

## 4.14 BIOLOGICAL RESOURCES: WILDLIFE, VEGETATION, AND THREATENED AND ENDANGERED SPECIES

### Summary

This section addresses vegetation types, noxious weeds, wildlife, fisheries, riparian habitat, and special status species (including threatened, endangered, and sensitive species). Two federally-listed threatened (FT) species occur in the Boulder Segment and are the most important biological resources affected by the project: Preble's meadow jumping mouse (*Zapus hudsonius preblei*) and Ute ladies'-tresses orchid (*Spiranthes diluvialis*), as well as rare natural communities (tallgrass prairies). Other important resources are more widely distributed within the project area and include riparian woodland and riparian shrub habitat, prairie dog colonies, and wildlife movement corridors.

Natural habitats are mostly limited to the foothills west of Boulder, fragmented areas of remnant native prairie, and riparian corridors. The wildlife species present are typical of urban habitats in the Colorado Front Range, except in the Boulder foothills and adjacent prairies, where there is high diversity associated with the relatively undeveloped foothills habitats. United States Highway 36 (US 36), like all busy highways, is a barrier to wildlife movement, especially mammals, reptiles, and amphibians because of traffic, noise, the expanse of pavement, and lack of cover.

Management of noxious weeds is required under federal and state Executive Orders (EOs) and acts. State-listed category A species are designated for eradication and require prevention of seed production. Two small populations of one List A species, myrtle spurge, are known to occur in the project area.

Two listed FT species are known to occur in the project area: Preble's meadow jumping mouse and Ute ladies'-tresses orchid. Colorado butterfly plant (*Gaura neomexicana*) occurs in the vicinity of the project area on Walnut Creek and is FT. Three state-threatened (ST) species, bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), and common shiner (*Luxilus cornutus*), also occur in the project area.

A total of nine areas are managed by the City of Boulder Open Space and Mountain Parks (OSMP) for protection or propagation of populations of Preble's meadow jumping mouse and Ute ladies'-tresses orchids. These parcels are wildlife and waterfowl refuges and would be impacted by either build packages eligible under Section 4(f) as wildlife and waterfowl refuges. The Section 4(f) evaluation can be found in Chapter 7, Final Section 4(f) Evaluation.

The Federal Highway Administration and Federal Transit Administration have initiated consultation with the U.S. Fish and Wildlife Service (USFWS) and a Programmatic Biological Assessment (PBA) has been submitted as part of the Final Environmental Impact Statement (FEIS) process to address effects from this project to federally-listed species. Impacts in the PBA were assessed by comparing the activities and footprint for the Combined Alternative Package (Preferred Alternative) to the biological resources within the project area. Impacts are described by timing (construction or operations), mode of action (direct or indirect), and duration of impact (short term or long term).

The Combined Alternative Package (Preferred Alternative) would result in construction impacts from clearing of vegetation and earth moving. Impacts to wildlife would include habitat loss, habitat fragmentation, disturbance, and mortality. Most impacts due to habitat loss would be permanent from conversion of natural habitat to impervious surface or facilities and would occur in linear areas next to the existing highway. Construction activity would temporarily displace many animals. Direct, long-term impacts to fish and other aquatic organisms would occur where new bridges or culverts would be installed

*Two federally listed threatened species (Preble's meadow jumping mouse and Ute ladies'-tresses orchid) and rare natural communities (tallgrass prairies) occur in the Boulder Segment and are the most important biological resources affected by the project.*

or extended; these impacts would be mitigated using best management practice (BMP). Long-term impacts may also occur from highway runoff. There would be no direct effects to aquatic species inhabiting lakes or ponds. Implementation of the Combined Alternative Package (Preferred Alternative) *may affect, and is likely to adversely affect*, habitat and populations of the Preble’s meadow jumping mouse and the Ute ladies’-tresses orchid in Boulder County, Colorado. Additionally, the project *may affect, but is not likely to adversely affect*, populations of the Colorado butterfly plant known to occur about 0.7-mile upstream of US 36 on Walnut Creek, but could spread to the US 36 construction footprint over time. Impacts to state-listed burrowing owls include permanent loss of potential nesting habitat and disturbance to individuals during nesting and migration due to construction activities. Impacts to the common shiner would include displacement during construction and sediment deposition from cleared construction areas. Other sensitive plant and animal species would also incur moderate to severe impacts.

## Affected Environment

Biological resource data were collected from existing sources for the project area (e.g., maps, databases, publications, and agency information). This information was used to provide context and to assist in assessing indirect and cumulative effects. Field studies were conducted in the study area, which includes all areas within 300 feet of the US 36 centerline, and provide the basis for assessing direct effects. The study area primarily includes urban and developed habitats. Native, undisturbed habitats in the study area are primarily fragmented areas of remnant native prairie and riparian corridors, which typically have an abundance of non-native plant species. The wildlife present in the study area have generally adapted to urban and rural habitats in the Colorado Front Range. Exceptions are areas of protected open space in the Boulder Segment and native prairies, where the higher quality habitat supports a greater diversity of species. More detailed information about the affected environment is provided in the *Biological Resources Technical Memorandum* (URS 2004a).

### Vegetation

*The natural vegetation of the area includes native prairie and riparian vegetation on the plains, foothills and mountain grassland, xeric (dry) upland shrub, and ponderosa pine in the foothills.*

The natural vegetation of the area includes native prairie and riparian vegetation on the plains, foothills and mountain grassland, xeric (dry) upland shrub, and ponderosa pine in the foothills west of Boulder. Most of the project area consists of agricultural land (irrigated or dryland) and urban and developed areas in the cities of Denver, Boulder, Arvada, Broomfield, Westminster, Superior/Louisville, and Lafayette. Narrow bands of riparian vegetation are present along many streams and some irrigation canals. Wetlands also occur in many areas, and are described and evaluated in Section 4.21, Wetlands and Other Waters. The distribution of vegetation communities in the project area are presented in Table 4.14-1, Distribution of Vegetation Types. Acreages of each vegetation type occurring in the project area are presented in Table 4.14-2, Approximate Acres of Vegetation Types. The following descriptions of vegetation types were primarily derived from City of Boulder (2004) and Natural Diversity Information Source (NDIS) data, combined with field observations (US 36 Mobility Partnership 2004).

**Table 4.14-1: Distribution of Vegetation Types**

Segment	Primary Upland Vegetation Types	Primary Riparian Areas
Denver	Urban	South Platte River
Adams	Urban	Clear Creek
Westminster	Urban, some irrigated and dryland agriculture	Big Dry Creek and Walnut Creek
Broomfield	Urban, some irrigated and dryland agriculture	None
Superior/Louisville	Urban, irrigated agriculture, native prairie	Rock Creek, Coal Creek
Boulder	Mostly urban, irrigated agriculture, and native prairie open space	South Boulder Creek, Boulder Creek, Fourmile Canyon Creek, and many ditches

Source: US 36 Mobility Partnership, 2004.

**Table 4.14-2: Approximate Acres of Vegetation Types**

Vegetation Type	Acres
Native prairie	13,800
Cottonwood riparian woodland	1,450
Other riparian woodland	50
Riparian herb	4,150
Dry lands and irrigated cropland	30,450
Urban or developed	80,300
Open water	5,200
<b>Total</b>	<b>135,400</b>

Source: NDIS, 2006.

### **Native Prairie**

Most of the native prairie is midgrass prairie containing species such as little bluestem (*Schizachyrium scoparium*), western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), side-oats grama (*Bouteloua curtipendula*), and needle and thread grass (*Hesperostipa comata*). Many areas of midgrass prairie in the project area contain a large component of non-native and weedy species because of past and present land use practices. Small areas of tallgrass prairie, considered rare in Colorado, occur within the South Boulder Creek drainage. Irrigated or sub-irrigated tallgrass areas within the South Boulder Creek floodplain are dominated by big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), yellow Indian grass (*Sorghastrum nutans*), and prairie cordgrass (*Spartina pectinata*). Little bluestem, big bluestem, side-oats grama, blue grama, and several dropseed species (*Sporobolus* sp.) are common in xeric tallgrass areas, which are even more limited in extent. Tallgrass prairies are significant due to their scarcity and wildlife that occur in association with them, which includes butterflies and birds such as grasshopper sparrow (*Ammodramus savannarum*).

### **Riparian Woodland**

Riparian habitats are those areas associated with streams and other water bodies that have distinctly different vegetation due to the presence of surface water or groundwater. Riparian habitat supports a higher diversity of resident wildlife than any other habitat in the Front Range and many of the species that occur exclusively inhabit wetlands or riparian environments (Andrews and Righter 1992; NDIS 2006). In general, small mammal diversity is low in riparian areas adjacent to developed areas because of predation by domestic cats. Amphibians and many reptiles occur most frequently in riparian habitats. Riparian habitat is important for breeding birds and many migratory species, which use riparian corridors to travel through (Andrews and Righter 1992). Riparian corridors also link wildlife populations in areas of high quality habitat, allowing movement through the urban environment.

*Riparian habitats provide corridors that link habitat patches and wildlife populations, allowing movement through the urban environment.*

Native low-elevation riparian woodlands are dominated by plains cottonwood (*Populus deltoides*), peach-leaved willow (*Salix amygdaloides*), and box elder (*Negundo aceroides*). Non-native species, such as Russian olive (*Elaeagnus angustifolia*), crack willow (*Salix fragilis*), Siberian elm (*Ulmus pumila*), and green ash (*Fraxinus pennsylvanica*), are very common and are increasing. Based on the classification in the *Field Guide to the Wetland and Riparian Plant Associations of Colorado* (Carsey et al. 2003), the primary cottonwood plant association types are plains cottonwood/smooth brome grass woodland, plains cottonwood/wooly sedge woodland, and plains cottonwood peachleaf willow/sandbar willow woodland. The herbaceous vegetation typically contains a large amount of non-native weedy species.

### **Riparian Shrub**

The most common riparian shrub species in the project area is sandbar willow (*Salix exigua*). These areas are in the sandbar willow/barren ground shrubland or sandbar willow/mesic (moist) graminoid (grass species) shrubland riparian associations (Carsey et al. 2003). Other riparian species include leadplant (*Amorpha angustifolia*), hawthorn (*Crataegus macracantha* and *C. erythropoda*), snowberry (*Symphoricarpos occidentalis*), and chokecherry (*Prunus virginiana*). Riparian shrub habitat supports Preble's meadow jumping mouse, an FT species.

### **Riparian Herb**

Riparian herb communities vary in composition depending upon the local hydrology and site history. Wet meadows and marshes are dominated by species such as cattails (*Typha* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), creeping bentgrass (*Agrostis alba*), and reed canarygrass (*Phalaris arundinacea*), and are described in greater detail in Section 4.21, Wetlands and Other Waters. Moist and dry areas are dominated by mostly non-native species, such as smooth brome (*Bromus inermis*), timothy (*Phleum pretense*), Kentucky bluegrass (*Poa pratensis*), quackgrass (*Elymus repens*), Canada thistle (*Cirsium arvense*), and Indian hemp (*Apocynum cannabinum*).

### **Dry Lands and Irrigated Cropland**

These areas include active croplands, pastures, and hayfields, as well as abandoned or fallow areas, or areas that have been converted to open space. Much of this area is dominated by non-native grass species, primarily smooth brome and crested wheatgrass (*Agropyron cristatum*), and weedy species such as field bindweed (*Convolvulus arvensis*).

### **Urban or Developed Land**

Urban or developed land includes residential, industrial and commercial areas, developed parks, transportation facilities, and interspersed small areas of non-native grassland and weeds. It is the largest land cover type in the project area.

### **Open Water**

Aquatic habitats associated with rivers, lakes, streams, and ponds are described further in the Fisheries and Aquatic Habitats subsection below.

## **Wildlife**

### **Large Mammals**

Resident mule deer (*Odocoileus hemionus*) inhabit undeveloped areas throughout the Broomfield, Superior/Louisville, and Boulder segments. White-tailed deer (*Odocoileus virginianus*) are concentrated along Boulder Creek, South Boulder Creek, Coal Creek, and Rock Creek. The riparian and agricultural habitats along the South Platte River are considered to be high priority habitat for white-tailed deer, and moderate priority habitat for mule deer (NDIS 2006). American elk (*Cervus elaphus*) and large carnivores, such as mountain lion (*Felis concolor*), and black bear (*Ursus americanus*), are mainly limited to the Boulder foothills; however, individuals occasionally travel through riparian corridors to lower elevation areas.

### **Black-tailed Prairie Dogs**

Black-tailed prairie dogs (*Cynomys ludovicianus*) are large, colonial burrowing rodents that occupy grassland habitats in the project area. Black-tailed prairie dogs are a “keystone species” of the short and midgrass prairie ecosystem; many other wildlife species depend on prairie dogs for food and shelter, and their colonies support a higher diversity of plants and wildlife (Miller et al. 1994). Raptors such as bald eagles, ferruginous hawks, red-tailed hawks, and golden eagles prey on prairie dogs, especially in winter months (Weber and Whitman 2001). Burrowing owls, mice, snakes, and toads use abandoned prairie dog burrows to nest or den. Based on a recent petition, the USFWS is currently conducting a review of the black-tailed prairie dog to determine whether to propose adding it to the list of threatened or endangered species. The species is considered by the Colorado Division of Wildlife (CDOW) and the Colorado Natural Heritage Program (CNHP) as a species of special concern. The Colorado Department of Transportation (CDOT) and many of the counties and municipalities in the project area have prairie dog relocation policies (see Mitigation at the end of this section).

*Black-tailed prairie dogs are a “keystone species” of the short and midgrass prairie ecosystem.*

### **Raptors**

Twenty-two raptor species are known or likely to occur in the project area. The most common species include American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), Swainson’s hawk (*Buteo swainsonii*), and turkey vulture (*Cathartes aura*). Surveys to locate raptor nests within 0.5 mile of the proposed project alignments were conducted in April and June 2004. About 20 active red-tailed hawk nests and seven active Swainson’s hawk nests were found in the Westminster, Broomfield, Superior/Louisville, and Boulder segments. Osprey (*Pandion haliaetus*), American kestrel, and great-horned owl nests were also observed. All nests were located in large trees, primarily in rural areas along irrigation ditches. Prairie dog colonies and grassland patches throughout the corridor provide good foraging habitat for a variety of raptors seasonally or in migration. Seven raptor species are discussed under Threatened, Endangered, and Other Special Status Species.

*The most common raptor species in the project area include American kestrel, great-horned owl, red-tailed hawk, Swainson’s hawk, and turkey vulture.*

### **Other Wildlife**

Wildlife species considered more common in the project area are listed by habitat in Table 4.14-3, Common Wildlife Species in the Project Area.

### **Wildlife Crossings**

US 36, like all busy highways, is a barrier to wildlife movement, especially mammals, reptiles, and amphibians because of traffic, noise, the expanse of pavement, and lack of cover. The US 36 corridor has bridges or large bottomless culverts (three-sided with a natural substrate) at Rock Creek, Coal Creek, and South Boulder Creek, which provide relatively good passage under the highway. Bottomless box culverts at ditches on City of Boulder open space (Davidson Ditch, Goodhue Ditch, Marshallville Ditch) are spaced at frequent intervals and therefore also provide relatively good opportunities for passage by small and medium-sized animals during periods of no or low flow. Dry Creek has a double culvert with one side occupied by the creek and the other used as a bikeway, which is much less useful for wildlife movement. Other drainages and ditches have culverts that may provide for some wildlife movement when they are not carrying water, but have limited value because of their concrete or metal bottoms, small diameter, or length. These include three crossings of Allen Ditch (Adams Segment), Farmers Highline Canal, Niver Canal and Equity Ditch (Westminster Segment), Community Ditch and Interlocken Loop (Broomfield Segment), an unnamed tributary of Rock Creek (Superior/Louisville Segment), and an unnamed ditch on Davidson Mesa and Shearer Ditch (Boulder Segment).

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Table 4.14-3: Common Wildlife Species in the Project Area

Habitat	Mammals	Birds	Reptiles and Amphibians
All habitats (except water)	Red fox ( <i>Vulpes vulpes</i> ), mule deer ( <i>Odocoileus hemionus</i> ; urban in Boulder), little brown bat ( <i>Myotis lucifugus</i> ), and big brown bat ( <i>Eptesicus fuscus</i> )	Mourning dove ( <i>Zenaidura macroura</i> ), American robin ( <i>Turdus migratorius</i> ), American crow ( <i>Corvus racyrhynchos</i> ), black-billed magpie ( <i>Pica pica</i> ), American kestrel ( <i>Falco sparverius</i> )	
Urban/Developed	Raccoon ( <i>Procyon lotor</i> ), fox squirrel ( <i>Sciurus niger</i> ), house mouse ( <i>Mus musculus</i> ), and Norway rat ( <i>Rattus norvegicus</i> )	Black-capped chickadee ( <i>Parus atricapillus</i> ), house finch ( <i>Carpodacus mexicanus</i> ), house sparrow ( <i>Passer domesticus</i> ), European starling ( <i>Sturnus vulgaris</i> ), rock dove ( <i>Columba livia</i> ), northern flicker ( <i>Colaptes auratus</i> ), Canada goose ( <i>Branta canadensis</i> )	
Grassland (includes native prairie, pastures, hay meadows, and open space)	Coyote ( <i>Canis latrans</i> ), striped skunk ( <i>Mephitis mephitis</i> ), long-tailed weasel ( <i>Mustela frenata</i> ), American badger ( <i>Taxidea taxus</i> ), cottontail ( <i>Sylvilagus</i> sp.), jackrabbit ( <i>Lepus</i> sp.), thirteen-lined ground squirrel ( <i>Spermophilus tridecemlineatus</i> ), northern pocket gopher ( <i>Thomomys talpoides rostralis</i> ), plains pocket gopher ( <i>Geomys bursarius</i> ), deer mouse ( <i>Peromyscus maniculatus</i> ), and prairie vole ( <i>Microtus ochrogaster</i> )	Horned lark ( <i>Erenophila alpestris</i> ), Western meadowlark ( <i>Sturnella neglecta</i> ), red-winged blackbird ( <i>Agelaius phoeniceus</i> ), Killdeer ( <i>Charadrius vociferous</i> ), common grackle ( <i>Quiscalus quiscula</i> ), barn swallow ( <i>Hirundo rustica</i> ), European starling ( <i>Sturnus vulgaris</i> ), western kingbird ( <i>Tyrannus verticalis</i> ), rock dove, Swainson's hawk ( <i>Buteo swainsoni</i> ), rough-legged hawk ( <i>Buteo lagopus</i> ; winter), northern harrier ( <i>Circus cyaneus</i> ), red-tailed hawk ( <i>Buteo jamaicensis</i> )	Tiger salamander ( <i>Ambystoma tigrinum</i> ), plains spadefoot ( <i>Spea bombifrons</i> ), Woodhouse's toad ( <i>Bufo woodhousei</i> ), six-lined racerunner ( <i>Cnemidophorus sexlineatus</i> ), bullsnake ( <i>Pituophis catenifer</i> ), western rattlesnake ( <i>Crotalus viridis</i> )
Prairie dog colonies	Same as grassland species above, plus: black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	Grassland species above, plus: burrowing owl ( <i>Athene cucularia</i> ), ferruginous hawk (winter), bald eagle ( <i>Haliaeetus leucocephalus</i> ; winter), golden eagle ( <i>Aquila chrysaetos</i> ; winter)	Same as grassland species except tiger salamander not present
Riparian and wetland	Raccoon, long-tailed weasel, coyote, white-tailed deer ( <i>Odocoileus virginianus</i> ), eastern cottontail, fox squirrel, beaver ( <i>Castor canadensis</i> ), muskrat ( <i>Ondatra zibethicus</i> ), meadow vole ( <i>Microtus pennsylvanicus</i> ), Preble's meadow jumping mouse ( <i>Zapus hudsonius preblei</i> ), deer mouse, and porcupine ( <i>Erethizon dorsatum</i> )	Red-winged blackbird, American goldfinch ( <i>Carduelis tristis</i> ), black-capped chickadee, song sparrow ( <i>Melospiza melodia</i> ), chipping sparrow ( <i>Spizella passerina</i> ), downy woodpecker ( <i>Picoides pubescens</i> ), Bullock's oriole ( <i>Icterus bullockii</i> ), belted kingfisher ( <i>Ceryle alcyon</i> ), red-tailed hawk, Cooper's hawk ( <i>Accipiter cooperii</i> ), great horned owl ( <i>Bubo virginianus</i> ), eastern screech owl ( <i>Otus asio</i> )	Northern leopard frog ( <i>Rana pipiens</i> ), western chorus frog ( <i>Pseudacris triseriata</i> ), bullsnake, northern water snake ( <i>Nerodia sipedon</i> ), garter snakes ( <i>Thamnophis</i> sp.), tiger salamander, Woodhouse's toad, bullfrog ( <i>Rana catesbeiana</i> )
Lakes, ponds, and rivers	Muskrat	American avocet ( <i>Recurvirostra americana</i> ), spotted sandpiper ( <i>Actitis macularia</i> ), killdeer, great blue heron ( <i>Ardea herodias</i> ), double-crested cormorant ( <i>Phalacrocorax auritus</i> ), Canada goose, mallard, cinnamon teal ( <i>Anas cygnoptera</i> ), blue-winged teal ( <i>Anas discors</i> ) ring-necked duck ( <i>Athya collaris</i> ; winter), northern shoveler ( <i>Anas clypeata</i> ; winter), gadwall ( <i>Anas strepera</i> ; winter), common goldeneye ( <i>Bucephalus clangula</i> ; winter)	Snapping turtle ( <i>Chelydra serpentina</i> ), yellow mud turtle ( <i>Kinosternon flavescens</i> ), garter snakes, northern water snake

Source: General: NDIS, 2006.

