



I-70 Floyd Hill to Veterans Memorial Tunnels

Terrestrial Wildlife and Aquatic Species
Technical Report
May 2021

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List of Acronyms

ALIVE	A Landscape Level Inventory of Valued Ecosystem Components
BGEPA	Bald & Golden Eagle Protection Act
BLM	Bureau of Land Management
BMPs	Best management practices
CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CMGC	Construction Manager/General Contractor
CPW	Colorado Parks and Wildlife
CR	County Road
CSS	Context Sensitive Solution
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
I-70	Interstate Highway 70
ITF	Issue Task Force
LIZ	Linkage interference zone
MBTA	Migratory Bird Treaty Act
MEXL	Mountain Express Lane
MOU	Memorandum of Understanding
MP	Milepost
NEPA	National Environmental Policy Act
NLCD	National Land Cover Database
PEIS	Programmatic Environmental Impact Statement
ROD	Record of Decision
SB 40	Senate Bill 40
SGCN	Species of Greatest Conservation Need
SWAP	State Wildlife Action Plan
SWEEP	Stream and Wetland Ecological Enhancement Program
TESP	Terrestrial Ecological System Patches
US 6	U.S. Highway 6
US 40	U.S. Highway 40
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WVC	wildlife-vehicle collision

1. Introduction and Purpose of this Report

The Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA), in cooperation with local communities and other agencies, are conducting the Interstate 70 (I-70) Floyd Hill to Veterans Memorial Tunnels Environmental Assessment (EA) to advance a portion of the program of improvements for the I-70 Mountain Corridor identified in the 2011 Tier 1 *Final I-70 Mountain Corridor Programmatic Environmental Impact Statement* (PEIS) and approved in the 2011 *I-70 Mountain Corridor Record of Decision* (ROD). The EA is a Tier 2 National Environmental Policy Act (NEPA) process and is supported by resource-specific technical reports.

The purpose of this technical report is to document the existing conditions, impacts, and mitigation for terrestrial wildlife and aquatic species, including their habitats in the Study Area. This report also includes a description of the applicable laws and regulations and a summary of the resource analysis and mitigation framework from the PEIS and ROD. Additional information about terrestrial wildlife and aquatic species habitat is presented in the *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020a) and the *I-70 Floyd Hill to Veterans Memorial Tunnels Vegetation and Noxious Weeds Technical Report* (CDOT, 2020b). Federal and state threatened and endangered species and species of special concern are addressed in the *I-70 Floyd Hill to Veterans Memorial Tunnels Threatened and Endangered Species Technical Report* (CDOT, 2020c).

2. Proposed Action and Alternatives

2.1. Description of Proposed Action and Alternatives

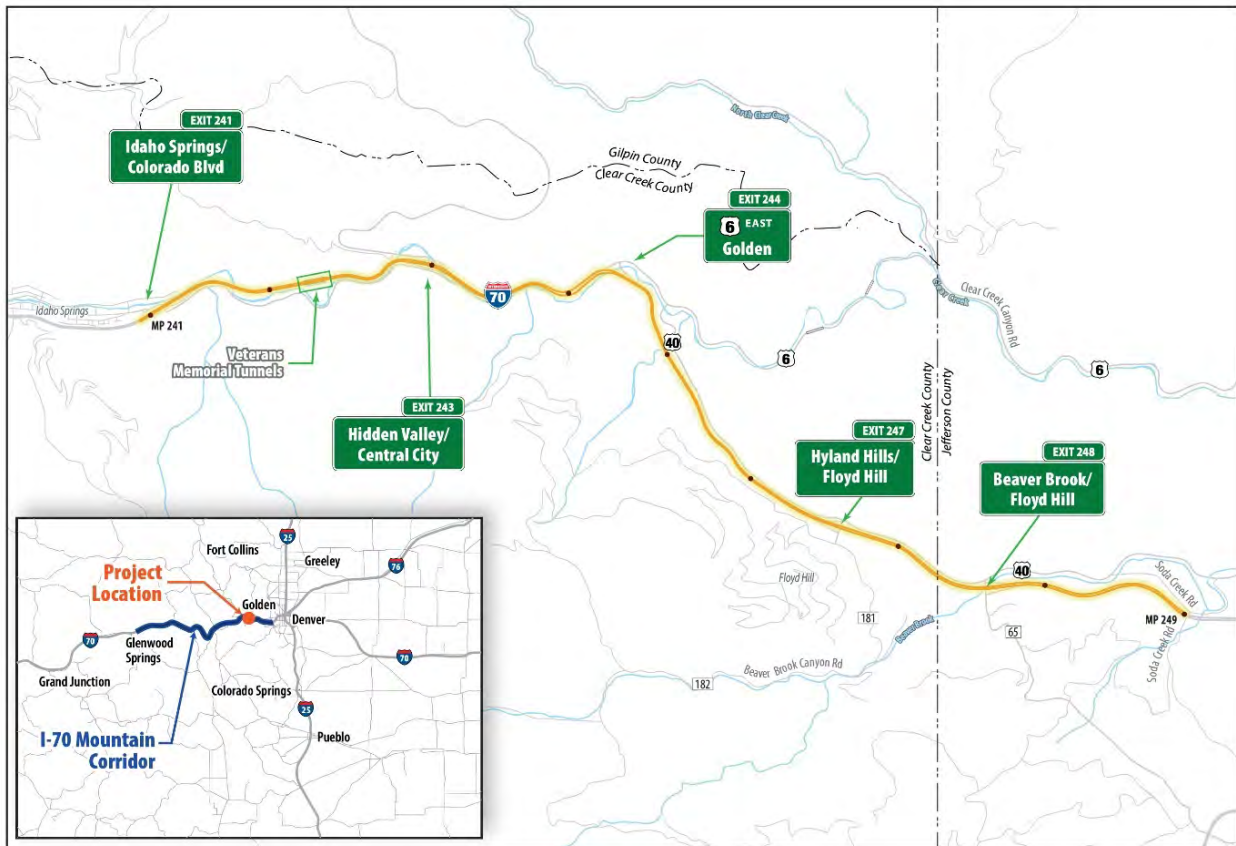
CDOT and FHWA propose improvements along approximately 8 miles of the I-70 Mountain Corridor from the top of Floyd Hill through the Veterans Memorial Tunnels to the eastern edge of Idaho Springs. The purpose of the Project is to improve travel time reliability, safety, and mobility, and address the deficient infrastructure through this area.

The major Project elements include:

- Adding a third westbound travel lane to the two-lane section of I-70 from the current three-lane to two-lane drop (approximately milepost [MP] 246) through the Veterans Memorial Tunnels
- Constructing a new frontage road between the U.S. Highway 6 (US 6) interchange and the Hidden Valley/Central City interchange
- Improving interchanges and intersections throughout the Project Area
- Improving design speeds and stopping sight distance on horizontal curves
- Adding an eastbound auxiliary lane to I-70 on Floyd Hill between the US 6 interchange and the Hyland Hills/Floyd Hill interchange
- Improving the multimodal trail (Clear Creek Greenway) between US 6 and the Veterans Memorial Tunnels
- Reducing wildlife-vehicle collisions (WVCs) and improving wildlife connectivity with new and/or improved wildlife overpasses or underpasses
- Providing two permanent air quality monitors at Floyd Hill and Idaho Springs to collect data on local air quality conditions and trends
- Coordinating rural broadband access with local communities, including providing access to conduits and fiber in the interstate right-of-way

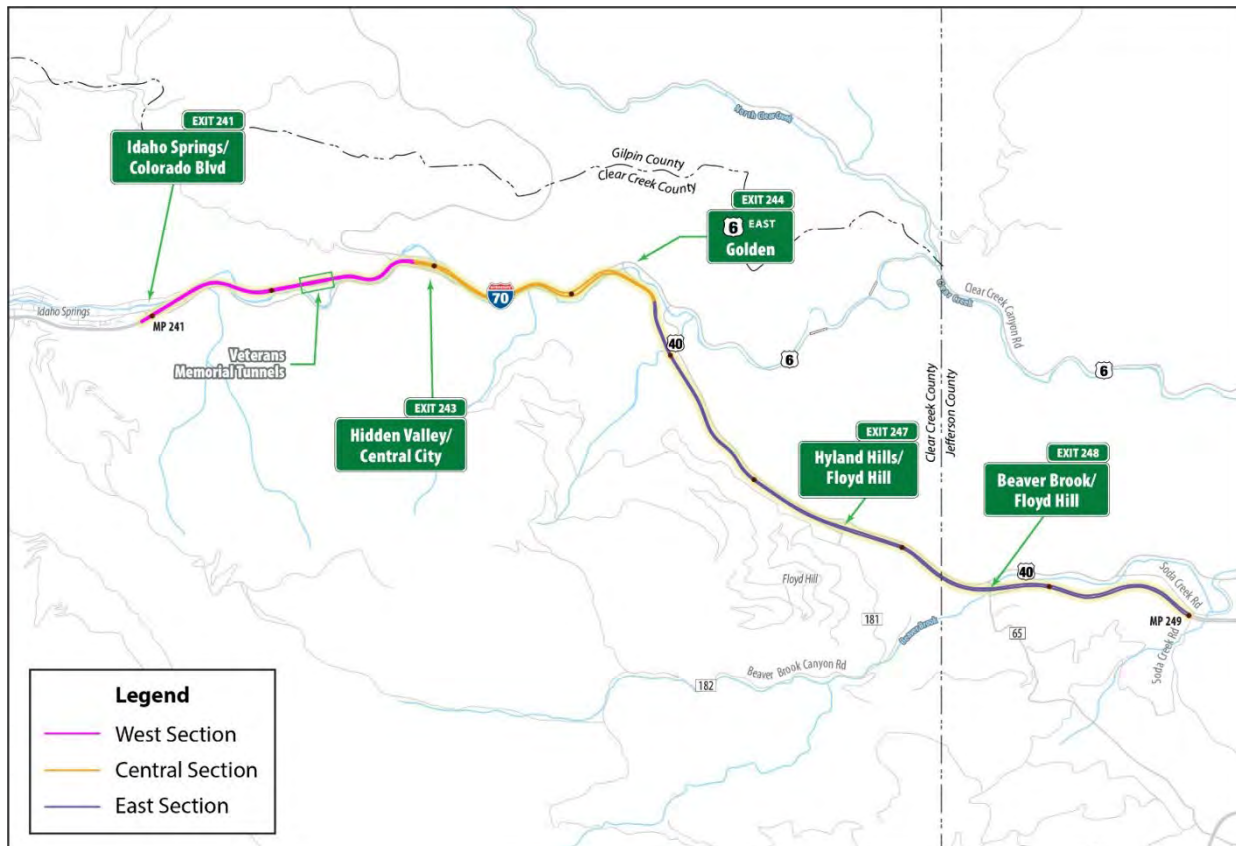
The Project is located on I-70 between MP 249 (east of the Beaver Brook/Floyd Hill interchange) and MP 241 (Idaho Springs/Colorado Boulevard), west of the Veterans Memorial Tunnels. It is located mostly in Clear Creek County, with the eastern end in Jefferson County (see Exhibit 1). The primary roadway construction activities would occur between County Road (CR) 65 (the Beaver Brook/Floyd Hill interchange) and the western portals of the Veterans Memorial Tunnels (MP 247.6 and MP 242.3, respectively), with the Project Area extended east and west to account for signing, striping, and fencing.

Exhibit 1. Project Location



Three alternatives are being evaluated in the EA: (1) No Action Alternative, (2) Tunnel Alternative, and (3) Canyon Viaduct Alternative. The Project improvements are grouped into three geographic sections: (1) East Section (top of Floyd Hill to US 6 interchange), (2) Central Section (US 6 interchange to Hidden Valley/Central City interchange), and (3) West Section (Hidden Valley/Central City interchange through Veterans Memorial Tunnels) (see Exhibit 2).

Exhibit 2. East, Central, and West Project Sections



The action alternatives—the Tunnel Alternative and Canyon Viaduct Alternative—include the same improvements in the East Section and West Section to flatten curves, add a third westbound travel lane (the new lane would be an Express Lane), provide wildlife and water quality features, and improve interchange/intersection operations.

Through the Central Section between the US 6 interchange and the Hidden Valley/Central City interchange, the action alternatives vary in how they provide for the third westbound I-70 travel lane and frontage road connections as follows:

- The **Tunnel Alternative** would realign westbound I-70 to the north (along the curve between MP 244.3 and MP 243.7) through a new 2,200-foot-long tunnel west of US 6. Eastbound I-70 would be realigned within the existing I-70 roadway template to flatten curves to improve design speed and sight distance. This alternative also would include two design options for the alignment of the new frontage road—north or south of Clear Creek. The Clear Creek Greenway trail would be reconstructed in its current location on the south side of Clear Creek.
- The **Canyon Viaduct Alternative** would realign approximately one-half mile of both the westbound and eastbound I-70 lanes (along the curve between MP 244 and MP 243.5) on viaduct structures approximately 400 feet south of the existing I-70 alignment on the south side of Clear Creek Canyon. Through the realigned area, the frontage road would be constructed under the viaduct on the existing I-70 roadway footprint north of Clear Creek. The Clear Creek Greenway would be reconstructed in its current location on the south side of Clear Creek. The viaduct would cross above Clear Creek and the Clear Creek Greenway twice.

Additional information regarding the alternatives evaluated in the EA can be found in *the I-70 Floyd Hill to Veterans Memorial Tunnels Alternatives Analysis Technical Report* (CDOT, 2020d).

2.2. No Action Alternative

The No Action Alternative includes ongoing highway maintenance. In addition, due to its poor condition, the westbound I-70 bridge at the bottom of Floyd Hill is programmed to be replaced regardless of whether CDOT moves forward with one of the action alternatives. Therefore, replacing the bridge in kind (as a two-lane bridge) is part of the No Action Alternative. Under the No Action Alternative, the bridge would be replaced in its current location but would need to be designed to current standards, with a 55 mile-per-hour (mph) design speed and improved sight distance with wider shoulders.

2.3. Action Alternatives: East Section

In the East Section between the top of Floyd Hill and the US 6 interchange, the action alternatives are the same. Through this section, westbound I-70 would be widened to the south to accommodate a third travel lane, which is planned as an Express Lane. The typical section would include an additional 12-foot travel lane and inside and outside shoulders of varying widths, depending on sight distance needs around curves. The proposed footprint would include a 4-foot buffer between the new Express Lane and the existing (general purpose) lanes.

In the eastbound direction, the three travel lanes would be retained but the roadway would be realigned where needed to accommodate westbound widening or curve modifications to improve sight distance and safety. An approximately one-mile-long eastbound auxiliary (climbing) lane would be added in the uphill direction from the bottom of Floyd Hill to the Hyland Hills/Floyd Hill interchange (Exit 247). Water quality features would be added along the south side of the eastbound lanes.

At the Beaver Brook/Floyd Hill and Hyland Hills/Floyd Hill interchange systems, the split-diamond interchange configuration (with on- and off-ramps connected by U.S. Highway 40 [US 40]) would remain, and no new accesses would be provided. However, roundabout intersections constructed on US 40 as part of a separate project address immediate issues with traffic flow and delays at the Floyd Hill neighborhood ingress and egress.

Wildlife fencing would be added along the north and south sides of I-70 between the Hyland Hills/Floyd Hill interchange on the west and Soda Creek Road on the east to reduce WVCs.

2.4. Action Alternatives: Central Section

The Central Section of the Project involves the most substantial improvements—including realigning curves, adding a third westbound travel lane, improving the Clear Creek Greenway, and providing the frontage road connection. These improvements occur within the most-constrained section of the Project Area, where the existing I-70 footprint and planned roadway improvements are located between canyon rock walls north and south of existing I-70 and Clear Creek. Because of these constraints, the action alternatives within this section include the same improvements but differ with respect to the I-70 mainline and frontage road alignments and the relationship of the roadway improvements to the rock walls and the creek. The Clear Creek Greenway would be reconstructed generally along its existing alignment under both action alternatives, but the Clear Creek Greenway's location to the creek and roadway infrastructure would differ.

2.4.1. I-70 Mainline

The I-70 mainline through this section continues the same roadway typical section from the East Section. Both alternatives would provide an additional westbound 12-foot travel lane; inside and outside shoulders of varying widths, depending on sight distance needs around curves; and a 4-foot buffer between the new planned Express Lane and the existing (general purpose) lanes.

Under the Tunnel Alternative, approximately one mile of westbound I-70 would be realigned to the north near the US 6 interchange. A portion of the realignment would extend through a 2,200-foot-long tunnel that would tie in to the existing westbound I-70 alignment and elevation just east of the Hidden Valley/Central City interchange. The three eastbound I-70 lanes through this area would remain within the existing roadway prism but would be realigned, moving approximately 100 feet north into the rock face adjacent to the existing westbound lanes to flatten horizontal curves and improve the design speed and sight distance.

Under the Canyon Viaduct Alternative, the westbound I-70 alignment would shift to the south on a new 5,300-foot-long viaduct beginning at approximately MP 245 east of the exit ramp to US 6 and it would rejoin the existing alignment about one-half mile east of the Hidden Valley/Central City interchange at approximately MP 243.5. Through this area, eastbound I-70 also would be realigned on a separate viaduct structure next to westbound I-70 from MP 243.4 east to just beyond MP 244.3. Both viaduct structures would cross Clear Creek and the Clear Creek Greenway twice near MP 243.9 and MP 243.5 (approximately 60 feet above ground level).

2.4.2. Frontage Road

Both alternatives include a new approximately 1.5-mile-long frontage road connection between the Hidden Valley/Central City interchange and the US 6 interchange. The frontage road would run from the intersection of CR 314 and Central City Parkway (south of the I-70 eastbound off-ramp at the Hidden Valley/Central City interchange where CR 314, which acts as a frontage road from east Idaho Springs, terminates) to the US 6/I-70 ramp terminal. The roadway section for the frontage road would consist of two 11-foot lanes (one in the eastbound direction and one in the westbound direction) with consistent 2-foot shoulders. The design speed would be 30 mph and the roadway would be constructed to comply with Clear Creek County local access standards.

The Tunnel Alternative includes two design options for this frontage road:

- **North Frontage Road Option** would provide the new frontage road connection between the two interchanges mostly on the north side of Clear Creek. The I-70 mainline would be realigned north into the mountainside, requiring substantial rock cuts (150 feet high) to make room for the frontage road between the creek and existing I-70. The Clear Creek Greenway would be reconstructed along its current alignment north of Clear Creek. In the Sawmill Gulch area where the existing trail's grade does not meet Americans with Disabilities Act (ADA) standards, the Greenway trail would be lowered to meet grades.
- **South Frontage Road Option** would provide the new frontage road connection between the two interchanges mostly on the south side of Clear Creek. Moving the frontage road to the south side of the creek would require new rock cuts on the south side of Clear Creek Canyon and less substantial rock cuts on the north side of I-70. The Clear Creek Greenway would be reconstructed generally along its current alignment south of Clear Creek; in the Sawmill Gulch area, an approximately 1,500-foot new section of the Greenway trail would be constructed

across the creek to the north (with two pedestrian bridge crossings of the creek) to be ADA compliant, and the existing trail would remain in place but not be resurfaced. The Clear Creek Greenway would be located closer to the frontage road than under the North Frontage Road Option; although the design seeks to maximize horizontal and vertical separation between the facilities and includes a new section of trail to meet ADA compliance, the alignment of the frontage road nearer to the Greenway and between the Greenway and creek is not supported by Clear Creek County, Idaho Springs, community members, or the Project Technical Team because it diminishes the recreational experience.

Under the Canyon Viaduct Alternative, the existing I-70 pavement under the elevated structures would be repurposed for the frontage road; excess right of way would be available for other uses—presumably, creek and recreation access—through this approximately one-mile area of the canyon.

2.5. Action Alternatives: West Section

The West Section between the Hidden Valley/Central City interchange and the Veterans Memorial Tunnels continues the widening of the interstate to add the third westbound travel lane and to flatten the S-curve in this location. Improvements in this section are the same under both action alternatives. The curve modifications require realigning both the I-70 mainline and frontage road through this section. The I-70 mainline alignment would shift south approximately 100 feet around the first curve from the Hidden Valley/Central City interchange, then north around the second curve approximately 50 feet, continuing a slight (25 foot) shift north before tying into the existing alignment at the Veterans Memorial Tunnels. Much of CR 314 would be realigned south between the Doghouse Rail Bridge over Clear Creek near the Veterans Memorial Tunnels east portal and the Hidden Valley/Central City interchange. A small section of CR 314 (between MP 242.6 and MP 242.7) would remain and connect to the reconstructed portions west and east.

These alignment shifts result in substantial rock cuts on both the north and south sides of the canyon. On the north side, rock cuts up to 160 feet high would be required next to the I-70 westbound lanes (along the curve in the area where CR 314 is not reconstructed). To realign CR 314 south, rock cuts from 70 feet to 100 feet high are required on the south side of the canyon. Additionally, a 1,200-foot section of Clear Creek, which is located between I-70 and CR 314, would need to be relocated south near MP 242.5.

The Hidden Valley/Central City interchange would not be reconstructed, and the I-70 bridges would remain because they are wide enough to accommodate the widened I-70 footprint without being replaced. All the on- and off-ramps for the interchange would be reconstructed, but the bridges over Clear Creek for the I-70 westbound off-ramp and I-70 eastbound on-ramp also can be retained. New bridges over Clear Creek to the west would be needed for the I-70 westbound on-ramp and I-70 eastbound off-ramp to accommodate the curve flattening and shift of I-70 to the south in this location. The CDOT maintenance facility would need to be relocated.

No changes are required west of the Veterans Memorial Tunnels. Within the westbound tunnel, the roadway would be restriped for the third lane (the expansion of the tunnel to accommodate the third lane was completed in 2014). After the tunnel, restriping and signing would continue west to the next interchange at Idaho Springs/Colorado Boulevard (Exit 241), where the third lane would terminate. The Express Lane would operate in conjunction with the westbound Mountain Express Lane (MEXL) during peak periods (winter and summer weekends).

2.6. Construction of Action Alternatives

CDOT is planning to use a Construction Manager/General Contractor (CMGC) delivery method for construction of the Project. This contracting method involves a contractor advising in the design phases to better define Project technical requirements and costs, improve design quality and constructability, and reduce risks through the construction phase. This method promotes innovation and aligns well with the multidisciplinary Context Sensitive Solutions process. It was used successfully on the Twin Tunnels projects to reduce environmental impacts and accommodate community values in the design and construction project development phases.

Construction of the action alternatives is anticipated to be complex and take four to five years but could occur generally within the proposed right of way. CDOT would work with the CMGC to refine the construction details and develop a plan that promotes safety and minimizes disruption to the traveling public and nearby residents and businesses.

The Tunnel Alternative would take approximately one year longer to build than the Canyon Viaduct Alternative; most of the additional time would be needed for the tunnel rock blasting and construction that could take place without disrupting traffic. However, in addition to the tunnel rock blasting, the Tunnel Alternative has considerable rock cuts at the tunnel portals and along the north side of I-70 to realign curves, widen the highway, and add the frontage road connection. Rock cuts, staging for the excavation of the tunnel portals, and haul of waste rock are major construction activities that are likely to interrupt traffic on I-70 due to increased construction equipment traffic on the highway and the proximity of construction to live traffic, the need for temporary lane closures and detours, and closures for blasting. The North Frontage Road Option has significantly larger (taller and longer) rock cuts than the South Frontage Road Option.

The Canyon Viaduct Alternative has substantially less rock cuts and blasting compared to the Tunnel Alternative but would require more work in the existing highway right of way. Bridge construction over and pier placement within the highway template will need to be carefully coordinated. However, construction of some elements, such as the bench portion of the viaduct, are separated from the existing I-70 alignment and could be constructed offline similarly to the tunnel excavation.

Specific construction methods and phasing will be determined with contractor input and could affect the duration and/or physical requirements for construction activities. The focus of environmental impact analysis during the NEPA process is to identify resources and locations sensitive to construction impacts and incorporate reasonable mitigation measures, including the potential to avoid impacts by avoiding sensitive areas, to inform the contractor's plans. Final design and construction plans will consider changes in resource impacts, and reevaluations will be completed as needed during final design.

3. Applicable Laws, Regulations, and Guidance

This section includes a description of applicable federal and state laws and regulations pertaining to terrestrial and aquatic species and their habitat.

3.1. Federal Laws and Regulations

3.1.1. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits individuals and companies from knowingly, or with wanton disregard for the consequences of the Act, taking Bald or Golden Eagles, their body parts, active or recently inactive nests, chicks, or eggs, which includes collection, molestation, disturbance, or killing. The BGEPA also provides protections for inactive Eagle nests outside of the breeding season.

3.1.2. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703-712) protects migratory birds and their active nests, eggs, young, and parts from possession, sale, purchase, barter, transport, import, export, and take. For purposes of the MBTA, “take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect” (50 Code of Federal Regulations [CFR] 10.12). In Colorado, most birds are protected under the MBTA. For a list of all the birds protected under the MBTA, refer to the MBTA Protected Species List (10.13 List) (USFWS, 2013). Any birds not found on this list, such as the Rock Dove (*Columbia livia*) and the European Starling (*Sturnus vulgaris*), are considered invasive and no protections have been provided to them. A Migratory Bird Permit memorandum was issued in 2003 that stipulates there is no prohibition against destruction of inactive nests if the breeding season is avoided (USFWS, 2003).

3.1.3. Federal Executive Order 13186—Responsibilities of Federal Agencies to Protect Migratory Birds

This Executive Order directs federal agencies that take actions which, either directly or indirectly, affect migratory birds to develop a Memorandum of Understanding (MOU) and to work with the U.S. Fish and Wildlife Service (USFWS) and other federal agencies to promote the conservation of migratory bird populations.

3.1.4. Section 1119(n) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

This section of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users identifies that the Transportation Secretary is to conduct a Wildlife-Vehicle Collision Reduction Study of methods to reduce collisions between motor vehicles and wildlife, and report to Congress within two years on causes, impacts, and solutions. A manual of best practices is due one year after reporting to Congress. The Secretary is required to develop a training course for transportation professionals.

3.2. State Laws and Regulations

3.2.1. The Colorado State Wildlife Action Plan

Colorado Parks and Wildlife (CPW) has developed a State Wildlife Action Plan (SWAP) to address species vulnerable due to the loss of habitat, modifications to natural systems (natural hydrological and fire regimes), invasion of non-native and problematic native species, land conversion, and other environmental changes; and to identify Species of Greatest Conservation Need (SGCN).

