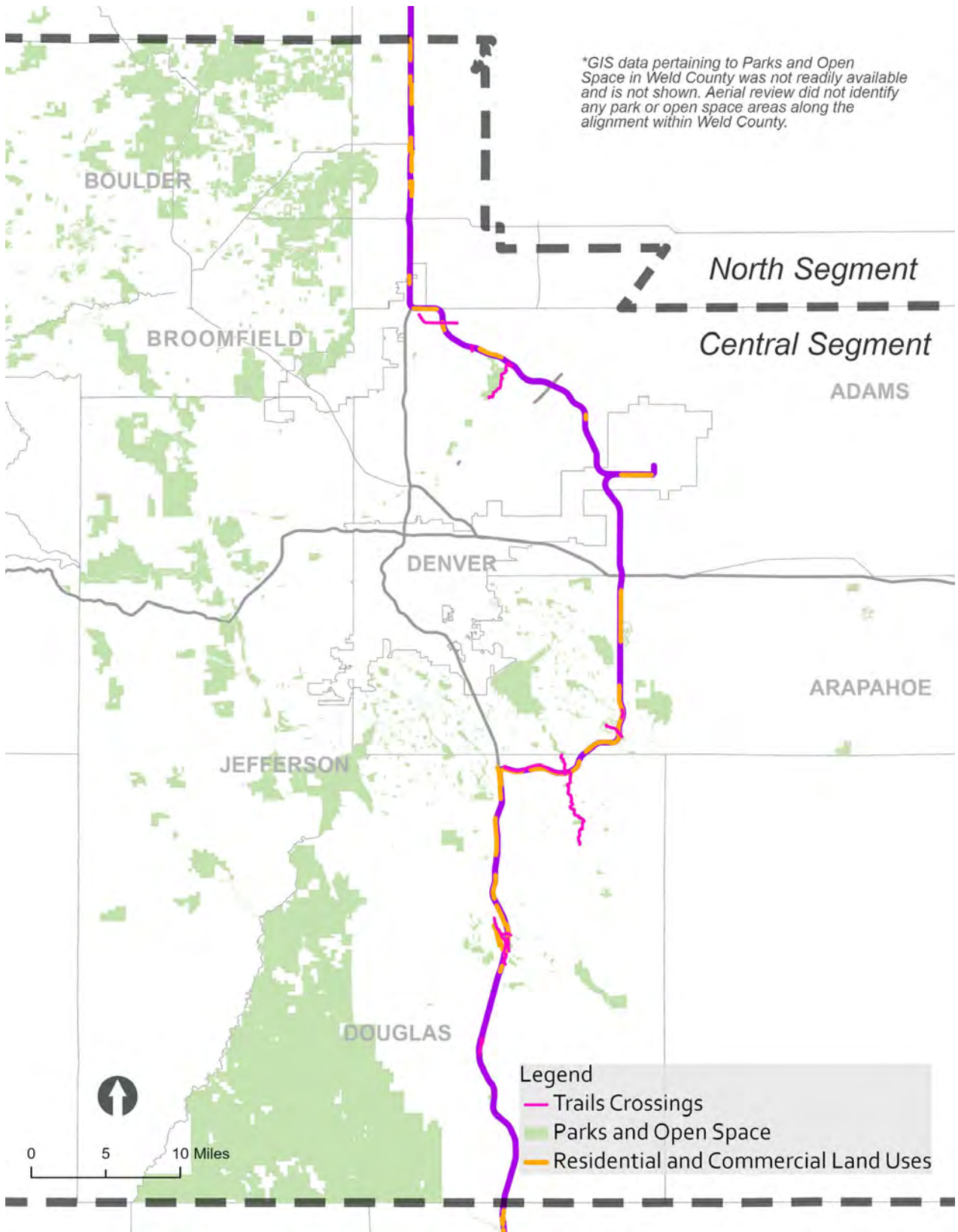
Threatened & Endangered Species Critical Habitat

Noise and Vibration

South Segment



Central Segment



North Segment

**GIS data pertaining to Parks and Open Space in Weld County was not readily available and is not shown. Aerial review did not identify any park or open space areas along the alignment within Weld County.*

FORT COLLINS

LONGMONT

North Segment

Central Segment

BOULDER

Legend

- Trails Crossings
- Parks and Open Space
- Residential and Commercial Land Uses



0 3.5 7 Miles



COLORADO
Department of Transportation

Hazardous Materials

Superfund Sites

Central Segment (no sites in South or North Segments)