Mammals: Adams, 2003; Fitzgerald et al. 1994.

Birds: Andrews and Righter, 1992; Boulder County Nature Association, 1999; Kingery, 1998.

Amphibians and Reptiles: Hammerson, 1999.

### **Sensitive Habitats and Wildlife Corridors**

Sensitive habitats discussed below include open space and natural areas important for wildlife, and critical wildlife habitat identified by Boulder County Parks and Open Space, and City of Boulder OSMP. In addition, Potential Conservation Areas (PCA) identified by CNHP (2004) are considered ecologically important for wildlife and/or provide good wildlife habitat, and wildlife corridors are also discussed. Ten parcels in the project area are owned by City of Boulder OSMP, and managed as open space for the protection of federally-threatened species or other sensitive wildlife and are therefore considered Section 4(f) properties functioning as wildlife refuges. These properties may or may not be within the study area, but are in the vicinity of the project corridor and include the South Boulder Creek Trail Crossing, Van Fleet, Yunker, and Galluci parcels, and are discussed in detail in Chapter 7, Final Section 4(f) Evaluation.

Wildlife corridors connect fragmented areas of habitat surrounded by developed or human-inhabited areas. In small patches of habitat, corridors are essential for survival of populations as they are a means for animals to disperse or inhabit when resources are scarce in their core home range. Without corridors to access adjacent areas of habitat, wildlife populations become isolated and susceptible to local extinctions through inbreeding, lack of resources, and disease, among other reasons. Important habitats and corridors are discussed by project segment and are shown in Figure 4.14-1, Important Habitats and Corridors, and Figure 4.14-2, Sensitive Areas and Wildlife Corridors (Enlarged View).

*Wildlife corridors connect fragmented areas of habitat surrounded by developed or human-inhabited areas.*

#### **Denver Segment**

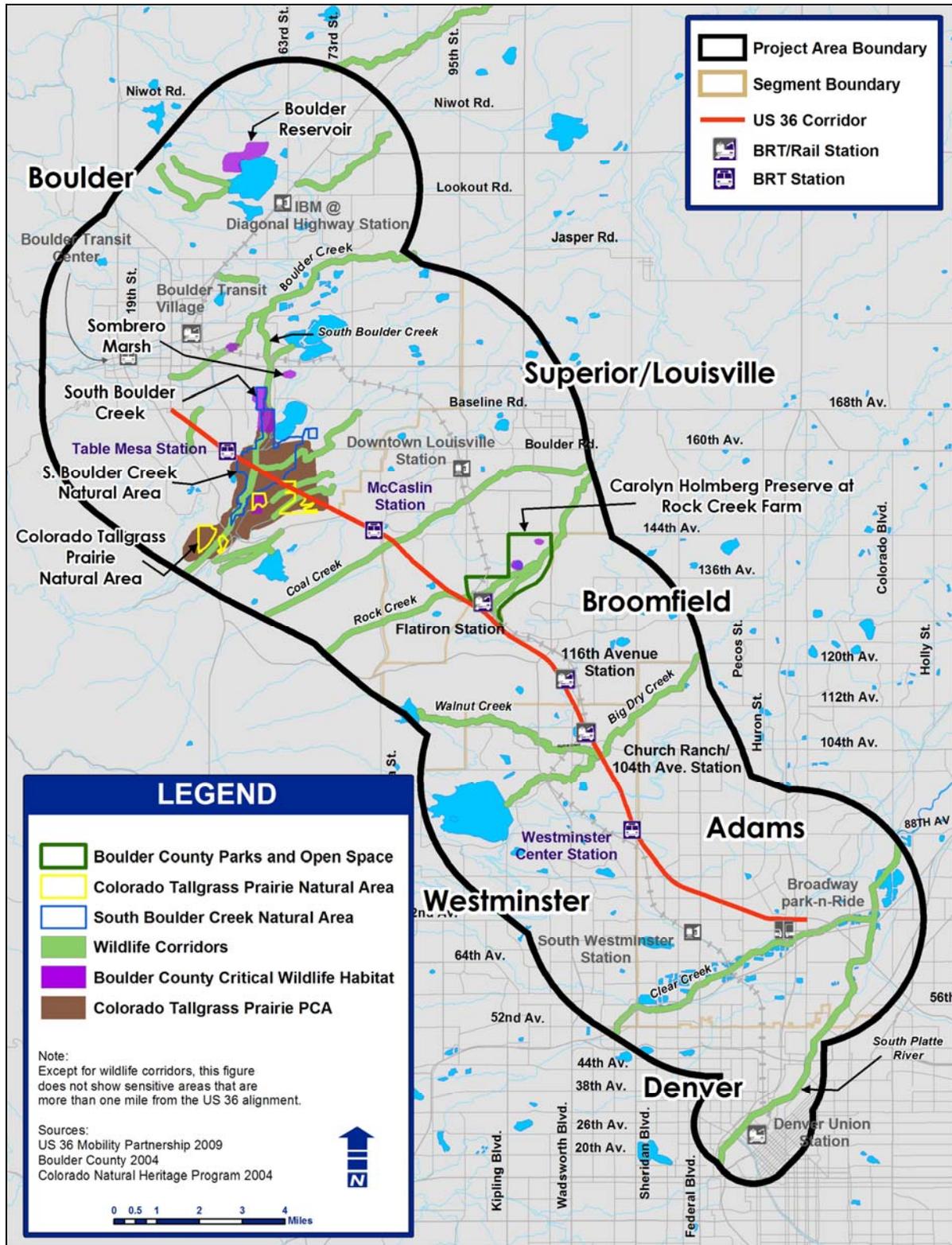
The South Platte River is highly disturbed and altered, and is bordered mostly by industrial areas. The riparian habitat along the river supports waterfowl, other migratory birds, and urban-adapted wildlife. The South Platte River serves as an important corridor for species that otherwise would not have connected habitat within the heavily developed area of Denver. Several other natural areas within the Denver Segment are located 1 mile or more from the US 36 corridor and provide habitat linkages to Clear Creek or the South Platte River, including Inspiration Point Park, Berkeley Lake, Rocky Mountain Lake, and Heron Pond. Though these areas are largely fragmented and disturbed, they are the best wildlife habitats in this segment. The City and County of Denver has not formally designated them as natural areas, but Heron Pond has been proposed for formal designation.

*The South Platte River is highly disturbed and altered, and is bordered mostly by industrial areas. However, it serves as an important corridor for species that otherwise would not have connected habitat in Denver.*

#### **Adams Segment**

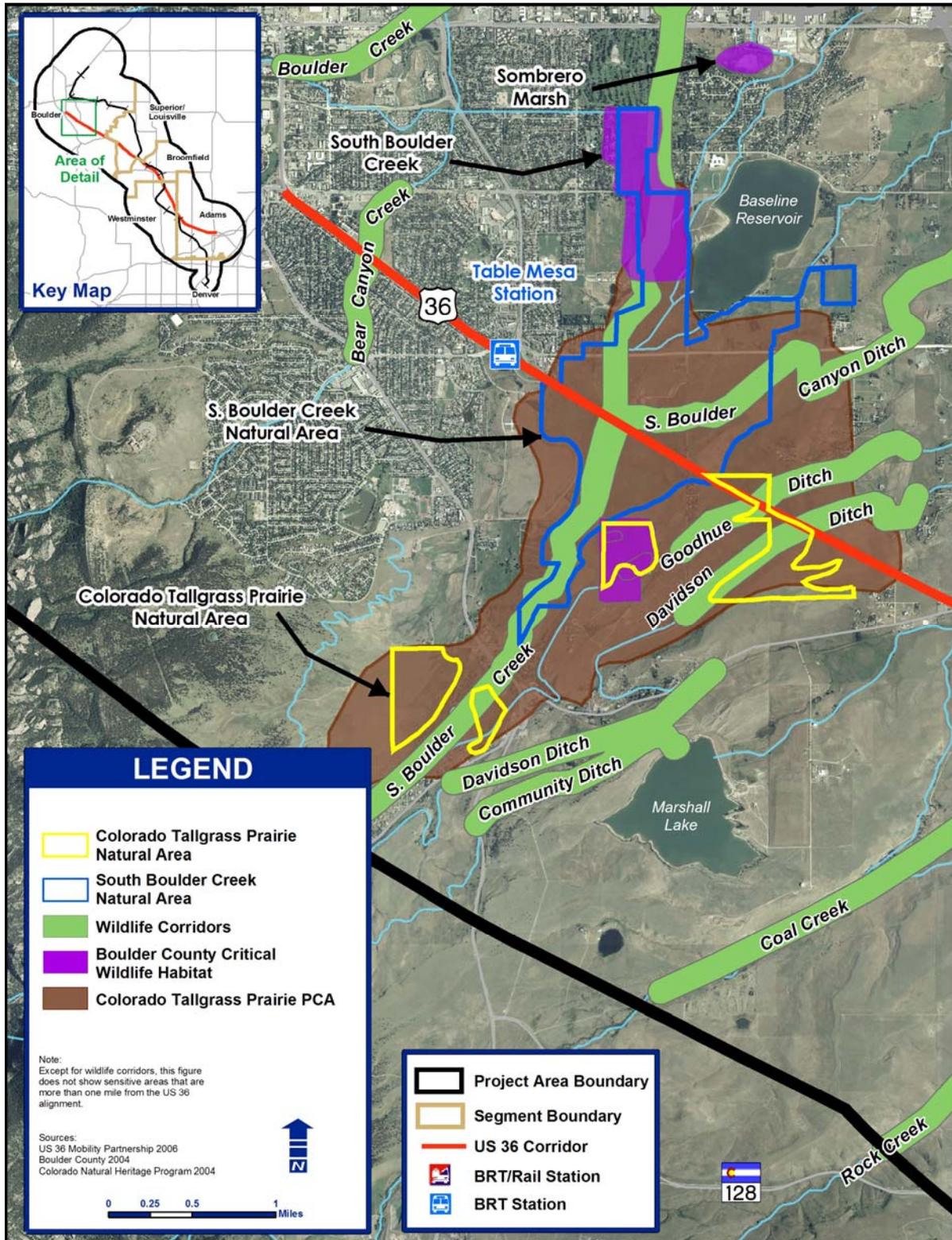
Clear Creek is a riparian corridor that provides habitat for migrating and nesting birds, beavers, and red fox. Native small mammal populations are likely low due to the presence of prey species, such as non-native house mice, Norway rats, and domestic cats associated with the surrounding residential neighborhoods. Lowell Ponds State Wildlife Area is located more than 2 miles from the project corridor. It consists of warm water ponds and trails for wildlife viewing, hiking, fishing, and picnicking. Riverside Cemetery, adjacent to the South Platte River, is a wildlife viewing area located more than 2 miles east of the project corridor.

Figure 4.14-1: Important Habitats and Corridors



Note: The 116<sup>th</sup> Avenue Rail Station is not a part of the 2004 FasTracks Program. Additional stations were added in the early planning stages of the US 36 Environmental Impact Statement. Exact rail station locations and additional stations may be reconsidered in the U.S. Army Corps of Engineers/Regional Transportation District Northwest Rail Environmental Assessment/Environmental Evaluation.

Figure 4.14-2: Sensitive Areas and Wildlife Corridors (Enlarged View)



### **Westminster Segment**

*Standley Lake North is an area of general biodiversity interest as it provides nesting and roosting habitat for bald eagles.*

Two sensitive habitats are located several miles south of the project corridor. Two Ponds National Wildlife Refuge is 72 acres and located in the City of Arvada. This refuge is managed for wetlands and native wildlife, and contains wetland, riparian woodland, and prairie grassland habitats (USFWS 2004). CNHP has identified one PCA in this segment: Standley Lake North, an area of general biodiversity interest as it provides nesting and roosting habitat for bald eagles, an ST species. Standley Lake Open Space supports wetlands and prairie grasslands that provide habitat for prairie dogs, beaver, mule deer, Swainson's hawk, and various other raptors and birds. Standley Lake Open Space is connected with habitats to the northeast by Big Dry Creek, which is lined by numerous wetlands and scattered cottonwoods. Big Dry Creek and Walnut Creek are important riparian corridors for wildlife.

### **Broomfield Segment**

Boulder County Parks and Open Space purchased the 1,151-acre Carolyn Holmberg Preserve at Rock Creek Farm in 1980 for agricultural preservation. The farm is currently active and is classified as irrigated cropland (NDIS 2006). However, native prairie also is present at the preserve, as well as riparian and wetland habitats. The preserve provides important habitat for prairie dogs, raptors, and other grassland birds.

### **Superior/Louisville Segment**

The Carolyn Holmberg Preserve at Rock Creek Farm (described above) overlaps with this segment. Coal Creek and Rock Creek are movement corridors for mule deer and white-tailed deer concentration areas (NDIS 2006). The Coal Creek Trail Open Space area includes a 7-mile trail along the creek. It provides important habitat for wildlife, including mule deer, white-tailed deer, coyotes, foxes, and a variety of birds. Habitats that have been preserved include cottonwood riparian forest, riparian shrub (willow), and wetlands.

### **Boulder Segment**

Several types of sensitive habitats occur in this segment, including Colorado state-designated natural areas, CNHP PCAs and rare plant communities, as well as important natural communities and critical wildlife habitat identified in the *Boulder County Comprehensive Plan* (Boulder County 2004). Ten City of Boulder OSMP properties located in the project area function as wildlife refuges for FT Preble's meadow jumping mouse and Ute ladies'-tresses orchid. More detail on these properties can be found in Chapter 7, Final Section 4(f) Evaluation.

**Colorado Tallgrass Prairie PCA** — The Colorado Tallgrass Prairie PCA is considered an area of very high biodiversity because of a large occurrence of FT and globally imperiled Ute ladies'-tresses orchid (CNHP 2004). The area also supports Preble's meadow jumping mouse, other rare plant species, and mesic tallgrass prairie (*Andropogon gerardii-Sorghastrum nutans-Spartina pectinata*), which is globally imperiled and critically imperiled in Colorado. The Colorado Tallgrass Prairie PCA also provides nesting habitat for grasshopper sparrows (*Ammodramus savannarum*), as shown in Figure 4.14-2, Sensitive Areas and Wildlife Corridors (Enlarged View). The Colorado Tallgrass Prairie PCA occurs on both sides of US 36.

**Colorado Tallgrass Prairie Natural Area** — This area includes 269 acres comprised of 8 parcels of land that overlap the Colorado Tallgrass Prairie PCA. These parcels are managed by City of Boulder OSMP, all of which are located within the project area (City of Boulder OSMP 2004, and CNHP 2004). Most of the parcels are mesic tallgrass prairie, and the large portion on Davidson Mesa is xeric tallgrass prairie (*Andropogon gerardii-Schizachyrium scoparium*). Xeric tallgrass prairie is ranked by CNHP as imperiled both globally and in the state of Colorado. This is identified as a natural area in the *Boulder County Comprehensive Plan* (Boulder County 2004), and the xeric tallgrass prairie is identified as an important natural community. This area includes riparian forest, wet meadows, and tallgrass prairies.

**South Boulder Creek Natural Area** — This state-designated natural area occupies 1,193 acres, and is managed by City of Boulder OSMP. It features a mosaic of high quality wetlands, wet meadows, and mesic grasslands, and good condition plains cottonwood riparian habitat (CNHP 2004). Portions of this area are also identified as natural communities (wet prairie) in the *Boulder County Comprehensive Plan* (Boulder County 2004). The South Boulder Creek Natural Area occupies both sides of US 36 and overlaps the 3,086-acre Colorado Tallgrass Prairie PCA. Boulder County designated portions of this natural area as critical wildlife habitat that supports red-headed woodpecker (*Melanerpes erythrocephalus*), bobolink (*Dolichonyx oryzivorus*), and Johnny darter (*Etheostoma nigrum*) (Boulder County 2004).

*The South Boulder Creek Natural Area features a mosaic of high quality wetlands, wet meadows, mesic grasslands, and good condition plains cottonwood riparian habitat.*

**South Boulder Canyon Ditch** — This site is a CNHP PCA located east of Boulder. It is rated as general biodiversity interest, and contains American groundnut (*Apios americana*), which is listed as critically imperiled in Colorado.

### Critical Wildlife Habitats

**Boulder Creek Cottonwood Grove** — This cottonwood grove on Boulder Creek, located south of Pearl Street and west of North 55<sup>th</sup> Street, is considered a critical wildlife habitat due to its high diversity and density of species (Boulder County 2004). Willow trees, shrubs, and cottonwoods dominate the riparian habitat.

**Boulder Reservoir** — The site on the west side of Boulder Reservoir includes wetlands and grassland habitats and is designated critical wildlife habitat by the City of Boulder OSMP due to nesting habitat for osprey, northern harrier, short-eared owl, and American bittern. The site is also considered potential nesting habitat for burrowing owls, though none have nested at the site recently (Boulder County 2004).

**Sombrero Marsh** — The City of Boulder OSMP, Boulder County Parks and Open Space, and Boulder Valley School District own this 20-acre site located east of Boulder. Sombrero Marsh is a designated critical wildlife habitat because of the native prairie potholes and wetlands that support a variety of wildlife species, including Wilson's phalarope, red-tailed hawks, and northern harriers. In addition, muskrats, raccoons, skunks, eastern cottontail, ground squirrels, and voles also are frequently observed at the site.

*Sombrero Marsh is a designated critical wildlife habitat because of the native prairie potholes and wetlands that support a variety of wildlife species.*

**South Boulder Creek** — A cottonwood and willow riparian habitat and adjacent wet meadows are designated critical wildlife habitat. It provides habitat for two bird species that are considered special status, red-headed woodpecker and bobolink, as well as a fish species, Johnny darter. The *Boulder County Comprehensive Plan* (Boulder County 2004) also identifies South Boulder Creek as an important stream habitat corridor.