The Colorado SWAP documents the status of knowledge about many wildlife SGCN, most of which are not hunted or fished. It also documents the threats to the SGCN and the habitats upon which they depend and includes a description of strategies that can be employed to lessen those threats. The plan reflects the fundamental goal of CPW and the state to secure wildlife populations so that they do not require protection via federal or state listing regulations and fulfills the requirements of the State Wildlife Grants program (CPW, 2015). To facilitate the changing conditions in Colorado, the SWAP is updated every 10 years and is a living document; it was last updated in 2016.

3.2.2. Senate Bill 40 Wildlife Certification

Colorado Senate Bill 40 (SB 40) is a state statute (33-5-101-107, Colorado Revised Statutes 1973, as amended) that protects riparian habitat for wildlife species. It requires any agency of the state to obtain wildlife certification from CPW when the agency plans construction in any stream or stream bank within the jurisdiction of SB 40. A formal agreement between CPW and CDOT is designed to protect and preserve fish and wildlife habitat resources (primarily trees and shrubs) associated with streams that intersect state and federal highways in Colorado (CDOT & CPW, 2013a; CDOT & CPW, 2013b).

An SB 40 Wildlife Certification is obtained from CPW when construction occurs in or adjacent to jurisdictional SB 40 streams, including their banks or tributaries. Jurisdictional SB 40 streams typically are associated with the following:

- All perennial streams represented by solid blue lines on U.S. Geological Survey (USGS) 7.5-foot quadrangle maps or in the National Hydrography Dataset
- Segments of ephemeral and intermittent streams providing flowing water beneficial to fish and wildlife
- Segments of streams that are comprised of riparian vegetation dependent on groundwater or overbank flooding
- Segments of streams having wetlands present upstream or downstream of the Project

4. Terrestrial & Aquatic Species in the Tier 1 PEIS

4.1. Context

During the Tier 1 PEIS, CDOT sought input from federal and state agencies to characterize wildlife habitat and connectivity within the I-70 Mountain Corridor. In addition to identifying protected species in the I-70 Mountain Corridor, the PEIS identified issues related to habitat connectivity and WVCs as a concern for terrestrial species. These issues were evaluated through an interagency committee known as A Landscape-Level Inventory of Valued Ecosystem Components (ALIVE) Issue Task Force (ITF). Agencies that participated in the ALIVE ITF include CDOT, CPW, USFWS, U.S. Forest Service (USFS), Bureau of Land Management (BLM), and FHWA. The ALIVE ITF identified 13 areas where the I-70 Mountain Corridor interferes with wildlife migration, including elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), and Canada lynx (*Lynx canadensis*). These locations are referred to as linkage interference zones (LIZs). By focusing on areas of known migration and wildlife use, and creating wildlife crossings, the PEIS concluded that WVCs could be reduced and habitat connectivity could be improved. The ALIVE MOU, signed in April 2008, provides a framework for addressing wildlife connectivity, WVCs, and habitat enhancement and formalizes the LIZ locations where crossings should be included as part of future Tier 2 projects in the I-70 Mountain Corridor (CDOT, 2008). Updates made to the LIZ locations (Kintsh et.al 2011) are discussed in more detail in Section 4.2.1 of this document.

Additionally, the PEIS evaluated stream and wetland health, recognizing the potential impacts the I-70 Mountain Corridor alternatives could have on water quality and aquatic ecosystems and formed an interagency committee known as the Stream and Wetland Ecological Enhancement Program (SWEEP) ITF to identify and address environmental issues related to wetlands, streams, aquatic species, and fisheries in the I-70 Mountain Corridor. The SWEEP MOU was developed to establish common ground among agencies and organizations with interests in stream and wetland ecology in the corridor, create mitigation strategies and systems, and define collaboration among the interested parties for ongoing and future projects in the I-70 Mountain Corridor (CDOT, 2010). Agencies participating in the SWEEP ITF include CDOT, CPW, FHWA, USFWS, USFS, BLM, Upper Clear Creek Watershed Association, Trout Unlimited, and local agencies. Refer to the *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020a) for more information on the SWEEP ITF process and mitigation strategies for wetlands and streams.

4.2. Analysis in Tier 2 Processes

For Tier 2 projects, lead agencies need to conduct project-specific analyses of direct and indirect impacts on biological resources, including terrestrial and aquatic species. The Tier 2 analysis needs to document general wildlife and fish species and habitat present within the study area. If the project will cause a loss of habitat, the lead agencies need to identify mitigation measures that compensate for lost habitat and improve wildlife connectivity.

In addition, the PEIS noted the following actions applicable to the Floyd Hill Project:

- Adhere to any new or revised laws or regulations pertaining to biological resources.
- Develop specific and more-detailed mitigation strategies and measures.
- Consider opportunities for enhancement on a project-by-project basis.
- Evaluate fisheries, including localized temperature concerns.

- Fulfill responsibilities set forth in the ALIVE (CDOT, 2008) and SWEEP (CDOT, 2010) MOUs.

The PEIS included a Programmatic Biological Opinion, which set requirements for addressing potential impacts to federally listed threatened and endangered species. These requirements are discussed in the *I-70 Floyd Hill to Veterans Memorial Tunnels Threatened and Endangered Species Technical Report* (CDOT, 2020c).

4.2.1. Additional Projects in the Floyd Hill Area

Five Tier 2 NEPA studies have been conducted on the I-70 Mountain Corridor near or within the Floyd Hill area. These projects include the Eastbound and Westbound Twin Tunnels projects (CDOT, 2011a; CDOT, 2014a), frontage road improvements between Idaho Springs and the Hidden Valley/Central City interchange (CDOT, 2012), the Eastbound Peak Period Shoulder Lane Categorical Exclusion (CDOT, 2014b), and the Westbound Peak Period Shoulder Lane Categorical Exclusion (CDOT, 2018). Each project identified general land cover, ecoregions, aquatic resources, and biological resources present within the project-specific study area, including bighorn sheep, elk, mule deer, Bald Eagle (*Haliaeetus leucocephalus*), Peregrine Falcon (*Falco peregrines anatum*), and various other terrestrial and aquatic species.

These projects identified likely impacts to terrestrial wildlife species, such as temporary and permanent habitat loss, increased fatalities due to attempts at crossing the highway, noise and light impacts, and indirect impacts from conflicts with humans from expanding the highway and Clear Creek Greenway Trail. Potential impacts to aquatic species were identified from increased sedimentation caused by erosion and construction activities that could affect fish and benthic invertebrate habitat.

In addition, the I-70 Eco-Logical Project (Kintsch et al., 2011) occurred after completion of the PEIS and applied an ecosystem-based approach to better integrate wildlife considerations in transportation planning within the I-70 Mountain Corridor limits. The ultimate objective of the project was to develop solutions for mitigating transportation impacts on wildlife habitat connectivity from MP 258 to MP 130. The project reviewed and revised the 13 LIZs that were identified in the ALIVE MOU and identified 4 new LIZs. The following two LIZs were confirmed within the Floyd Hill Study Area:

- “LIZ O: Clear Creek Junction” is located between MP 243.0 and MP 244.9 and is approximately 2 miles long. There are two existing bridges over Clear Creek in this area; however, neither structure provides pathways for wildlife under I-70. The primary target species at this location are elk and mule deer. Additional target species include bighorn sheep, mountain lion (*Felis concolor*), Canada lynx, and Preble’s meadow jumping mouse (*Zapus hudsonius preblei*).
- “LIZ P: Beaver Brook” is located between MP 245.5 and MP 250.2, is approximately 5 miles long, and overlaps with the eastern end of the Floyd Hill Study Area for 2.5 miles. The primary target species at this location are elk and mule deer. Additional target species include black bear, Canada lynx, mountain lion, northern leopard frog (*Lithobates pipiens*), and Preble’s meadow jumping mouse.

5. Affected Environment

5.1. Wildlife Study Area

The Wildlife Study Area (Study Area) for direct effects is approximately 1,252 acres and it was delineated by creating a 500-foot buffer around the I-70 Floyd Hill Project limits, identified in Section 2.1 of this document. It was extended to a 1,000-foot-radius buffer around the interchange areas (see Exhibit 3). The Project limits were extended approximately on-half-mile east along the I-70 right of way to account for wildlife fencing, which is included as a mitigation for wildlife-vehicle collisions. The Study Area for indirect effects is much larger and fluctuates per species. It is the area of species habitat that could be indirectly affected by the proposed action alternatives.

The Study Area is located within the Southern Rockies Ecoregion (Level III Ecoregions), which is within the Crystalline Mid-Elevation Forests Ecoregion (21c of Level IV Ecoregions) (EPA, 2013). It varies in elevation from approximately 7,100 feet to 7,900 feet and encompasses both Foothills and Montane Zone vegetation that include mixed conifer forests; ponderosa pine (*Pinus ponderosa*) woodlands; deciduous scrublands with mountain mahogany (*Cercocarpus montanus*); Douglas-fir (*Pseudotsuga menziesii*) forests; and barren rock outcrops (CNHP, 2011).

5.2. Methodology

The information presented in this section was obtained by conducting a desktop review of publicly available information, reviewing previous biological studies completed in the Floyd Hill area, and conducting a field reconnaissance from public right of way in the Summer of 2017 and a field survey along Beaver Brook in the Summer of 2018 (see Appendix A for site photographs). Additional field surveys, conducted earlier and later in the growing season, are required to identify plant species that grow during those months.

Land cover was analyzed to quantify natural and built environments. The USGS's National Land Cover Database (NLCD) (USGS, 2017a) and the Colorado Natural Heritage Program (CNHP) Terrestrial Ecological System Patches (TESP) (CNHP, 2011) are the best available datasets for vegetation within the Study Area. The TESP dataset has a higher resolution than the NLCD; however, it only covered the Jefferson County portion of the Study Area. Therefore, the NLCD was used to map the dominant vegetative communities within the Study Area. This database has a resolution of 30-meter x 30-meter pixels and is not very accurate; therefore, it was supplemented with data gathered during site visits and Google Maps aerial imagery. The following land cover classifications are located within the Study Area:

- **Developed, High Intensity**—Mostly paved areas dominated by impervious surfaces
- **Developed, Medium Intensity**—Disturbed areas, sparsely vegetated, small amount of impervious surface
- **Developed, Low Intensity**—Low-density residential areas with native vegetation throughout; includes agricultural lands
- **Developed, Open Space**—Areas with manicured lawns (ex: parks)
- **Evergreen Forest**—Areas dominated by evergreen trees
- **Deciduous Forest**—Areas dominated by deciduous trees
- **Mixed Forest**—Areas with both evergreen and deciduous trees
- **Grassland**—Natural landscapes dominated by grass species
- **Open Water**—Creeks, ponds, and other water sources

- **Shrub/Scrub**—Areas with shrubs, grasses, and herbaceous plants
- **Wetlands**—Areas that contain both herbaceous and woody wetland areas

5.3. General Habitat

Approximately 518.5 acres (41.5 percent) of the Study Area is developed (see Exhibit 4 and Exhibit 5). I-70 and other transportation facilities make up most of these developed areas. There also are commercial and residential developments and sparsely developed single-family residences at the eastern end of the Project and a large rock quarry on the north side of I-70 at the bottom of Floyd Hill (approximately MP 244.6). Between the US 6 interchange and the Veterans Memorial Tunnels, developed areas include a small number of commercial businesses, residences, a CDOT maintenance yard, and the Black Hawk City Water Plant. To the west of the Veterans Memorial Tunnels, developed areas are located south of I-70. Limited native vegetation occurs within these developed areas.

5.3.1. Land Cover and Vegetation Communities

Approximately 732 acres (58 percent) of the Study Area are classified as having native vegetation (see Exhibits 4 and 5). Approximately 431 acres (34 percent) consist of evergreen forests, 178 acres (14 percent) of shrub/scrub, 53 acres (4 percent) of grasslands, 32 acres (3 percent) of wetlands, 29 acres (2 percent) of open water, and 9 acres (less than 1 percent) of deciduous and mixed forest communities.

Vegetation communities identified in the Study Area included ponderosa pine woodlands, deciduous scrublands with mountain mahogany, Douglas fir forests, and mixed forests. Trees are denser on north-facing slopes than south-facing slopes and shrub/scrub is denser on south-facing slopes. Dominant grasses identified in the I-70 right-of-way were smooth brome (*Bromus inermis*) and western wheatgrass (*Pascopyrum smithii*).

Riparian habitat occurs along Clear Creek, an unnamed tributary to Clear Creek, Beaver Brook, an unnamed tributary to Beaver Brook, Johnson Gulch, and Sawmill Gulch (see Exhibit 3). Clear Creek is heavily channelized with steep riprapped banks. Riparian habitat associated with Clear Creek are small, located within the creek channel, and generally lack large riparian vegetation. Vegetation observed includes narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus incana*), river birch (*Betula fontinalis*), numerous willow species (*Salix spp.*), Engelmann spruce (*Picea engelmannii*), and snowberry (*Symphoricarpos spp.*).

Please see Appendix B for a complete list of vegetation documented in the Study Area.

Exhibit 3. Terrestrial Wildlife and Aquatic Species Study Area

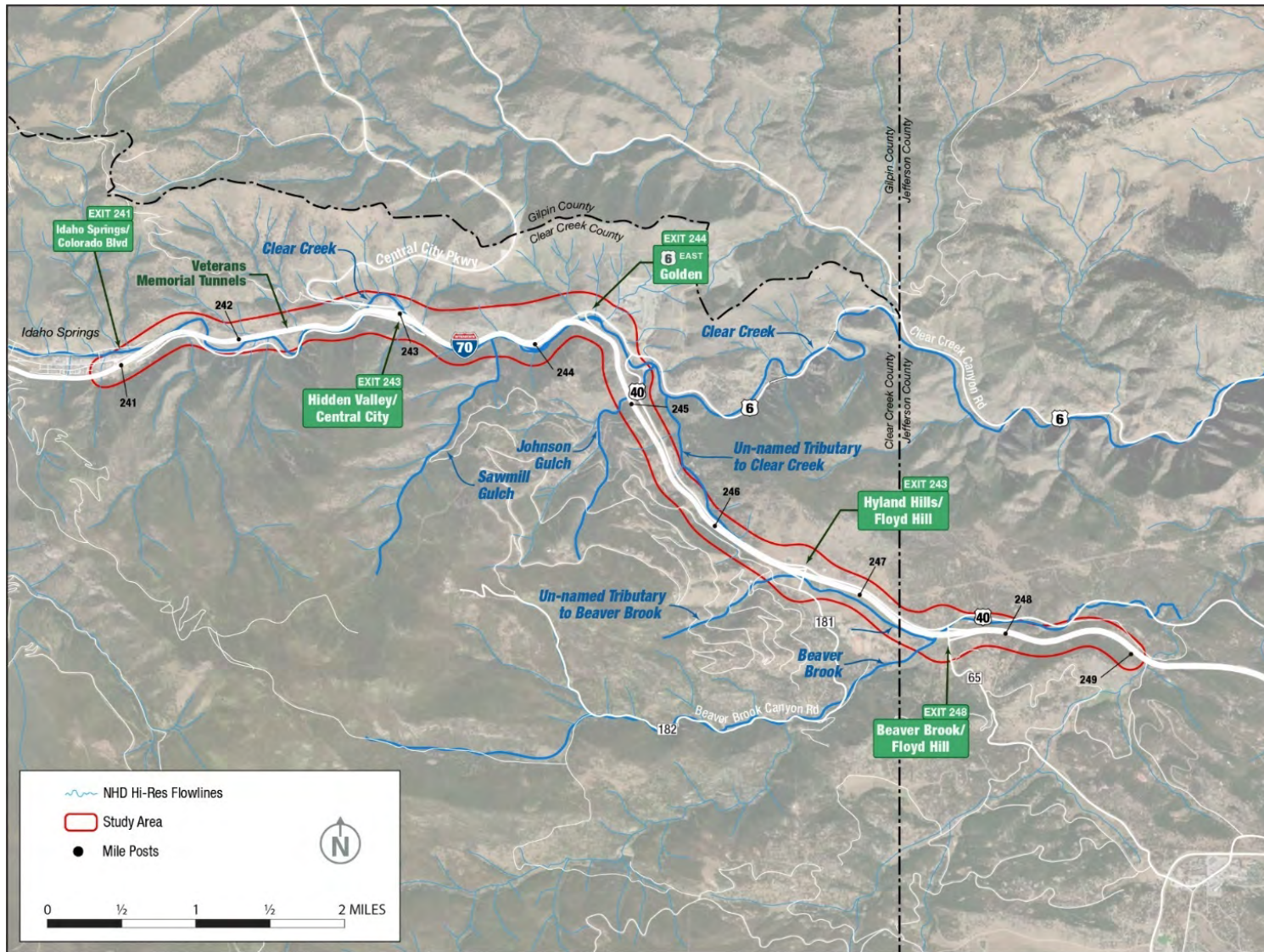
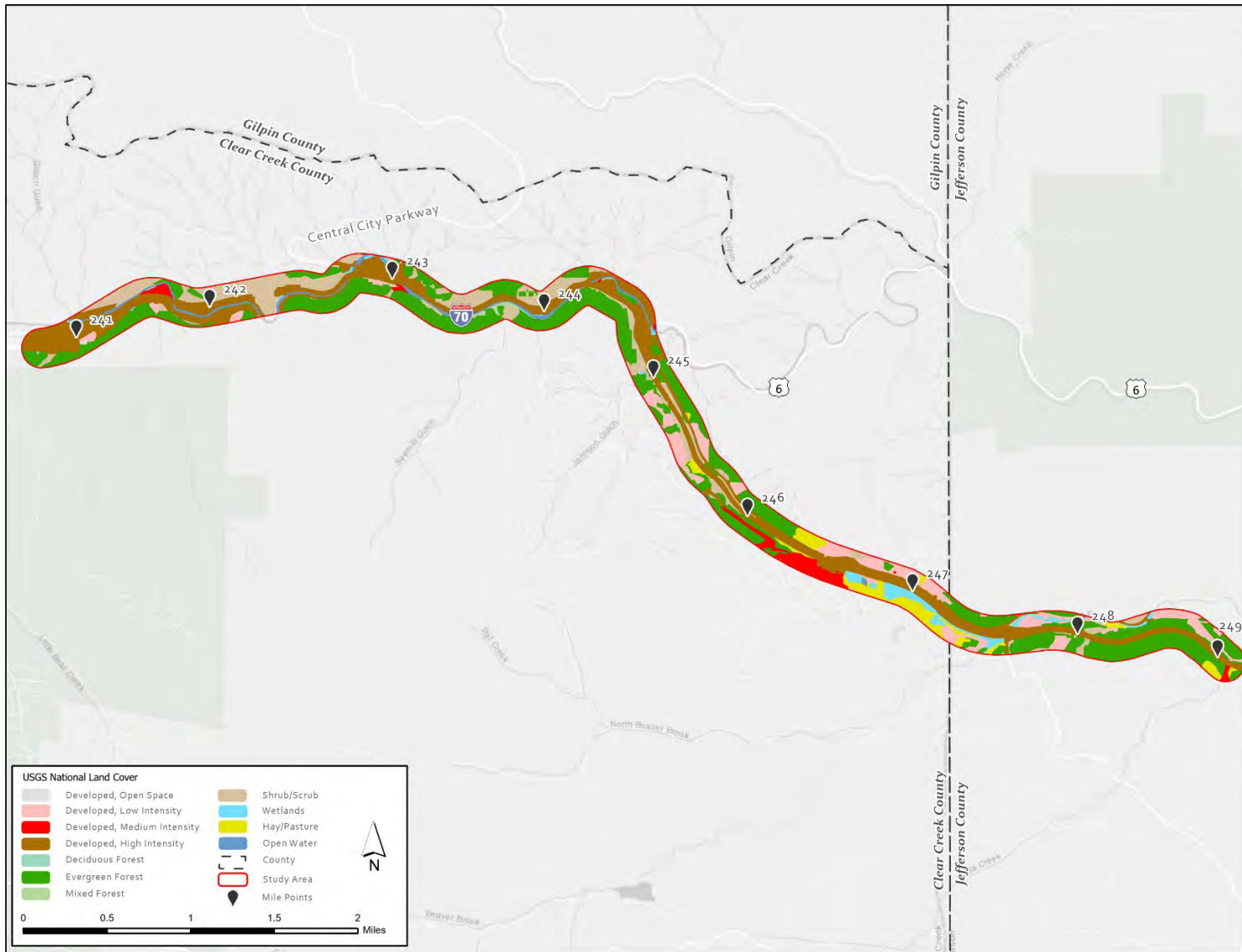


Exhibit 4. Land Cover and Vegetation Communities within the Study Area



Source: USGS, 2017a; Google, 2020.

Exhibit 5. Summary of Land Cover in the Study Area

Land Cover Type	Area (acres)	Percent of Study Area (%)
Developed Areas		
Developed, Open Space	1	< 1
Developed, Low Intensity	111	9
Developed, Medium Intensity	38	3
Developed, High Intensity	370	30
Subtotal	520	42
Vegetation Communities		
Deciduous Forest	4	< 1
Evergreen Forest	439	35
Grasslands	53	4
Wetlands	32	3
Mixed Forest	5	< 1
Shrub/Scrub	170	14
Open Water	29	2
Subtotal	732	58
TOTAL	1,252	100

Source: USGS, 2017a; Google, 2020.

5.4. General Wildlife

This section discusses general wildlife species and habitats that are known to occur or have the potential to occur within or near the Study Area. The following categories are discussed in more detail below: terrestrial mammals, connectivity for terrestrial mammals, raptors and migratory birds, reptiles and amphibians, aquatic species, and jurisdictional SB 40 areas.

5.4.1. Terrestrial Mammals

Terrestrial mammal species within the Study Area include ungulates (hooved mammals), carnivores (canines, cats, weasels, and bears), bats, lagomorphs (rabbits and hares), and rodents (squirrels, chipmunks, mice, voles, woodrats) (CPW, 2017a, 2017b, and 2017c; CDOT, 2011a, 2011b, and 2014; CDOT and FHWA, 2012; and Kintsch et al., 2011).

Three ungulate species—mule deer, elk, and bighorn sheep—use suitable habitat within the Study Area, which is within the overall range for all three species (CPW, 2017b). Mule deer and elk typically occupy higher elevations, usually forested habitat, during the summer and then migrate to lower elevations and south-facing slopes in the winter. Two mule deer seasonal ranges, designated by CPW, occur within the Study Area: severe winter range and winter concentration range. The severe winter range crosses the Study Area in the Floyd Hill area between MP 245.5 and MP 246. The winter concentration areas occur on the north side of I-70 between MP 245 and MP 241 (CPW, 2017b) (see Exhibit 6). In addition, two elk seasonal ranges occur within the Study Area: winter range and resident population areas. Elk winter range and resident population areas occur in the Floyd Hill area (see Exhibit 7) and the winter range extends farther west on the south side of I-70.

Bighorn sheep typically occur in steep, high mountain terrain. In Colorado, they prefer habitat dominated by grass, low shrubs, rock cover, and areas with good escape terrain and topographic relief (Fitzgerald et al., 1994). They often retreat to rest on inaccessible cliffs.

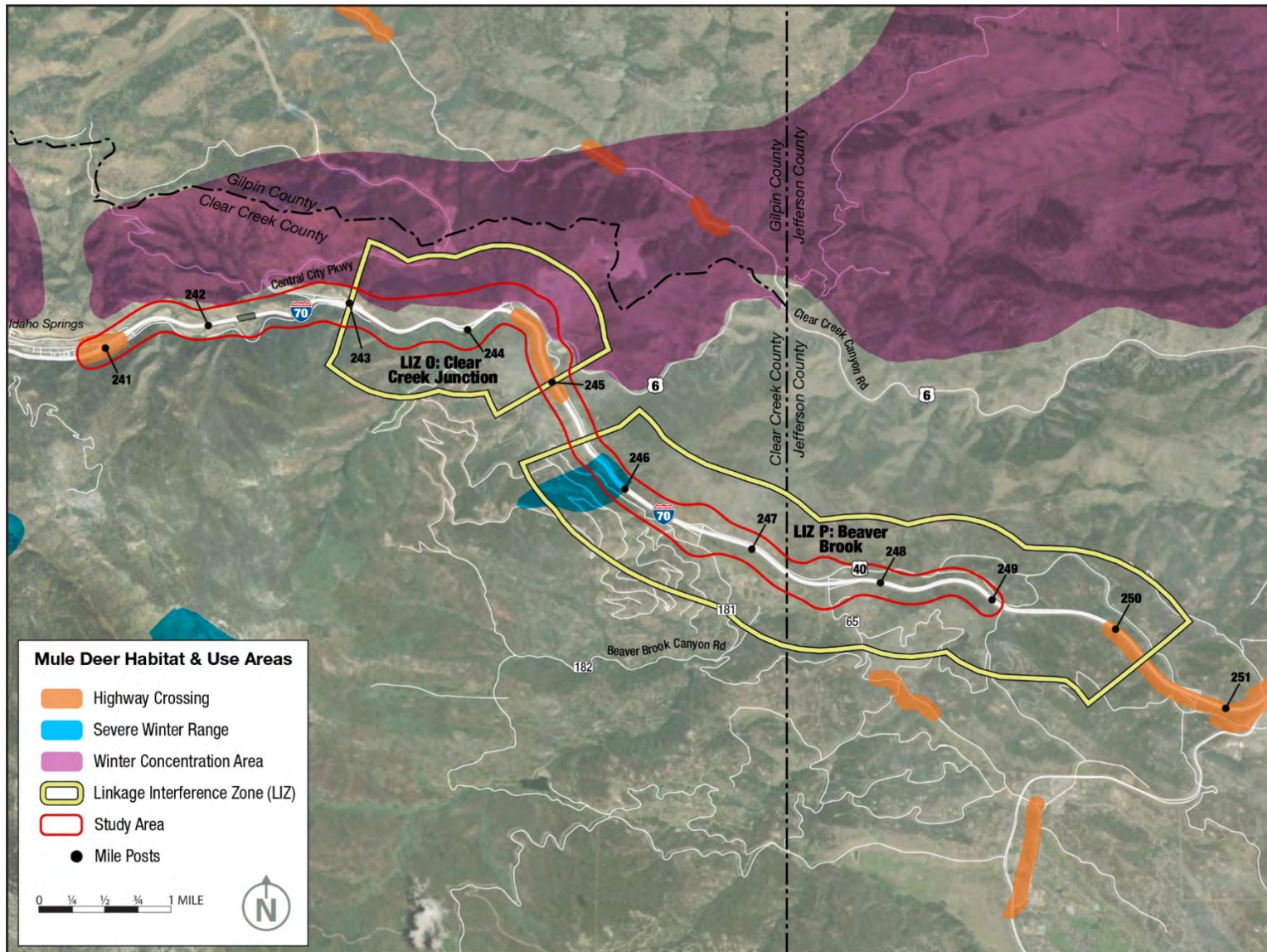
No bighorn sheep production areas are located within the Study Area; the closest production area is approximately a half mile east of the US 6 interchange. However, the mountain range north of I-70 serves as bighorn sheep summer and winter range with a patch of severe winter range between MP 244 and MP 243 (see Exhibit 8). In areas of the I-70 Mountain Corridor, bighorn sheep are attracted to the vegetation and de-icing minerals along I-70. Within the Project Area, they have been observed crossing I-70 via the Twin Tunnels land bridge to access the rocky/open south-facing slopes. However, sheep generally do not cross Clear Creek to access areas on the south side because it is densely forested and unsuitable for the species.