**Fourmile Canyon Creek** — Boulder County has identified the area from the east side of State Highway 119 to the confluence with Boulder Creek as an important stream habitat corridor. The portion of this creek consists of cottonwood riparian forest and wetlands habitat that links to Walden/Sawmill ponds.

### Other Sensitive Habitats

A number of other sensitive areas in the Boulder area are located 0.5 mile or more from the project alignments. These include the following:

- PCAs: Sunshine Canyon, Boulder Foothills/Green Mountain, Shanahan Grassland, Marshall Mesa, Fourmile Creek, North Boulder Grasslands, Hoover Hill, Walnut Creek, and White Rocks
- Rocky Flats National Wildlife Refuge

- Boulder County-designated critical wildlife habitats — Lefthand Creek Cottonwood Groves, Boulder Mountain Parks/Eldorado Mountain, Boulder Valley Ranch, Walden and Sawhill ponds
- Boulder County-designated important stream habitat corridors — Lefthand Creek

### **Noxious Weeds**

*Noxious weeds are plant species not native to Colorado that have negative impacts on crops, native plant communities, livestock, or the management of natural or agricultural systems.*

Noxious weeds are plant species not native to Colorado that have negative impacts on crops, native plant communities, livestock, or the management of natural or agricultural systems. Noxious weeds are officially designated as such by the state of Colorado and/or individual counties, municipalities, or other land managers. Management of noxious weeds is required under Federal EO 13112 Invasive Species, State of Colorado EO D 006 99-Development and Implementation of Noxious Weed Management Programs, and the Colorado Noxious Weed Act, §§ 35-5.5-101 through 119, Colorado Revised Statutes (CRS 2003). The Colorado Noxious Weed Act requires all persons to use integrated methods to manage noxious weeds, if such plants are likely to be materially damaging to neighboring lands.

New permanent rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act were adopted in early 2004. Under the new rules, state-listed noxious weeds are placed into one of three categories. List A species are designated for eradication and require prevention of seed production or development of reproductive propagules; List A species are rare noxious weed species that can be prevented from establishing permanent populations in Colorado. Two small populations of one List A species, myrtle spurge, were found during field surveys. List B species would be managed by a state noxious weed management plan with the goal of stopping the continued spread of these species. List C species are those for which the state, in consultation with other interested parties, would develop management plans with the goal of supporting jurisdictions that choose to require management of those species. Each county and some cities in the project area also maintain a list of noxious weeds that are a local priority.

Table 4.14-4, Noxious Weeds Observed in the Project Area, lists the noxious weeds observed in the project area during field surveys conducted in May, June, and July 2004. Reports by counties and municipalities, the Department of Agriculture 2002 QuarterQuad Survey maps (Colorado Department of Agriculture 2009), and the CDOT Global Positioning System and Geographic Information System (GIS) Weed Survey Map (CDOT 2002) also provide data on noxious weeds in the project area. The City of Boulder OSMP maintains a list of additional weed species for lands that it manages. This list includes several species that are not identified by the state, but are of ecological importance to the management goals of the department (City of Boulder 2004). The US 36 corridor is adjacent to OSMP lands in several areas, and observations of the additional species managed by OSMP are listed in Table 4.14-5, City of Boulder Open Space and Mountain Parks Additional Weed Species.

**Table 4.14-4: Noxious Weeds Observed in the Project Area**

Common Name	Scientific Name	Noxious Weed Listing			Observed in Project Area (by Segment) <sup>4</sup>
		Colorado State List Category <sup>1</sup>	CDOT <sup>2</sup>	Cities/Counties <sup>3</sup>	
Bouncingbet	<i>Saponaria officinalis</i>	B	-	Bo	Superior/Louisville
Bull thistle	<i>Cirsium vulgare</i>	B	X	D	Boulder
Canada thistle	<i>Cirsium arvense</i>	B	X	All	All
Chicory	<i>Cichorium intybus</i>	C	-	-	Broomfield, Superior/Louisville, and Boulder
Common burdock	<i>Arctium minus</i>	C	-	-	Westminster, Superior/Louisville, and Boulder
Common mullein	<i>Verbascum thapsus</i>	C	-	J	Broomfield, Superior/Louisville, and Boulder
Common St. Johnswort	<i>Hypericum perforatum</i>	C	-	-	Superior/Louisville and Boulder

**Table 4.14-4: Noxious Weeds Observed in the Project Area**

Common Name	Scientific Name	Noxious Weed Listing			Observed in Project Area (by Segment) <sup>4</sup>
		Colorado State List Category <sup>1</sup>	CDOT <sup>2</sup>	Cities/ Counties <sup>3</sup>	
Common tansy	<i>Tanacetum vulgare</i>	B	-	Bo	Boulder
Common teasel	<i>Dipsacus fullonum</i>	B	-	J, Bo	Westminster, Broomfield, Superior/Louisville, and Boulder
Cutleaf teasel	<i>Dipsacus laciniatus</i>	B	-	-	Westminster and Superior/Louisville
Dalmatian toadflax	<i>Linaria dalmatica</i> , <i>L. genistifolia</i>	B	X	D, A, J, BC, Bo	Westminster, Broomfield, Superior/Louisville, and Boulder
Diffuse knapweed	<i>Centaurea diffusa</i>	B	X	All	Westminster, Broomfield, Superior/Louisville, and Boulder
Downy brome (cheatgrass)	<i>Bromus tectorum</i>	C	X	Bo	All
Field bindweed	<i>Convolvulus arvensis</i>	C	X	A, Br	All
Hoary cress (whitetop)	<i>Cardaria draba</i>	B	X	D, J, Bo	All
Houndstongue	<i>Cynoglossum officinale</i>	B	X	D, J, Bo	Westminster, Superior/Louisville, and Boulder
Jointed goatgrass	<i>Aegilops cylindrica</i>	C	X	Bo	Boulder
Kochia	<i>Kochia scoparia</i>	-	X	-	All
Leafy spurge	<i>Euphorbia esula</i>	B	X	All	Adams and Superior/Louisville
Moth mullein	<i>Verbascum blattaria</i>	B	-	-	Broomfield and Superior/Louisville
Musk thistle	<i>Carduus nutans</i>	B	X	All	All
Myrtle spurge	<i>Euphorbia myrsinites</i>	A	-	Bo	Broomfield and Boulder
Perennial pepperweed	<i>Lepidium latifolium</i>	B	X	D, Bo	Adams, Westminster, and Boulder
Perennial sowthistle	<i>Sonchus arvensis</i>	C	-	-	Superior/Louisville
Poison hemlock	<i>Conium maculatum</i>	C	-	-	Adams, Westminster, Broomfield Superior/Louisville, and Boulder
Quackgrass	<i>Elytrigia repens</i>	B	-	-	Broomfield and Superior/Louisville
Redstem filaree	<i>Erodium cicutarium</i>	B	-	-	Westminster, Superior/Louisville, and Boulder
Russian olive	<i>Elaeagnus angustifolia</i>	B	X	Bo	All
Salt cedar (tamarisk)	<i>Tamarix parviflora</i> / <i>T. ramosissima</i>	B	X	A, Br, Bo	Westminster, Superior/Louisville, and Boulder
Scotch thistle	<i>Onopordum acanthium</i> / <i>O. tauricum</i>	B	X	All	All
Sulfur cinquefoil	<i>Potentilla recta</i>	B	-	Bo	Boulder
Yellow toadflax	<i>Linaria vulgaris</i>	B	X	D, A, J, BC, Bo	Adams and Westminster

Source: CRS, 2003.

Notes:

<sup>1</sup> Colorado Department of Agriculture (2009).

A = All populations of List A species in Colorado are designated by the Commissioner for eradication.

B = List B species would be managed by a state noxious weed management plan with the goal of stopping the continued spread of these species.

C = List C species are those for which the state, in consultation with other interested parties, would develop management plans with the goal of supporting jurisdictions that choose to require management of those species.

<sup>2</sup> Colorado Department of Transportation *Statewide Maintenance List* (2003).

<sup>3</sup> Colorado Department of Agriculture, County Weed Lists, City of Boulder Open Space and Mountain Parks Noxious Weed/Weeds of Concern Species Profile/Best Management Practices list. D = City and County of Denver, A = Adams County, J = Jefferson County, Br = Broomfield County, BC = Boulder County, Bo = City of Boulder.

<sup>4</sup> Field observations made during biological field studies, May, June, and July 2004.

- = not applicable

CDOT = Colorado Department of Transportation

**Table 4.14-5: City of Boulder Open Space and Mountain Parks Additional Weed Species<sup>1</sup>**

Common Name	Scientific Name	Observed on OSMP Lands in Project Area <sup>2</sup>
Crown vetch	<i>Coronilla varia</i>	Boulder Segment
Smooth brome	<i>Bromus inermis</i>	Boulder Segment

Notes:

<sup>1</sup> From City of Boulder Open Space and Mountain Parks Noxious Weeds/Weeds of Concern Species Profile/Best Management Practices.

<sup>2</sup> Field observations made during biological field studies, May, June, and July 2004.

OSMP = Open Space and Mountain Parks

### **Fisheries and Aquatic Habitat**

Many rivers, ponds, lakes, and reservoirs throughout the project area provide habitat for native and introduced fish species, and other aquatic species. Some ditches with perennial flow or perennial pools also provide fish habitat. Intermittent streams provide limited aquatic habitat. Streams and lakes located within 0.25 mile of the corridor are identified in Table 4.14-6, Aquatic Habitats in the Project Area. The only identified recreational fishing area is Boulder Creek, but limited fishing may occur in other areas.

**Table 4.14-6: Aquatic Habitats in the Project Area**

Segment	Perennial Rivers and Streams	Major Intermittent Streams	Lakes and Ponds
Denver	South Platte River (many fish species)	None	None
Adams	Clear Creek	None	None
Westminster	Big Dry Creek (population of state-threatened fish species)	Walnut Creek	Lower Church Lake
Broomfield	None	None	None
Superior/ Louisville	None	Rock Creek Coal Creek	Hogdson-Harris Reservoir
Boulder	South Boulder Creek (17 species of native and non-native fish), Boulder Creek (mostly non-native fish, segment from US 36 to Fourmile Creek supports fishing of rainbow, brown, and brook trout)	None	None

Source: US 36 Mobility Partnership, 2004.

Note:

US 36 = United States Highway 36

### **Threatened, Endangered, and Other Special Status Species**

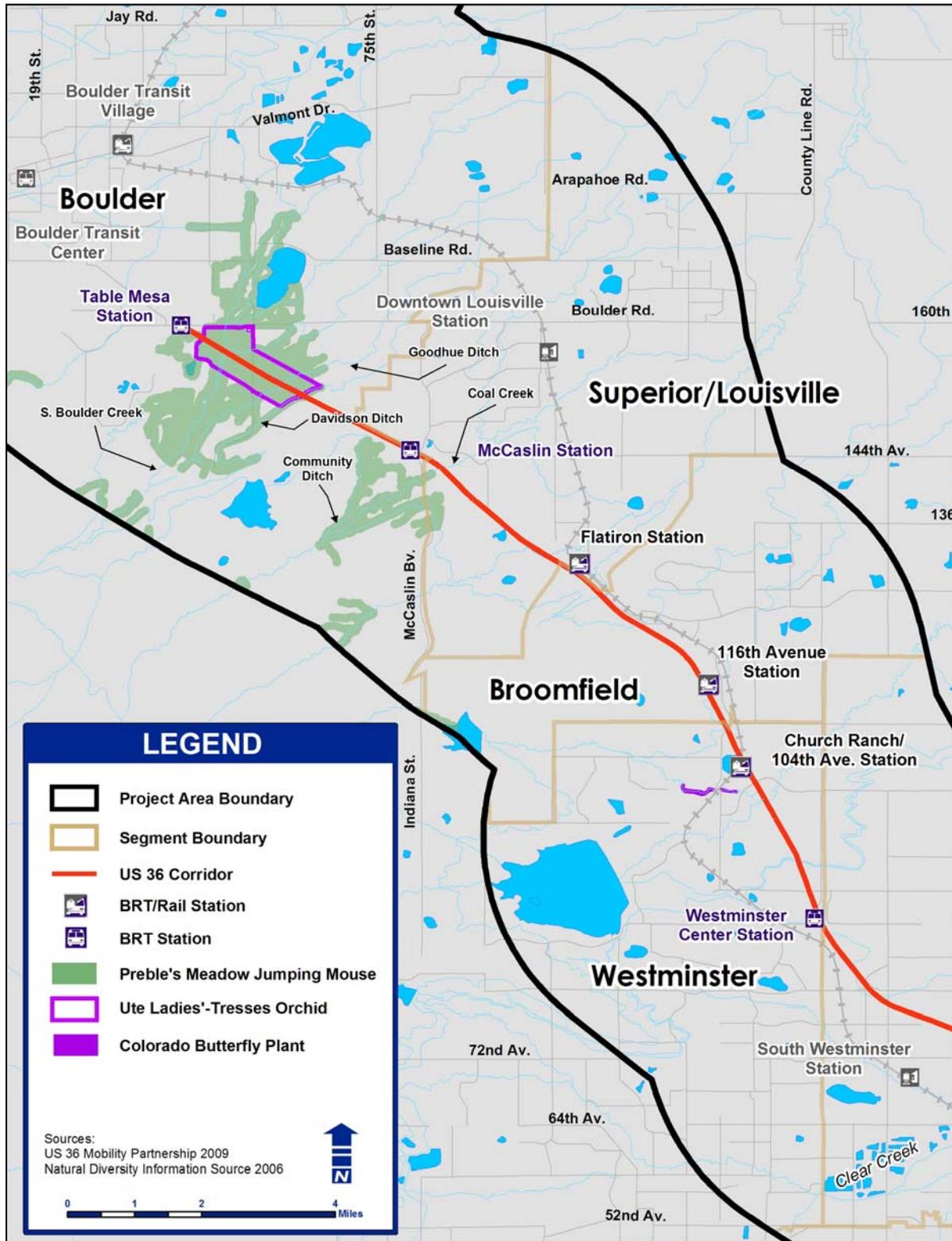
#### **Listed Federally-Threatened or Federally-Endangered Species**

Listed FT or federally-endangered species are protected under the Endangered Species Act; State-endangered or ST are protected under Colorado State law. Two federally-listed as threatened species are known to occur in the project area: Preble’s meadow jumping mouse and Ute ladies’-tresses orchid (Table 4.14-7, Federal and State-Listed Threatened and Endangered Species and Their Potential to Occur in the Project Area). The Colorado butterfly plant (FT) is known to occur about 0.7 mile upstream of US 36 on Walnut Creek, but not within the US 36 construction footprint. These species are shown in Figure 4.14-3, Habitat Areas of Threatened and Endangered Species. In addition, three ST species, bald eagle, burrowing owl, and common shiner, occur in the project area.

#### **Other Sensitive Species**

Other sensitive species include species considered by CDOW as special concern, species considered sensitive by county agencies, and species considered rare or vulnerable by CNHP. Twenty-four sensitive species are known or expected to occur in the project area (Table 4.14-8, Other Special Status Species Likely to Occur in the Project Area).

Figure 4.14-3: Habitat Areas of Threatened and Endangered Species



Note: The 116<sup>th</sup> Avenue Rail Station is not a part of the 2004 FasTracks Program. Additional stations were added in the early planning stages of the US 36 Environmental Impact Statement. Exact rail station locations and additional stations may be reconsidered in the U.S. Army Corps of Engineers/Regional Transportation District Northwest Rail Environmental Assessment/Environmental Evaluation.

**Table 4.14-7: Federal and State-Listed Threatened and Endangered Species and Their Potential to Occur in the Project Area**

Common Name	Species	Federal Status	State of Colorado Status	Habitat	Potential for Occurrence in Project Area
<b>Birds</b>					
Bald eagle	Haliaeetus leucocephalus	-	ST	Open water near tall trees and prairie dog colonies, especially in winter.	Present; summer nesting pairs in Westminster and Boulder segments, and wintering populations in Westminster, Broomfield, Superior/Louisville, and Boulder segments.
Burrowing owl	Athene cunicularia	-	ST	Grasslands, usually in association with prairie dog colonies.	Present; documented in Superior/Louisville and Boulder segments; could potentially occur elsewhere.
Interior least tern	Sterna antillarum	FE	SE	Migrants occur at reservoirs, lakes, and rivers with bare sandy shorelines. Local uncommon summer resident on southeastern plains of Colorado.	Unlikely, only during spring migration. Nests along the Platte River in central Nebraska.
Mexican spotted owl	Strix occidentalis lucida	FT	ST	Mixed conifer forests and pinyon-juniper woodland with narrow, shady, cool canyons in sandstone slickrock elevations of 4,400 to 6,800 feet.	Not present; no suitable habitat.
Piping plover	Charadrius melodus	FT	ST	Wetlands, lakeshores, and marshes. Rare migrant on eastern plains to foothills of Colorado between April and May.	Unlikely; occurrence very rare in eastern Colorado. Occurs downstream along Platte River in central Nebraska.
Whooping crane	Grus americana	FE	SE	Rare migrant in Colorado, east of project area. Stopover habitat during migration includes wetlands, irrigated meadows, broad drainage bottoms and reservoir edges. Generally in areas with minimal human disturbance.	Unlikely; stopover is extremely unlikely within the project area, though individuals may fly over during migration. Occurs downstream along Platte River in central Nebraska.
<b>Mammals</b>					
Black-footed ferret	Mustela nigripes	FE	SE	Found in association with black-tailed prairie dog colonies in grassland habitats.	Unlikely. Considered extirpated from eastern Colorado.
Canada lynx	Lynx canadensis	FT	SE	Contiguous old-growth spruce, fir, and lodgepole pine forests with deep snow and available prey of snowshoe hare.	Not present; no suitable habitat.
Preble's meadow jumping mouse	Zapus hudsonius preblei	FT	ST	Front Range of northern Colorado and southern Wyoming along permanent or intermittent streams in areas of good herbaceous cover and adequate cover of shrubs and trees.	Present in project area along South Boulder Creek and adjacent ditches crossed by US 36 in Boulder Segment. Critical habitat designated in Jefferson County.
<b>Amphibians</b>					
Boreal toad	Bufo boreas boreas	-	SE	Damp areas dominated by lodgepole pine, aspen, or Engelmann spruce-subalpine fir forests.	Not present; no suitable habitat.

**Table 4.14-7: Federal and State-Listed Threatened and Endangered Species and Their Potential to Occur in the Project Area**

Common Name	Species	Federal Status	State of Colorado Status	Habitat	Potential for Occurrence in Project Area
<b>Fish</b>					
Brassy minnow	<i>Hybognathus hankinsoni</i>	-	ST	Fluctuating streams of the Front Range and eastern plains.	Potentially present in project area; considered rare, but may occur in any stream (CDOW 2004).
Common shiner	<i>Luxilus cornutus</i>	-	ST	Cool, clear, moderate gradient streams with gravel bottoms shaded by brush or trees.	Present in Stearns Lake, Big Dry Creek, and mainstem of South Platte River in Denver.
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	FT	ST	Cold, clear, gravelly headwater streams in the Arkansas and South Platte River drainages.	Not present; nearest population is in Rocky Mountain National Park.
Pallid sturgeon	<i>Scaphirhynchus albus</i>	FE	-	Known population in Mississippi River from Missouri to the Gulf of Mexico.	Not present in project area. Occurs downstream in lower reaches of Platte River.
<b>Invertebrates</b>					
Pawnee montane skipper	<i>Hesperia leonardus montana</i>	FT	-	Found in the South Platte Canyon, southwest of Denver.	Not present; no suitable habitat and no known populations in project area.
<b>Plants</b>					
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	FT	-	Sub-irrigated alluvial soils along streams; open meadows on floodplains.	Present; largest population in Colorado in Boulder Segment along US 36.
Colorado butterfly plant	<i>Gaura neomexicana</i> spp. <i>coloradensis</i>	FT	-	Sub-irrigated alluvial soils of drainage bottoms within mixed grass prairie.	Present along Walnut Creek approximately 0.5 mile west of US 36 in Westminster.

Source: USFWS, 2009; CNHP, 2004; CDOW, 2007a.

Status:

- FE = listed as federally-endangered
- FT = listed as federally-threatened
- SE = listed as endangered by CDOW
- ST = listed as threatened by CDOW

Notes:

- = no status
- CDOW = Colorado Division of Wildlife
- US 36 = United States Highway 36

**Table 4.14-8: Other Special Status Species Likely to Occur in the Project Area**

Common Name	Scientific Name	State Status	CNHP Status	County Status	Habitat	Occurrence in US 36 Project Area
<b>Birds</b>						
Barn owl	Tyto alba	-	-	BCNA3	Nests in natural crevices of trees, cliffs, and arroyo banks; and in human-built structures.	Likely present in Superior/Louisville and Boulder segments; recent nests known from White Rocks and Rock Creek.
Bobolink	Dolichonyx oryzivorus	-	-	BC BCNA4	Nests in moist tallgrass meadows and irrigated hayfields with young vegetation.	Present in Boulder Segment; occurs in South Boulder Creek area; designated county critical wildlife habitat along South Boulder Creek at Baseline Road.
Ferruginous hawk	Buteo regalis	SC	G4/S3B, S4N	-	Grasslands and shrublands; wintering birds prey on prairie dogs.	Likely present in open areas of Superior/Louisville and Boulder segments in winter, especially prairie dog towns. No current known nests in project area; historic records of nests south of Boulder.
Golden eagle	Aquila chrysaetos	-	-	OSMP BCNA4	Nests on cliffs and trees in rough areas. Forages in all adjacent habitats.	Present; known nesting areas in foothills areas of Boulder Segment. May forage in open areas from Westminster to Boulder segments.
Loggerhead shrike	Lanius ludovicianus	-	-	BCNA1	Nests in isolated trees or shrubs in rural areas and grasslands.	Likely present from Westminster to Boulder segments; nesting records in area, record of occurrence along South Boulder Creek.
Northern bobwhite	Colinus virginianus	-	-	OSMP BCNA1	Lowland riparian forests and agricultural areas with woody cover.	Potentially present year-round in Boulder Segment; records of occurrence along South Boulder Creek, though uncommon in area.
Northern harrier	Circus cyaneus	-	-	BCNA1	Grasslands, agricultural areas, and marshes. Breeds around marshes.	Present, breeds at Boulder Reservoir in Boulder Segment and possibly other areas. Forages in open areas from Westminster to Boulder segments.
Northern mockingbird	Mimus polyglottos	-	-	BCNA3	Agricultural areas with scattered trees, prairie, shrublands, and lowland riparian areas.	Potentially present year-round from Westminster to Boulder segments, though more likely during migration and summer; record of occurrence along South Boulder Creek. Rarely occurs in project area.
Osprey	Pandion haliaetus	-	-	BCNA3	Nests and forages near large bodies of water.	Present in Boulder Segment in summer and migration; known nesting areas at Boulder Reservoir and Valmont Reservoir.
<b>Mammals</b>						
Black-tailed prairie dog	Cynomys ludovicianus	SC	G4/S4	-	Grasslands throughout eastern Colorado.	Present; documented throughout project area, mostly in Westminster, Broomfield, Superior/Louisville, and Boulder segments.

**Table 4.14-8: Other Special Status Species Likely to Occur in the Project Area**

Common Name	Scientific Name	State Status	CNHP Status	County Status	Habitat	Occurrence in US 36 Project Area
<b>Amphibians</b>						
Northern leopard frog	<i>Rana pipiens</i>	SC	-	-	Pond, lake, and reservoir edges; wet meadows, marshes, streams, and irrigation ditches.	Likely present in all segments; documented on several properties in Boulder County, and are expected to occur in suitable habitats within the project area.
<b>Reptiles</b>						
Common garter snake	<i>Thamnophis sirtalis</i>	SC	-	-	Aquatic, wetland, and riparian habitats in marshes, ponds, and stream edges, below 6,000 feet in northeastern Colorado.	Likely present in all segments; suitable habitat includes Sombrero Marsh, Boulder Creek, South Boulder Creek, Rock Creek, and the South Platte River among other sites.
<b>Fish</b>						
Iowa darter	<i>Etheostoma exile</i>	SC	-	-	Lakes in aquatic vegetation and in undercut stream banks with vegetation extending into the water.	Documented in South Platte River, may be present in other suitable habitats in project area.
Johnny darter	<i>Etheostoma nigrum</i>	-	-	BC	Isolated portions of the South Platte River and several tributaries in riffles, runs, and pools with sand and rubble substrates.	Likely present in Boulder Segment: critical wildlife habitat designated in South Boulder Creek and Lethand Creek by Boulder County.
Orange-spotted sunfish	<i>Lepomis humilis</i>	-	-	OSMP	Lakes, reservoirs, and low gradient, murky rivers and streams.	Potentially present in Boulder Segment; reported occurrence in South Boulder Creek.
<b>Invertebrates</b>						
Hop's feeding azure (butterfly)	<i>Celastrina humulus</i>	-	G2/G3/S2	-	Mountain foothill canyons and ravines, 5,800-6,500 feet, usually associated with patches of hops.	Present southwest of Boulder in Boulder Segment.
Otloe skipper (butterfly)	<i>Hesperia otloe</i>	-	G3/G4/S2	-	Native tallgrass prairie.	Present; documented in tallgrass prairie in Boulder Segment.
<b>Plants</b>						
Dwarf wild indigo	<i>Amorpha nana</i>	-	G5/S2/S3	OSMP	Prairies and grasslands.	Present; known from several locations south and southeast of Boulder on OSMP land in Boulder Segment.
American groundnut	<i>Apios Americana</i>	-	G5/S1	OSMP	Mesic woodlands, riparian areas, and stream banks. Occurs in Colorado along a river bank, three irrigation ditches, and a seep on a shaded cliff.	Present; occurrences within 0.5 mile of both US 36 and BNSF Railway alignments in Boulder Segment. Five occurrences east of Boulder. Historic location in Denver County.
Narrow-leaved milkweed	<i>Asclepias stenophylla</i>	-	G4/G5/S2	OSMP	Prairie habitat on outwash mesas.	Present; known from two locations in Boulder Segment west of CO 93; may occur at other locations.
Gay-feather	<i>Liatris ligulistylis</i>	-	G5/S1/S2	OSMP	Wet meadows.	Present; known from one location south of Boulder in Boulder Segment.
Toothcup	<i>Rotala ramosior</i>	-	G5/S1	OSMP	Muddy or sandy shores or damp depressions.	Present; known to occur in South Boulder Creek area in Boulder Segment.
Prairie violet	<i>Viola pedatifida</i>	-	G5/S2	OSMP	Prairies, open woodlands, and forest openings; rocky sites on the outwash mesas. 5,800 to 8,800 feet.	Present; known to occur in prairie grasslands south and north of Boulder in Boulder Segment; historic record in 1893 from Denver Segment.

**Table 4.14-8: Other Special Status Species Likely to Occur in the Project Area**

Common Name	Scientific Name	State Status	CNHP Status	County Status	Habitat	Occurrence in US 36 Project Area
Philadelphina fleabane	<i>Erigeron philadelphicus</i>	-	G5/S1	-	Small patches of sparse or low-growing vegetation in mesic and wet meadows.	Found during US 36 field studies in OSMP west of South Boulder Creek on both sides of US 36.

Source: General: Boulder County, 2002; City of Boulder OSMP, 1997; City of Boulder OSMP, 2004; NDIS, 2006.

Mammals: Adams, 2003; Fitzgerald et al. 1994.

Birds: Andrews and Righter, 1992; Boulder County Nature Association, 1999; Kingery, 1998.

Amphibians and Reptiles: Hammerson, 1999.

Fish: Van Buren, 2004; Winkle, 2004; Woodling, 1985.

Invertebrates: Iowa Department of Natural Resources 2001; Opler et al. 1995.

Plants: Anderson and Spackman, 2003; City of Boulder OSMP, 1997; Great Plains Flora Association, 1986; Mayo, 2004; Neely, 2004; Spackman et al. 1997; Weber and Wittman, 2001.

Status:

SC = State of Colorado Species of Special Concern (CDOW 2007a).

G1/S1 = Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or 1,000 or fewer individuals), or because some factor of its biology makes it especially vulnerable to extinction.

G2/S2 = Imperiled globally/state because of rarity (6 to 20 occurrences, or 1,000 to 3,000 individuals), or because other factors demonstrably make it very vulnerable to extinction throughout its range.

G3/S3 = Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences, or 3,000 to 10,000 individuals).

G4/S4 = Apparently secure globally/state, though it may be quite rare in parts of its range, especially at the periphery. Usually more than 100 occurrences and 10,000 individuals.

G5/S5 = Demonstrably secure.

- = no status

BCNA = Boulder County Nature Association Sensitive Species List

BCNA1 - Rare and declining

BCNA2 - Declining (but not yet rare)

BCNA3 - Rare

BCNA4 - Isolated or restricted populations

BCNA5 - Needs research

BCNA6 - Extirpated

Notes:

CNHP = Colorado Natural Heritage Program

OSMP = Open Space and Mountain Parks

US 36 = United States Highway 36

## **Impact Evaluation**

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This section describes impacts to biological resources in the study area that would result from construction and operations of each build package (Packages 2 and 4 and the Combined Alternative Package [Preferred Alternative]), and methods that would or could be used to reduce impacts. Impacts, in many cases, would be similar to each of the build packages; therefore, the discussion of impacts in Package 4 and the Combined Alternative Package (Preferred Alternative) are sometimes compared with Package 2 or each other, and are sometimes discussed only as they are different from one another. The discussion of impacts in the Combined Alternative Package (Preferred Alternative) provides a comparison of the Combined Alternative Package (Preferred Alternative) to both Package 2 and Package 4.

### **Methodology**

Impacts are described in this section by timing (construction or operations), mode of action (direct or indirect), and duration of impact (short term or long term, where long term is more than 3 years). Impacts were assessed by comparing the activities and footprint in Package 2 and Package 4, with discussion of the west-end Local Street Option in the Combined Alternative Package (Preferred Alternative) that is different from the option discussed in the general impacts discussion of that package, to the biological resources described in the Affected Environment subsection. Direct impacts were quantified where possible by calculating acres of habitat loss within the package footprint using GIS overlays. Other impacts that cannot be quantified, including indirect impacts, are described in terms of their mode of action and relative importance. The proposed mitigation measures are based on project-specific impacts, standard methods used by CDOT and other agencies to mitigate impacts, and actions recommended by wildlife management agencies and organizations.

### **Package 1: No Action**

#### ***Direct Impacts***

##### **All Segments**

No substantial highway improvements are planned along US 36, so no new impacts would occur along US 36 under Package 1. However, US 36, in its current configuration, would continue to contribute to habitat fragmentation and isolation of wildlife populations due to inadequate habitat connectivity across the highway. Although an adequate number of wildlife crossings currently exist that are suitable for multi-species use, habitat would continue to be fragmented and individual animals killed when attempting to cross the highway. Although large mammal road kill is currently rare on US 36, it is evident many birds, prairie dogs, and other small and medium-sized mammals are hit by vehicles.

#### ***Indirect Impacts***

##### **All Segments**

Under Package 1, the planned population increase in the project area would result in increased urbanization. This would result in development of land that is currently available to support biological resources.

### **Package 2: Managed Lanes/Bus Rapid Transit**

#### ***Direct Impacts***

##### **All Segments**

##### **Vegetation**

Several types of native vegetation are located within the construction footprint. Construction impacts would primarily occur from clearing of vegetation and earth moving. Most impacts would be direct and permanent by removal of vegetation and replacement with pavement or a project-related feature. Acres of

vegetation impacted are shown by package in Table 4.14-9, Direct Impacts to Vegetation by Type. There would be no direct impacts to xeric tallgrass prairie, xeric upland shrub, foothills and mountain grassland, or ponderosa pine under either of the build packages. Impacts to irrigated and dryland cropland, open water, and urban or built-up land are analyzed as a general category (other) because these are not natural habitats or a vegetation classification. Impacts to riparian herb habitat are not provided separately, as much of this habitat is interspersed with riparian woodland or shrub, or else has been included in wetland impacts (see Section 4.21, Wetlands and Other Waters).

**Table 4.14-9: Direct Impacts to Vegetation by Type**

Vegetation Type	Package 2		Package 4		Combined Alternative Package (Preferred Alternative) (acres)
	Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)	
Mesic tallgrass prairie	2.16	3.05	2.16	3.05	2.60
Midgrass prairie	51.45	51.45	54.21	54.21	54.65
Riparian woodland	5.52	5.65	4.61	4.76	5.44
Riparian shrub	5.86	6.89	5.64	7.13	7.15/7.03 <sup>1</sup>
Other (cropland, developed, and open water)	1,171.47	1,169.09	1,111.52	1,119.19	1,047.17/1,047.23 <sup>1</sup>
<b>Total in Study Area</b>	<b>1,236.46</b>	<b>1,236.13</b>	<b>1,178.14</b>	<b>1,188.34</b>	<b>1,117.01/1,116.95<sup>1</sup></b>

Source: US 36 Mobility Partnership, 2009.

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup> The first number is for the Combined Alternative Package (Preferred Alternative), the second number is for the Local Streets Option at the west-end.

The area of impact to mesic tallgrass prairie and midgrass prairie would be similar for Package 2 and Package 4. The Combined Alternative Package (Preferred Alternative) would have impacts in between those for Option A and Option B of Package 2 and Package 4. This vegetation type is not affected by the west-end Local Street Option. Mesic tallgrass prairie occurs only on portions of City of Boulder open space, where it is mostly within the Colorado Tallgrass Prairie Natural Area. Midgrass prairie occurs only in the Davidson Mesa, and this area is the subject of Boulder Open Space restoration efforts to control non-native and invasive plants. Package 2 would impact this midgrass prairie the least of the three build packages; the Combined Alternative Package (Preferred Alternative) would impact the most, but this comes from a refined design that would minimize impacts to the historic observation area on the top of Davidson Mesa. This vegetation type would not be affected by the west-end Local Street Option.

Riparian habitat impacts, both shrub and woodland types, would be similar for both Package 2 and Package 4. The Combined Alternative Package (Preferred Alternative) would impact quantities similar to Option B in Package 2 and Package 4, even though the impacts on the west-end would not be in the same locations. Therefore, the impact differences between these packages may be due in part to refined bridge and culvert replacement data that was used in determining these impacts throughout the corridor. Refined bikeway curvatures, bridge height and length, and toe-of-slope estimates have made impact assessment in these areas more realistic. There would be less of an impact with the Combined Alternative Package (Preferred Alternative) with the west-end Local Streets Option, but the difference is negligible.

Table 4.14-10, Direct Impacts to Riparian Habitats Along the US 36 Corridor, shows the largest areas of permanent, direct impact to riparian woodland and shrub along important riparian wildlife corridors within the project area. Riparian shrub or riparian woodland habitats may also constitute wetlands. The numbers presented in Table 4.14-10 do not include impacts to wetlands, which can be found in Section 4.21, Wetlands and Other Waters.

**Table 4.14-10: Direct Impacts to Riparian Habitats Along the US 36 Corridor**

Riparian Habitat Area	Package 2 Option A and Option B <sup>1</sup> (acres)			Package 4 Option A and Option B <sup>1</sup> (acres)			Combined Alternative Package (Preferred Alternative) (acres)		
	Riparian Woodland	Riparian Shrub	Total	Riparian Woodland	Riparian Shrub	Total	Riparian Woodland	Riparian Shrub	Total
Farmers Highline Canal/Niver Canal	1.26	0.22	1.48	0.91	0.16	1.07	1.04	0.18	1.22
Walnut Creek	0.30	0.15	0.45	0.00	0.00	0.00	0.33	1.04	1.37
Big Dry Creek	0.13	0.16/0.17	0.29/0.30	0.13/0.14	0.14	0.27/0.28	0.44	0.15	0.59
Rock Creek	0.65	0.10	0.75	0.33	0.10/0.70	0.43/1.03	0.46	0.12	0.58
Coal Creek	0.31	0.00	0.31	0.34	0.00	0.34	0.66	0.00	0.66
Marshallville Ditch	0.14	0.53	0.67	0.19	0.63	0.82	0.11	0.40	0.51
Shearer Ditch	0.72	0.36	1.08	0.80	0.35	1.15	0.56	0.16	0.72
South Boulder Creek/ South Boulder Canyon Ditch	0.45/0.55	1.00/1.71	1.45/2.26	0.41/0.51	1.00/1.23	1.41/1.74	0.53	1.40	1.93
Upper Bear Creek Ditch	0.07	1.06/1.37	1.13/1.44	0.06/0.07	1.07/1.73	1.13/1.80	0.07	1.04	1.11
Other miscellaneous riparian impact along US 36 corridor	1.49/1.52	2.28	3.77/3.80	1.44/1.47	2.19	3.63/3.66	1.24	2.66/2.57 <sup>2</sup>	3.90/3.81 <sup>2</sup>
<b>Total</b>	<b>5.52/5.65</b>	<b>5.86/6.89</b>	<b>11.38/12.54</b>	<b>4.61/4.76</b>	<b>5.64/7.13</b>	<b>10.25/11.89</b>	<b>5.44</b>	<b>7.15/7.06<sup>2</sup></b>	<b>12.59/12.50<sup>2</sup></b>

Source: US 36 Mobility Partnership, 2009.

**Notes:**

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup> When there are two numbers, the first number is for Option A and the second number is for Option B.

<sup>2</sup> The first number is for the Combined Alternative Package (Preferred Alternative), the second is for the Local Streets Option at the west-end.

Under Package 2 Option A, the largest impact to riparian habitat would occur at Farmers Highline Canal/Niver Canal; while under Option B the largest riparian impacts would occur at South Boulder Creek. The riparian woodland and shrubland located in the Boulder Segment is considered high quality due to the presence of threatened and endangered plant and animal species. Walnut Creek, Big Dry Creek, Rock Creek, and Coal Creek are considered important wildlife corridors as well as high quality wildlife habitat. These areas are protected by Senate Bill 40 and would require coordination with CDOW and mitigation of the tree and shrub impacts.

**Wildlife**

Impacts to wildlife include habitat loss, habitat fragmentation, disturbance (avoidance and displacement), and mortality. Habitat loss would result from removal of existing habitat and replacement with pavement or structures. Most impacts due to habitat loss would be permanent, but habitat loss may be temporary in areas that are revegetated after construction. The loss of habitat would generally be in linear areas adjacent to the existing highway.

*Impacts to wildlife include habitat loss, habitat fragmentation, disturbance, and mortality.*

Wildlife habitat in the project area was categorized as high, moderate, and low quality to further assess the impact to wildlife. High-quality wildlife habitat consists of riparian, wetland, foothills, sensitive areas, and prairie dog colonies. Moderate-quality habitat consists of native prairie/grassland and large undeveloped or agricultural areas. Low-quality habitats are developed/urban areas, small to medium-sized golf courses without connectivity to a high- or medium-quality habitat, and isolated patches of undeveloped land. It should be noted that each of these habitats were evaluated based on their condition within the corridor immediately adjacent to US 36. For example, native prairie/grassland was characterized as moderate-quality due to its disturbed nature immediately adjacent to US 36, including a large component of non-native and weedy species. Similarly, foothills habitat was categorized as high-

quality based on a low level of disturbance and a dominance of native species. Acreage of high- and moderate-quality habitat loss is provided in Table 4.14-11, Direct Impacts to High- and Moderate-Quality Wildlife Habitat.