There is suitable foraging habitat within the Study Area for several common predator species, including mountain lion, bobcat (*Felis rufus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), American pine marten (*Martes americana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and other species of weasels (*Mustela* spp.) (Fitzgerald et al., 1994; CPW, 2017a, 2017b; USFWS, 2017). In addition, black bear (*Ursus americanus*) fall concentration areas have been mapped within the Study Area in Idaho Springs and Floyd Hill (see Exhibit 9).

Bat and lagomorph species likely to occur in the Study Area include big brown bat (*Eptesicus fuscus*), little brown myotis (*Myotis lucifugus*), big free-tailed bat (*Nyctinomops macrotis*), hoary bat (*Lasiurus cinereus*), eastern cottontail (*Sylvilagus floridanus*), and mountain cottontail (*Sylvilagus nuttallii*). Snowshoe hares (*Lepus americanus*) may live in or migrate through the Study Area; however, in Colorado, this species typically is found at higher elevation ranges of 8,000 feet to 11,500 feet (Fitzgerald et al., 1994) in boreal forests with dense vegetative cover. Bats can be found in areas with bare rock outcrops, rock crevices, and in trees that contain cavities and hollows.

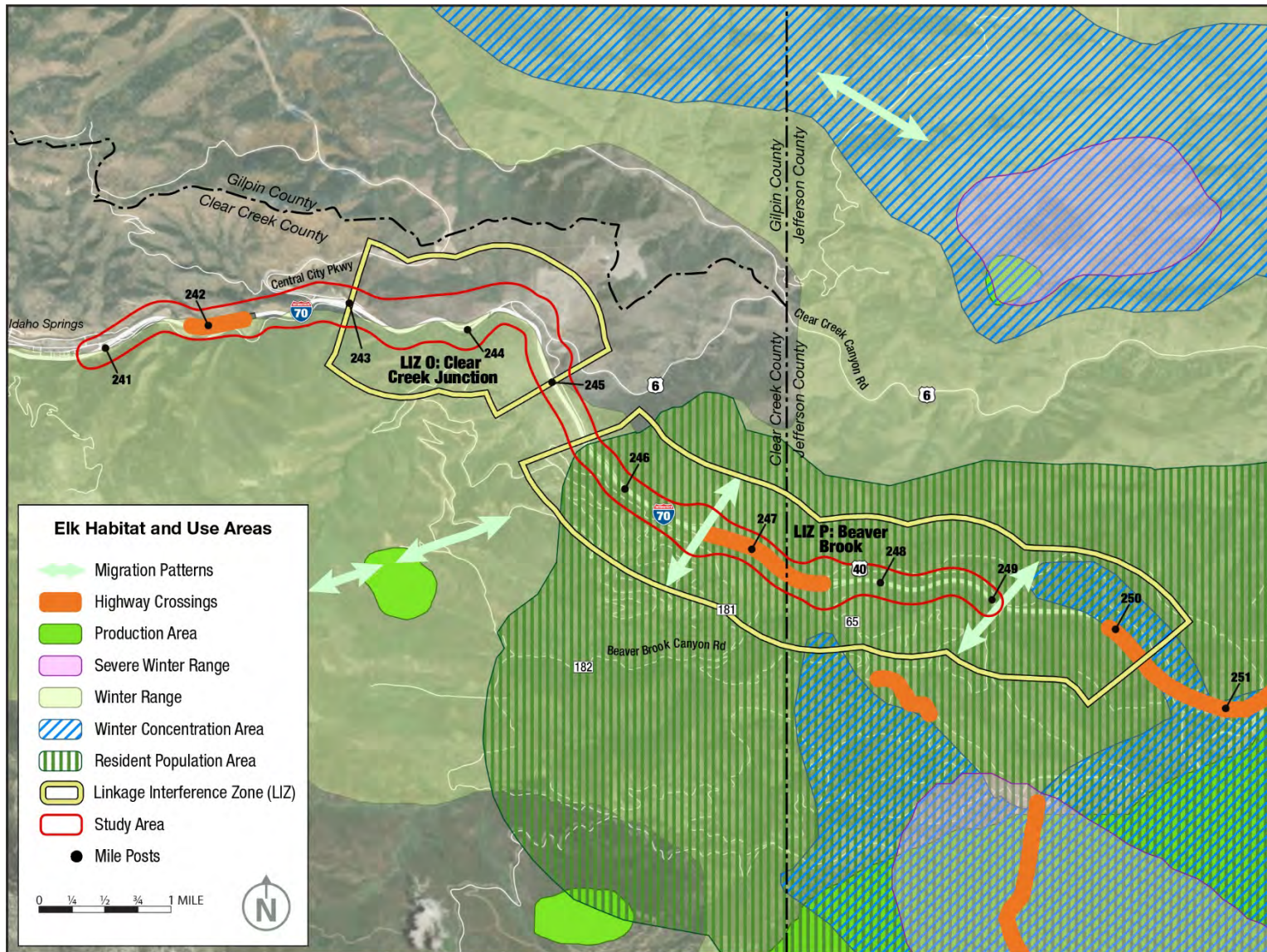
Rodent species use a variety of habitats that occur in the Study Area, mostly large open areas or edge habitat with changes in vegetation community, density, or structure (Fitzgerald et al., 1994; CPW, 2017a, 2017b). Many of these species may use the Study Area for short or long periods to fulfill their life-cycle needs, including seasonally or in short- or long-distance migration. Rodents common to the Study Area include the deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), golden-mantled ground squirrel (*Callospermophilus lateralis*), and pine squirrel (*Tamiasciurus hudsonicus*). Various other mice, voles, shrews, and woodrats also are likely to use the Study Area.

Exhibit 6. Mule Deer Habitat & Use Areas



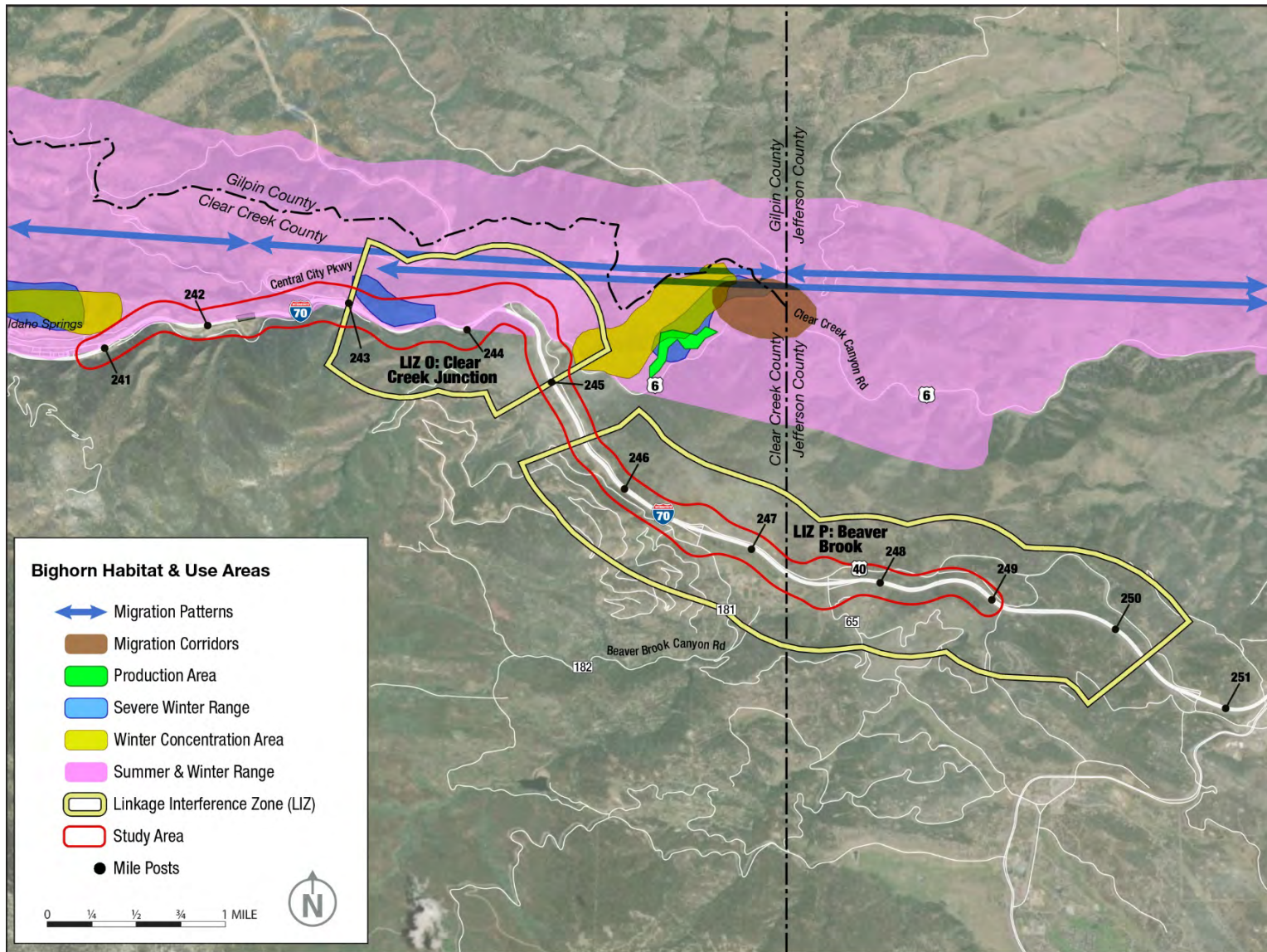
Source: CPW, 2017b

Exhibit 7. Rocky Mountain Elk Habitat & Use Areas



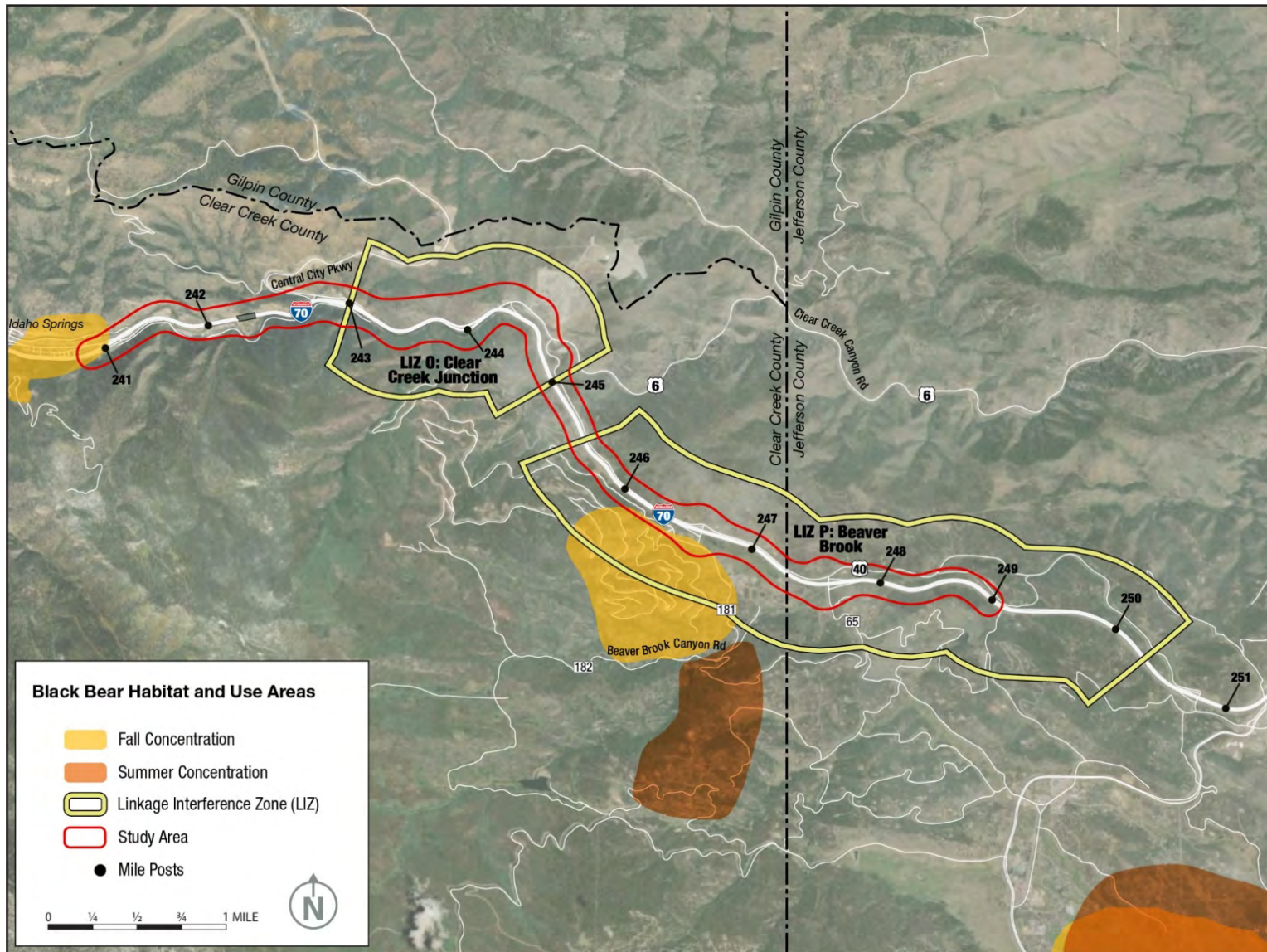
Source: CPW, 2017b

Exhibit 8. Rocky Mountain Bighorn Sheep Habitat & Use Areas



Source: CPW, 2017b

Exhibit 9. Black Bear Habitat & Use Areas



Source: CPW, 2017b

5.4.2. Connectivity for Terrestrial Wildlife

Due to a large footprint and high traffic volumes and speeds, I-70 is considered a major barrier to wildlife within the I-70 Mountain Corridor. Construction of the interstate has resulted in a direct loss of habitat. Concrete median barriers, shoulder barriers, retaining walls, and rock ledges also impede wildlife movement across I-70. In addition, the effects of the interstate extend beyond the road footprint itself. Traffic volumes, noise, and lighting contribute to a barrier effect that may inhibit wildlife from attempting to cross or even approach habitat adjacent to the interstate. Annual average daily traffic volumes between Idaho Springs and the top of Floyd Hill range from 42,000 vehicles per day to 50,000 vehicles per day (CDOT, 2016a). At these volumes, the entire Study Area may be considered a near-complete barrier for wildlife species movement (Charry and Jones, 2009). Vehicle traffic also causes wildlife mortalities when animals are struck attempting a crossing.

Most of the existing structures within the Study Area (bridges, drainage culverts, and road interchanges) are too small or don't have appropriate substrate below the bridge for hooved animals such as mule deer, elk, and bighorn sheep to cross under I-70 from one side to the other. However, the land bridge over the Veterans Memorial Tunnels (MP 242) do provide some habitat connectivity. Mule deer have been observed crossing the land bridge and entering the heavily forested habitat on the south side of the interstate (CDOT, 2019). Additionally, the north side of the land bridge is steep and rocky and provides suitable habitat for bighorn sheep, which have been observed entering the area from the north. The heavily forested habitat on the south side is not suitable for bighorn sheep; therefore, they primarily stay on the north side of the interstate.

5.4.3. Wildlife-Vehicle Collisions

A preliminary analysis of WVCs and roadkill data from MP 241 through MP 251 (Veterans Memorial Tunnels to the eastern end of LIZ P) identified that, between January 2007 and December 2017, a total of 271 WVCs were reported to law enforcement (see Exhibit 10). Of these WVCs, 24 resulted in injuries to motorists and the remainder involved property damage only. The majority of reported WVCs involved mule deer (57 percent) and elk (38 percent). Other species involved in reported WVCs include bighorn sheep, black bear, and mountain lion. During this same timeframe, CDOT Maintenance crews removed 301 wildlife carcasses along this segment, primarily mule deer (49 percent) and elk (27 percent). CDOT maintenance logs provide numbers of individual species recovered from the roadway. Carcass reports capture medium-sized and smaller fauna, including bobcat, coyote, red fox, and raccoon, that are subject to roadkill but are not represented in crash reports because they do not typically cause major crashes or damage to vehicles. Crash reports and CDOT Maintenance data comprise the primary sources of WVC data and capture different but overlapping information. Additionally, CPW recorded multiple bighorn sheep WVC mortalities near the US 6/I-70 interchange (Huwer, 2015). Exhibit 10 summarizes WVCs by species for each set of data.

Exhibit 10. Total Reported WVCs & Carcass Pickups, 2007 to 2017, MP 241 to MP 251

Wildlife Species	Crash Reports	CDOT Maintenance	CPW Carcass Pickup
Black Bear	5	3	0
Bighorn Sheep	3	0	3
Bobcat	0	1	0
Coyote	1	5	0
Deer	154	146	0
Elk	102	82	0
Fox	0	4	0
Mountain Lion	5	1	1
Raccoon	0	1	0
Unknown	1	57	0
Total	271	301	4

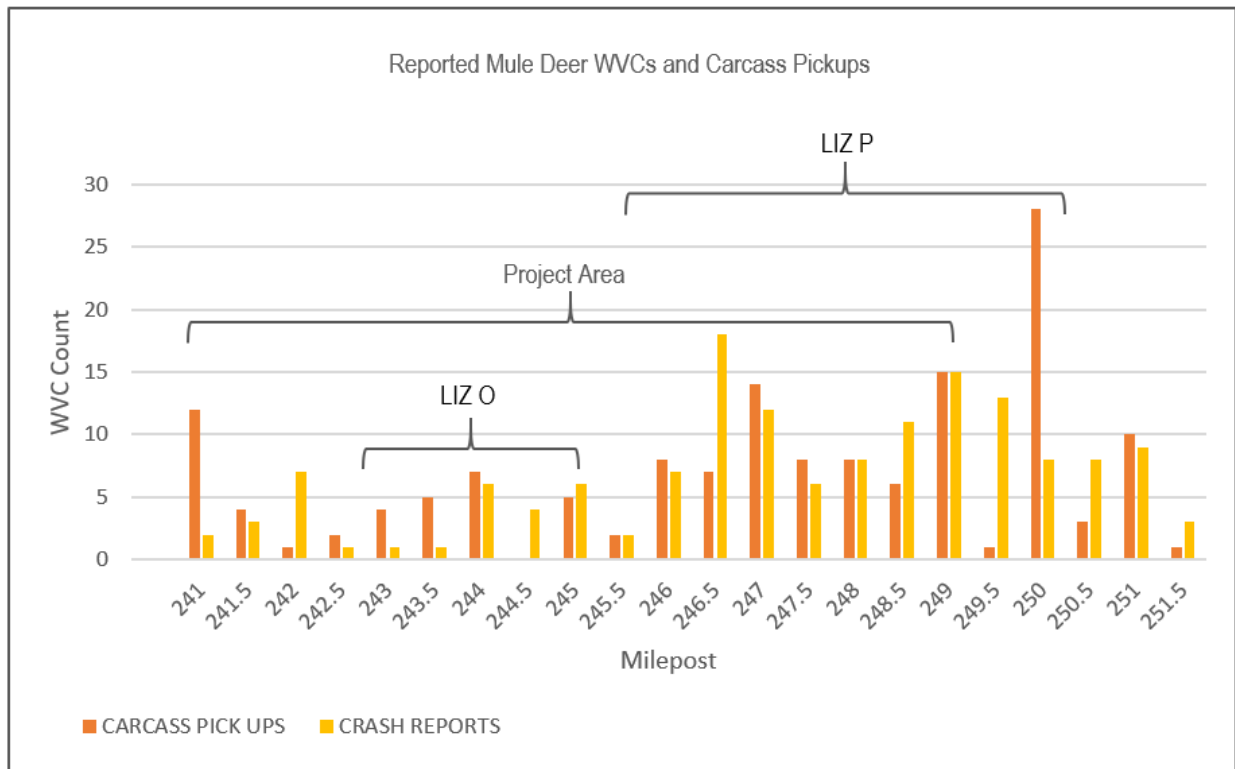
Source: CDOT, 2020e; CDOT, 2020f; CPW, 2019.

WVCs generally are recognized as being substantially under-reported for a variety of reasons, including when crashes involve uninsured drivers, result in little damage to the vehicle and its occupants, involve large semi-trucks, or for other reasons. Also, crash reports typically identify wildlife species that are involved in a WVC but do not record when multiple animals are involved. CDOT Maintenance carcass data also under-represents the number of WVCs. For example, carcasses are not available/found when animals survive the initial collision, leaving the roadway but succumbing to their injuries elsewhere; when animals are thrown beyond the road shoulder; or when fresh roadkill is salvaged for human consumption.

Exhibit 11 and Exhibit 12 display the number of WVCs by milepost reported to law enforcement and carcass pickups by CDOT Maintenance for deer and elk, respectively. Concentrations of WVCs involving deer were evident between MP 246 and MP 251, which corresponds with LIZ P. The highest spike occurred at MP 250, east and outside of the Study Area, with a second spike at the top of Floyd Hill (MP 246.5). A smaller spike was apparent around MP 241, on the west side of the Veterans Memorial Tunnels. Concentrations of WVCs involving elk also were highest in LIZ P in the same locations of high deer WVCs. Within the Study Area, the greatest number of WVCs involving elk occurred around the top of Floyd Hill (MP 246.5 to MP 247). The greatest number of elk carcass pickups occurred at MP 248. WVCs with bighorn sheep occurred between MP 242.0 and MP 242.5, on either side of the Veterans Memorial Tunnels. These incidents appear to have been reduced by mitigation efforts conducted as a part of the Twin Tunnels Projects, which widened the eastbound and westbound Veterans Memorial Tunnels, removed trees west of the tunnels that attracted animals to the north edge of the road, and created a wildlife bench on the south side of Clear Creek and the I-70 bridge over Clear Creek west of the Hidden Valley/Central City interchange, although more data will be needed to confirm this as a long-term trend.

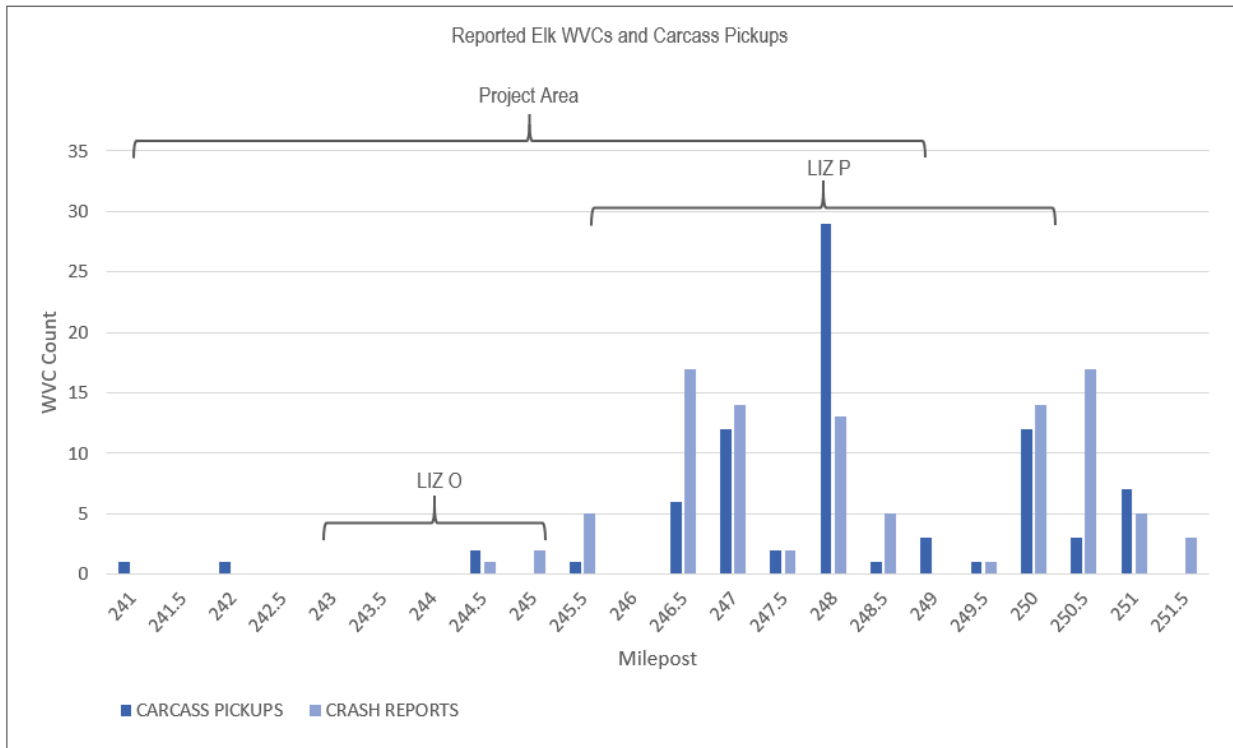
Exhibit 13 displays the number of WVCs reported to law enforcement, carcass pickups by CDOT Maintenance, and roadkill carcass pickups by CPW for carnivores. Concentrations of WVCs involving carnivores are different when compared to ungulate WVCs, as herbivores or prey species are more numerous than carnivores in the wild. The highest carnivore WVCs occurred between MP 246 and MP 249, which falls within the LIZ P. The highest spike occurred at MP 246.5, at the top of Floyd Hill. A smaller spike was apparent around MP 247.5, near where Beaver Brook crosses under I-70.

Exhibit 11. Reported Mule Deer WVCs and Carcass Pickups, 2007 to 2017



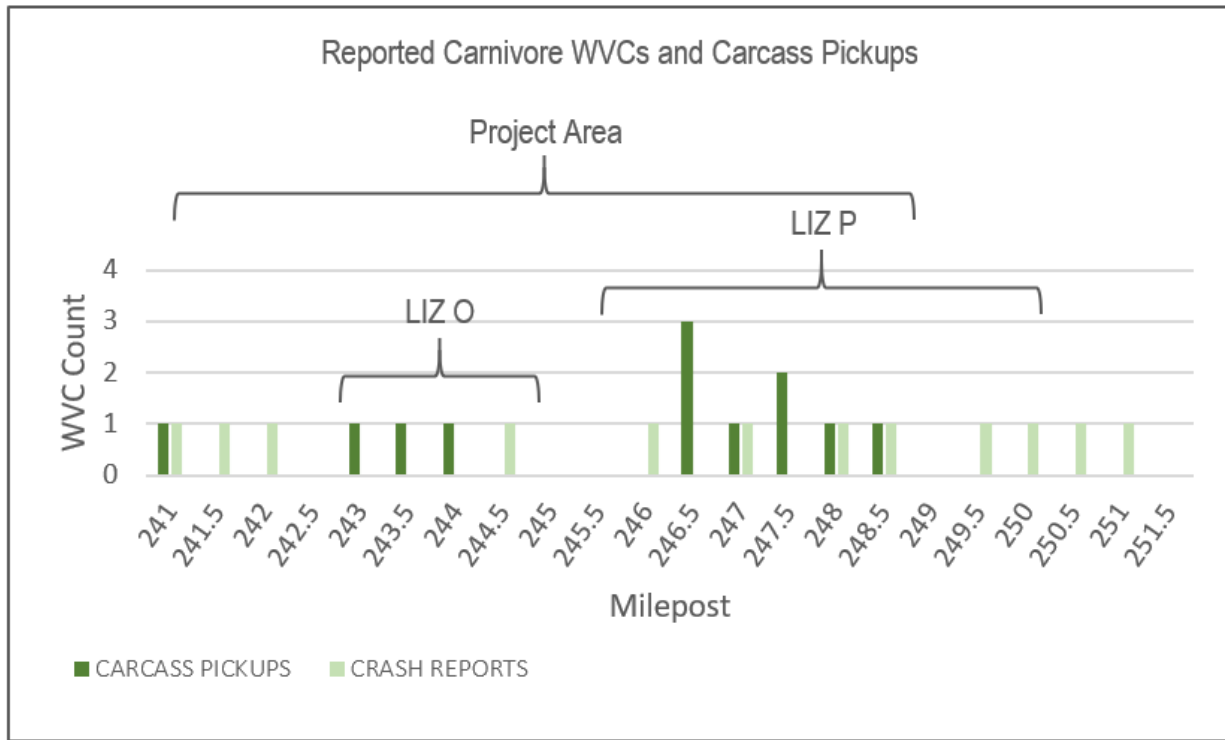
Source: CDOT, 2020e; CDOT, 2020f.

Exhibit 12. Reported Elk WVCs and Carcass Pickups, 2007 to 2017



Source: CDOT, 2020e; CDOT, 2020f.

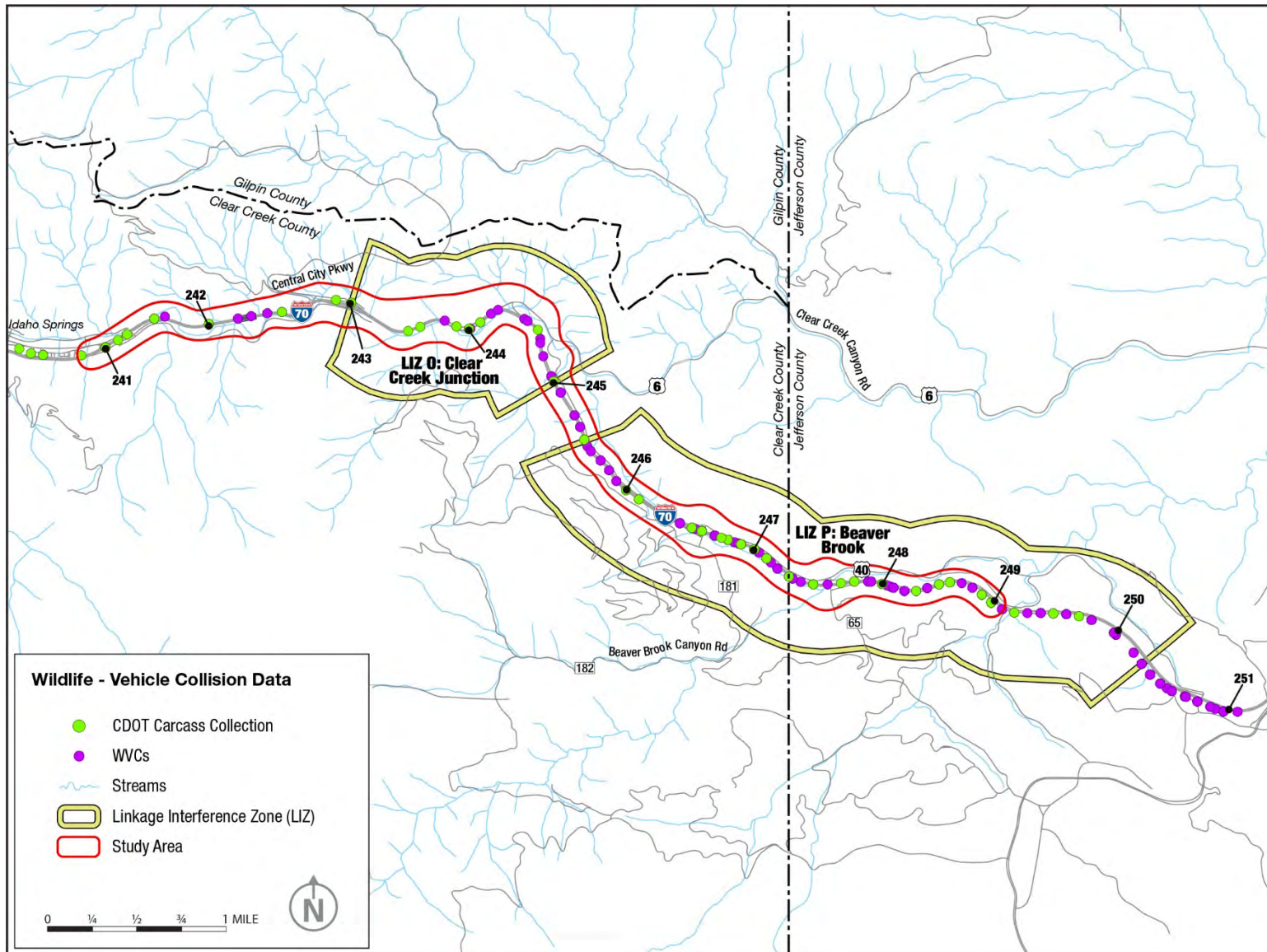
Exhibit 13. Reported Carnivore WVCs and Carcass Pickups, 2007 - 2017



Source: CDOT, 2020e; CDOT, 2020f; CPW, 2019

Exhibit 14 displays WVC locations and carcass pickup locations within the boundaries of the two LIZs that overlap with the Study Area. It is important to note that WVC reports and carcass data were collected by different entities (law enforcement agencies and CDOT Maintenance, respectively), and an overlap of data collection may exist since these agencies perform different functions on I-70.

Exhibit 14. WVC Hotspots & LIZs



Source: CDOT, 2020e; CDOT, 2020f

5.4.4. Raptors and Migratory Birds

The deciduous forest, evergreen forest, shrub/scrub, woody wetlands, and areas with rocky outcrops found within the Study Area provide foraging, roosting, and nesting habitat for a variety of migratory birds, including raptors and passerines (CDOT, 2014). The Study Area also provides limited areas with nesting habitat for a variety of waterfowl, including geese and ducks.

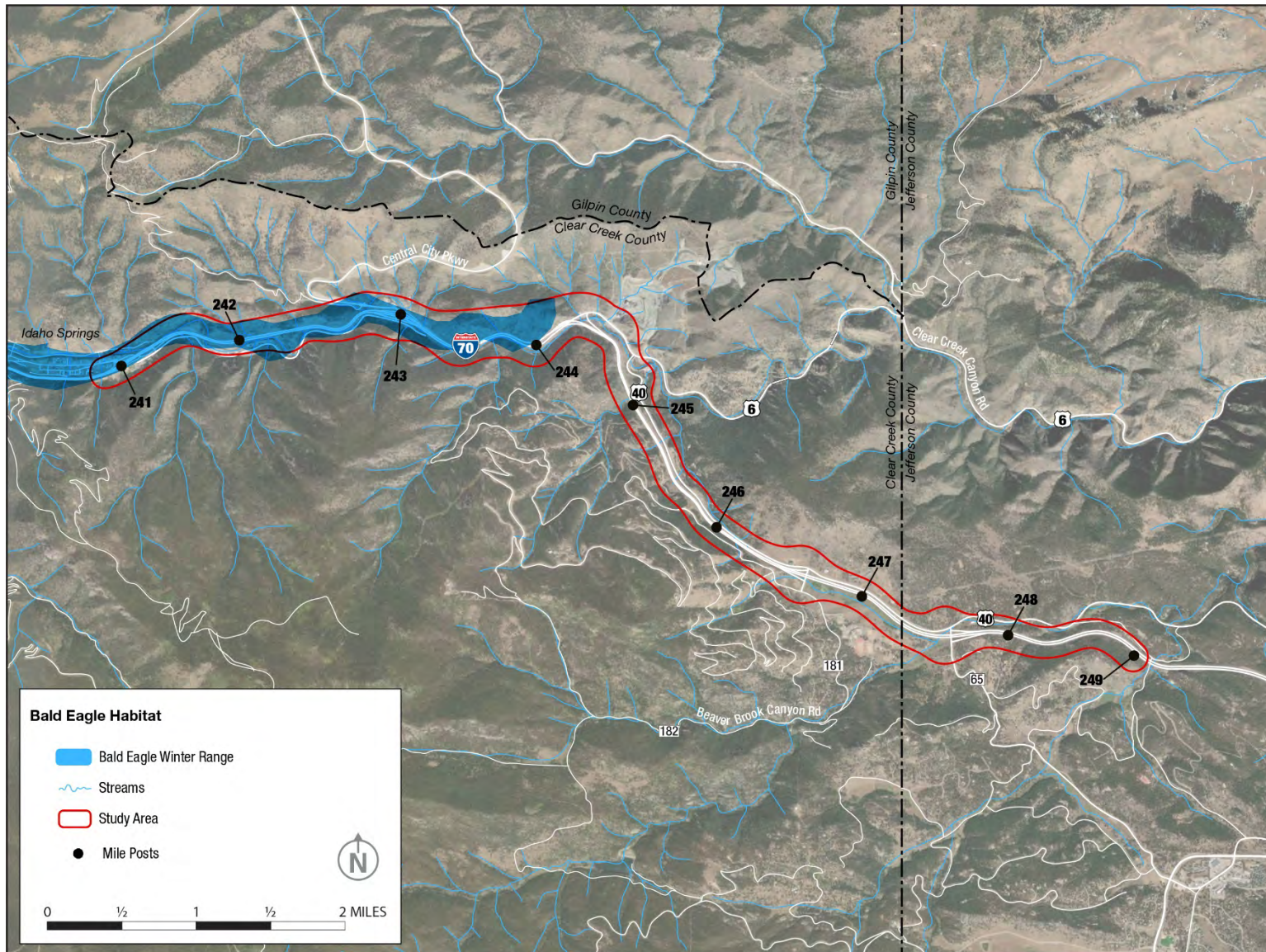
Common breeding birds documented during annual Breeding Bird Atlas surveys near the Clear Creek Watershed include Broad-Tailed Hummingbird (*Selasphorus platycercus*), Northern Flicker (*Colaptes auratus*), Tree Swallow (*Tachycineta bicolor*), Violet-Green Swallow (*Tachycineta thalassina*), Mountain Chickadee (*Poecile gambeli*), Red-Breasted Nuthatch (*Sitta canadensis*), House Wren (*Troglodytes aedon*), Ruby-Crowned Kinglet (*Regulus calendula*), American Robin (*Turdus migratorius*), Yellow-Rumped Warbler (*Setophaga coronata*), Dark-Eyed Junco (*Junco hyemalis*), and Pine Siskin (*Carduelis pinus*) (Evergreen Audubon, 2017).

Wintering birds documented in the Study Area in 2016 Breeding Bird Atlas surveys were American Robin, Black-Capped Chickadee (*Poecile atricapillus*), Mountain Chickadee, Cassin's Finch (*Haemorhous cassinii*), Common Raven (*Corvus corax*), Steller's Jay (*Cyanocitta stelleri*), Black-Billed Magpie (*Pica hudsonia*), American Crow (*Corvus brachyrhynchos*), Pygmy Nuthatch (*Sitta pygmaea*), Dark-Eyed Junco, and Townsend's Solitaire (*Myadestes townsendi*) (National Audubon Society, 2016).

Bald Eagles and Golden Eagles (*Aquila chrysaetos*) potentially can be found year-round in the Study Area. Habitat within and adjacent to Clear Creek has been identified as winter range and winter foraging areas for Bald Eagles (CPW, 2017b) (see Exhibit 15). However, no previously identified active nests or winter roosts have been identified within the Study Area or within one mile of the Study Area (CPW, 2017b). The Study Area lacks continuous riparian habitat and large cottonwood trees, which Bald Eagles prefer, thus reducing the quality of Bald Eagle habitat in the Study Area.

No migratory bird or raptor nests were observed during field surveys in Summer 2017 and Summer 2018. However, additional surveys need to occur prior to construction to confirm the presence/absence of nesting migratory birds and raptors.

Exhibit 15. Bald Eagle Winter Range Areas



Source: CPW, 2017b

5.4.5. Reptiles and Amphibians

Several reptiles and amphibians are known to occur or have potential to occur in the Study Area, including barred tiger salamander (*Ambystoma mavortium*), tiger salamander (*Ambystoma tigrinum*), boreal chorus frog/western chorus frog (*Pseudacris maculata*), and the western terrestrial garter snake (*Thamnophis elegans*) (CPW, 2017a and 2017b). These species live primarily in riparian habitats and are commonly found statewide from the plains up into the mountains. They likely are present in or near the Beaver Brook riparian corridor and potentially along Clear Creek. However, potential habitat along Clear Creek is marginal due to limited vegetation and lack of aquatic habitat diversity due to steep riprapped banks and limited floodplain connectivity.

5.4.6. Aquatic Species

Clear Creek is considered a “high-value” fishery that provides high-quality habitat for a variety of fish species (CPW, 2017c). It supports wild, naturally reproducing brown trout (*Salmo trutta*) populations and stocked populations of rainbow trout (*Oncorhynchus mykiss*).

Brown trout spawn from October through November and make up the majority of fish present in Clear Creek between Georgetown and Golden (CDOT, 2014; CPW, 2017c). Brown trout spawning habitat typically consists of a clean gravel substrate that is aerated by oxygenated water flowing through the nest (or redd) and over eggs that have been deposited in the substrate. These conditions typically are located at the tail of a pool and are present downstream of the Veterans Memorial Tunnels (CDOT & FWHA, 2012). CPW conducted a survey to document brown trout redds in the Fall of 2012 from Floyd Hill to the Scott Lancaster Memorial Trail Covered Bridge. A total of 49 redds were found along this stretch. Four redds were found adjacent to the Twin Tunnels Project Area (CDOT, 2014; CPW, 2020a). Brown trout spawning habitat is found from the bridge at the Game Check Station Trailhead parking lot downstream to where Clear Creek splits off to the north of I-70 (CDOT, 2017a).

Fish habitat improvements on Clear Creek were completed in 2015 adjacent to the Veterans Memorial Tunnels as part of the Twin Tunnels Project. Previously in this location, the stream was too wide and contained limited pool habitat. As part of the fish habitat improvement project, the stream channel was narrowed, and pools were created. Since the improvement project, brown trout numbers have increased and the density of brown trout within the habitat enhancement section is the highest it has ever been (CPW, 2017c; CPW, 2020a). Refer to Exhibit 16 for fish sampling and population estimates provided by CPW in Clear Creek within the Study Area (CPW, 2020b).

Exhibit 16. Fish Sampling & Population Estimates Before & After the Twin Tunnels Enhancement Project

Year	Species	1st Catch	2nd Catch	Population Estimate*	Number per Mile*
Station SP6714 (Twin Tunnels Lower)					
Prior to In-Stream Improvements					
2012	Rainbow Trout	4	N/A	4	41
2012	Brown Trout	70	15	89	915
2013	Brook Trout	1	N/A	1	10
2013	Brown Trout	87	13	102	1,051
2013	Rainbow Trout	5	N/A	5	51

Year	Species	1st Catch	2nd Catch	Population Estimate*	Number per Mile*
2014	Longnose Sucker	1	N/A	1	17
2014	Brown Trout	72	13	88	1,450
2014	Brown Trout	125	28	161	1,655
2014	Rainbow Trout	15	N/A	15	154
Total (All Species)		380	69	466	5,344
Post-Construction of In-Stream Improvements					
2015	Brown Trout	128	20	152	1,558
2015	Rainbow Trout	3	1	5	46
2016	Brown Trout	86	17	107	1,101
2016	Rainbow Trout	5	3	13	128
2017	Brown Trout	150	48	221	2,266
2017	Rainbow Trout	9	N/A	9	92
2017	Brown Trout	66	15	85	1,409
2018	Brook Trout	3	N/A	3	31
2018	Brown Trout	170	47	235	2,414
2018	Rainbow Trout	5	1	6	64
2018	Rainbow x Cutthroat	1	N/A	1	10
2019	Brown Trout	230	60	311	3,197
2019	Rainbow Trout	21	1	22	227
Total (All Species)		877	213	1,170	12,543
Station SP7886 (Twin Tunnels Upper)					
Prior to In-Stream Improvements					
2013	Brown Trout	22	1	23	396
2013	Rainbow Trout	2	N/A	2	34
2014	Brown Trout	42	6	49	843
2014	Rainbow Trout	2	N/A	2	34
Total (All Species)		68	7	76	1,307
Post-Construction of In-Stream Improvements					
2015	Brown Trout	51	5	57	1,094
2016	Brown Trout	40	13	59	1,146
2017	Brown Trout	49	20	83	1,601
2017	Rainbow Trout	1	N/A	1	19
2018	Brown Trout	64	6	71	1,366
2019	Brown Trout	72	18	96	1,857
2019	Rainbow Trout	4	N/A	4	77
Total (All Species)		281	62	371	7,160

*Source: CPW 2020b

Brook trout (*Salvelinus fontinalis*), Snake River cutthroat trout (*Oncorhynchus clarki bouvieri*), and various species of sucker (*Catostomus* spp.) also are present in the Clear Creek segment between Georgetown and Golden (CPW, 2017c; CPW, 2020a). There is a naturally reproducing population of brook trout in Beaver Brook approximately one mile upstream from where Beaver Brook crosses I-70 (CPW, 2020a). No species surveys have been conducted by CPW in Beaver Brook segments within the Study Area (CPW, 2020a). However, minnows and smaller unknown trout species were observed in Beaver Brook downstream of Adams Acres at the northeast end of the Study Area during the 2018 field survey. No fish sampling was conducted to identify the trout species.

CPW limits the stocking rate for rainbow trout because of whirling disease, which affects rainbow trout at a higher rate. However, beginning in 2009, CPW began annual stocking of a whirling disease-resistant strain of rainbow trout in Clear Creek to increase survival and abundance (CPW, 2017c). No information is available on whether stocking of rainbow trout occurred within the segment of Clear Creek that is in the Study Area, but due to natural localized fish movements throughout their stream habitats, it is assumed the species is present.

Benthic invertebrate communities known to inhabit or potentially inhabit Clear Creek are composed primarily of mayflies (*Ephemeroptera* spp.), stoneflies (*Plecoptera* spp.), caddisflies (*Tricoptera* spp.), and midges. Based on sampling surveys conducted by CPW from 2004 to 2009, the aquatic macro invertebrate community of Clear Creek from just downstream of Idaho Springs typically has the lowest diversity and abundance compared to other portions of the stream (CDOT, 2014; CPW, 2011).

Aquatic connectivity is not an issue for fish or benthic invertebrates in the Study Area (CPW, 2020a).

5.4.7. Jurisdictional Senate Bill 40 Streams within the Study Area

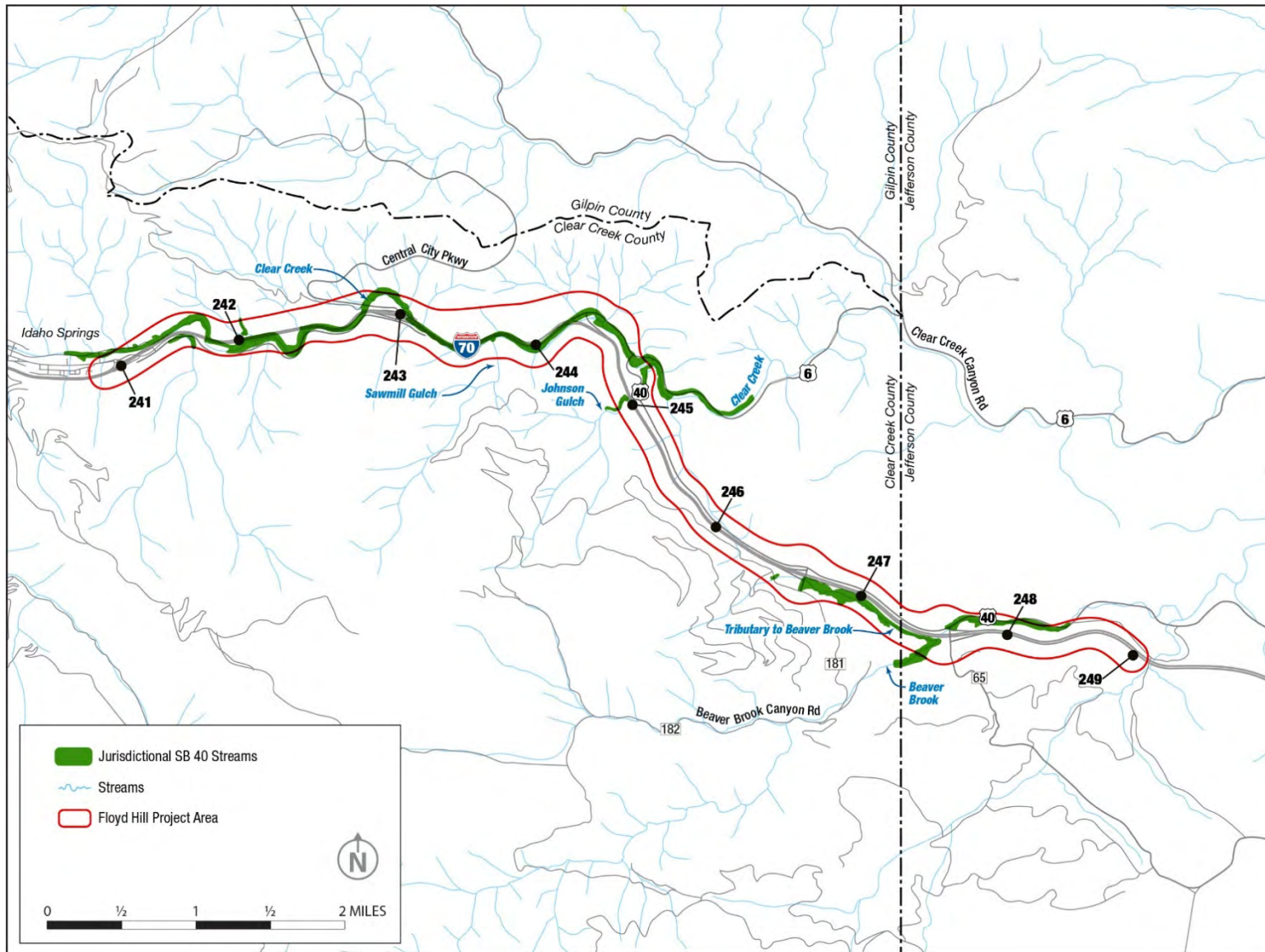
As noted in Section 3.2.2 of this document, jurisdictional SB 40 streams include:

- All perennial streams represented by solid blue lines on USGS 7.5-foot quadrangle maps or in the National Hydrography Dataset
- Segments of ephemeral and intermittent streams providing flowing water beneficial to fish and wildlife
- Segments of streams that are comprised of riparian vegetation dependent on groundwater or overbank flooding
- Segments of streams having wetlands present upstream or downstream of the Project

To identify jurisdictional SB 40 streams within a Study Area, a desktop review was conducted by reviewing aerial imagery and Federal Emergency Management Agency (FEMA) 100-year floodplains. The following four jurisdictional SB 40 streams, and their associated riparian areas, are located within the Study Area: Clear Creek, Beaver Brook, an unnamed tributary to Beaver Brook, and Johnson Gulch, (see Exhibit 17). Sawmill Gulch lacks the riparian vegetation requirements to qualify as a jurisdictional SB 40 stream.

To identify and quantify SB 40 vegetation along the above-mentioned streams, a formal survey would occur and SB 40 locations and mitigation measures (identified in Section 7 of this document) would be incorporated into final design. For more information on riparian vegetation, please see the I-70 Floyd Hills to Veterans Memorials Tunnel, Aquatic Resources Technical Report (CDOT, 2020a).

Exhibit 17. Jurisdictional SB 40 Streams within the Study Area



USFWS, 2020; FEMA, 2020; Google Aerial Imagery, 2018; CDOT, 2020a

6. Impacts

This section describes potential direct and indirect impacts of the proposed action alternatives and the No Action Alternative on terrestrial wildlife and aquatic species and their habitats. Direct impacts are caused by the Proposed Action and occur at the same time and place as that action. They occur when wildlife species are physically impacted during construction or wildlife habitats are degraded or destroyed. Long-term direct effects generally include permanent habitat fragmentation and loss of habitat. Short-term direct effects include temporary habitat loss and construction noise disturbance.