**Table 4.14-11: Direct Impacts to High- and Moderate-Quality Wildlife Habitat**

Wildlife Habitat Quality	Package 2		Package 4		Combined Alternative Package (Preferred Alternative) (acres)
	Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)	
High	84.80	93.43	85.55	92.51	86.27
Moderate	287.69	289.90	287.34	289.60	281.17/282.21 <sup>1</sup>
<b>Total</b>	<b>372.49</b>	<b>383.33</b>	<b>372.89</b>	<b>382.11</b>	<b>367.44/368.48<sup>1</sup></b>

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>The first number is for the Combined Alternative Package (Preferred Alternative), the second is for the Local Streets Option at the west-end.

Habitat fragmentation occurs when developed or unnatural features divide a previously contiguous area of habitat. Roads, residential and commercial developments, and agricultural areas can contribute to habitat fragmentation. Fragmentation is detrimental to wildlife as it isolates individuals into smaller sub-populations that can become vulnerable to disease, inbreeding, and possible elimination from the area or region. Connectivity between habitats, such as those divided by roads, allows animals to disperse to new territories to interact with other animals of their species, and promote genetic integrity through cross breeding. Additionally, without safe connectivity between habitats separated by a highway, animals become more vulnerable to mortality from vehicle collisions. Mortality may affect population sizes in a localized area and can be hazardous to the motoring public.

*Construction activity is likely to temporarily displace many animals due to noise, human presence, and heavy equipment.*

Construction activity is likely to temporarily displace many animals due to noise, human presence, and heavy equipment. Many animals avoid roads, and the widened road and increased traffic may result in long-term increases in displaced individuals. Avoidance and displacement results in indirect loss of habitat because habitats along roads and adjacent to construction areas are not used effectively. Indirect habitat loss has not been quantified because animal responses are dependent on the individual or species, and may change with time.

Direct wildlife mortality would occur in Package 2 during construction from losses of small terrestrial and burrowing animals during ground clearing and earth moving, and losses due to traffic (road kill) during both construction and operations.

**Large Mammals** — Mule deer and white-tailed deer would experience moderate impacts due to habitat loss and disturbance. Movement corridors along major streams would be temporarily affected during construction, but would be maintained or improved after construction. Elk and mountain lions occur rarely in the project area and are not expected to incur impacts as a result of this project.

**Black-tailed Prairie Dogs** — Impacts include destruction of burrows, habitat loss, and death or injury to individual black-tailed prairie dogs from construction activities and equipment. Table 4.14-12, Impacts to Active Black-tailed Prairie Dog Colonies, shows acreage of permanent impact to black-tailed prairie dogs under each package and option. Long-term direct impacts to prairie dogs resulting from implementation of Package 2 would be slightly greater in Option B than in Option A. CDOT has a prairie dog management policy that would be applied to the prairie dogs impacted by the project. Additionally, each of the county and city municipalities within the study area has policies for management of prairie dogs on their property. These policies are generally similar to CDOT’s policy in the order of management steps: avoidance, relocation, live-trapping, or lethal control.

*CDOT has a policy to relocate prairie dogs within impacted ROW for highway improvements. A large number of individual prairie dogs would need to be relocated under both build packages.*

**Table 4.14-12: Impacts to Active Black-tailed Prairie Dog Colonies**

Segment	Package 2		Package 4		Combined Alternative Package (Preferred Alternative) (acres)
	Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)	
Denver	0.00	0.00	0.00	0.00	0.00
Adams	0.00	0.00	0.00	0.00	0.00
Westminster	12.17	12.17	11.62	11.62	12.67
Broomfield	25.54	25.54	25.08	25.08	21.11
Superior/Louisville	22.93	22.93	21.53	21.53	23.51
Boulder	5.40	5.51	5.90	5.93	0.00
<b>Total</b>	<b>66.04</b>	<b>66.15</b>	<b>64.13</b>	<b>64.16</b>	<b>57.29</b>

Source: US 36 Mobility Partnership, 2009.

Note:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

**Raptors** — Direct impacts to raptors would occur by removal of nests in the right-of-way (ROW), disturbance to nesting pairs or young, and disturbance or displacement of individuals from foraging and/or nesting areas in construction zones. Removal of trees would affect availability of nest sites, and increased traffic and noise on US 36 may result in avoidance of high traffic areas by some species or individuals. Furthermore, direct loss of habitat would decrease the availability of important prey species, such as prairie dogs, which may indirectly reduce the number of nesting pairs.

CDOW recommends buffer zones around active raptor nests to avoid impacts to nesting birds or young. These buffer zone distances vary by species and consist of 0.25 mile for red-tailed hawks, 0.33 mile for Swainson’s hawk, and 0.50 mile for osprey. During the 2004 season, three red-tailed hawk nests were located within the buffer zone distance. No Swainson’s hawk or osprey nests were located within the buffer zone. Additional nests are located along the corridor; although no activity was observed during 2004 surveys, these nests may be used in the future. Nest locations are likely to be different at the time of construction, but these nest impacts are considered to be representative of the impacts that would occur.

**Other Birds** — Impacts to birds from construction and operations of US 36 would include direct loss of habitat, displacement during construction, mortality from vehicle collisions, and fragmentation of habitat due to highway widening. Birds would incur increased mortality from collisions with vehicles (especially at riparian crossings), resulting from a wider highway, and higher traffic volumes. Nearly all bird species present in the project area are protected by the Migratory Bird Treaty Act (MBTA), a federal act that prohibits destruction or disturbance of active nests that results in loss of eggs or young (USFWS 2004). All wild birds, including raptors, are protected under this Act, except for non-native species that

*All wild birds, including raptors, are protected under the MBTA, except for non-native species.*

include house sparrow, rock dove, and European starling. Vegetation clearing, earth moving, and other construction activities have the potential to destroy active nests of bird species protected under the act.

**Other Wildlife** — Impacts to small- and medium-sized mammals, reptiles, and amphibians would include habitat loss, mortality from vehicle collisions or crushing by construction equipment, and avoidance/displacement. During operation, Package 2 would result in increased mortality and habitat fragmentation. Wider roads accommodate more traffic and faster speeds, and require longer distances for small animals to travel to reach the other side. Therefore, wider roads make animals more vulnerable to crushing by a vehicle when attempting to cross the roadway.

**Wildlife Crossings** — The increased road width in Package 2 would result in wider bridges and longer culverts. This may decrease use by wildlife because of reduced vegetation cover under bridges and an increased tunnel effect at culverts, unless openings are increased in size.

*Wildlife crossings are important for animals to access adjacent areas or similar habitat separated by the highway.*

Wildlife crossings are important for animals to access adjacent areas of similar habitat separated by the highway. Without adequate under- or over-highway crossings, animals will either avoid crossing, isolating them from adjacent areas of habitat and other individuals of the same species, or may be killed by vehicles while attempting to cross the road. Ditch and stream crossings are often good wildlife crossing locations; however, many of the existing structures do not allow animal use because of size or lack of dry passage, or they are spaced too

far apart to provide sufficient crossing opportunities. Additionally, many animals are not adapted to riparian environments or do not travel along stream or ditches, such as black-tailed prairie dogs, coyotes, and cottontails. When habitat becomes fragmented, animals are cut off from adjacent areas, potentially resulting in loss of local populations from an area.

The impacts of proposed bridges at Big Dry Creek, Rock Creek, Coal Creek, Davidson Ditch, Goodhue Ditch, and South Boulder Creek are described below under Sensitive Habitats and Wildlife Corridors. Concrete box culverts or circular metal culverts would be used in other ditches and drainages, which may provide decreased opportunities for wildlife crossing because of their increased length. Wildlife crossings would be improved in two areas due to new extra-wide drainage structures that are planned by others. These include Airport Creek, where a triple 12-foot by 5-foot box culvert would be installed, and Cherryvale Road, where a two-span, 39-foot wide by 255-foot long bridge would be installed. The Cherryvale Road bridge is adjacent to OSMP lands, while the Airport Creek structure is adjacent to grassland, rural residential, prairie dog colonies, and cropland.

#### **Sensitive Habitats and Wildlife Corridors**

These habitats and corridors appear in Table 4.14-13, Direct Impacts to Sensitive Wildlife Habitats, and Figure 4.14-2, Sensitive Areas and Wildlife Corridors (Enlarged View).

The project would have no impacts to Boulder County Critical Wildlife Habitats, National Wildlife Refuges, state wildlife areas, or wildlife viewing areas in either of the build packages. Package 2 would have impacts to City of Boulder OSMP properties eligible under Section 4(f) that function as wildlife refuges for Preble's meadow jumping mouse and also contains Ute ladies'-tresses orchid; detailed information on these properties is in Chapter 7, Final Section 4(f) Evaluation. Package 2 would have the following impacts to sensitive wildlife habitats.

The proposed crossing structures at each wildlife corridor are discussed below by segment. The structure width is opening-to-opening, parallel to the channel; while the length of the structure is perpendicular to the channel.

**Table 4.14-13: Direct Impacts to Sensitive Wildlife Habitats**

Segment	Sensitive Area	Package 2		Package 4		Combined Alternative Package (Preferred Alternative) (acres)
		Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)	
Broomfield and Superior/Louisville	Carolyn Holmberg Preserve/Rock Creek Farm Open Space	20.50	20.50	15.53	15.53	14.39
Boulder	South Boulder Creek Natural Area	44.39	53.37	45.04	52.41	42.59
	Colorado Tallgrass Prairie Natural Area	11.35	11.35	11.92	11.92	11.34
	Colorado Tallgrass Prairie Potential Conservation Area <sup>1</sup>	93.75	103.60	99.30	107.48	94.50
<b>Total<sup>1</sup></b>		<b>114.25</b>	<b>124.10</b>	<b>114.83</b>	<b>123.01</b>	<b>105.87</b>

Source: US 36 Mobility Partnership, 2006.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>The area creating the Colorado Tallgrass Prairie Natural Area and Potential Conservation Area includes portions of the South Boulder Creek Natural Area and the Colorado Tallgrass Prairie Natural Area. As a result, the total area of sensitive wildlife habitats is not calculated by adding the sums of each sensitive area.

**Westminster Segment**

**Big Dry Creek** — The existing 31-foot long by 106-foot wide, two-cell box culvert would be extended by 130 feet for a total culvert width of 236 feet. In addition to the short-term impacts associated with construction and loss of habitat, the Big Dry Creek corridor would experience long-term impacts from reduced wildlife use of the crossing and increased fragmentation between upstream and downstream portions of Big Dry Creek.

**Superior/Louisville Segment**

**Rock Creek** — The existing two-cell concrete box culvert would be replaced with a three-cell box culvert. Each cell would be 20 feet long by 8 feet high. The culvert would be 286-foot wide (52 feet wider than existing). The increased width would be balanced by the increased opening size, and the new structure would allow continued wildlife crossing.

**Coal Creek** — A larger bridge would be constructed at Coal Creek to elevate it out of the floodplain with a proposed 200-foot channel bottom. The proposed three-span bridge would be 294 feet long (240 feet longer than the existing) by 212 feet wide (121 feet wider than the existing). Wildlife passage would be reduced during construction but would return to existing conditions or improve after construction. The larger bridge would reduce riparian habitat at the crossing but provide good wildlife passage.

**Boulder Segment**

**Davidson Ditch** — The existing 26-foot long by 110-foot wide, single-cell culvert could be extended by 290 feet for a total width of 400 feet. This is a conservative estimate but would likely reduce wildlife use due to the increased width and adversely affect connectivity between habitats in the City of Boulder open space on both sides of the highway.

**Goodhue Ditch** — Changes to this ditch crossing could include widening the crossing from the existing 160 feet to an additional 110 feet, for a total of 270 feet to cross. This is a conservative estimate. Impacts would also reduce wildlife use and connectivity in the area.

**South Boulder Creek** — The existing three-span bridge would be widened by 40 feet for a total width of 227 feet. The alignment is not parallel with the existing bridge, so the width of widening on each side of the bridge varies. This action would not adversely affect long-term use of the corridor by wildlife.

**South Boulder Canyon Ditch** — The existing 15-foot long by 170-foot wide ditch could be widened an additional 250 feet as a conservative estimate. This action would likely affect wildlife use and connectivity in the South Boulder Creek Floodplain.

### Noxious Weeds

*Project-related construction activities may introduce new noxious weeds into the study area or increase the abundance of existing noxious weeds.*

Project-related construction activities may introduce new noxious weeds into the study area or increase the abundance of existing noxious weeds. These activities include mobilization of construction vehicles, excavation and transport of borrow materials and topsoil, land clearing, and reclamation. Removal of existing vegetation and disturbance of soils encourages germination of weed seeds and spread of roots and seeds. Disturbed areas may be seeded by airborne or wildlife-borne seeds from plants in adjacent habitats. After construction, noxious weeds can persist or become established on road edges and in reclaimed areas. Noxious weeds that are present in the construction footprint can spread onto adjacent lands. The primary concerns with noxious weeds are effects on public land (open space), sensitive areas, sensitive species, agriculture, and wetland and riparian habitat. Noxious weeds can degrade habitat quality on open space, sensitive areas and riparian habitat, and can cause increased management problems and costs in all areas.

The primary concerns are Lists A and B species that are common and likely to spread within and from the construction area. One List A species, myrtle spurge, was observed during 2004 field surveys but is not located within the construction footprint. The most common List B species along US 36 are Canada thistle, common teasel, diffuse knapweed, hoary cress, perennial pepperweed, Russian olive, and Scotch thistle. Canada thistle, common teasel, perennial pepperweed, and Russian olive are particularly likely to invade wetland and riparian areas, and all of these species can invade upland areas. Cutleaf teasel and houndstongue are more limited in distribution but are also likely to spread in wetlands and riparian areas, respectively.

### Fisheries and Aquatic Habitats

During construction, fish and other aquatic organisms may be adversely affected by construction activities, such as clearing of vegetation and earth moving on streambanks, construction in streams for installation of culverts or bridge piers, movement and reconstruction of stream channels, and accidental spills of fuel or other materials. These activities may cause increases in suspended solids, sedimentation of stream habitats, changes in water temperature through reductions in riparian cover, losses of habitat, and changes in water flow or quality. These impacts would generally be short term except where permanent project features occupy stream habitat. These impacts would be minimized through use of construction BMPs to control erosion, sedimentation, and spills.

Direct, long-term impacts would occur where new bridges or culverts are installed or extended (Table 4.14-14, Impacts to Aquatic Habitats). Concrete box culverts would replace natural streambed substrate with concrete, which is of limited use for aquatic organisms. The relative darkness within the culvert would reduce food production in the stream and on the banks. Changes in streamflow velocity and loss of natural streambed material may greatly decrease passage by fish and other organisms. Impacts from bridges would be less severe because natural streambeds would be maintained, and the more open structure of a bridge would allow more light. However, food productivity is generally reduced unless the height and width of the bridge allows good light penetration to the stream and adjacent riparian habitat. Direct, long-term impacts would also occur where streams are relocated, because of the time needed to re-establish riparian vegetation ecosystem functions in the new stream channel.

**Table 4.14-14: Impacts to Aquatic Habitats**

Segment	Aquatic Habitat	Construction Activity	Long-term Loss or Modification of Aquatic Habitat <sup>1</sup>		
			Package 2	Package 4	Combined Alternative Package (Preferred Alternative)
Denver	N/A	N/A	N/A	N/A	N/A
Adams	N/A	N/A	N/A	N/A	N/A
Westminster	Big Dry Creek	Extension of existing culvert	Additional 130 feet of stream channel in culvert	Same as Package 2	Additional 150 feet of stream channel in culvert
Broomfield	N/A	N/A	N/A	N/A	N/A
Superior/ Louisville	Rock Creek	New box culvert	Additional 52 feet of stream channel in culvert	Additional 6 feet of stream channel in culvert	Additional 34 feet of stream channel in culvert
		Relocation of stream channel on south side of highway	1,400 feet of stream channel relocated	Same as Package 2	Negligible relocation of stream channel
	Coal Creek	New bridge	Additional 121 feet of stream channel under bridge	Additional 105 feet of stream channel under bridge	Additional 98 feet of stream channel under bridge
Boulder	South Boulder Creek	Widen existing bridge	Additional 40 feet of stream channel under bridge	Same as Package 2	Same as Package 2

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>Excludes existing stream channel within culverts or under bridge.

N/A = not applicable

Long-term impacts may also occur from highway runoff, which contributes sediment, petroleum products, and other pollutants to stream environments and degrades stream quality. Highway runoff would be controlled and treated to the level required under the Colorado Department of Public Health and the Environment stormwater permit required for construction projects over 1 acre, and as required in the *CDOT MS4 Permit New Development and Redevelopment Program* (CDOT 2004), using detention ponds and other permanent BMPs.

*Long-term impacts may also occur from highway runoff, which contributes sediment, petroleum products, and other pollutants to stream environments and degrades stream quality.*

Direct, long-term losses of stream habitats are summarized below. There would be no direct impacts on lakes or ponds, although Lower Church Lake would be within 100 feet of the construction footprint. No recreational fishing lakes or streams would be impacted by the implementation of Package 2.

### Threatened and Endangered Species

Impacts to threatened and endangered species in the study area were assessed quantitatively where possible (Table 4.14-15, Direct Habitat Loss to Threatened and Endangered Species). Impacts to Preble's meadow jumping mouse, burrowing owl, and Ute ladies'-tresses orchid habitat are shown in Figure 4.14-3, Habitat Areas of Threatened and Endangered Species. Impacts to other threatened or endangered species, including the Colorado butterfly plant, would be indirect or are not quantifiable; these impacts are discussed by species. A PBA has been prepared and is included with the FEIS to address the impacts of the Combined Alternative Package (Preferred Alternative) on federally-listed species and satisfy Endangered Species Act Section 7 Consultation requirements.

**Table 4.14-15: Direct Habitat Loss to Threatened and Endangered Species**

Species	Package 2		Package 4		Combined Alternative Package (Preferred Alternative) (acres)
	Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)	
Preble's meadow jumping mouse	43.31	52.81	50.47	54.63	41.71
Ute ladies'-tresses orchid	37.92	45.59	41.04	46.88	35.94
Burrowing owl	66.04	66.15	64.13	64.16	63.29

Source: US 36 Mobility Partnership, 2009.

Note:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

**Preble's Meadow Jumping Mouse** — Preble's meadow jumping mice occupy stream and ditch crossings under and adjacent to the US 36 corridor in portions of the Boulder Segment. Habitat for the mouse includes land within 300 feet on either side of a stream or ditch floodplain. These locations include South Boulder Creek north and south of US 36, and all suitable riparian and adjacent upland habitat east to Davidson Ditch. The *Site Habitat Assessments for Preble's Meadow Jumping Mouse Technical Memorandum* (URS 2004b) provides information on suitability of each riparian crossing in the study area to support Preble's meadow jumping mouse. Direct impacts to Preble's meadow jumping mouse include loss of habitat and mortality to individuals from earth moving or crushing during construction in the US 36 ROW. Construction occurring during the active season or during winter hibernation may kill individuals. Direct impacts are summarized in Table 4.14-15, Direct Habitat Loss to Threatened and Endangered Species. Although the project primarily impacts habitats along the existing US 36 ROW that are not necessarily considered high quality, the various ditches and creeks along US 36 in the Boulder Segment are occupied by Preble's and therefore construction would have adverse effects to the subspecies. Based on the results shown in Table 4.14-15, Package 2 under Option B would result in greater habitat loss than under Option A. Implementation of Package 2, Options A or B, *may affect, and is likely to adversely affect*, Preble's meadow jumping mouse in the project area.