Indirect impacts typically occur later in time, after construction has been completed, and result from changes made to habitats. Examples of indirect impacts to wildlife include increased shading to a river or stream, changes to plant species composition, increased barriers to wildlife movement, and changes in habitat connectivity.

6.1. Methodology

Permanent and temporary direct impacts were identified by overlaying GIS layers of the action alternatives with wildlife habitat data. Locations within the construction limits where vegetated habitat would be replaced with transportation facilities were identified as having permanent impacts. Locations where vegetation would be damaged or removed during construction but revegetated afterward were identified as having temporary direct impacts.

6.2. No Action Alternative Impacts

As described in Section 2.2 of this document, the No Action Alternative would include ongoing highway maintenance and replacement of the westbound I-70 bridge at the bottom of Floyd Hill. The new bridge would be constructed in the same location and it would be wider than the existing bridge. The area is classified as a high-intensity developed area that is dominated by impervious surfaces, including I-70, US 6, and the Clear Creek Greenway Trail. Several areas at the interchange also are heavily disturbed and devoid of vegetation, including parking areas, creek pullouts, dirt piles, and the riprapped banks of Clear Creek. Vegetation in the remaining areas consists of herbaceous plants along the roadside and bridge abutments and a few small trees and shrubs.

There is potential for construction to directly impact small mammals and snakes that may live in the area. However, wildlife habitat is marginal, and impacts would be minimal. Larger terrestrial wildlife likely would avoid the area during construction, so no direct impacts would be expected. Additionally, the new bridge would have a higher clearance zone than the existing bridge, but no wildlife connectivity improvements would occur.

Potential impacts to raptor and migratory bird habitat could occur during clearing and grubbing and other earthmoving activities. Construction activities could result in direct mortality to raptors and migratory birds and cause others to become displaced. If construction occurs during the nesting season for raptors and migratory birds (February 1 through August 31), a pre-construction survey for nesting birds would be completed prior to beginning construction activities, and active nests would be avoided.

Clear Creek in this location lacks riparian habitat, so impacts to reptiles and amphibians would not be expected. Additionally, the Clear Creek channel would be avoided during construction, and bridge replacement activities would not impact aquatic species in the area.

Indirect impacts could result from construction noise and lighting, accidental chemical spills during construction, and the introduction and spread of noxious weeds and invasive plants that displace native vegetation used by wildlife.

6.3. Tunnel Alternative Impacts

6.3.1. East Section

Project elements in this location include adding a third lane in the westbound direction, modifying curves to improve sight distance and safety, and adding an eastbound auxiliary lane from the bottom of Floyd Hill to the Hyland Hills/Floyd Hill interchange. To accommodate the additional lanes, retaining walls, structure, and rock cuts would be required in several locations. Water quality features and wildlife fencing would be added along the south side of the eastbound lanes. Additionally, wildlife fencing would be added along the north and south sides of I-70 between the Hyland Hills/Floyd Hill interchange and Soda Creek Road to reduce WVCs.

6.3.1.1. Direct Impacts

General Wildlife Habitat

The Study Area within the East Section of the Project consists of approximately 298 acres (45 percent) of developed land and approximately 372 acres (55 percent) of vegetated lands (see Exhibit 18). Approximately 245 acres (37 percent) consist of evergreen forest, 41 acres (6 percent) of shrub/scrub, 29 acres (4 percent) of wetlands, 3 acres (less than 1 percent) of deciduous forest, and 1 acre (less than 1 percent) of open water.

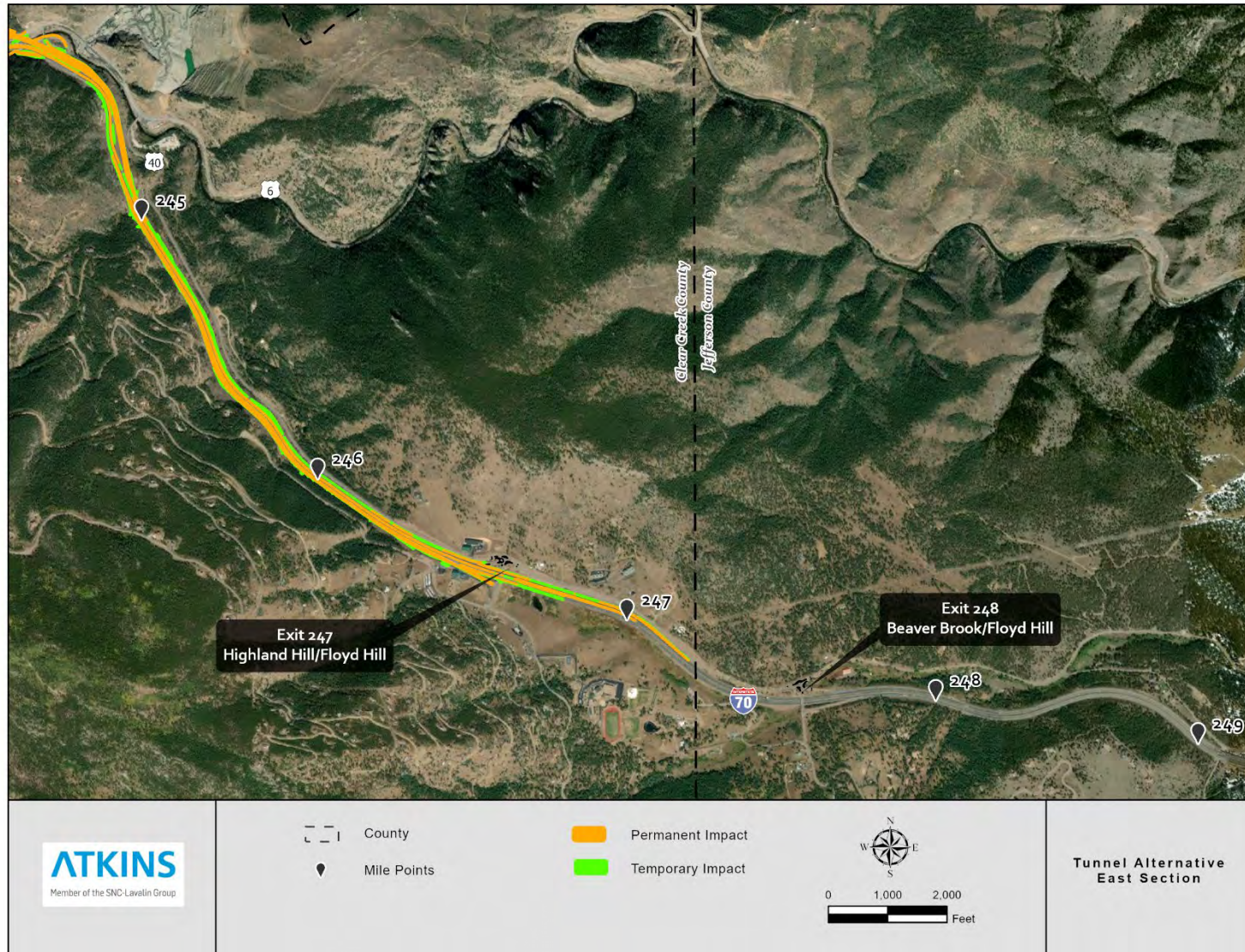
Permanent direct impacts to general wildlife habitat would result from increased pavement required for the additional westbound and eastbound lanes, rock blasting, construction of retaining walls and bridge piers, and potential installation of rock-fall mitigation. Temporary direct impacts would result from construction, staging areas, and access for heavy construction equipment. Less than 1 acre of vegetated habitat (less than 1 percent of the East Section Study Area) would be permanently incorporated into the transportation facility and approximately 2 acres (less than 1 percent of the East Section Study Area) would be temporarily impacted during construction (see Exhibit 18). These impacts are minimal and would occur in areas adjacent to I-70 that are currently degraded. Mitigation measures identified in Section 7 of this document would avoid and minimize impacts to the remaining areas.

Exhibit 18. Direct Impacts to General Wildlife Habitat, Tunnel Alternative, East Section

Land Cover	Total Habitat		Permanent Impacts		Temporary Habitat	
	Acres	Percent Study Area	Acres	Percent Study Area	Acres	Percent Study Area
Developed Areas						
Developed, Open Space	—	—	—	—	—	—
Developed, Low Intensity	102	15	—	—	< 1	< 1
Developed, Medium Intensity	31	5	—	—	< 1	< 1
Developed, High Intensity	165	25	11	2	6	< 1
Subtotal	298	45	11	2	6	< 1
Vegetation Communities						
Deciduous Forest	3	< 1	—	—		
Evergreen Forest	245	37	< 1	< 1	< 1	< 1
Grasslands	53	8	< 1	< 1	1	< 1
Wetlands	29	4	—	—	—	—
Mixed Forest	—	—	—	—	—	—
Shrub/Scrub	41	6	< 1	< 1	1	< 1
Open Water	1	< 1	—	—	—	—
Subtotal	372	55	< 1	< 1	2	< 1
TOTAL	670	100	11	2	8	2

Source: USGS, 2017a.

Exhibit 19. Wildlife Habitat Impact Areas within the East Section of the Project



Mule deer severe winter range overlaps with the Study Area between MP 245.5 and MP 246 (see Exhibit 20). To accommodate the eastbound auxiliary lane, construction in this area would include cutting into the adjacent rock slope and widening I-70 to the south. When complete, the rock wall would be approximately 15 feet tall and impassable for mule deer. However, the rock cut would be constructed in a very steep slope that is devoid of most vegetation and also currently impassable for mule deer (see Photo 1). Mule deer would continue to travel around the rock cut area to access other locations within the severe winter range.



Photo 1. Proposed Rock Cut Area Within Mule Deer Severe Winter Range

Elk winter range and a resident population area overlap with the Study Area in the Floyd Hill area, between MP 245.5 and the east end of the Project Area (see Exhibit 20). Permanent habitat impacts would result from widening I-70 to the south to accommodate the eastbound acceleration lane and the third westbound lane, and rock cuts. However, the habitat immediately adjacent to I-70 is low quality because of the presence of the interstate and surrounding developed areas (see Photo 2).

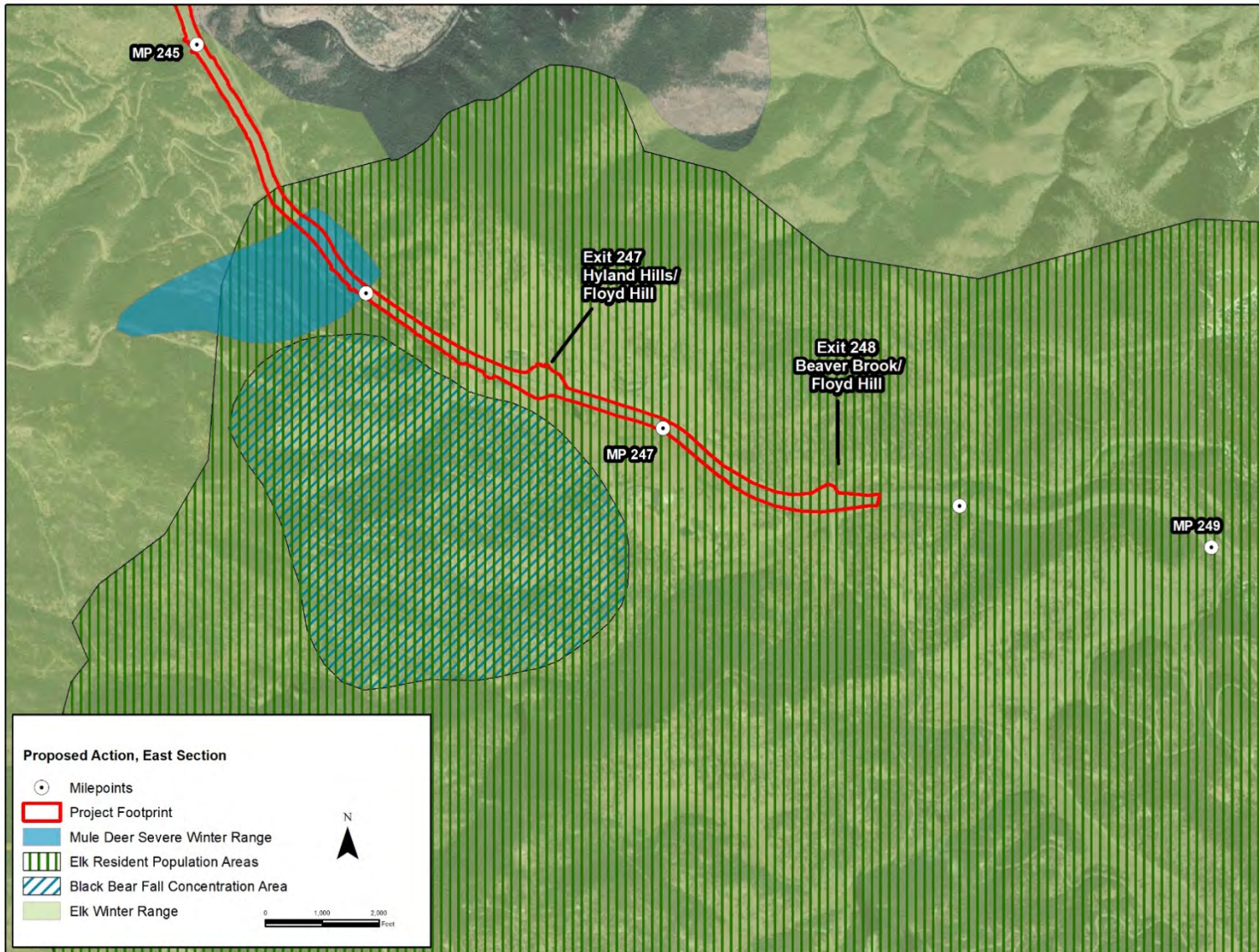


Photo 2. Elk Habitat South Side of I-70

A black bear Fall season concentration area is located south of the Hyland Hills/Floyd Hill interchange, but it is outside the limits of disturbance and no permanent or temporary impacts would occur (see Exhibit 20). No bighorn sheep habitat occurs within the East Section of the Project, therefore no impacts to the species would be expected.

Habitat availability for small mammals and their predators also would be reduced slightly and construction activities could cause mortality to individual animals. However, large terrestrial mammals would likely avoid the Study Area during construction, so impacts to these species would be minor.

Exhibit 20. Terrestrial Mammal Habitat in the East Section of the Project



Source: CPW, 2017b

Connectivity for Terrestrial Mammals

Existing I-70 has resulted in habitat fragmentation for terrestrial mammals that historically migrated and dispersed across the area prior to the construction of I-70. Project elements that would increase habitat fragmentation include the third I-70 westbound lane, eastbound auxiliary lane, and additional guardrail on the south side of I-70. Reduced congestion levels on I-70 also could result in higher traffic volumes. The increased width of I-70, potential higher traffic volumes, and the added obstacle (guardrail) wildlife would need to cross over would make it harder for animals to successfully navigate across the interstate, resulting in an increase in the barrier effect to wildlife movement and may result in higher incidence of WVC for those animals that do attempt crossing.

The East Section of the Project is within the Beaver Brook LIZ, which experiences a high rate of elk WVCs. To reduce WVCs, wildlife fencing would be added along the north and south sides of I-70 between the Hyland Hills/Floyd Hill interchange and east of Soda Creek Road. This additional fencing would result in permanent habitat fragmentation for elk and other species in the area, preventing wildlife movement across I-70 except at the existing Soda Creek Road bridge at MP 249.

Proposed mitigation measures are discussed in Appendix C of this document.

Raptors and Migratory Birds

Construction activities could result in direct mortality to raptors and migratory birds and cause others to become displaced. Rock blasting can disturb nesting and roosting birds and construction workers and equipment could cause stress to nesting birds and result in abandonment and/or predation of nests. Therefore, if construction occurs during the nesting season for raptors and migratory birds (February 1 through August 31), a pre-construction survey for nesting birds would be completed prior to construction, and active nests would be identified, protected, and avoided. Additionally, if rock retaining material is used at the rock cut areas, the material could inadvertently trap birds and small forest owls and cause fatalities.

Reptiles and Amphibians

Riparian habitat in the East Section of the Project are located along Johnson Gulch (MP 245); along Beaver Brook south of I-70, between the Hyland Hills/Floyd Hill interchange and the Beaver Brook/Floyd Hill interchange; and along Beaver Brook and an associated unnamed tributary on the north side of I-70 east of the Beaver Brook/Floyd Hill interchange (see Exhibit 17).

Widening I-70 to the south has the potential to cause permanent and temporary direct impacts to these areas. Impacts could result from earthwork activities, moving equipment over riparian shrubs and trees, and cutting shrubs and trees to accommodate project-related activities. With the implementation of mitigation measures described in Section 7 of this document, impacts to riparian areas would be avoided and minimized.

Aquatic Species

Habitat for aquatic species occurs in Beaver Brook, which crosses I-70 at the Beaver Brook/Floyd Hill interchange via an underground metal culvert. On the south side, the culvert inlet is more than 100 feet away from the I-70 edge of pavement and no construction would occur in this area. On the north side, the culvert outlet is approximately 65 feet north of the westbound I-70 off-ramp and more than 150 feet away from proposed construction at the Beaver Brook/Floyd Hill interchange. These areas would be avoided during construction and no impacts to aquatic species and their habitat would occur in the East Section of the Project.

6.3.1.2. Indirect Impacts

General Wildlife Habitat

Construction activities would expose soils and create opportunities for the introduction and spread of noxious and invasive weeds in the Study Area. Noxious weeds have the potential to out-compete native vegetation species that are preferred by the wildlife species in the area. The additional travel lanes could result in an increase of harmful chemicals (i.e., deicer and petroleum-based products) on roadside vegetation.

Terrestrial Mammals

Higher traffic volumes and increased noise levels could cause high levels of stress to resident terrestrial mammals and result in displacement. This result could potentially make the wildlife more susceptible to predations and environmental conditions, such as weather.

Connectivity for Terrestrial Mammals

The increased barrier effect of I-70 would further isolate wildlife populations north and south of I-70 and impact dispersal. This would preclude genetic interchange between wildlife populations and potentially affect long-term genetic diversity. The resident elk herd at the top of Floyd Hill remains connected to elk herds to the south and is a healthy and viable population despite a lack of connectivity with populations to the north of I-70.

Proposed mitigation measures are discussed in Appendix C of this document.

Raptors and Migratory Birds

The additional eastbound auxiliary lane and the third westbound lane could cause an increase in vehicle collisions with migratory birds and raptors. As the traffic volume increases on I-70, increased noise may have indirect impacts on birds by reducing habitat use and potentially population size adjacent to the roadway. Rock fall material installed over rock cuts could inadvertently trap avian species and result in mortality.

6.3.2. Central Section

Project elements in the Central Section that could potentially impact wildlife species and habitat include:

- Tunnel boring
- Realigning curves (rock blasting)
- Adding a third I-70 westbound lane
- Improving the Clear Creek Greenway

Below is a description of the Tunnel Alternative's potential direct and indirect impacts.

6.3.2.1. Direct Impacts

This section includes direct impacts that are common to both the North Frontage Road and South Frontage Road Design Options. Impacts that are specific to each Design Option are discussed in Section 6.3.2.3 of this document.

General Wildlife Habitat

The Study Area within the Central Section of the Project consists of approximately 86 acres (32 percent) of developed land and approximately 186 acres (68 percent) of vegetated lands (see Exhibit

21). Approximately 116 acres (43 percent) of the land is evergreen forest, approximately 50 acres (18 percent) are shrub/scrub, approximately 14 acres (5 percent) are open water, approximately 5 acres (2 percent) are mixed forest, and approximately 1 acre (less than 1 percent) is wetlands. Exhibits showing the above land cover have been created for each Design Option and are included in Section 6.3.2.3 of this document.

Permanent direct impacts to general wildlife habitat would result from increased pavement required for the additional westbound lane, rock blasting, retaining walls, and construction of the frontage road and retaining walls. Temporary direct impacts would result from construction activities, staging areas, and access for heavy construction equipment.

Exhibit 21. General Wildlife Habitat, Central Section

Land Cover	Total Habitat	
	Acres	Percent Study Area
Developed Areas		
Developed, Open Space	—	—
Developed, Low Intensity	2	< 1
Developed, Medium Intensity	2	< 1
Developed, High Intensity	82	30
Subtotal	86	32
Vegetation Communities		
Deciduous Forest	—	—
Evergreen Forest	116	43
Wetlands	1	< 1
Mixed Forest	5	2
Grassland/Pasture	—	—
Open Water	14	5
Shrub/Scrub	50	18
Subtotal	186	68
TOTAL	272	100

Source: USGS, 2017a

Terrestrial Mammals

A mule deer winter concentration area is located north of I-70 (see Exhibit 22). No impacts would occur to the surface of this land; however, the westbound I-70 tunnel would be constructed through the subsurface of this area (see Exhibit 22). Increased noise levels and vibrations from tunnel blasting could cause high stress levels to mule deer herds in this area, and animals may choose to avoid this area during construction. However, when construction is complete, long-term noise levels would be reduced because the westbound travel lanes would be in the tunnel (CDOT, 2020g).

Habitat availability for small mammals and their predators could be reduced slightly and construction activities could potentially result in mortality.

Connectivity for Terrestrial Mammals

The Central Section of the Project is located within the Clear Creek LIZ and there is less north/south wildlife movement across the I-70 corridor than in the Beaver Brook LIZ, discussed in Section 6.3.1 of

this document. Due to the barrier of I-70 and the steep slopes on the north side, wildlife typically approaches the Project Area from the south and move parallel with I-70 and Clear Creek. At the US 6 interchange, the I-70 westbound and eastbound bridges and the westbound off-ramp bridge would be replaced, and a new I-70 eastbound on-ramp would be constructed over Clear Creek. A wildlife bench would be constructed next to the Greenway Trail under all the bridges. This would improve riparian corridor connectivity and allow animals to access riparian habitat east of the US 6 interchange and upland habitat north of I-70.

However, once the improvements to the Clear Creek Greenway Trail are complete, human presence along the trail is expected to increase (personal communication, Francesca Tordonato, Environmental Program Manager/Senior Biologist, CDOT Region1). This increase in human presence could inhibit animals from traveling through the area during daytime hours.

Additional direct impacts are discussed below for each Design Option.

Raptors and Migratory Birds

Construction activities could result in direct mortality to raptors and migratory birds and cause others to become displaced. Rock blasting can disturb nesting and roosting birds and construction workers and equipment could cause stress to nesting birds and result in abandonment and/or predation of nests. Therefore, if construction occurs during the nesting season for raptors and migratory birds (February 1 through August 31), a pre-construction survey for nesting birds would be completed prior to beginning construction activities, and active nests would be identified, protected, and avoided. Additionally, if rock retaining material is used at the rock cut areas, the material could inadvertently trap birds and small forest owls and cause fatalities.

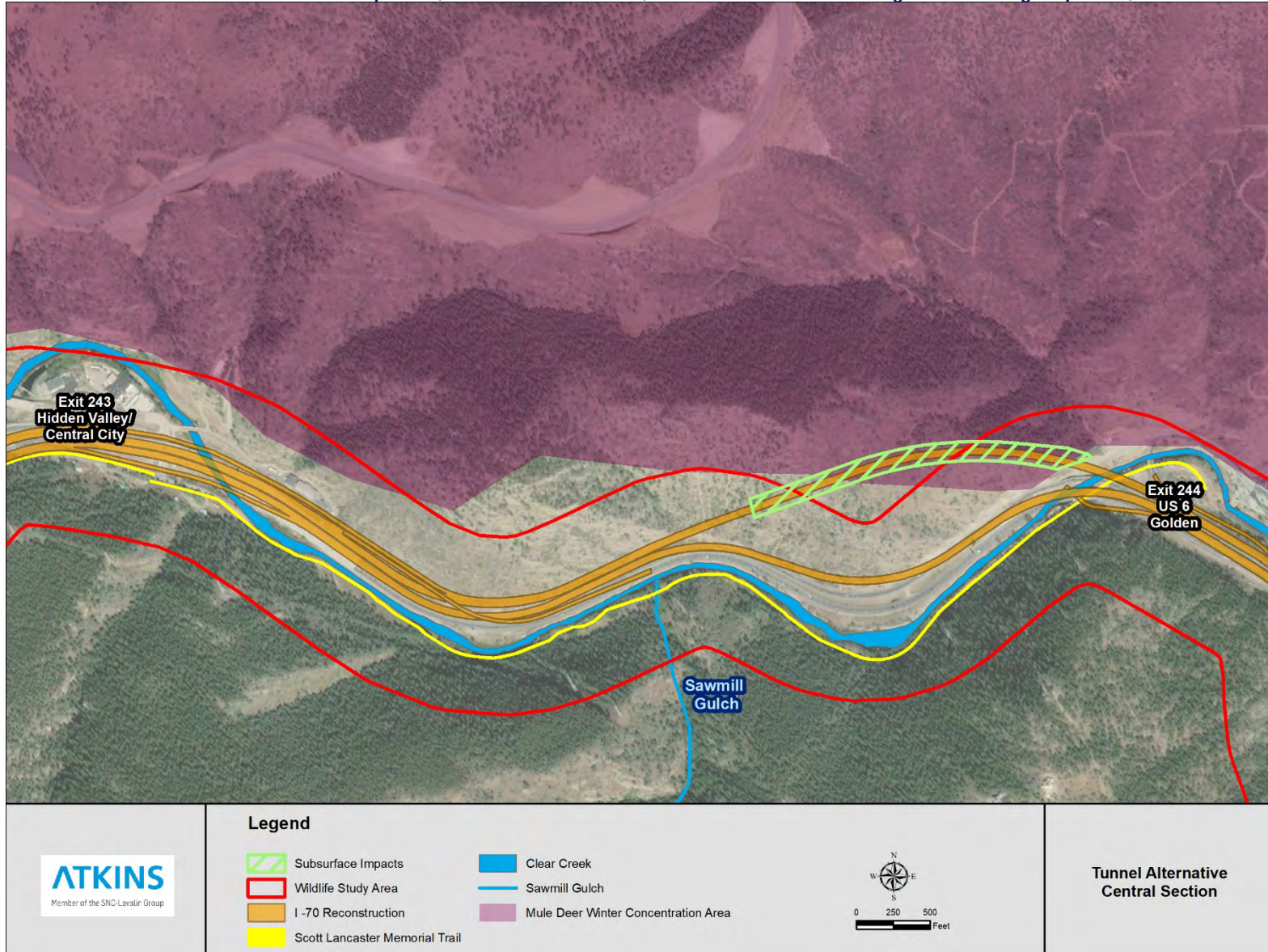
Bald Eagle winter range occurs throughout the Central Section of the Study Area (see Exhibit 15). However, Clear Creek lacks continuous riparian habitat and large cottonwood trees in this location that are preferred by Bald Eagles. No roost sites, communal roost sites, or nests are located within or near the Central Section of the Study Area. Therefore, impacts to Bald Eagles would not be expected. Nonetheless, if construction occurs during the raptor and migratory bird nesting season (February 1 through August 31), a pre-construction survey would be completed prior to beginning construction activities. All nesting birds would be avoided during construction. See Section 7 of this document for more information.

Reptiles and Amphibians

Riparian habitat areas in the Central Section of the Project are located along Clear Creek (see Exhibit 17). Construction of bridges, bridge piers, and bridge abutments has potential to cause permanent and temporary impacts to these areas. Potential impacts also could result from tunnel construction in the US 6 interchange area.

Direct impacts could result from earthwork activities, moving equipment over riparian shrubs and trees, and cutting shrubs and trees to accommodate project-related activities. However, with the implementation of mitigation measures described in Section 7 of this document, impacts to riparian areas would be avoided and minimized.

Exhibit 22. Mule Deer Habitat Impacts*, Tunnel Alternative, North and South Frontage Road Design Options, Central Section



Source: CPW, 2017b; *Subsurface impacts related to tunnel construction;

Aquatic Species

Construction of bridge piers and abutments could directly impact individual fish, spawning habitat, and macroinvertebrates. Individual fish and invertebrates could be injured or killed by heavy equipment and boulder movement during construction. Pools, used for over wintering, could be destroyed or filled in. Additionally, accidents or spills (ex: equipment leaking hydraulic fluid) could occur that negatively impact trout and aquatic macroinvertebrate habitats or populations. However, with the implementation of mitigation measures described in Section 7 of this document, impacts to aquatic species would be avoided and minimized.

6.3.2.2. Indirect Impacts

This section includes indirect impacts for both the North Frontage Road and South Frontage Road Design Options.

General Wildlife Habitat

Areas that currently receive a lot of direct sunlight could become shaded by new bridges, which would change habitat conditions and suitability for some species. Construction activities would create opportunities for the introduction and spread of noxious weeds that have potential to out-compete native vegetation species preferred by wildlife. The additional travel lane also could result in increased levels of chemicals (i.e., deicer and petroleum-based products) that could adversely affect roadside vegetation.

Terrestrial Mammals

A permanent increase in traffic volumes and associated noise levels could cause stress to resident terrestrial mammals and result in displacement. Animals may choose to avoid the Clear Creek corridor, which provides food and water in this Central Section of the Project Area. This could potentially weaken some animals and make them more susceptible to illness, predators, and environmental conditions, such as weather.

Connectivity for Terrestrial Mammals

The increased barrier effect of I-70 would further isolate wildlife populations north and south of I-70 and impact dispersal. This would preclude genetic interchange between wildlife populations and potentially affect long-term genetic diversity. Individual bighorn sheep may occasionally attempt crossing I-70 to the south, however, as movements between sub-herds and genetic interchange occur on an east-west axis along the north side of I-70, there are no anticipated population impacts to bighorn sheep from either design option.

Proposed mitigation measures are discussed in Appendix C of this document.

Raptors and Migratory Birds

The additional eastbound auxiliary lane and the third westbound lane could cause an increase in vehicle collisions with migratory birds and raptors. As the traffic increases on I-70, increased noise may have indirect impacts on birds by reducing habitat use and potentially avian abundance adjacent to the roadway. Material installed to prevent rockfall could inadvertently trap avian species and result in mortality.

Reptiles and Amphibians

Construction activities would disturb the ground surface and increase the likelihood of noxious weeds becoming established that could crowd out more-desired native vegetation. Increased runoff from the widened road could contain pollutants that impact wildlife and plant species. However, indirect impacts to riparian habitat and wildlife species are anticipated to be temporary and minor after implementation of mitigation measures identified in Section 7 of this document.

Aquatic Species

Construction activities could increase the mobility and delivery of sediments, which could cover spawning gravel beds and smother eggs and emerging fry by reducing oxygen availability. Increased turbidity and reduced oxygen levels could cause the abundance and diversity of macroinvertebrates to decline. Areas that currently receive a lot of direct sunlight could become shaded by new bridges, which could change habitat conditions for fish and invertebrate species.

6.3.2.3. Impacts of Design Options

The sections below describe impacts specific to each design option.

General Wildlife Habitat

The North Frontage Road Option would permanently incorporate slightly more than 6 acres of vegetated habitat (2 percent of the Central Section Study Area) into the transportation facility and temporarily impact approximately 6 acres (2 percent of the Central Section Study Area) (see Exhibit 23 and Exhibit 24). The South Frontage Road Option would permanently incorporate approximately 7 acres of vegetated habitat (3 percent of the Central Section Study Area) into the transportation facility and temporarily impact approximately 5 acres (2 percent of the Central Section Study Area) (see Exhibit 23 and Exhibit 25).

The North Frontage Road Option would construct I-70 farther north than the South Frontage Road Option and would permanently impact approximately 4 acres of shrub/scrub and 2 acres of evergreen forest on the north side of I-70 (Exhibit 23). The South Frontage Road Option would impact only approximately 1 acre of vegetation on the north side of I-70 and approximately 6 acres of vegetation (evergreen forest, mixed forest, and shrub/scrub) on the south side of Clear Creek (Exhibit 23). The higher impacts of the South Frontage Road Option would result from new roadway construction south of Clear Creek.

Conversely, the North Frontage Road and South Frontage Road Design Options would reclaim approximately 4 acres and 5 acres of land, respectively. Reclaimed areas for the North Frontage Road Option would occur in medians and thin shoulder areas that would not provide suitable habitat for most wildlife species. However, the South Frontage Road Option would remove the I-70 eastbound lanes between the Sawmill Gulch area and the US 6 interchange. This area is adjacent to the north side of Clear Creek and would provide opportunities to restore approximately 4 acres of riparian areas along this stretch of the creek. Riparian areas are considered high-quality wildlife habitat because they provide cover, food, and water for a wide range of species.

Exhibit 23. Direct Impacts to General Wildlife Habitat, Tunnel Alternative, North and South Frontage Road Design Options, Central Section

Land Cover	Total Habitat		North Frontage Road Option				South Frontage Road Option			
	Acres	Percent Study Area	Permanent Impacts		Temporary Impacts		Permanent Impacts		Temporary Impacts	
			Acres	Percent Study Area	Acres	Percent Study Area	Acres	Percent Study Area	Acres	Percent Study Area
Developed Areas										
Developed, Open Space	—	—	—	—	—	—	—	—	—	—
Developed, Low Intensity	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Developed, Medium Intensity	2	< 1	< 1	< 1	—	—	< 1	< 1	< 1	< 1
Developed, High Intensity	82	30	9	3	8	3	10	4	6	2
Subtotal	86	32	9	3	8	3	10	4	6	2
Vegetation Communities										
Deciduous Forest	—	—	—	—	—	—	—	—	—	—
Evergreen Forest	116	43	2	< 1	2	< 1	4	2	2	< 1
Wetlands	1	< 1	—	—	—	—	—	—	—	—
Mixed Forest	5	2	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
Grassland/Pasture	—	—	—	—	—	—	—	—	—	—
Open Water	14	5	< 1	< 1	—	—	—	—	—	—
Shrub/Scrub	50	18	4	2	4	2	2	< 1	3	1
Subtotal	186	68	6	2	6	2	7	3	5	2
TOTAL	272	100	15	5	14	5	17	7	11	4

Source: USGS, 2017a

Exhibit 24. Wildlife Habitat Impact Areas, Tunnel Alternative, North Frontage Road Design Option, Central Section

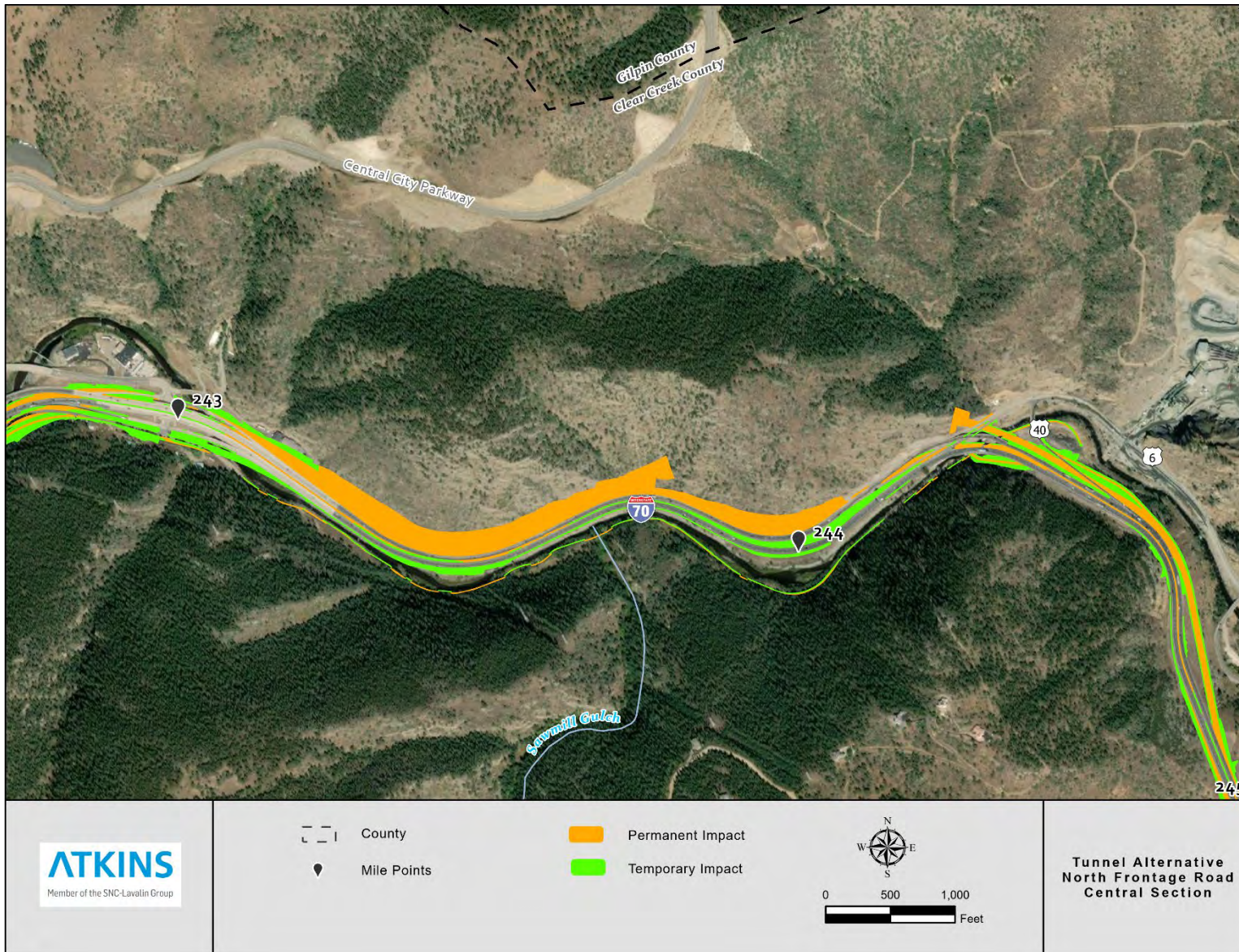
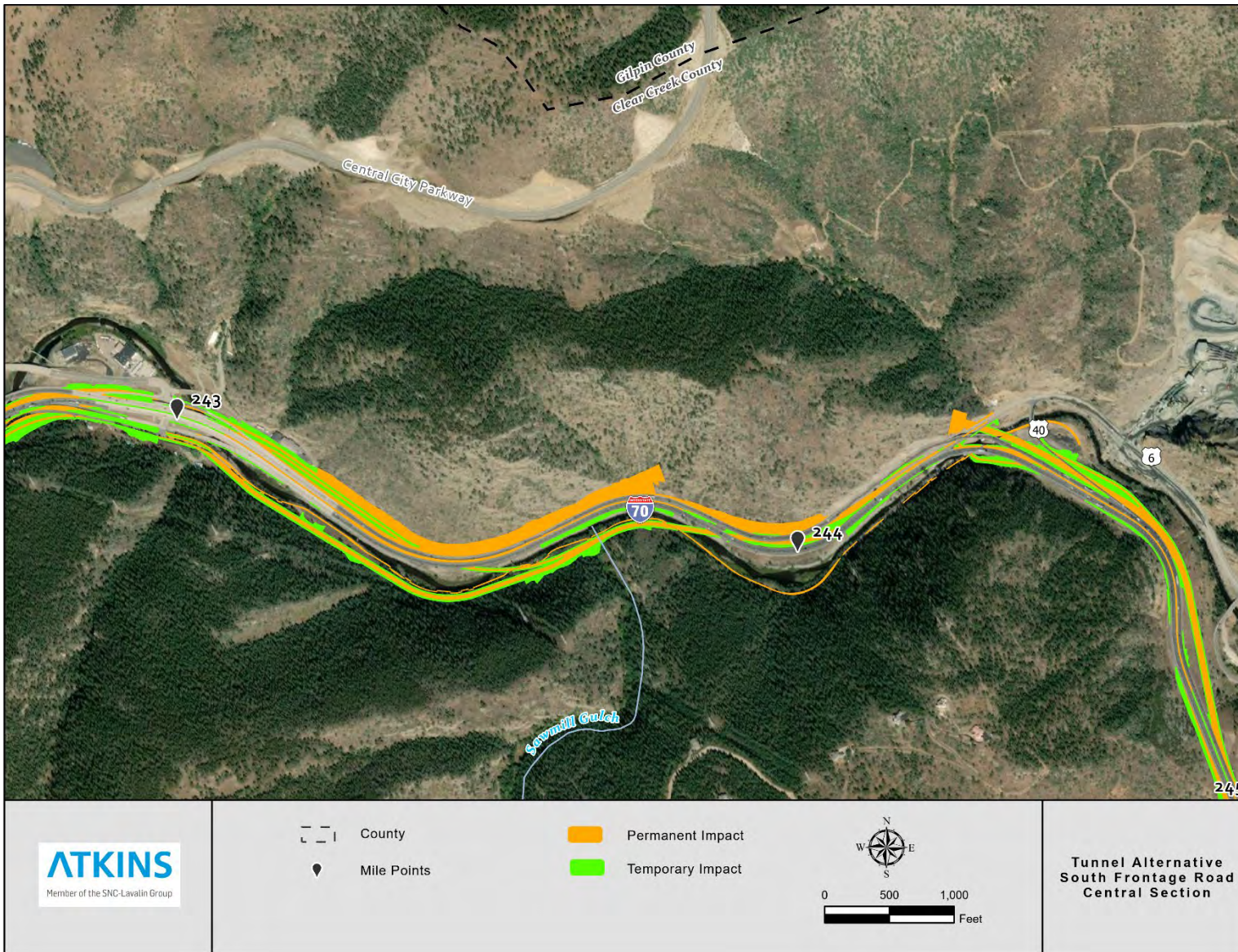


Exhibit 25. Wildlife Habitat Impact Areas, Tunnel Alternative, South Frontage Road Design Option, Central Section



Terrestrial Mammals

Both Frontage Road Design Options would impact approximately 7 acres of subsurface area in the bighorn sheep summer and winter range during construction of the tunnel. Rock cuts associated with the North Frontage Road Option would impact approximately 20 acres of south-facing slope along the north side of I-70 (see Exhibit 26). The South Frontage Road Option would impact approximately 11 acres of south-facing slope (see Exhibit 27). Additionally, the North Frontage Road and South Frontage Road Design Options would permanently impact approximately 6 acres and 2 acres of bighorn sheep severe winter range, respectively.

At the beginning of construction, rock blasting at the portals would temporarily affect wildlife resources due to disturbance from construction noise and increased human presence. As tunnel construction progresses, the blasting would occur inside the tunnel and the noise would be largely muffled by the mountain. The presence of construction workers and heavy machinery combined with construction noise and vibration from blasting would likely lead to temporary wildlife displacement to individuals that occur in the vicinity of the project.

Bighorn sheep summer range, winter range, and severe winter range occur within the Central Section of the Project, north of I-70 (see Exhibits 26 and 27). The closest bighorn sheep production area is over a half mile to the east of the US 6 interchange. Bighorn sheep may be more susceptible to displacement than other species. Therefore, noise and vibrations from tunnel construction and rock blasting could cause bighorn sheep to avoid these habitat ranges during construction.

Rock cuts within these habitat areas would occur immediately adjacent to I-70 and have potential to alter bighorn sheep movement patterns within the Study Area. The North Frontage Road Option would have substantially more impact on severe winter range due to rock cuts than the South Frontage Road Option. Approximately 20 acres of south-facing slope and big horn sheep summer and winter range and 6 acres of bighorn sheep severe winter range would be lost with the North Frontage Road Option, due to extensive rock cuts and excavation along the eastbound I-70 travel lanes. If material is installed to prevent rockfall, it could limit access to suitable bighorn sheep habitat. Additionally, rock cuts within the severe winter range could prevent sheep from accessing roadside salts and vegetation when food sources are scarce. As a result, bighorn sheep could choose less suitable range that results in increased predation and mortality. However, tunnel and rock blasting would be short term and severe winter years occur infrequently. In addition, noise modeling indicates permanent noise levels would decrease because the I-70 westbound lanes would be constructed through a tunnel (CDOT, 2020g).

The North Frontage Road Option would not impact elk winter range, but the South Frontage Road Option would permanently impact 11 acres of winter range on the south side of Clear Creek (see Exhibit 28). The existing landscape in that area is dominated by evergreen forest. Construction would replace the trees with new roadway, 5-foot-tall to 35-foot-tall retaining walls, guardrails, and other structures. The area would change drastically, becoming dominated by transportation facilities.

Connectivity for Terrestrial Mammals

Currently, terrestrial mammals primarily travel from south of the Study Area to the Clear Creek riparian corridor, which is a water source. The North Frontage Road Option would not impact an animal's ability to reach the creek because all the transportation infrastructure would stay on the north side of Clear Creek. However, the South Frontage Road Option would create a barrier effect.

To construct the frontage road south of Clear Creek, suitable habitat would be replaced with transportation infrastructure including, pavement, tall retaining walls, and guardrail. It would be difficult for animals to cross over the infrastructure to reach Clear Creek. In some areas, a permanent loss of connectivity would occur. In other areas increased WVCs are likely, resulting in wildlife mortality.



Additionally, the South Frontage Road Option would result in transportation infrastructure occurring on both sides of the creek, thereby increasing human impacts and presence along the riparian corridor, introducing more crossing conflicts with vehicles, and decreasing habitat suitability.

Raptors and Migratory Birds

The South Frontage Road Option would remove approximately 5 acres of roadway surface along the north side of Clear Creek. The area would be restored to natural conditions and provide an opportunity to improve riparian habitat along Clear Creek. Potential improvements would include planting willow and cottonwood trees and improving fish habitat conditions in Clear Creek, which also would improve the Bald Eagle winter range in this Section of the Project. These improvements would benefit all migratory birds and raptors and could potentially increase species diversity and abundance in the Study Area.

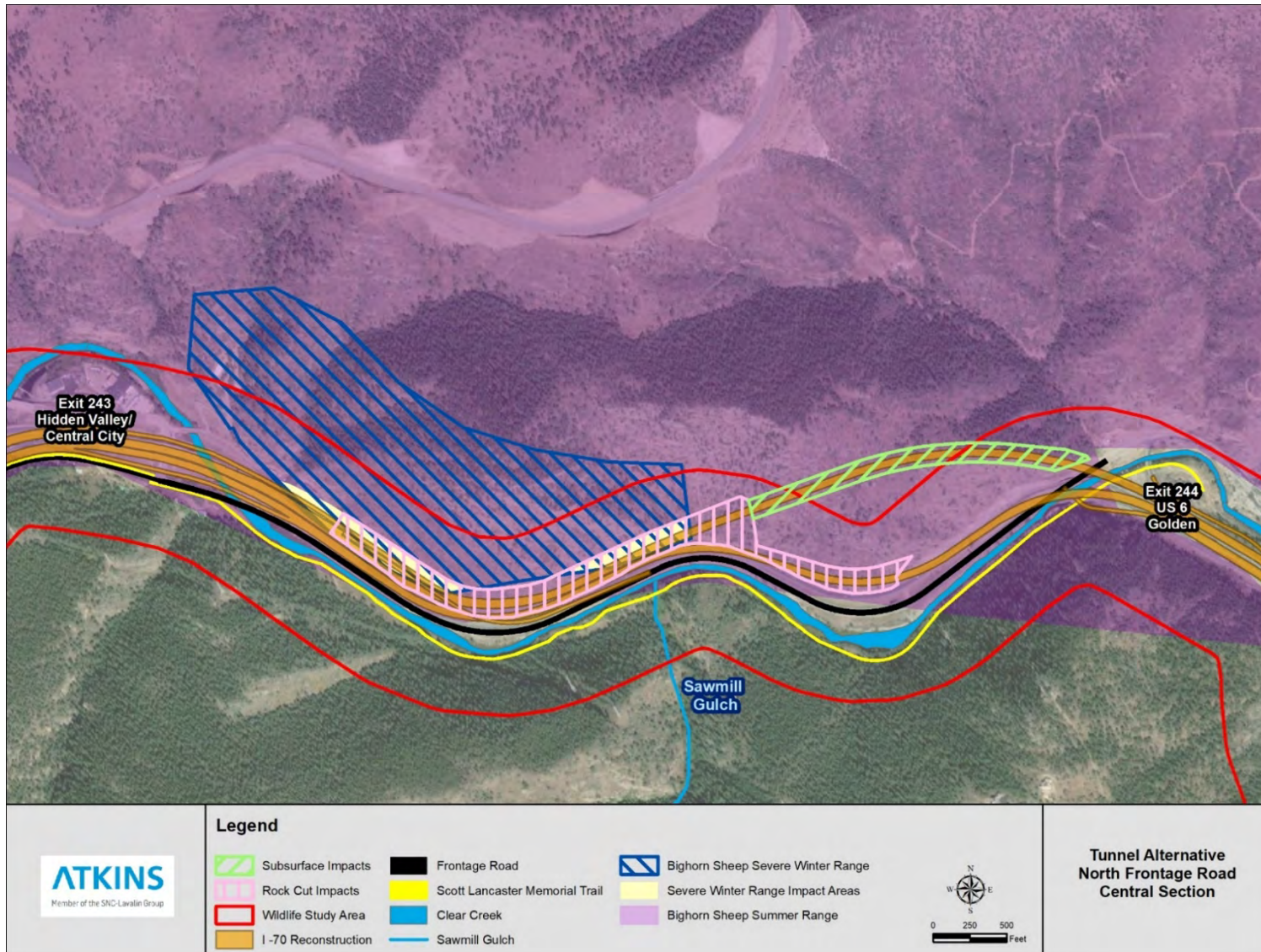
Reptiles and Amphibians

In addition to the potential riparian habitat improvements discussed above, restoring the north bank of the creek under the South Frontage Road Option provides more opportunity to widen the associated floodplain in some locations, add meander and creek length, remove riprap, add cross-vanes to dissipate stream energy, and lower the bench to floodplain level (due to the additional area reclaimed from the I-70 roadway on the north side of Clear Creek). These areas would be planted and/or seeded with native species and improvements would create suitable habitat conditions for many reptile and amphibian species.

Aquatic Species

The potential South Frontage Road riparian improvements also would benefit aquatic species. The addition of native trees and shrubs would provide shade, which would cool water temperatures and improve habitat conditions for aquatic species. There also would be an opportunity to create pools and improve fish spawning habitat along this stretch of Clear Creek.