The US 36 bikeway alignment adopted for the Combined Alternative Package (Preferred Alternative) would result in direct Preble's meadow jumping mouse habitat loss, whereas the Cherryvale Road/South Boulder Road alignment would result in no direct Preble's meadow jumping mouse habitat loss. There are also indirect effects associated with the US 36 bikeway alignment. Based on information provided by Boulder OSMP, the existing trail along South Boulder Road and part of Cherryvale Road is heavily used by bikers, equestrians, and walkers with their dogs. The frequent human use and multiple access points to the adjacent open space promote an element of human intrusion. This human intrusion is not currently a factor along the US 36 alignment because there is no easy access to the adjacent open space. This indirect impact due to human intrusion is difficult to quantify, but was considered in the selection of the bikeway alignment. It is also worth noting that some of the human intrusion would be mitigated with fencing to deter stray trips into the adjacent open space. Fencing is currently used along the South Boulder Creek dirt path in the project area and has proven to be effective. The impacts for the bikeway are included with the roadway footprint impacts. More specifically, this occurs when the retaining wall is proposed as part of the roadway construction to reduce the impacts to open space. Although the retaining wall would reduce the footprint of the highway, grassy level paths would still be required for periodic maintenance of the retaining wall. These paths are generally NOT paved, and would support native vegetation that would allow for Preble's movement and foraging.

**Burrowing Owl** — Impacts to nesting burrowing owls include permanent loss of potential nesting habitat (prairie dog habitat loss), and disturbance to individuals from construction activities during nesting and migration. Although no nests are currently known along the US 36 corridor, burrowing owls use portions of Boulder OSMP property south of US 36 in the vicinity of Cherryvale Road and suitable nesting habitat occurs in other parts of the Broomfield, Superior/Louisville, and Boulder segments. If owls or their young are present in burrows near the road, they could be killed or injured if the burrows are destroyed

during the nesting period (April 1 to July 31) or during the period when burrowing owls are present (March 1 to October 31).

Noise and disturbance during construction could also adversely affect burrowing owls nesting within 150 feet of construction activity and could cause nest abandonment (CDOW 2007b). Impacts would be avoided by seasonal restrictions on construction and/or 150-foot (50-yard) buffers around active nests.

**Brassy Minnow and Common Shiner** — Impacts to brassy minnows, if present in creeks, and common shiners inhabiting Big Dry Creek within the study area, include displacement during construction of bridge and culvert crossings. In addition, impacts to fish and fish habitat could potentially occur from sediment deposition from cleared construction areas adjacent to the channel, and from accidental releases of fuel, oil, or other materials that would adversely affect water quality. Impacts would be most detrimental during the fish-spawning period in late spring and early summer. These impacts would be temporary and would be addressed by the use of BMPs, a sediment control plan, and spill prevention plan. Fish passage under the highway at Dry Creek may be reduced due to the increased culvert length.

**Ute Ladies'-tresses Orchid** — The Ute ladies'-tresses orchid is known to occur along both sides of US 36 from Davidson Ditch to the western edge of the City of Boulder's Van Fleet open space. Small to large patches of Ute ladies'-tresses orchid occur in scattered locations throughout this area, and populations vary widely from year to year. Field studies for preparation of this FEIS included a reconnaissance of the habitat; at least 20 to 30 orchids were observed in the construction footprint in August of 2004. A more detailed survey to map individuals within the construction footprint would be conducted prior to construction. Individual plants of Ute ladies'-tresses orchid that occur within the construction footprint would be destroyed by crushing, uprooting, or burial during ground-clearing and earth-moving activities. Direct impacts are most likely to occur where the construction footprint would extend outside of the CDOT ROW for road widening, on-ramps, and stormwater detention ponds.

*Small to large patches of Ute ladies'-tresses orchid occur in scattered locations, and populations vary widely from year to year.*

Indirect effects on Ute ladies'-tresses orchids resulting from construction and operation could occur from habitat alteration caused by changes in hydrology and drainage patterns in areas adjacent to the highway within the City of Boulder OSMP property in the Boulder Segment. Long-term loss of natural flow in creeks or irrigation ditches that would eliminate wetlands would cause long-term declines in Ute ladies'-tresses orchids.

The number of plants that could be affected is unknown, but is likely to represent a very small portion of the South Boulder Creek population, which numbers up to 20,000 plants. Implementation of the US 36 improvements under Package 2, Option A or Option B, *may affect, and is likely to adversely affect*, Ute ladies'-tresses orchids.

The US 36 bikeway alignment adopted for the Combined Alternative Package (Preferred Alternative) would result in direct Ute ladies'-tresses orchid habitat loss, whereas the Cherryvale Road/South Boulder Road alignment would result in no direct habitat loss. There are also indirect effects associated with the US 36 bikeway alignment. Based on information provided by Boulder OSMP, the existing trail along South Boulder Road and part of Cherryvale Road is heavily used by bikers, equestrians, and walkers with their dogs. The frequent human use and multiple access points to the adjacent open space promote an element of human intrusion. This human intrusion is not currently a factor along the US 36 alignment because there is no easy access to the adjacent open space. This indirect impact due to human intrusion is difficult to quantify, but was considered in the selection of the bikeway's alignment. It's also worth noting that some of the human intrusion would be mitigated with fencing to deter stray trips into the adjacent open space. Fencing is used along the South Boulder Creek dirt path in the project area and has proven to be effective.

**Colorado Butterfly Plant** — This species is known to occur about 0.7 mile upstream of US 36 on Walnut Creek, but not within the construction footprint. The Colorado butterfly plant could become established along downstream portions of Walnut Creek or Dry Creek prior to construction. If present in the construction footprint, construction activities would destroy plants and soil seed banks by exposure or deep burial. In consultation with the USFWS, this project *may affect, but is not likely to adversely affect* this species, since it is not currently known to occur in the study area, but it could move into the area from its upstream location over time.

**Platte River Species** — Implementation of this project would not affect listed species that occur downstream on the Platte River in Nebraska (interior least tern, piping plover, whooping crane, and pallid sturgeon), because the project would not involve water depletions or changes in amount or timing of downstream flows. Water for construction would be obtained from municipal sources.

**Other Federally-Listed Species** — The US 36 project would not affect other listed species, including Mexican spotted owl, black-footed ferret, Canada lynx, greenback cutthroat trout, and Pawnee montane skipper, because no suitable habitat occurs within the study area or any areas that could be affected indirectly.

**Other Sensitive Species** — Impacts to other listed sensitive species that may incur moderate to high impacts are described in Table 4.14-16, Impacts to Other Sensitive Plant and Animals Species in the Study Area.

**Table 4.14-16: Impacts to Other Sensitive Plant and Animal Species in the Study Area**

Common Name	Segment Present in Study Area	Type of Impact	Relative Impact
Barn owl	Superior/Louisville and Boulder	Loss of foraging habitat, displacement from suitable habitats during construction activities. May incur disturbance or destruction of nests during construction.	Moderate — nests between February and November in cutbanks along riparian corridors and abandoned buildings. Known nesting along Rock Creek.
Bobolink	Boulder—Present in Boulder County Open Space areas on both sides of US 36 near South Boulder Creek	Disturbance to or destruction of nests from land-clearing, loss of nesting and foraging habitat. Increase in noise, both during construction and during highway operation, can negatively affect breeding activity. Indirect impacts include potential mortality from flying across highway to reach adjacent habitats.	Moderate — potential disturbance to nests or nesting individuals.
Northern leopard frog	All segments	Mortality from crushing by construction equipment or land-clearing as well as loss of habitat where any wetlands or riparian habitats are disturbed or removed.	High — construction mortality and loss of high quality wildlife habitat.
Common garter snake	All segments	Mortality from crushing by construction equipment or land-clearing as well as loss of habitat where any wetlands or riparian habitats are disturbed or removed.	High — construction mortality and loss of high quality wildlife habitat.
Dwarf wild indigo, American groundnut, narrow-leaved milkweed, gay-feather, toothcup, prairie violet, and Philadelphia fleabane	Boulder	Loss of individuals and soil seedbanks from land-clearing or earth-moving during construction.	Moderate — Project may destroy individual plants and would cause a permanent loss of habitat, but would affect only a small area and is unlikely to adversely affect viability of existing population on adjacent open space.

Source: US 36 Mobility Partnership, 2004.

Other sensitive species, including ferruginous hawk, golden eagle, northern harrier, and osprey, would incur minimal impacts; impacts to these raptors may include loss of foraging habitat and avoidance of these habitats during construction. The barn owl could be affected by the project in the riparian areas or in abandoned buildings. It is known to occur along Rock Creek. The bobolink is known to be present in the Boulder County open space near South Boulder Creek and could be directly or indirectly disturbed from increased noise and disturbance in the area. Loggerhead shrike, northern mockingbird, and northern bobwhite are considered uncommon in the study area and therefore the potential for impacts would be considered low for those birds. The northern leopard frog and common garter snake are found throughout the corridor and could be crushed or suffer from habitat loss in wetland or riparian areas during construction. Fish species, including Iowa darter, Johnny darter, and orange-spotted sunfish, would be displaced from areas of construction occurring in or near water. Additionally, effects from siltation and changes in water quality may impact fish, but these impacts would be mitigated and are considered minimal. Implementation of Package 2 would have minor impacts to sensitive butterflies; Hop's feeding azure and Ottoe skipper would have adjacent areas of suitable habitat following construction. Vegetation loss could affect sensitive plant species if individual seeds or seed banks in the soil are destroyed. However, the loss to the population as a whole would likely be minimal.

### **Indirect Impacts**

#### **All Segments**

Indirect impacts to biological resources are as follows:

- Aquatic organisms and habitats may be indirectly affected through erosion of upland soils.
- Continued development in the project area would further fragment prairie dog colonies by reducing available habitat and dividing colonies into smaller sub-populations that are vulnerable to disease, inbreeding, and predation. Additionally, indirect impacts to other species associated with prairie dogs or their burrows would occur from removal of a prairie dog colony. CDOT's Impacted Black-tailed Prairie Dog Policy (CDOT 2005) will be followed for this project. This could include relocation of prairie dogs within impacted ROW for highway improvements; a large number of individual prairie dogs would need to be relocated.
- Indirectly, wider roads reduce wildlife access to preferred habitats by further restricting connectivity, isolating populations as land becomes more fragmented, and isolating individual animals from other populations and habitat.
- Impacts to Preble's meadow jumping mouse, the Colorado butterfly plant, and Ute ladies'-tresses orchid habitat are shown in Figure 4-14.3, Habitat Areas of Threatened and Endangered Species.
- The loss of black-tailed prairie dog habitat could indirectly affect wintering bald eagle prey availability.
- Indirect effects to Preble's meadow jumping mouse from further restricting connectivity at riparian corridors may occur in some locations. However, replacement of crossing structures would increase connectivity across the highway at some locations. Other indirect effects on Preble's meadow jumping mouse include degradation of habitat caused by increased noxious weeds, habitat alteration caused by changes in hydrology and drainage patterns from development, and increased water runoff. Changes in hydrology caused by highway construction could eliminate wetlands adjacent to the highway, reducing habitat suitability for Preble's meadow jumping mice. Increased runoff could reduce water quality and result in increased flow in culverts, which would reduce connectivity under US 36 for Preble's meadow jumping mice.
- Indirect effects could occur to additional Ute ladies'-tresses orchid plants from increased competition with noxious weeds, as well as alteration of hydrology and drainage patterns in areas adjacent to the highway in the Boulder Segment.

- Indirect impacts to sensitive bird species may occur from disturbance to or destruction of nests from land-clearing, loss of nesting, and foraging habitat. Protective fencing would be installed to prevent unnecessary intrusions into sensitive habitats. Indirect impacts include potential mortality from flying across the highway to reach adjacent habitats, as described in “Other Birds” section.

### **Package 4: General-Purpose Lanes, High-Occupancy Vehicle, and Bus Rapid Transit**

#### **Direct Impacts**

##### **All Segments**

This section describes the impacts to biological resources from construction and operations of Package 4. Impacts from implementation of Package 4 would be similar to the impacts described for Package 2. Acres of impact associated with the US 36 corridor for Options A and B are provided in Tables 4.14-9 through 4.14-16.

##### **Vegetation**

Impacts to natural vegetation in Package 4 are shown in Table 4.14-9, Direct Impacts to Vegetation by Type, and Table 4.14-10, Direct Impacts to Riparian Habitats Along the US 36 Corridor. Under Package 4 Option A, the largest impact to riparian habitat would occur at Rock Creek; while under Option B, the largest riparian impacts would occur at Upper Bear Creek Ditch. These areas are protected by Senate Bill 40 and would require coordination with CDOW and mitigation of the tree and shrub impacts. Package 4 under both Options A and B would have slightly less impacts than Package 2 overall, although Package 4 would impact some of the smaller drainages more than Package 2. The difference is that Package 4 would not impact Walnut Creek, and the impacts on the west end and by Farmers Highline Canal would be substantially less than Package 2. The general types of impact under Package 4 would be the same as described for Package 2.

##### **Wildlife**

Impacts would be similar to those described for Package 2 and would include habitat loss, habitat fragmentation, disturbance (avoidance and displacement), and mortality. Acres of direct impacts to high- and moderate-quality wildlife habitat are presented in Table 4.14-11, Direct Impacts to High- and Moderate-Quality Wildlife Habitat.

**Black-tailed prairie dogs** — Impacts to black-tailed prairie dogs would be approximately 2 acres less under Package 2 than Package 4. As shown in Table 4.14-12, Impacts to Active Black-tailed Prairie Dog Colonies, for Option A, a total of 64.13 acres of black-tailed prairie dog colonies located in the Westminster, Superior/Louisville, and Boulder segments, would be impacted in Package 4. For Package 4 Option B, a total of 64.16 acres would be impacted.

##### **Sensitive Habitats and Wildlife Corridors**

Direct impacts to sensitive habitats are provided in Table 4.14-13, Direct Impacts to Sensitive Wildlife Habitats. Improvements to the US 36 corridor would affect portions of the Carolyn Holmberg Preserve, Colorado Natural Areas, and the CNHP Colorado Tallgrass Prairie PCA (see Figure 4.14-1, Important Habitats and Corridors). Removal of vegetation along the ROW at these locations would create a wider gap between habitat on each side of the highway and would contribute to habitat fragmentation in these areas.

The following section discusses the crossing structures planned at each wildlife corridor along the US 36 corridor under Package 4. The structure width is opening-to-opening, and parallel to the channel, while the length of the structure is perpendicular to the channel.

##### **Westminster Segment**

**Big Dry Creek** — Under Package 4, extension of the existing box culvert would be the same as described in Package 2, resulting in the same impacts.

### **Superior/Louisville Segment**

**Rock Creek** — The existing two-cell concrete box culvert would be replaced with a three-cell box culvert. Each cell would be 20 feet wide by 8 feet high. The culvert would be increased from 32 feet to 82 feet in length, and 240 feet in width (6 feet wider than existing) under Package 4. The increased width would be balanced by the increased opening size, and the new structure would allow continued wildlife crossing. This is 46 feet smaller (less wide) than Package 2, so it should be better for wildlife passage than Package 2.

**Coal Creek** — Under Package 4, a larger, 294-foot long bridge would be constructed with a proposed 200-foot channel bottom. The proposed three-span bridge would be 196 feet wide under Package 4. Wildlife passage would be reduced during construction but should return to existing conditions after construction. The larger bridge would reduce riparian habitat at the crossing but the bridge would provide good wildlife passage. This bridge would be 16 feet smaller (less wide) than Package 2, although the difference should be negligible.

### **Boulder Segment**

**Davidson Ditch** — The existing 26-foot long, single-cell culvert would be extended 99 feet for a total out-to-out width of 195 feet under Package 4. This is an additional 10 feet wider than for Package 2. This is likely to reduce wildlife use of this crossing due to the increased width and adversely affect connectivity between habitats in City of Boulder open space on the two sides of the highway. Habitat connectivity is particularly important here because of the presence of Preble's meadow jumping mouse in the vicinity.

**Goodhue Ditch** — Changes to this ditch crossing could include widening the crossing from the existing 160 feet to an additional 170 feet, for a total of 330 feet to cross. This is a conservative estimate but it is likely that Goodhue Ditch impacts would also reduce wildlife use and connectivity in the area. This is an additional 60 feet wider than for Package 2.

**South Boulder Creek** — Under Package 4, the proposed culvert changes and associated impacts would be the same as described under Package 2.

**South Boulder Canyon Ditch** — The existing 15-foot long by 170-foot wide ditch could be widened an additional 220 feet as a conservative estimate. This is 30 feet less wide than for Package 2. This action would likely affect wildlife use and connectivity in the South Boulder Creek floodplain.

### **Noxious Weeds**

Impacts to noxious weeds in Package 4 would be similar to those described for Package 2.

### **Fisheries and Aquatic Habitats**

The types of impacts to fisheries and aquatic habitats would be the same as those described for Package 2, except at Coal Creek and Rock Creek, where the impacts would be less since the structures would not need to be as wide as in Package 2. Direct, long-term losses of stream habitats are summarized in Table 4.14-14, Impacts to Aquatic Habitats. There would be no direct effects on lakes or ponds, but construction would occur within 100 feet of Lower Church Lake. Impacts to water quality and habitat in lakes, ponds, and streams would be minimized through use of construction BMPs to control erosion, sedimentation, and spills and is discussed in Section 4.20, Water Resources: Water Quality and Floodplains.

### **Threatened and Endangered Species**

**Preble's Meadow Jumping Mouse** — The area of habitat affected would be 50.47 acres under Option A and 54.63 acres under Option B (Table 4.14-15, Direct Habitat Loss to Threatened and Endangered Species). This is over 7 acres more than Package 2, Option A, and almost 2 acres more than Package 2, Option B. The types of impacts that would occur would be the same as described for Package 2. For Options A or B under Package 4, the project *may affect, and is likely to adversely affect*, Preble's meadow jumping mouse.

**Burrowing Owl** — High-quality habitat occurs in association with the prairie dog colonies in the Broomfield, Superior/Louisville, and Boulder segments, and acreages of impact are shown in Table 4.14-12, Impacts to Active Black-tailed Prairie Dog Colonies. The types of impacts would be similar to but less than those described for Package 2.

**Ute Ladies'-tresses orchid** — The occupied and potentially occupied habitat affected would be 41.04 acres under Option A and 46.88 acres under Option B (Table 4.14-15, Direct Habitat Loss to Threatened and Endangered Species). This is over 3 acres more than for Package 2, Option A, and 1.3 acres more than for Package 2, Option B. The types of impacts that would occur would be the same as described for Package 2. Implementation of the US 36 improvements under Package 4, Options A or B, *may affect, and is likely to adversely affect*, Ute ladies'-tresses orchids.

**Colorado Butterfly Plant** — Impacts to Colorado butterfly plant in Package 4 would be the same as described in Package 2 and would be indirect in nature.

**Other Sensitive Species** — Impacts to sensitive animal species in Package 4 would be the same as those impacts described in Package 2 and are described in Table 4.14-16, Impacts to Other Sensitive Plant and Animals Species in the Study Area.

### ***Indirect Impacts***

#### **All Segments**

Indirect impacts for Package 4 would be similar to those described for Package 2.

### **Combined Alternative Package (Preferred Alternative): Managed Lanes, Auxiliary Lanes, and Bus Rapid Transit**

### ***Direct Impacts***

#### **All Segments**

This section describes the impacts to biological resources from construction and operations of the Combined Alternative Package (Preferred Alternative). The types of impacts from implementation of the Combined Alternative Package (Preferred Alternative) would be similar to the impacts described for Packages 2 and 4. Acres of impact associated with the US 36 Combined Alternative Package (Preferred Alternative) are provided in Tables 4.14-9 through 4.14-16 and a summary of the build package comparisons are included in Tables 4.14-17 through 4.14-23. The results of the comparisons in each table are illustrated by a decrease or increase in impacts. For example, in Table 4.14-17, Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Vegetation by Type, the total impact for mesic tallgrass prairie for the Combined Alternative Package (Preferred Alternative) would be 2.60 acres, which represents an increased impact of 0.44 acre over Package 2, Option A, and a decreased impact of 0.45 acre when compared to Package 2, Option B.