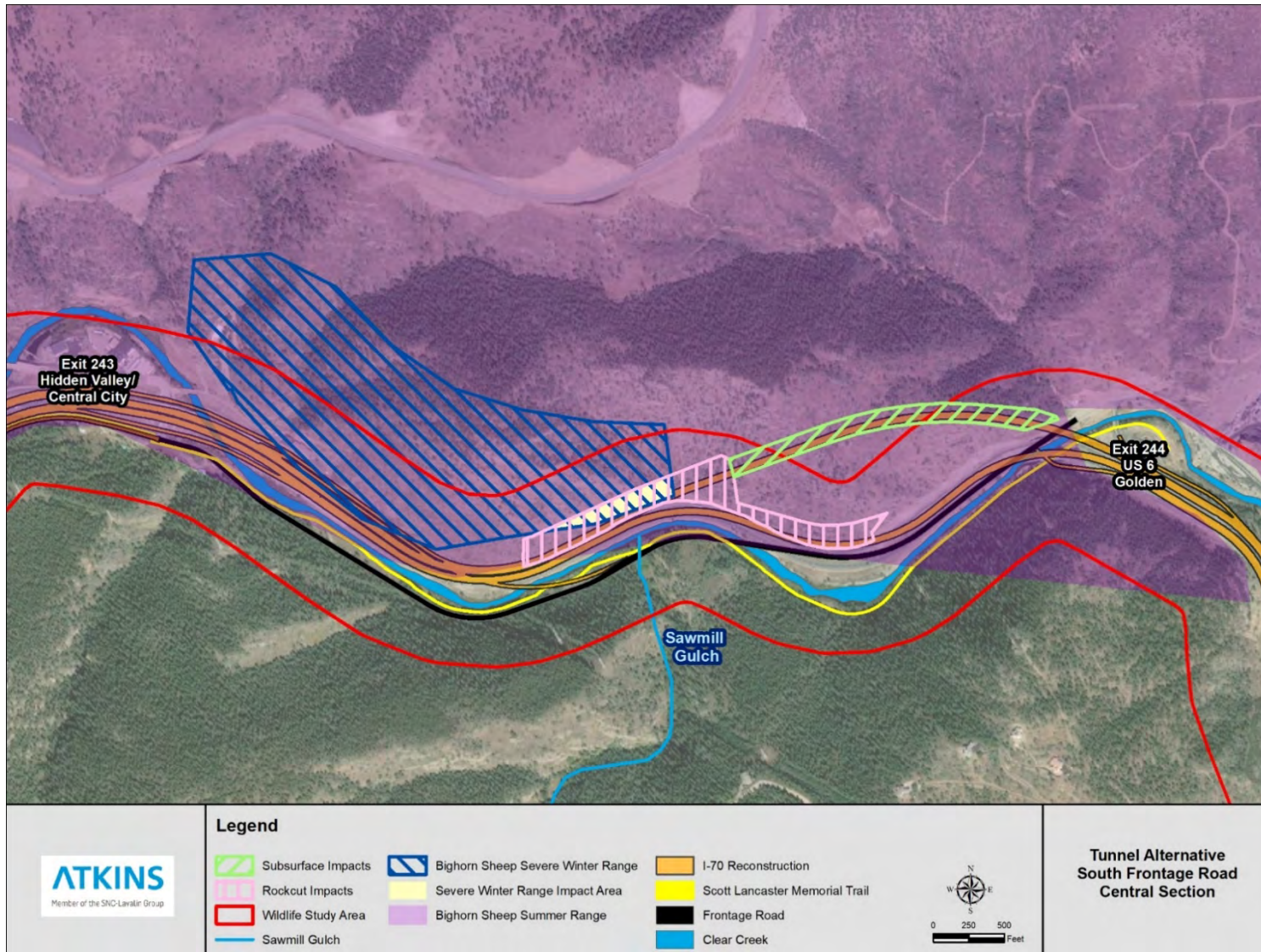
Exhibit 26. Bighorn Sheep Habitat Impacts* Tunnel Alternative, North Frontage Road Design Option, Central Section**



Source: CPW, 2017b; *Subsurface impacts related to tunnel construction;

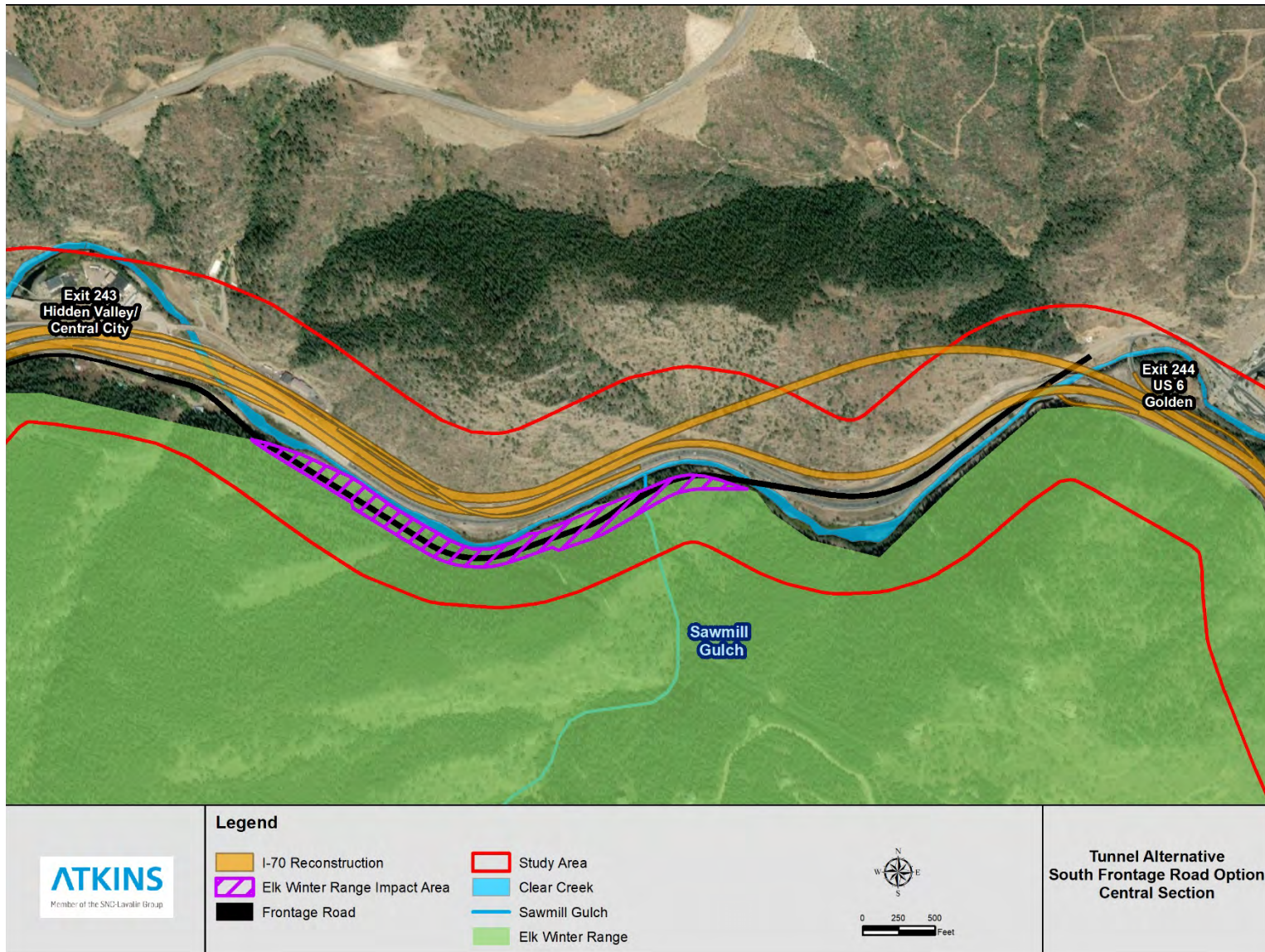
**Existing I-70 within the bighorn sheep summer range boundary excluded from impact calculations;

Exhibit 27. Bighorn Sheep Habitat Impacts, Tunnel Alternative, South Frontage Road Design Option, Central Section*



Source: CPW, 2017b; *Subsurface impacts related to tunnel construction;
**Existing I-70 within the bighorn sheep summer range boundary excluded from impact calculations;

Exhibit 28. Elk Habitat Impacts, Tunnel Alternative, South Frontage Road Design Option, Central Section



Source: CPW, 2017b

6.3.3. West Section

Project elements in the West Section include widening the interstate between the Hidden Valley/Central City interchange and the Veterans Memorial Tunnels to accommodate the third westbound travel lane, which then would be restriped through the tunnel and continue west to the next interchange at Idaho Springs/Colorado Boulevard (Exit 241).

To improve sight distance and safety, the S-curve on I-70 would be flattened, which would require realigning the I-70 mainline and frontage road through this section. Rock cuts would be needed on the north side of I-70 and the south side of the frontage road east of the Veterans Memorial Tunnels. Additionally, on the east side of the Veterans Memorial Tunnels, a 1,200-foot section of Clear Creek would be realigned to the south to accommodate the I-70 realignment, and the Scott Lancaster Memorial Trail would be constructed as an off-road trail between Clear Creek and the frontage road.

6.3.3.1. Direct Impacts

General Wildlife Habitat

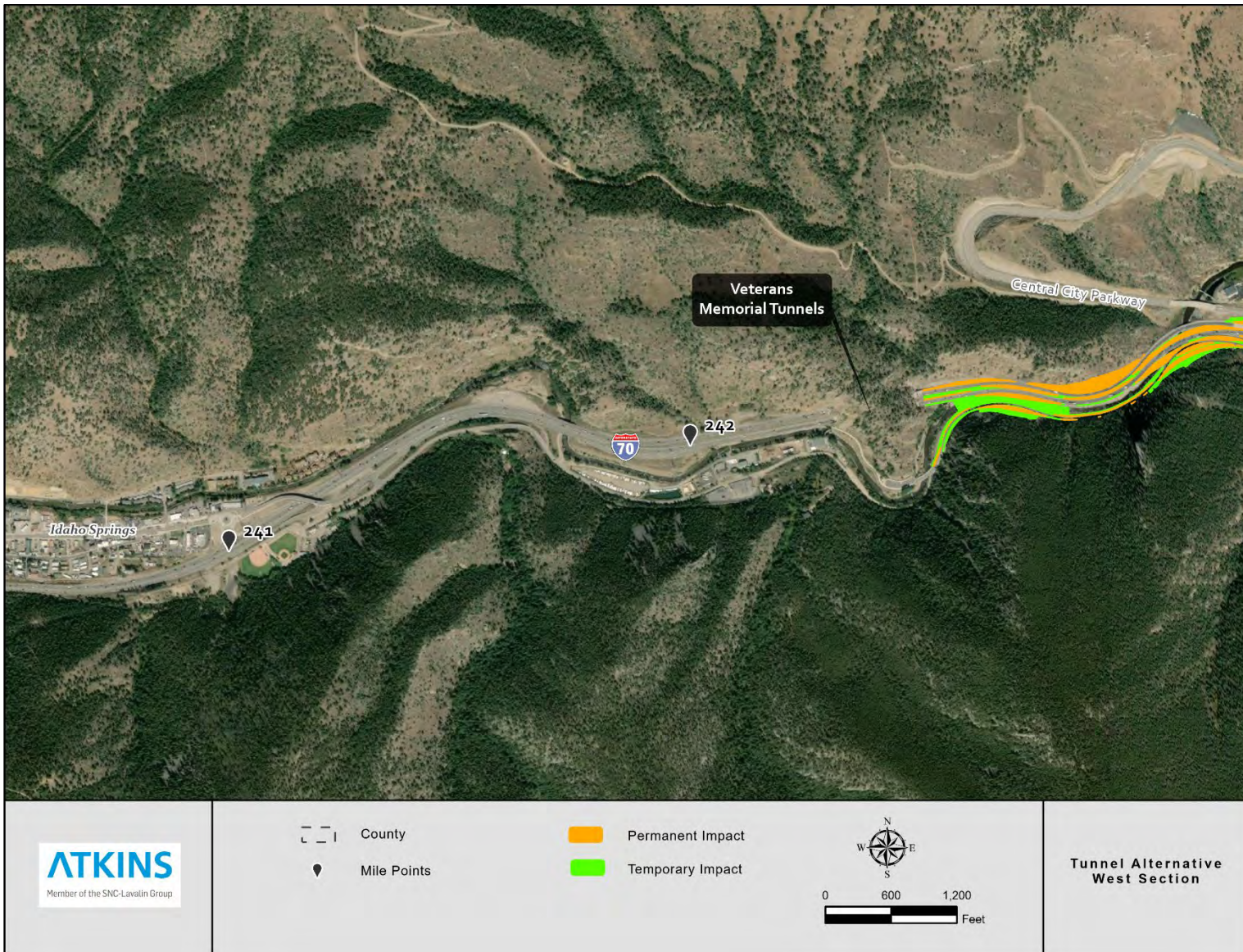
The Study Area within the West Section of the Project consists of approximately 136 acres (44 percent) of developed land and approximately 173 acres (56 percent) of vegetated lands (see Exhibit 29). Approximately 79 acres (26 percent) are evergreen forest, 79 acres (26 percent) are shrub/scrub. The remaining 15 acres (5 percent) of vegetated lands are composed of deciduous forest, open water, and wetland plant communities.

Exhibit 29. Tunnel Alternative, West Section, Direct Impacts to Land Cover

Land Cover	Total Habitat		Permanent Impacts		Temporary Impacts	
	Acres	Percent Study Area	Acres	Percent Study Area	Acres	Percent Study Area
Developed Areas						
Developed, Open Space	1	< 1	—	—	—	—
Developed, Low Intensity	7	2	—	—	< 1	< 1
Developed, Medium Intensity	5	2	—	—	—	—
Developed, High Intensity	123	40	2	< 1	3	< 1
Subtotal	136	44	2	< 1	3	1
Vegetation Communities						
Deciduous Forest	1	< 1	—	—	< 1	< 1
Evergreen Forest	79	26	< 1	< 1	1	< 1
Shrub/Scrub	79	26	< 1	< 1	1	< 1
Mixed Forest	—	—	—	—	—	—
Open Water	13	4	< 1	< 1	1	< 1
Wetlands	1	< 1	—	—	—	—
Subtotal	173	56	< 1	< 1	3	< 1
TOTAL	309	100	2	< 1	6	2

Source: USGS, 2017a

Exhibit 30. Wildlife Habitat Impact Areas, Tunnel Alternative, West Section



Approximately 2 acres of vegetated habitat (less than 1 percent of the West Section Study Area) would be permanently incorporated into the transportation facility and approximately 6 acres (2 percent of the West Section Study Area) would be temporarily impacted during construction (see Exhibit 29 and Exhibit 30).

Permanent direct impacts to general wildlife habitat would result from:

- Increased pavement for the additional I-70 westbound lane between the Hidden Valley/Central City interchange and the Veterans Memorial Tunnels
- Realigning Clear Creek and the frontage road on the east side of the Veterans Memorial Tunnels
- Improvements/realignment of the Scott Lancaster Memorial Trail
- Rock blasting on the north and south sides of I-70
- Construction of retaining walls

Temporary direct impacts would result from construction, staging areas, and access for heavy construction equipment.

The rock cut areas north of I-70 would occur on an existing rock slope with little vegetation (see Photo 3). The NLCD classifies this rock slope as developed land and shrub/scrub. The rock cut areas south of I-70 are a bit more vegetated and are classified as developed land and evergreen forest (see Photo 4). Realignment of Clear Creek and the adjacent frontage road and Scott Lancaster Memorial Trail would impact existing vegetation between Clear Creek and the frontage road (see Photo 5). The land cover is classified as developed with small patches of shrub/scrub, evergreen forest, and deciduous forest.



Photo 3. Rock Cut Area, North Side of I-70

Terrestrial Mammals

Approximately 2 acres of elk winter range would be permanently incorporated into the transportation system due to rock cuts on the north and south of I-70 (see Exhibit 31). As noted above, the north rock cut area is steep, rocky, and sparsely vegetated (see Photo 3). It is not suitable habitat for elk because it is too steep, does not offer suitable foraging habitat, and is disconnected from the prime elk winter range areas south of I-70.



Photo 4. Rock Cut Area, South Side of I-70

Bighorn sheep winter and summer range is located on the north side of I-70 and the species is known to cross over the Veterans Memorial Tunnels land bridge to Clear Creek, which is used as a water source. The northern rock cut area is within bighorn sheep summer and winter ranges (see Exhibit 32). Approximately 2 acres of this habitat would be impacted by rock cuts. Noise and vibrations from rock blasting could cause bighorn sheep to avoid this habitat during construction and alter bighorn sheep movement patterns within the Study Area. If

material is installed to prevent rockfall, it could limit access to suitable bighorn sheep habitat. As a result, bighorn sheep could choose less suitable range that results in increased predation and mortality. However, rock blasting would be short term.

No impacts would occur to the black bear fall concentration area at the western end of the Study Area.

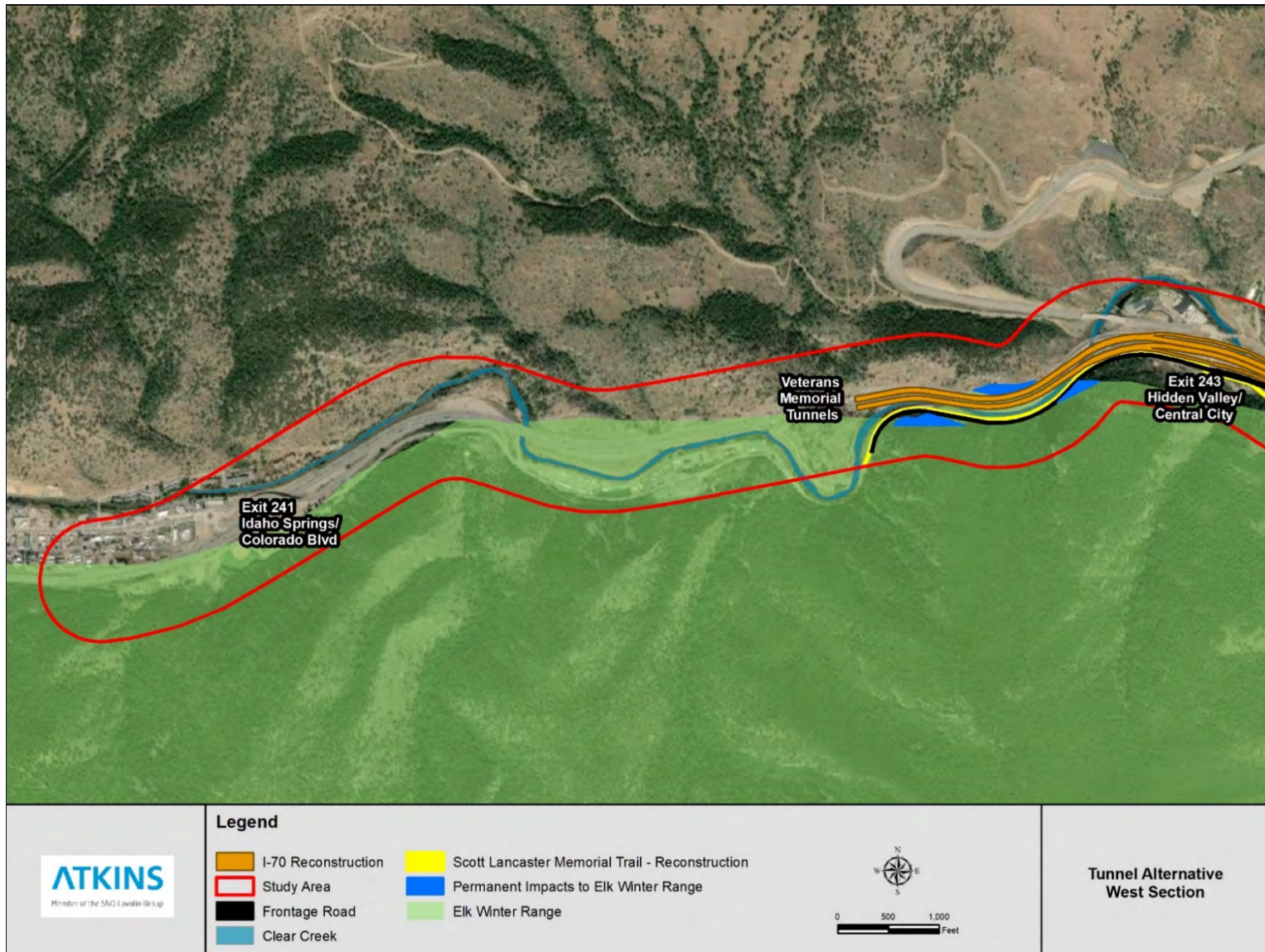


Photo 5. Clear Creek Realignment Area



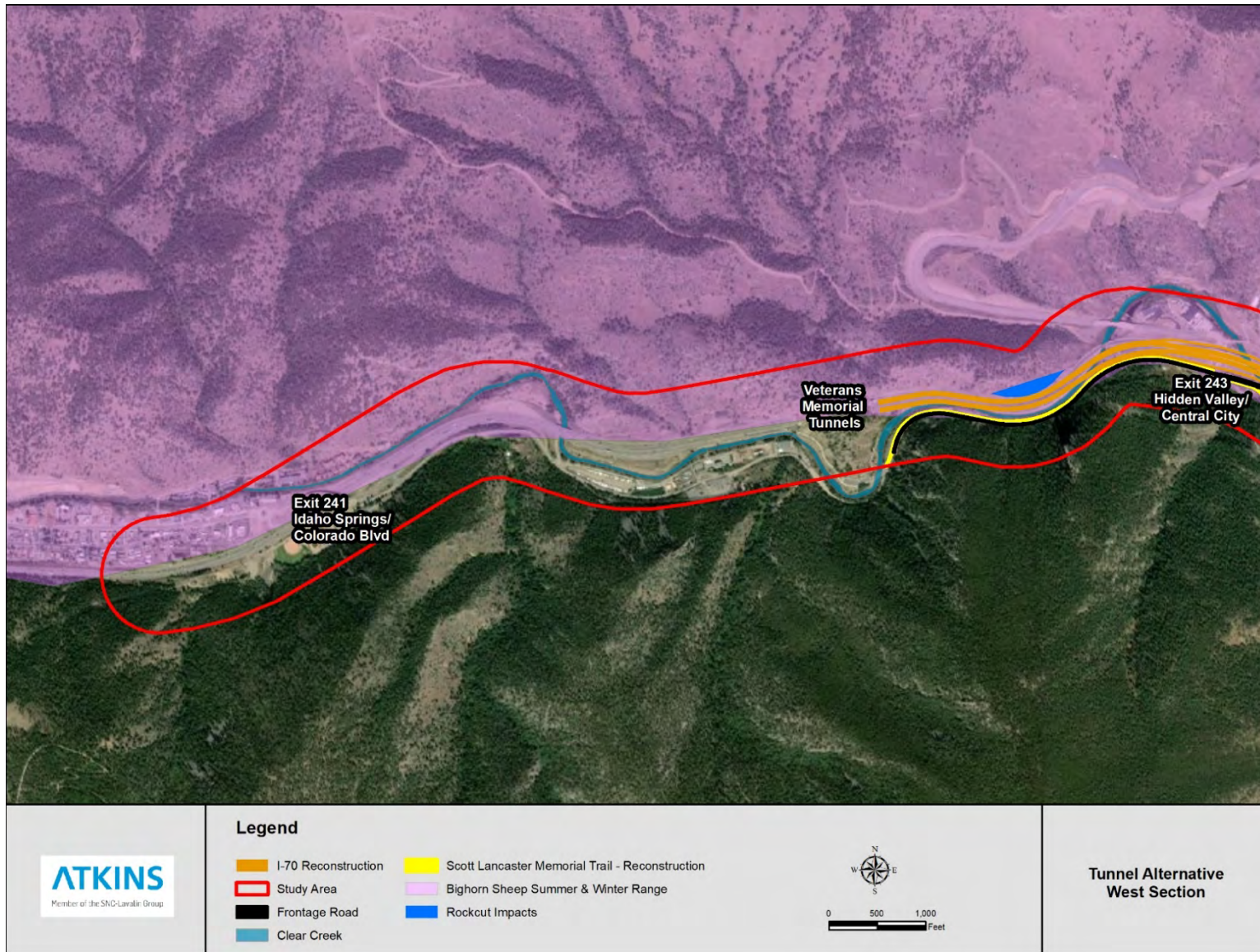
Photo 6. Clear Creek Realignment Area

Exhibit 31. Elk Habitat Impacts, Tunnel Alternative, West Section



Source: CPW, 2017b

Exhibit 32. Bighorn Sheep Habitat Impacts, Tunnel Alternative, West Section



Source: CPW, 2017b

Connectivity for Terrestrial Mammals

The West Section of the Project is not within a LIZ; however, CPW has identified mule deer highway crossing habitat in the Idaho Springs area and elk highway crossing habitat to the west of the Veterans Memorial Tunnels (see Exhibit 6 and Exhibit 7). Project elements that would increase the barrier to north/south wildlife migration and movement include, the additional I-70 westbound lane, reconstruction of the Greenway Trail, installation of guardrail between the Greenway Trail and Clear Creek, retaining walls, and rock cut slopes. As a result, there is potential for increased numbers of wildlife mortalities from WVCs.

Additionally, once improvements to the Clear Creek Greenway Trail are complete, human presence along the trail is expected to increase (personal communication, Francesca Tordonato, Environmental Program Manager/Senior Biologist, CDOT Region1). This increase in human presence could inhibit animals from traveling through the area during daytime hours.

Proposed mitigation measures are discussed in more detail in Appendix C of this document.

Raptors and Migratory Birds

Potential impacts to raptors and migratory birds would be the same as those listed for the Central Section of the Project. For additional information, please see Section 6.3.2.1 and Section 6.3.2.2 of this document.

Reptiles and Amphibians

Riparian habitat in the West Section of the Project are located along Clear Creek (see Exhibit 17). Construction activities related to realigning Clear Creek are not likely to impact reptiles and amphibians because the creek channel in this location lacks suitable habitat for these species (see photos 5, 6 and 7). Clear Creek in this location is confined by I-70 on the north and the Greenway Trail and Frontage Road on the south. As a result, there are no opportunities to improve riparian habitat in this location. However, locations further downstream, within the Central Section of the Project Area, do provide opportunities to improve riparian habitat along the creek. Exact locations for riparian and stream improvements would be developed in consultation with CPW and the USACE before final design.

In other sections of Clear Creek, direct impacts could result from earthwork activities, moving equipment over riparian shrubs and trees, and cutting shrubs and trees to accommodate project-related activities. However, potential habitat in these areas also is considered marginal due to limited vegetation and riprapped creek banks, so impacts would be minor. Additionally, with the implementation of mitigation measures described in Section 7 of this document, impacts to riparian areas would be avoided and minimized.



Photo 7. Clear Creek Realignment Area

Aquatic Species

Construction activities associated with the Clear Creek realignment, have potential to impact fish, spawning habitat, and macroinvertebrates. Individual species could be injured or killed by heavy equipment and boulder movement during construction. Construction activities also could result in

increased sedimentation, which could cover spawning gravel beds and smother eggs and emerging fry by reducing oxygen availability. Pools, used for over wintering, could be destroyed or filled in. A temporary increase in turbidity and reduced oxygen levels could cause macroinvertebrate mortality. Additionally, accidents or spills (ex: equipment leaking hydraulic fluid) could occur that negatively impact trout and aquatic macroinvertebrate habitats or populations. With the implementation of mitigation measures described in Section 7 of this document, impacts to aquatic species would be avoided and minimized.

6.3.3.2. Indirect Impacts

General Wildlife Habitat

A loss of wildlife habitat and vegetative cover could provide an opportunity for non-native invasive plants and noxious weeds to be introduced and spread across the area. There also is potential for construction activities to result in a loss of the native plant seed bank in areas where excavation or extensive fill is required. These areas also are susceptible to noxious weed if fill is brought from off site.

Terrestrial Mammals

A permanent increase in traffic volumes and associated noise levels could cause stress to resident terrestrial mammals and result in displacement.

Connectivity for Terrestrial Mammals

The increased barrier effect of I-70 could cause wildlife populations north and south of I-70 to become increasingly isolated from one another, which would limit genetic interchange between wildlife populations and decrease genetic diversity. An increase in traffic volumes would create a larger barrier to wildlife attempting to cross the interstate and could result in habitat loss/fragmentation.