**Table 4.14-17: Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Vegetation by Type**

Vegetation Type	Combined Alternative Package (Preferred Alternative) (acres)	Package 2		Package 4	
		Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)
Mesic tallgrass prairie	2.60	+0.44	-0.45	+0.44	-0.45
Midgrass prairie	54.65	+3.20	+3.20	+0.44	+0.44
Riparian woodland	5.44	-0.08	-0.21	+0.83	+0.68
Riparian shrub	7.15/7.03 <sup>1</sup>	+1.29/+1.17 <sup>1</sup>	+0.26/+0.14 <sup>1</sup>	+1.51/+1.39 <sup>1</sup>	+0.02/-0.10 <sup>1</sup>
Other (cropland, developed, and open water)	1,047.17/1,047.23 <sup>1</sup>	-124.30/-124.24 <sup>1</sup>	-121.92/-121.86 <sup>1</sup>	-64.35/-64.29 <sup>1</sup>	-72.02/-71.96 <sup>1</sup>
<b>Total in Study Area</b>	<b>1,117.01/1,116.95<sup>1</sup></b>	<b>-119.45/-119.51<sup>1</sup></b>	<b>-119.12/-119.18<sup>1</sup></b>	<b>-61.13/-61.19<sup>1</sup></b>	<b>-71.33/-71.39<sup>1</sup></b>

Source: US 36 Mobility Partnership, 2009.

**Notes:**

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>The first number is for the Combined Alternative Package (Preferred Alternative), the second is for the Local Streets Option at the west-end.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

**Vegetation**

Impacts to natural vegetation in the Combined Alternative Package (Preferred Alternative) would be similar to those described for Packages 2 and 4, and are shown in Table 4.14-17, Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Vegetation by Type, and Table 4.14-18, Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Riparian Habitats Along the US 36 Corridor. The tables also show whether the Combined Alternative Package (Preferred Alternative) impact numbers represent an increase or a decrease (in acres) when compared to impacts associated with Package 2 and Package 4. The notable changes with the Combined Alternative Package (Preferred Alternative) is a slight increase in impacts to midgrass prairie and riparian shrub when compared to Option A in Packages 2 and 4, and a large decrease in impacts to other (cropland, developed, and open water) when compared to Options A and B in Package 2 and Package 4. As in Package 2 and Package 4, there would be no direct impacts to xeric tallgrass prairie, xeric upland shrub, foothills and mountain grassland, or ponderosa pine under the Combined Alternative Package (Preferred Alternative). Also, the type of impact under the Combined Alternative Package (Preferred Alternative) would be the same as described for Package 2 and Package 4.

**Table 4.14-18: Comparison of Combined Alternative Package (Preferred Alternative)  
 Direct Impacts to Riparian Habitats Along the US 36 Corridor**

Riparian Habitat Area	Combined Alternative Package (Preferred Alternative)			Package 2 Option A/B (acres)			Package 4 Option A/B (acres)		
	Riparian Woodland	Riparian Shrub	Total	Riparian Woodland	Riparian Shrub	Total	Riparian Woodland	Riparian Shrub	Total
	Farmers Highline Canal/Niver Canal	1.04	0.18	1.22	-0.22	-0.04	-0.26	+0.13	+0.02
Walnut Creek	0.33	1.04	1.37	+0.03	+0.89	+0.92	+0.33	+1.04	+1.37
Big Dry Creek	0.44	0.15	0.59	+0.31	-0.01	+0.30A/+0.29B	+0.31A/+0.30B	+0.01	+0.32A/+0.31B
Rock Creek	0.46	0.12	0.58	-0.19	+0.02	-0.17	+0.13	+0.02A/-0.58B	+0.15A/-0.45B
Coal Creek	0.66	0.00	0.66	+0.35	0.00	+0.35	+0.32	0.00	+0.32
Marshallville Ditch	0.11	0.40	0.51	-0.03	-0.13	-0.16	-0.08	-0.23	-0.31
Shearer Ditch	0.56	0.16	0.72	-0.16	-0.20	-0.36	-0.24	-0.19	-0.43
South Boulder Creek/South Boulder Canyon Ditch	0.53	1.40	1.93	+0.08A/-0.02B	+0.4A/-0.31B	+0.48A/-0.33B	+0.12A/+0.02B	+0.4A/+0.17B	+0.52A/+0.19B
Upper Bear Creek Ditch	0.07	1.04	1.11	0.00	-0.02A/-0.33B	-0.02A/-0.33B	+0.01A/0.00B	-0.03A/-0.69B	-0.02A/-0.69B
Other miscellaneous riparian impact along US 36 corridor	1.24	2.66/2.57 <sup>1</sup>	3.90/3.81 <sup>1</sup>	-0.25A/-0.28B	+0.38 <sup>2</sup> A +0.29 <sup>3</sup> B	+0.13A/+0.10B <sup>2</sup> 0.04A/+0.01B <sup>3</sup>	-0.20A/-0.23B	+0.47 <sup>2</sup> +0.38 <sup>3</sup>	+0.27A/+0.24B <sup>2</sup> +0.18A/+0.15B <sup>3</sup>
<b>Total</b>	<b>5.44</b>	<b>7.15/7.06<sup>1</sup></b>	<b>12.59/12.50<sup>1</sup></b>	<b>-0.08A/-0.21B</b>	<b>+1.29A/+0.26B<sup>2</sup></b> <b>+1.20A/+0.17B<sup>3</sup></b>	<b>+1.21A/+1.12B<sup>2</sup></b> <b>+0.05A/-0.04B<sup>3</sup></b>	<b>+0.83A/+0.68B</b>	<b>+1.51A/+0.02B<sup>2</sup></b> <b>+1.42A/-0.07B<sup>3</sup></b>	<b>+2.34A/+0.07B<sup>2</sup></b> <b>+2.25A/-0.61B<sup>3</sup></b>

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>The first number is for the Combined Alternative Package (Preferred Alternative), the second number is for the Local Streets Option at the west-end.

<sup>2</sup>The A/B option pair is compared with number for the Combined Alternative Package (Preferred Alternative).

<sup>3</sup>The A/B option pair is compared with number for the Local Streets Option at the west-end.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to
- US 36 = United States Highway 36

Under the Combined Alternative Package (Preferred Alternative), the largest impact to riparian habitat would occur in the same riparian area as Package 2, Option B, but the impacts would be less by 0.33 acre or 15 percent. The west-end Local Street Option would impact a riparian area associated with the University of Colorado, Boulder South Campus parcel and would require mitigation. The Combined Alternative Package (Preferred Alternative) would impact the riparian areas more overall than either Package 2 or Package 4 but as described under the Package 2 impact section, some of these increases could come from refined design and better toe-of-slope impact detail. The Combined Alternative Package (Preferred Alternative) would also affect Walnut Creek, unlike Package 4 which would not impact that creek, but it would have less of an affect to some of the larger canals and creeks, like Farmers Highline Canal and South Boulder Creek, than Package 2. These riparian areas are protected by Senate Bill 40 and would require coordination with CDOW and mitigation of the tree and shrub impacts.

**Wildlife**

Impacts for the Combined Alternative Package (Preferred Alternative) would generally be less than those described for Packages 2 and 4, and would include habitat loss, habitat fragmentation, disturbance (avoidance and displacement), and mortality. Acres of direct impacts to high and moderate quality wildlife habitat are presented in Table 4.14-19, Comparison of the Combined Alternative Package (Preferred Alternative) Direct Impacts to High- and Moderate-Quality Wildlife Habitat. The table also shows whether the Combined Alternative Package (Preferred Alternative) impact numbers represent an increase or a decrease (in acres) when compared to impacts associated with Package 2 and Package 4.

**Table 4.14-19: Comparison of the Combined Alternative Package (Preferred Alternative) Direct Impacts to High- and Moderate-Quality Wildlife Habitat**

Wildlife Habitat Quality	Combined Alternative Package (Preferred Alternative) (acres)	Package 2		Package 4	
		Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)
High	86.27	+1.47	-7.16	+0.72	-6.24
Moderate	282.21	-5.48	-7.69	-5.13	-7.39
<b>Total</b>	<b>368.48</b>	<b>-4.01</b>	<b>-14.85</b>	<b>-4.41</b>	<b>-13.63</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

**Black-tailed prairie dogs** — Impacts to Black-tailed prairie dogs for the Combined Alternative Package (Preferred Alternative) would be less than those described for Packages 2 and 4. Acres of impacts are shown in Table 4.14-20, Comparison of the Combined Alternative Package (Preferred Alternative) Impacts to Active Black-tailed Prairie Dog Colonies. The table also shows whether the Combined Alternative Package (Preferred Alternative) impact numbers represent an increase or a decrease (in acres) when compared to impacts associated with Packages 2 and 4.

**Table 4.14-20: Comparison of the Combined Alternative Package (Preferred Alternative) Direct Impacts to Active Black-tailed Prairie Dog Colonies**

Segment	Combined Alternative Package (Preferred Alternative) (acres)	Package 2		Package 4	
		Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)
Denver	0	0	0	0	0
Adams	0	0	0	0	0
Westminster	12.67	+0.47	+0.47	+1.05	+1.05
Broomfield	21.11	-4.43	-4.43	-3.97	-3.97
Superior/Louisville	23.51	+0.58	+0.58	+1.98	+1.98
Boulder	0	-5.4	-5.51	-5.90	-5.93
<b>Total</b>	<b>57.29</b>	<b>-8.78</b>	<b>-8.89</b>	<b>-6.84</b>	<b>-6.87</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

### Sensitive Habitats and Wildlife Corridors

Improvements to the US 36 corridor would affect portions of the Carolyn Holmberg Preserve, Colorado Natural Areas, and the CNHP Colorado Tallgrass Prairie PCA (see Figure 4.14-1, Important Habitats and Corridors). Removal of vegetation along the ROW at these locations would create a wider gap between habitats on each side of the highway and would contribute to habitat fragmentation in these areas. Direct impacts to these sensitive habitats are slightly less overall in the Combined Alternative Package (Preferred Alternative) when compared to Package 2 and Package 4. The only increase in impact under Package 2, Option A, is associated with the Colorado Tallgrass Prairie PCA.

Acres of impacts are provided in Table 4.14-21, Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Sensitive Wildlife Habitats. The table also shows whether the Preferred Alternative impact numbers represent an increase or a decrease (in acres) when compared to impacts associated with Packages 2 and 4.

**Table 4.14-21: Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts to Sensitive Wildlife Habitats**

Segment	Sensitive Area	Combined Alternative Package (Preferred Alternative) (acres)	Package 2		Package 4	
			Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)
Broomfield and Superior/Louisville	Carolyn Holmberg Preserve/Rock Creek Farm Open Space	14.39	-6.11	-6.11	-1.14	-1.14
Boulder	South Boulder Creek Natural Area	42.59	-1.80	-10.78	-2.45	-9.82
	Colorado Tallgrass Prairie Natural Area	11.34	-0.01	-0.01	-0.58	-0.58
	Colorado Tallgrass Prairie Potential Conservation Area <sup>1</sup>	94.50	+0.75	-9.10	-4.80	-12.98
<b>Total</b>		<b>105.87</b>	<b>-8.38</b>	<b>-18.23</b>	<b>-8.96</b>	<b>-17.14</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

<sup>1</sup>The area creating the Colorado Tallgrass Prairie Natural Area and Potential Conservation Area includes portions of the South Boulder Creek Natural Area and the Colorado Tallgrass Prairie Natural Area. As a result, the total area of sensitive wildlife habitats is not calculated by adding the sums of each sensitive area.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

The following section discusses the crossing structures planned at each wildlife corridor along US 36 under the Combined Alternative Package (Preferred Alternative). The structure width is opening-to-opening, and parallel to the channel, while the length of the structure is perpendicular to the channel.

#### **Westminster Segment**

**Big Dry Creek** — Under the Combined Alternative Package (Preferred Alternative), extension of the existing box culvert would be the same as described in Packages 2 and 4, resulting in the same impacts.

#### **Superior/Louisville Segment**

**Rock Creek** — The existing two-cell concrete box culvert would be replaced with a three-cell box culvert. Each cell would be 20 feet wide by 8 feet high. The culvert would be increased from 32 feet to 52 feet in length, and to 267 feet in width (34 feet wider than existing, which is less than Package 2 but more than Package 4) under the Combined Alternative Package (Preferred Alternative). The increased width would be balanced by the increased opening size, and the new structure would allow continued wildlife crossing.

**Coal Creek** — Under the Combined Alternative Package (Preferred Alternative), a larger, 294-foot-long bridge would be constructed with a proposed 200-foot channel bottom. The proposed three-span bridge would be 189 feet wide under the Combined Alternative Package (Preferred Alternative), 98 feet wider than existing but less of a width change than Package 2 and Package 4. Wildlife passage would be reduced during construction but should return to existing conditions after construction. The larger bridge would reduce riparian habitat at the crossing but the bridge would provide good wildlife passage.

#### **Boulder Segment**

**Davidson Ditch** — The existing 26-foot-long, single-cell culvert would be extended a conservative estimate of 330 feet for a total out-to-out width of 440 feet under the Combined Alternative Package (Preferred Alternative). This is 30 feet wider than Package 4 and 40 feet wider than Package 2. This would likely reduce wildlife use of this crossing due to the increased width, and would adversely affect connectivity between habitats in City of Boulder open space on the two sides of the highway, although at this length, the extra few feet would probably not matter too much to the overall structure intimidation factor. Habitat connectivity is particularly important here because of the presence of Preble's meadow jumping mouse in the vicinity.

**Goodhue Ditch** — Changes to this ditch under the Combined Alternative Package (Preferred Alternative) would be the same as for Package 2 which adds an additional 110 feet to the width as a conservative estimate, but is less than Package 4 which would add 170 feet to the width. However, this ditch, which is 160 feet wide, would almost double in width and could cause wildlife to avoid using this crossing.

**South Boulder Creek** — Under the Combined Alternative Package (Preferred Alternative), the proposed culvert changes and associated impacts would be the same as described under Package 2 and Package 4, which would be only a 40-foot addition to the width. This change may not cause that great of an impediment to the movement of wildlife.

**South Boulder Canyon Ditch** — The existing 15-foot long by 170-foot wide ditch could be widened an additional 190 feet as a conservative estimate. This action would be less than the 250-foot and 220-foot width addition of Package 2 and Package 4, respectively, but would still double the width. This action is likely to affect wildlife use and connectivity in the South Boulder Creek floodplain.

#### **Noxious Weeds**

Impacts to noxious weeds in the Combined Alternative Package (Preferred Alternative) would be similar to those described for Package 2 and Package 4.

#### **Fisheries and Aquatic Habitats**

The types of impacts to fisheries and aquatic habitats would be the same as those described for Package 2 and Package 4. Direct, long-term losses of stream habitats are summarized in Table 4.14-22, Impacts to Aquatic Habitats. Impacts to the existing private detention ponds are intended to be accounted for within

the proposed footprint for the Combined Alternative Package (Preferred Alternative). Impacts to Coal Creek and Rock Creek would be less under the Combined Alternative Package (Preferred Alternative) than for Package 2 and Package 4, especially where the Rock Creek stream channel would have to be relocated. Construction would occur within 100 feet of Lower Church Lake. Impacts to water quality and habitat in lakes, ponds, and streams would be minimized through use of construction BMPs to control erosion, sedimentation, and spills.

**Table 4.14-22: Impacts to Aquatic Habitats**

Segment	Aquatic Habitat	Construction Activity	Long-term Loss or Modification of Aquatic Habitat <sup>1</sup>		
			Combined Alternative Package (Preferred Alternative)	Package 2	Package 4
Denver	N/A	N/A	N/A	N/A	N/A
Adams	N/A	N/A	N/A	N/A	N/A
Westminster	Big Dry Creek	Extension of existing culvert	Additional 150 feet of stream channel in culvert	Additional 130 feet of stream channel in culvert	Same as Package 2
Broomfield	N/A	N/A	N/A	N/A	N/A
Superior/Louisville	Rock Creek	New box culvert	Additional 34 feet of stream channel in culvert	Additional 52 feet of stream channel in culvert	Additional 6 feet of stream channel in culvert
		Relocation of stream channel on south side of highway	Negligible relocation of stream channel	1,400 feet of stream channel relocated	Same as Package 2
	Coal Creek	New bridge	Additional 98 feet of stream channel under bridge	Additional 121 feet of stream channel under bridge	Additional 105 feet of stream channel under bridge
Boulder	South Boulder Creek	Widen existing bridge	Additional 40 feet of stream channel under bridge	Same as the Combined Alternative Package (Preferred Alternative)	Same as the Combined Alternative Package (Preferred Alternative)

Source: US 36 Mobility Partnership, 2009.

Notes:

<sup>1</sup>Excludes existing stream channel within culverts or under bridge.

N/A = not applicable

### Threatened and Endangered Species

**Preble’s meadow jumping mouse** — Impacts to Preble’s meadow jumping mouse for the Combined Alternative Package (Preferred Alternative) would be less than those described for Package 2 and Package 4, although the types of impacts that would occur would be the same. For the Combined Alternative Package (Preferred Alternative), the project *may affect, and is likely to adversely affect*, the Preble’s meadow jumping mouse.

**Burrowing owl** — High-quality habitat occurs in association with the prairie dog colonies in the Broomfield, Superior/Louisville, and Boulder segments, and acreages of impact are shown in Table 4.14-20, Comparison of the Combined Alternative Package (Preferred Alternative) Direct Impacts to Active Black-tailed Prairie Dog Colonies. Impacts to burrowing owl for the Combined Alternative Package (Preferred Alternative) would be less than those described for Packages 2 and 4, and the types of impacts would be similar.

**Ute Ladies’-tresses orchid** — Impacts to Ute Ladies’-tresses orchid for the Combined Alternative Package (Preferred Alternative) would be less than those described for Package 2 and Package 4, and the types of impacts that would occur would be the same. Implementation of the US 36 improvements under the Combined Alternative Package (Preferred Alternative) *may affect, and is likely to adversely affect*, Ute ladies’-tresses orchids.

The Combined Alternative Package (Preferred Alternative) acres of impacts to Preble’s meadow jumping mouse, burrowing owl, and Ute ladies’-tresses orchid are provided in Table 4.14-23, Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts — Habitat Loss to Threatened and Endangered Species. The table also shows whether the Combined Alternative Package (Preferred Alternative) impact numbers represent an increase or a decrease (in acres) when compared to impacts associated with Package 2 and Package 4.

**Table 4.14-23: Comparison of Combined Alternative Package (Preferred Alternative) Direct Impacts — Habitat Loss to Threatened and Endangered Species**

Species	Combined Alternative Package (Preferred Alternative) (acres)	Package 2		Package 4	
		Option A (acres)	Option B (acres)	Option A (acres)	Option B (acres)
Preble's meadow jumping mouse	41.71	-1.60	-11.10	-8.76	-12.92
Ute ladies'-tresses orchid	35.94	-1.98	-9.65	-5.10	-10.94
Burrowing owl	63.29	-2.75	-2.86	-0.84	-0.88

Source: US 36 Mobility Partnership, 2006 and 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

- + = The Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = The Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

**Colorado Butterfly Plant** — Impacts to the Colorado butterfly plant in the Combined Alternative Package (Preferred Alternative) would be less than those described in Package 2 and Package 4. In consultation with the USFWS, implementation of the US 36 improvements under the Combined Alternative Package (Preferred Alternative) *may affect, but is not likely to adversely affect* the Colorado butterfly plant because the upstream populations could move into the project area over time.

**Other Sensitive Species** — Impacts to sensitive animal species in the Combined Alternative Package (Preferred Alternative) would be the same as those impacts described in Package 2 and Package 4 and are described in Table 4.14-16, Impacts to Other Sensitive Plant and Animals Species in the Study Area.

**Indirect Impacts**

**All Segments**

Indirect impacts for the Combined Alternative Package (Preferred Alternative) would be similar to those described for Packages 2 and 4.

**Mitigation**

Mitigation techniques to reduce impacts to biological resources are described in detail in Table 4.14-24, Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species.

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Loss of vegetation including sensitive habitats	Construction	<ul style="list-style-type: none"> <li>• During final design, the grading plan will be developed to minimize the removal of riparian vegetation where possible.</li> <li>• During construction, vehicle operation will be limited to the designated construction area, and the limits of the construction area will be fenced to exclude and protect sensitive habitats, including prairie dog towns, riparian areas, wetlands, and upland trees and shrubs.</li> <li>• Silt fencing, erosion logs, temporary berms, and other BMPs may be used to prevent degradation of habitats adjacent to the construction area by transport of eroded sediment.</li> <li>• Graded areas within the right-of-way will be seeded with an appropriate mixture of native grasses and forbs; shrubs will be planted where appropriate.</li> <li>• Restoration of disturbed riparian habitat will include planting of native trees and shrubs, as well as seeding and regrading. Native grasses, forbs, and shrubs will also be seeded in riparian areas. SB 40 requires replacement of riparian trees at a 1:1 ratio, and shrubs on a square-foot basis.</li> <li>• To compensate for the effects of riparian habitat loss, equivalent areas of riparian habitat will be enhanced or restored. This may include, but is not limited to, the planting of native trees and shrubs, control of noxious weeds, the seeding of native species, or establishment of conservation easements on riparian areas in the vicinity of the project.</li> <li>• All landscaping, such as trees, shrubs, lawn, perennials, and in some cases, native grasses, will be replaced where it was removed. CDOT Region 6 tree replacement policy will be followed.</li> <li>• See also landscaping removal mitigation under Section 4.11, Visual and Aesthetic Resources.</li> <li>• Impacts to sensitive areas will be avoided or minimized during final design, including the South Boulder Creek Natural Area and the Colorado Tallgrass Prairie PCA.</li> </ul>
Loss of prairie dog colonies	Construction	<p>CDOT has a state-wide policy on black-tailed prairie dog mitigation that will be implemented for prairie dogs located within the US 36 corridor. This policy identifies a four-step process to be used when black-tailed prairie dogs may be affected by a project:</p> <ul style="list-style-type: none"> <li>• Avoidance of impacts</li> <li>• Minimization of impacts</li> <li>• Relocation</li> <li>• If relocation is impossible or impractical, impacted black-tailed prairie dogs will be humanely removed from burrows that will be directly affected by the project, and donated for feeding of captive black-footed ferrets or raptors. The remaining individuals to be affected will be humanely euthanized.</li> </ul> <p>Additionally, each of the county or city municipalities within the study area has policies for the management of prairie dogs on their property. These policies are generally similar to CDOT's policy in the steps required: avoidance, relocation, live-trapping, or lethal control.</p>

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Disturbance to nesting raptors that could result in nest failure	Construction	<ul style="list-style-type: none"> <li>Trees in the construction footprint will be cleared prior to December 1 or after August 31 to prevent raptors (and other birds) from nesting (including courtship) on-site and to avoid the take of or disturbance to active nests during the breeding and courtship season. If construction is planned to begin after December 1 or prior to August 31, nest surveys will be conducted by a qualified biologist prior to construction to determine the absence or presence of nesting migratory birds. The USFWS Colorado Field Office will be contacted for further guidance if the field surveys identify the existence of active bird nests that cannot be avoided by construction activities. CDOW recommended no-work buffer zones are 0.5 mile for raptor nests and 50 feet for other migratory bird nests. CDOW will be contacted for further guidance if the field surveys identify the existence of active nests within these zones that cannot be avoided by construction activities.</li> <li>Raptor nest surveys will be conducted annually during an appropriate season (generally May 1 through June 1) to determine the presence of active raptor nests. If an active nest is located, monitoring or seasonal buffers may be established and coordinated with CDOW to prevent disturbance to nesting birds during construction.</li> <li>Protective buffer zones may be established around active nests during construction to avoid disturbance while nesting, if deemed necessary.</li> <li>Individual trees important for raptor perching that are to be removed in the right-of-way will be replaced at a 1:1 ratio or as specified by state and federal wildlife agencies to ensure raptor perch trees are replaced for future use. New trees may be planted near areas that naturally receive adequate water, such as near drainage areas or wetlands, or as determined by CDOT to ensure survival (if irrigation is available, that would be sufficient as well). Sapling trees in riparian mitigation areas may require initial watering for establishment.</li> <li>Artificial perches may be erected where important large perch trees are removed to provide perches until newly planted trees have matured.</li> </ul>
Potential loss of eggs or young of nesting migratory birds	Construction	<ul style="list-style-type: none"> <li> Destruction or disturbance of nests that results in loss of eggs or young is a violation of the MBTA. To comply with the MBTA (USFWS 2004), land-clearing activities will be timed to avoid the breeding season (primarily April 1 through August 31, but differs according to species) to avoid impacts to active bird nests, as described for raptors (see the first bullet above). In addition, any reconstruction of bridge structures may destroy or disturb swallows nesting on the underside of the bridge. Bridge reconstruction and demolition may be scheduled to avoid impacts to these birds, or actions to discourage nesting activities will be taken prior to the nesting season and will be continued through demolition. Birds that establish a nest in an active construction zone do so at their own risk and are not subject to this protection – a final determination of this status would be made by the CDOT wildlife biologist.</li> </ul>
Disruption/blockage of existing wildlife corridors and habitat fragmentation	Operations	<p><b>Specific Recommendations –</b></p> <ul style="list-style-type: none"> <li>Big Dry Creek — the City of Westminster/Urban Drainage agreement that does not allow modification of the hydraulic capacity of the existing structures should be revisited to allow either a separate dry crossing for wildlife (preferred), or modification of the existing stream culvert to facilitate wildlife movement.</li> <li>Rock Creek — replace triple box culvert with a bridge in the Combined Alternative Package (Preferred Alternative). The bridge would have an opening large enough to facilitate wildlife movement.</li> <li>Davidson, Goodhue, and Marshallville ditches — the culvert openings may be enlarged to compensate for increased length, and should be modified to facilitate wildlife crossing, or a separate dry crossing provided.</li> <li>Box culverts will be installed where feasible for small- to medium-sized animal crossings between the unnamed ditch on Davidson Mesa and Davidson Ditch; between South Boulder Creek and Upper Dry Creek Ditch; and west of 88<sup>th</sup> Street.</li> <li>Oversize culverts and/or modified culverts or dry culverts will be installed, where feasible, to facilitate wildlife crossing at Allen Ditch, Niver Canal, Farmers Highline Canal, Equity Ditch, Community Ditch, the unnamed tributary of Rock Creek, and the unnamed ditch on Davidson Mesa.</li> </ul>

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Disruption/blockage of existing wildlife corridors and habitat fragmentation (continued)	Operations (continued)	<p><b>General Guidelines for Wildlife Crossings —</b></p> <ul style="list-style-type: none"> <li>• Promote the improvement of wildlife corridors and connectivity to the extent practicable.</li> <li>• Where feasible, box culverts will be replaced with bottomless box culverts or bridges with natural substrate to promote animal usage. Where new culverts will be installed, bottomless box culverts or bridges will be used. Culverts will be installed in proximity to tree/shrub cover if possible, and will protect existing trees and shrubs near culverts and bridges from unnecessary encroachment and loss of habitat. Detailed final design will address protection from stormwater scour and sedimentation within proposed bottomless box culverts.</li> <li>• Bridge structures should span the largest amount of riparian habitat possible under a constructed bridge to limit the amount of disturbance to vegetation and to allow for dry passage along the water's edge. Riparian areas with dense vegetation are favored by many species for travel corridors.</li> <li>• Where feasible, large animal underpasses could be utilized to promote connectivity and movement. In general, riparian areas within the corridor would provide the most practical locations for large animal underpasses. Minimum dimensions for a large animal underpass should be 8-feet tall by 24-feet wide, with an openness ratio calculated in meters of 0.9 to 2.0 (height x width/length [meters]). As the width of the roadway increases, the height and width of the underpass structure should be increased proportionately. This openness will prevent a tunneling effect that would discourage animal use. Bridges and culverts will meet an openness ratio greater than 0.9 where it makes engineering sense.</li> <li>• Where feasible, if a stream or ditch conveys water, animals will be provided a shelf or a raised dry ledge on the side of the channel above ordinary high water to use as a dry walkway under the structure under normal flows. Shelves will be at least 1 foot higher than the normal water level and at least 1.3 feet wide to be effective (Forman et al. 2002).</li> <li>• Where feasible, vegetative debris, such as old stumps, logs, and small brush will be placed along one edge of the bottom of an underpass (approximately 1 foot wide) as cover for small mammals and amphibians when crossing. Vegetative debris will be anchored in place.</li> <li>• Crossing structures (i.e., culverts) should have natural bottom substrates, such as coarse sand, to facilitate wildlife use. Materials such as riprap and concrete should be avoided at culvert entrances and floors, if feasible.</li> </ul> <p><b>Recommendations for Small Animal Crossings —</b></p> <ul style="list-style-type: none"> <li>• Small animals will use small-diameter culverts (less than 3 feet in diameter) more than large culverts. Reptiles prefer circular pipes, while amphibians, rabbits, and domestic animals prefer rectangular vessels. Therefore, a variety of types of small animal crossings would be most effective.</li> <li>• Small animal culvert size would be less than 5 feet in diameter or height.</li> <li>• Where feasible, vegetative debris, such as old stumps, logs, and small brush will be placed along one edge of the bottom of an underpass (approximately 1 foot wide) as cover for small mammals and amphibians when crossing. Vegetative debris will be anchored in place.</li> </ul>
Spread of noxious weeds	Construction	<p>An integrated Noxious Weed Management Plan may be developed during final design in consultation with appropriate land management agencies where designated sensitive habitats occur and project work will extend over several years, or be handled in the plans and specifications as directed by CDOT biologists in consultation with these agencies. This plan will be implemented during construction and may include identification of noxious weeds in the area, weed management goals and objectives, and preventive and control methods. Upon completion of project construction, the area would fall under the control of a local or CDOT maintenance plan. Preventive measures may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>• Contractor vehicles may be inspected before they are used for construction to ensure that they are free of soil and debris capable of transporting noxious weed seeds or roots. Heavy construction equipment may be cleaned.</li> <li>• Noxious weeds observed in and near the construction area at the start of construction will be treated with herbicides or physically removed to prevent seeds blowing into disturbed areas during construction.</li> <li>• Periodic surveys should occur during the construction period to identify and treat noxious weeds that have developed, depending on how long the project is under construction.</li> <li>• Potential areas of topsoil salvage will be assessed for presence and abundance of noxious weeds prior to salvage. Topsoil from heavily infested areas will either be treated by spraying, taking it off site, or burying it during construction.</li> </ul>

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Spread of noxious weeds (continued)	Construction (continued)	<ul style="list-style-type: none"> <li>Disturbed areas will be reclaimed in phases throughout the project construction and seeded using a permanent native seed mixture. If areas are completed and permanent seeding cannot occur due to the time of year, mulch and mulch tackifier will be used for temporary erosion control until seeding can occur. Fertilizer will not be used in seeded areas because it can enhance the growth of noxious weeds at the expense of desired vegetation.</li> <li>Only certified weed-free mulch and bales will be used on the project (Title 35, Article 27.5, Forage Crop Certification 35-27.5-101).</li> <li>Weed control may use the principles of integrated pest management to treat target weed species efficiently and effectively by using a combination of two or more management techniques (biological, chemical, mechanical, and/or cultural). Weed control methods may be selected based on the management goal for the species, the nature of the existing environment, and methods recommended by Colorado State University, county weed boards, and other weed experts, but will keep in mind the applicability of these methods during construction and the likelihood that these methods will be used. The presence of important wildlife habitat or threatened and endangered species will be considered when choosing control methods.</li> </ul>
Potential loss of fisheries and aquatic habitat	Construction/Operations	<ul style="list-style-type: none"> <li>BMPs will be used to control erosion and sedimentation during construction and to protect water quality in streams. BMPs may include berms, brush barriers, check dams, erosion control blankets, filter strips, sandbag barriers, sediment basins, sheet mulching, silt fences, straw-bale barriers, surface roughening, and/or diversion channels. A spill prevention and emergency response plan will be prepared and used during construction for storage, handling and use of chemicals, fuels, and similar products.</li> <li>Under Colorado SB 40, any project affecting SB 40 jurisdictional streams, their banks, or tributaries is required to consult with CDOW. Following final design, an application for SB 40 Wildlife Certification may be required if the project does not fall within CDOT's Programmatic Agreement with CDOW, including detailed plans and specifications. CDOW will review the plans to ensure that they are technically adequate to protect and preserve fish and wildlife resources, and provide recommendations or alternative plans if the project would adversely affect a stream.</li> <li>Streams requiring channelization, realignment, or diversion will be restored equal to or better than pre-construction conditions, and restoration will be addressed in the Section 404 permit. Stream restoration should create a meandering channel with varying side slopes rather than a straight, trapezoidal channel, and should include pools and other habitat features. To control erosion, bioengineering or the use of plants to control erosion may be used instead of riprap or other unnatural bank stabilization techniques. Banks will be planted with native plant species.</li> <li>Also refer to Section 4.20, Water Resources: Water Quality and Floodplains, and Section 4.22, Construction-Related Impacts.</li> </ul>
Loss of listed FT and FE species or their habitat	Construction/Operations	<p>FHWA and FTA have initiated consultation with the USFWS. A PBA will be released with the FEIS for public comment. Conservation measures for impacts to federally-listed species were developed as part of the PBA. During final design, detailed mitigation measures related to threatened and endangered species will be developed in consultation with the USFWS. The following mitigation measures are proposed:</p> <p><b>Preble's meadow jumping mouse</b> —</p> <ul style="list-style-type: none"> <li>Direct impacts (death) will be avoided or minimized by use of silt fencing or similar visible barriers, restrictions in the area of disturbance, and construction limited to the non-active season (November 1 through April 30) in occupied habitat.</li> <li>Occupied habitat removed for project construction will be replaced through creation or enhancement of suitable habitat. Mitigation areas should link fragmented habitat patches by restoring areas of non-habitat between zones of occupied habitat. Mitigation for Preble's meadow jumping mouse could be coordinated with wetlands and riparian mitigation, where possible. A complete list of conservation measures will be developed through formal consultation with the USFWS.</li> <li>Small mammal ledges should be used in culverts to enhance mouse mobility.</li> </ul>

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Loss of listed FT and FE species or their habitat (continued)	Construction/Operations (continued)	<p><b>Ute ladies'-tresses orchid</b> —</p> <ul style="list-style-type: none"> <li>Surveys will be conducted to identify and map Ute ladies'-tresses orchid or habitat within and adjacent to the construction footprint in the area from Davidson Ditch to the west edge of Van Vleet open space. Surveys should be conducted for 3 years, when feasible, because the number of flowering plants varies widely from year, and would be done prior to final design. Surveys will be done during the flowering season by qualified botanists.</li> <li>Impacts will be avoided or minimized, where possible, by relocation of project components, such as detention ponds; by use of roadside ditches instead of ponds for water quality control; and/or by narrowing of the construction footprint.</li> <li>Project components within Ute ladies'-tresses orchid habitat will be designed to not adversely affect the hydrology of adjacent Ute ladies'-tresses orchid habitat. Monitoring wells may be needed to assess pre-construction water levels and to monitor changes during and after construction.</li> <li>In Colorado, the primary mitigation for unavoidable impacts to plants and habitat will be protection or enhancement of other existing populations. The conservation requirements will be commensurate with the level of impact, and will be determined in consultation with the USFWS.</li> <li>Ute ladies'-tresses orchids that cannot be avoided will be transplanted to a mitigation site or to a botanial garden. Removal and transplant of Ute ladies'-tresses orchids or the topsoil of their habitat will be conducted by botanists after tubers have formed in the fall. Detention ponds may be designed to provide suitable habitat for Ute ladies'-tresses orchids and may serve as transplant sites. Selection of a mitigation site will be coordinated with the mitigation for the Preble's meadow jumping mouse and wetlands, and will consider habitat suitability, benefits to the species, and provisions for long-term management and protection.</li> </ul> <p><b>Colorado Butterfly Plant</b> —</p> <ul style="list-style-type: none"> <li>Surveys will be conducted within and adjacent to the construction footprint at Dry Creek and Walnut Creek. If Colorado butterfly plants are found, CDOT will consult with the USFWS regarding appropriate conservation measures.</li> </ul>
Potential loss of state-listed threatened or endangered species and other sensitive species	Construction	<p><b>Burrowing Owl</b> —</p> <ul style="list-style-type: none"> <li>Surveys will be conducted between April 1 and July 31 of the construction year to determine the presence of burrowing owls and the locations of occupied nests. If nests are identified, construction will be avoided within 50 yards (150 feet) of an active nest site from April 1 to July 31 or as determined necessary by a CDOT wildlife biologist.</li> <li>If a nest becomes occupied after the start of active construction, a seasonal buffer zone will be required to prevent violation of the MBTA.</li> </ul> <p><b>Other Sensitive Animal Species</b> —</p> <ul style="list-style-type: none"> <li>Mitigation for nesting ospreys will be the same as for raptors (see above).</li> <li>Pre-construction nest surveys will be conducted for barn owls in dirt cutbanks in suitable riparian habitat (such as Walnut Creek) prior to construction if land clearing occurs between April 1 and September 30.</li> <li>Land-clearing activities will be avoided in known bobolink nesting habitat in the Boulder Segment during their nesting season (May 15 through July 30) unless the habitat has been surveyed by a qualified biologist and no nests were found to be present.</li> <li>To mitigate for impacts to common garter snakes in areas where BMPs will control erosion, coconut-straw erosion blankets with a biodegradable thread will be used rather than TRMs, which can harm snakes. The framework will be manufactured with openings of sufficient size and "give" to allow for safe passage of snakes through the blanket. Use of a netless excelsior blanket (Curlex Net-Free brand) combined with a heavy woven coir mat has been found successful (install the coir mat on top of the netless excelsior and anchor down).</li> </ul>

**Table 4.14-24: Mitigation Measures – Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species**

Impact	Impact Type	Mitigation Measures
Potential loss of state-listed threatened or endangered species and other sensitive species (continued)	Construction (continued)	<p><b>Other Sensitive Plant Species —</b></p> <ul style="list-style-type: none"> <li>Prior to construction, presence/absence surveys will be conducted for all areas that would be affected by project activities within designated sensitive habitats, including the South Boulder Creek Natural Area, Colorado Tallgrass Prairie Natural Area, and Colorado Tallgrass Prairie PCA. The survey(s) will be conducted by qualified botanists during an appropriate season for best observation and identification of the sensitive species. If found, mitigation for impacts to these sensitive habitats (which includes mesic and xeric tallgrass communities) will be developed based on the relative numbers of plants that would be affected, the potential for avoidance or minimization of impacts, and the potential for transplanting of individuals and seedbeds to suitable habitat on adjoining property. Mitigation measures will be developed in consultation with the land management agencies where the impacts will occur.</li> </ul>

Source: US 36 Mobility Partnership, 2006.

Notes:

- BMP = best management practice
- CDOT = Colorado Department of Transportation
- CDOW = Colorado Department of Wildlife
- FE = federally-endangered
- FEIS = Final Environmental Impact Statement
- FHWA = Federal Highway Administration
- FT = federally-threatened
- FTA = Federal Transit Administration
- MBTA = Migratory Bird Treaty Act
- PBA = Programmatic Biological Assessment
- PCA = Potential Conservation Area
- SB = Senate Bill
- TRM = turf reinforcement mats
- USFWS = U.S. Fish and Wildlife Service
- US 36 = United States Highway 36