Proposed mitigation measures are discussed in more detail in Appendix C of this document.

Raptors and Migratory Birds

Increased traffic volumes could increase vehicle collisions with migratory birds and raptors, and reduce habitat use adjacent to the roadway. Increased nighttime lighting could impact nocturnal species and birds that migrate at night. Material installed to prevent rockfall could inadvertently trap avian species and result in mortality.

Reptiles and Amphibians

Construction activities would disturb the ground surface and increase the likelihood of noxious weeds becoming established, which could crowd out more desirable riparian vegetation. Increased runoff from the widened road could contain pollutants that impact wildlife and plant species. However, indirect impacts to riparian habitat and wildlife species would be temporary and minimized by implementation of mitigation measure identified in Section 7 of this document.

Aquatic Species

Increased runoff from the widened road could contain increased levels of pollutants that impact the water quality of Clear Creek. Areas that currently receive a lot of direct sunlight could become shaded by new bridges, which changes habitat conditions for fish species.

6.4. Canyon Viaduct Alternative Impacts

6.4.1. East Section

The Canyon Viaduct Alternative's proposed changes in the East Section of the Project are the same as those described for the Tunnel Alternative. Therefore, impacts would be the same as those discussed for the Tunnel Alternative. See Section 6.3.1 of this document for more detail.

6.4.2. Central Section

In the Central Section of the Project Area, the Canyon Viaduct Alternative would construct eastbound and westbound I-70 on viaducts approximately 60 feet to 80 feet above ground level. The existing westbound I-70 pavement under the elevated structures would be repurposed for the new frontage road. The eastbound lanes would be removed, and the area would be restored to natural conditions.

6.4.2.1. Direct Impacts

General Wildlife Habitat

As discussed for the Tunnel Alternative, the Central Section of the Study Area consists of approximately 86 acres (32 percent) of developed land and approximately 186 acres (68 percent) of vegetated lands (see Exhibit 33 and Exhibit 34). Approximately 116 acres (43 percent) of the land is evergreen forest, approximately 50 acres (18 percent) are shrub/scrub, approximately 14 acres (5 percent) are open water, approximately 5 acres (2 percent) are mixed forest, and approximately 1 acre (less than 1 percent) is wetlands.

Approximately 6 acres of wildlife habitat (2 percent of the Central Section Study Area) would be permanently incorporated into the transportation facility. Approximately 4 acres (2 percent of the Central Section Study Area) would be temporarily impacted during construction, which is less than both Tunnel Alternative Frontage Road Design Options. However, impact calculations for the Canyon Viaduct Alternative do not include permanent and temporary impacts resulting from caisson construction because specific caisson locations were not known at the time this report was written.

Most impacts would occur in the Sawmill Gulch area due to construction of I-70 on the southern hillside (see Exhibit 34). Permanent impacts would occur to the shrub/scrub and evergreen forest plant communities at the top of the hill. Fewer permanent impacts would occur to the mixed forest plant community along Sawmill Gulch because a bridge would be constructed over the gulch to avoid impacts to Waters of the U.S. Also, impacts would occur on the canyon floor, due to caisson construction, and on the north side of I-70 where the viaduct would touch back down to ground level.

Reclaimed areas for the Canyon Viaduct Alternative would be greater than both Tunnel Alternative Frontage Road Design Options. The I-70 eastbound lanes would be removed from approximately MP 243.5 to MP 244.5 and approximately 8 acres (3 acres more than the Tunnel Alternative, South Frontage Road Option) of pavement would be removed. Of those, approximately 5 acres would be adjacent to Clear Creek and restored to riparian habitat.

Exhibit 33. Direct Impacts to General Wildlife Habitat, Canyon Viaduct Alternative, Central Section

Land Cover	Total Habitat		Permanent Impacts		Temporary Impacts	
	Acres	Percent Study Area	Acres	Percent Study Area	Acres	Percent Study Area
Developed Areas						
Developed, Open Space	—	—	—	—	—	—
Developed, Low Intensity	2	1	< 1	< 1	< 1	< 1
Developed, Medium Intensity	2	1	< 1	< 1	< 1	< 1
Developed, High Intensity	82	30	11	4	4	1
Subtotal	86	32	11	4	4	1
Vegetation Communities						
Deciduous Forest	—	—	—	—	—	—
Evergreen Forest	116	43	3	1	2	1
Wetlands	1	< 1	< 1	< 1	< 1	< 1
Mixed Forest	5	2	1	< 1	< 1	< 1
Grassland/Pasture	—	—	—	—	< 1	< 1
Open Water	14	5	—	—	—	—
Shrub/Scrub	50	18	2	1	2	1
Subtotal	186	68	6	2	4	2
TOTAL	272	100	17	6	8	3

Source: USGS, 2017a

Terrestrial Mammals

The Canyon Viaduct Alternative would not impact the mule deer winter concentration area on the north side of I-70, but approximately 5 acres of elk winter range would be permanently incorporated into the transportation facility and another 7 acres would be temporarily impacted during construction. These impacts would result from building I-70 into the hillside by Sawmill Gulch (see Exhibit 35). In this area, elk habitat would be bisected, and animals would not be able to travel from the ridgeline north to Clear Creek where the roadway crosses through this hillside. However, east and west of this hillside, animals would be able to travel under the viaduct to get to Clear Creek.

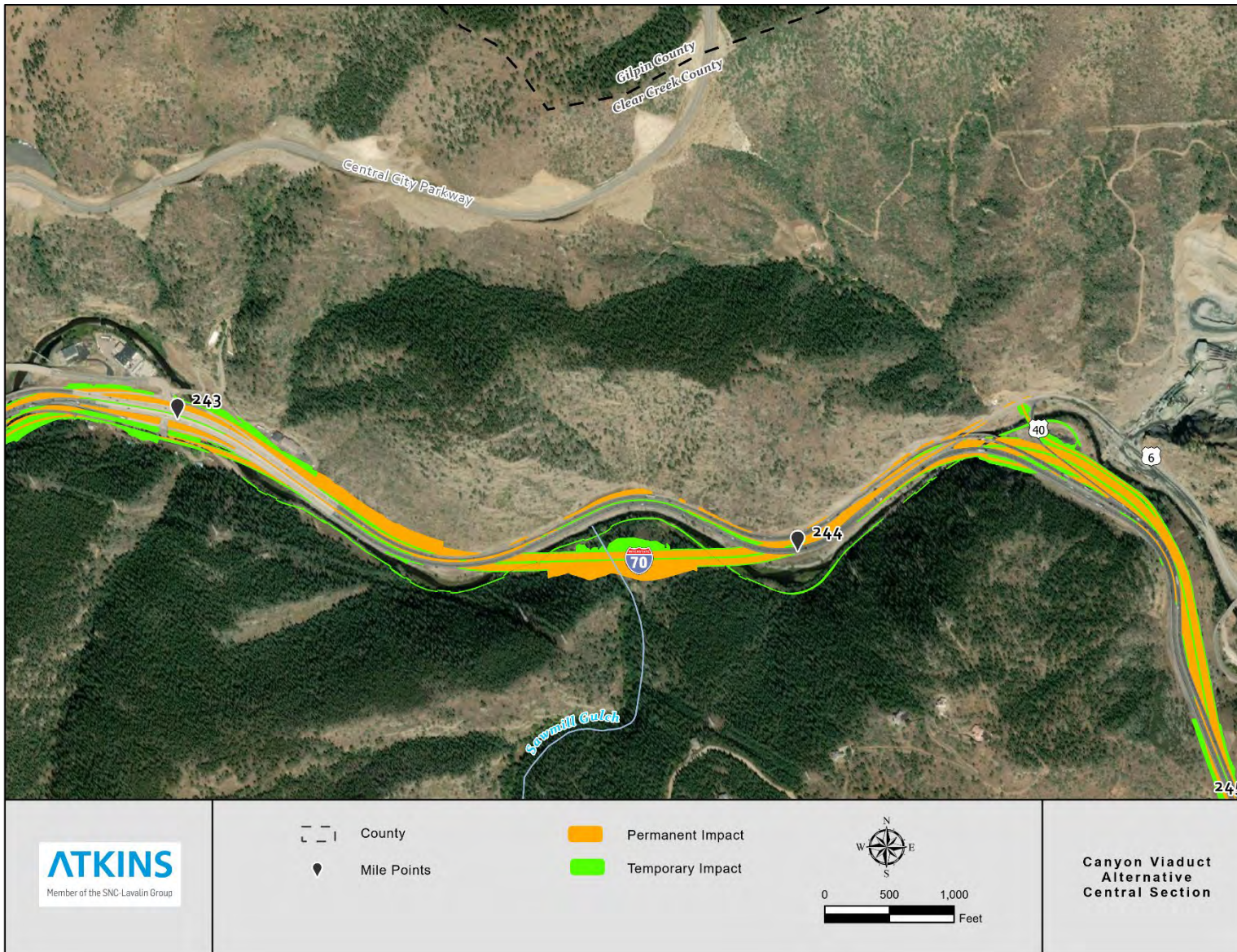
Approximately 5 acres of bighorn sheep summer and winter range and approximately 3 acres of severe winter range would be permanently impacted by rock cuts on the north side of I-70 (see Exhibit 36). These impact areas are much smaller than those of the Tunnel Alternative Frontage Road Design Options; however, temporary impacts are slightly greater than the South Frontage Road Option.

As mentioned above, bighorn sheep summer range, winter range, and severe winter range occur within the Central Section of the Project, north of I-70 (see Exhibits 26 and 27), and the closest bighorn sheep production area is over a half mile to the east of the US 6 interchange. Noise and vibrations from viaduct construction and rock blasting could cause bighorn sheep to avoid these habitat areas during construction. Rock cuts have potential to alter bighorn sheep movement patterns within the Study Area. If material is installed to prevent rockfall, it could limit access to suitable bighorn sheep habitat. Additionally, rock cuts and viaduct construction within the severe winter range would prevent sheep from accessing roadside salts and vegetation when food sources are scarce. As a result, bighorn sheep

could choose less suitable range that results in increased predation and mortality. However, construction and rock blasting would be short term and severe winter years occur infrequently.

Moving the I-70 travel lanes to an overhead viaduct would reduce traffic volumes and human presence on the canyon floor and lower noise levels. This, combined with the 8 acres of restored riparian habitat on the north side of the creek, would improve habitat conditions for all terrestrial mammals within the Study Area.

Exhibit 34. Wildlife Habitat Impact Areas, Canyon Viaduct Alternative, Central Section



Connectivity for Terrestrial Mammals

The Canyon Viaduct Alternative would considerably reduce the existing barrier effect to wildlife movement and dispersal across I-70 between the US 6 interchange and MP 243.5. Since the I-70 lanes would be moved overhead to the viaduct, wildlife attempting to travel north/south across the Project Area would only have to cross the US 6 Frontage Road. Additionally, the removal of the existing I-70 eastbound lanes would provide opportunities to improve the riparian habitat and east/west connectivity throughout the corridor.

Raptors and Migratory Birds

Potential impacts to raptors and migratory birds would be the same as those listed for the Tunnel Alternative. However, the Canyon Viaduct Alternative would restore 8 acres of riparian habitat along the north side of Clear Creek, 3 acres more than the Tunnel Alternative, South Frontage Road Option.

The viaduct structures would cross Clear Creek in two locations and potentially could hinder a bird's ability to access habitat in the area. However, birds would be able to fly around the viaduct to access other locations within the Study Area. Additionally, there would be less human infrastructure and disturbance on the canyon floor and the viaduct would provide ample nesting opportunities for various bird species, potentially making the area more inviting to many bird species.

As with the Tunnel Alternative, if construction occurs during the raptor and migratory bird nesting season (February 1 through August 31), a pre-construction survey would be completed prior to beginning construction activities. All nesting birds would be avoided during construction. See Section 7 of this document for more information.

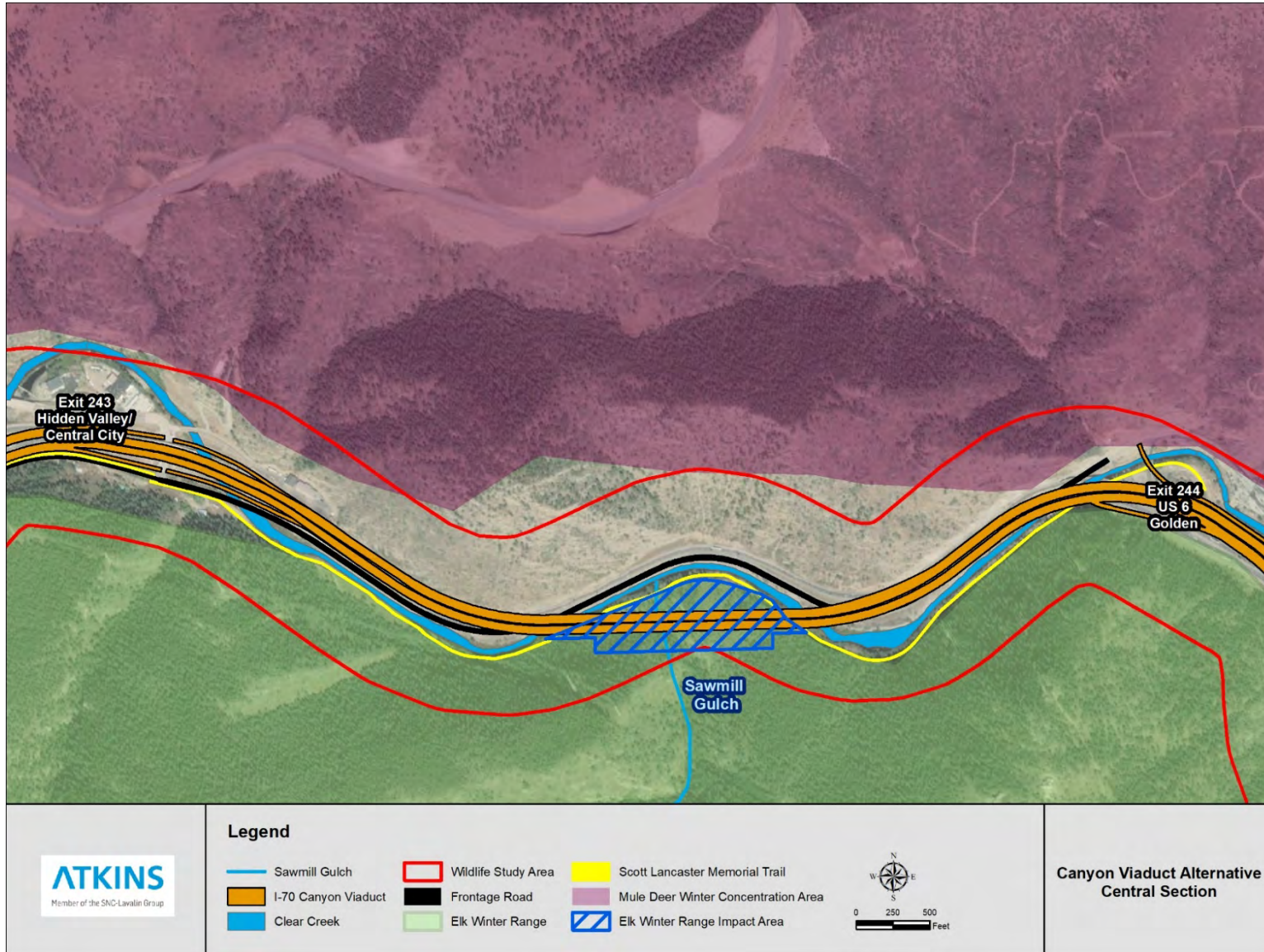
Reptiles and Amphibians

Potential impacts to riparian habitats where reptiles and amphibians live would be the same as those listed for the Tunnel Alternative. Due to the lack of riparian habitat in this stretch of the Clear Creek corridor and implementation of mitigation measures identified in Section 7 of this document, impacts would be minimal. Additionally, the Canyon Viaduct Alternative would restore three more acres of riparian habitat along the north side of Clear Creek than the Tunnel Alternative, South Frontage Road Option.

Aquatic Species

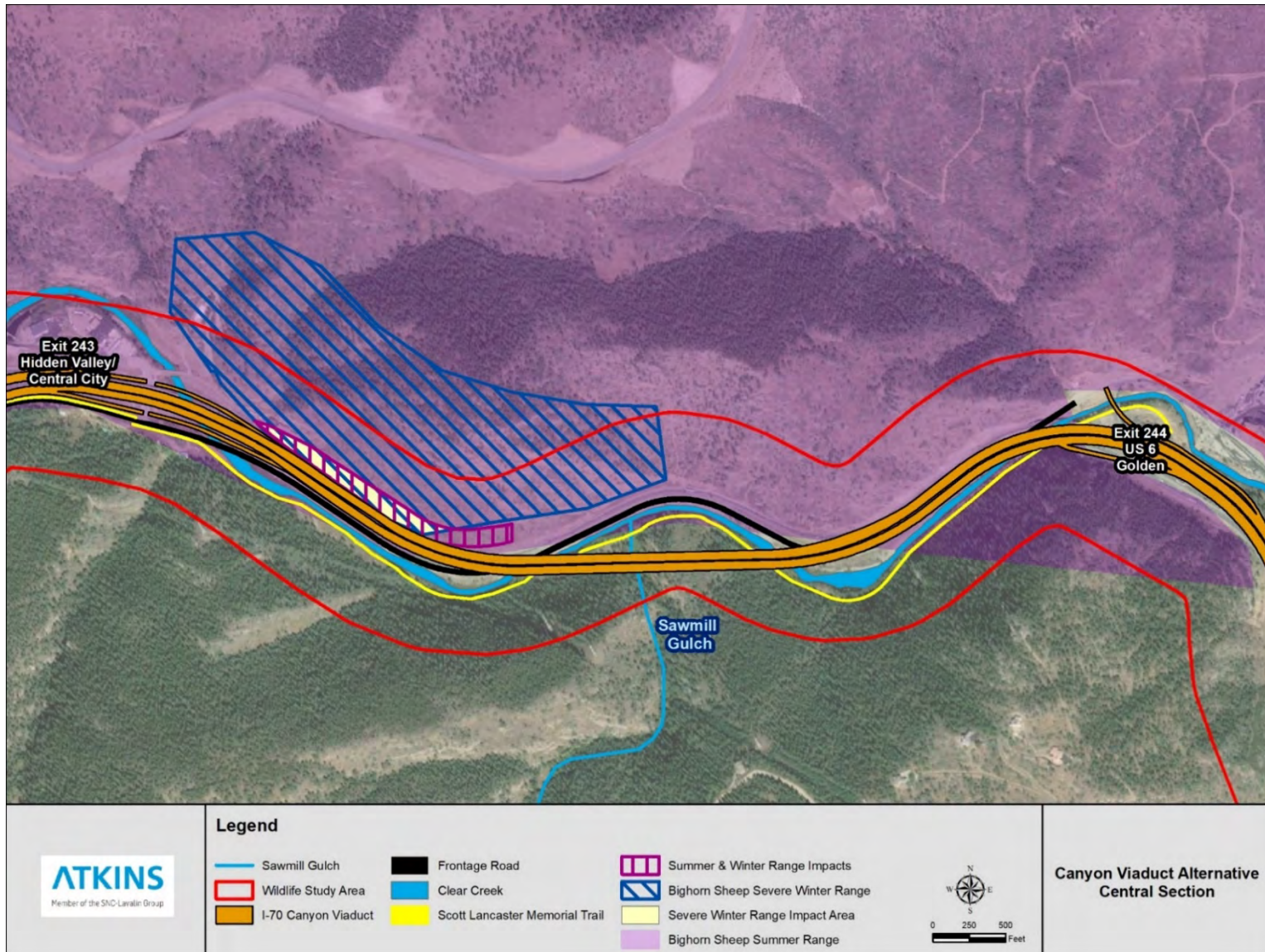
The Canyon Viaduct Alternative would have the same potential impacts to aquatic species as the Tunnel Alternative - South Frontage Road Option. However, three more acres of riparian habitat would be restored along the north side of Clear Creek under the Canyon Viaduct Alternative than the South Frontage Road Option. As a result, there is potential for a greater number of fish habitat improvements within the Central Section of the Project.

Exhibit 35. Mule Deer and Elk Habitat Impacts, Canyon Viaduct Alternative, Central Section



Source: CPW, 2017b

Exhibit 36. Bighorn Sheep Habitat Impacts, Canyon Viaduct Alternative, Central Section



Source: CPW, 2017b

6.4.2.2. Indirect Impacts

This section describes the potential indirect impacts associated with the Canyon Viaduct Alternative in the Central Section of the Project Area.

General Wildlife Habitat

The presence of a viaduct throughout the canyon could result in potentially higher levels of roadway contaminants reaching the ground and a higher degree of shading than the Tunnel Alternative presents. Areas that currently receive a lot of direct sunlight could become shaded, which would change habitat conditions and suitability for some plant species. However, the viaduct would be approximately 60 to 70 feet tall so sunlight would be able to reach most locations throughout the day. A temporary loss of wildlife habitat and vegetative cover could provide an opportunity for non-native invasive plants and noxious weeds to be introduced and spread across the area. There also is potential for construction activities to result in a loss of the native plant seed bank in areas where excavation or extensive fill is required. These areas also are susceptible to noxious weed invasion if fill is brought from off site.

Terrestrial Mammals

Noise modeling indicates that noise levels on the canyon floor would be slightly lower than existing conditions (CDOT 2020g). Reduced traffic on the canyon floor would reduce WVC rates.

Connectivity for Terrestrial Mammals

The elevated interstate would reduce habitat fragmentation considerably and alleviate the barrier effect for wildlife attempting to cross the interstate. Wildlife movement and dispersal would increase. There would be an increase in genetic interchange between populations that cross the Project Area, which would improve genetic diversity in the long-term.

Raptors and Migratory Birds

Increased traffic volumes and an elevated roadway could increase collisions with migratory birds and raptors. These impacts would be greater than those for the Tunnel Alternative because the westbound lane would not be constructed in a tunnel. Increased nighttime lighting could impact nocturnal species and birds that migrate at night.

Reptiles and Amphibians

Increased runoff from the widened road could contain pollutants that impact wildlife and plant species. However, indirect impacts to riparian habitat and wildlife species would be temporary and minor after implementation of mitigation measures identified in Section 7 of this document.

Aquatic Species

Construction activities could increase the mobility and delivery of sediments, which could cover spawning gravel beds and smother eggs and emerging fry by reducing oxygen availability. Increased turbidity and reduced oxygen levels could cause the abundance and diversity of macroinvertebrates to decline. Areas that currently receive a lot of direct sunlight could become shaded by new bridges, which changes habitat conditions for fish and invertebrate species.

6.4.3. West Section

The Canyon Viaduct Alternative's proposed changes in the West Section of the Project Area are the same as those described for the Tunnel Alternative. Therefore, impacts would be the same as those discussed for the Tunnel Alternative. See Section 6.3.3 of this document for more detail.

7. Mitigation

Mitigation measures are recommended to address permanent and temporary adverse impacts of the Project alternatives. Impacts identified in Section 6 are summarized in tabular format, by alternative, in this section to align with recommended mitigation.

7.1. Relevant Tier 2 Mitigation

To mitigate for potential impacts to terrestrial wildlife and aquatic species and their habitats, FHWA and CDOT committed to supporting the following policies and programs identified in the PEIS:

- Fulfill responsibilities set forth in the ALIVE MOU to address issues in the I-70 Mountain Corridor PEIS related to improving wildlife movement and reducing habitat fragmentation.
- Follow the processes outlined in the ALIVE MOU to reduce WVCs and increase habitat connectivity throughout the corridor. This includes, but is not limited to, the use of underpasses or overpasses dedicated to wildlife movement, fencing, berms, and vegetation to guide wildlife to crossing structures, as well as signage to alert motorists to the presence of wildlife. In addition, existing natural features that enhance habitat connectivity, such as the Twin Tunnels wildlife land bridge (Veterans Memorial Tunnels), will be protected, if feasible.
- Employ best management practices (BMPs) and erosion control measures to reduce soil losses, soil inundation, and sedimentation in locations adjacent to the construction area and provide sufficient cross-slope drainage structures during new construction to allow natural hydrologic conditions to be maintained on both sides of the right of way.
- Restore and replace fish habitat, using photo documentation, to help return these areas to previous conditions.

7.2. Tunnel Alternative: North and South Frontage Road Design Options

Reference specs and other documents here Mitigation measures would be the same for both the North Frontage Road and South Frontage Road Design Options. They are summarized in Exhibit 37.

Exhibit 37. Recommended Mitigation Measures for Permanent and Temporary Impacts of the Tunnel Alternative, North and South Frontage Road Design Options

Location	Activity	Impact	Mitigation
Within Project limits	Removal of riparian trees and shrubs and impacts to riparian habitats	Permanent and temporary loss of riparian vegetation and habitats, including within SB 40 jurisdictional areas	Develop and implement restoration plan for affected riparian and aquatic habitats in consultation with the USACE, CPW, and CDOT biologist. Plan will include the following measures: <ul style="list-style-type: none"> • A survey to document SB 40 resources will occur before final design, and SB 40 areas and mitigation measures will be incorporated into final design. • Riparian trees and shrubs removed during construction will be replaced at a ratio of 1:1 based on a stem count of

Location	Activity	Impact	Mitigation
			<p>all trees with diameter at breast height of 2 inches or greater for riparian trees.</p> <ul style="list-style-type: none"> Riparian shrubs removed during construction, whether native or non-native, will be replaced with native species, based on their preconstruction areal coverage. Riparian areas will be protected during construction by installing temporary construction fencing.
Within Project limits	Construction-related disturbance between February 1 and August 31	Possible effect to raptors, including temporary displacement, auditory disturbance, and habitat loss	<ul style="list-style-type: none"> Raptor nest surveys will be required if construction activities are scheduled between February 1 and August 31 and will include a 0.5-mile buffer from the construction site. If raptor nests are identified within the buffer, coordination with CPW and the USFWS is required to determine an appropriate course of action, which may include, but is not limited to, a delay in construction to avoid the breeding season. The project shall follow CPW Recommended Buffer Zones and Seasonal Restrictions for Colorado raptors (CPW 2020).
			<ul style="list-style-type: none">
Within Project limits	Construction-related disturbance between April 1 and August 31	Potential impacts to migratory birds and/or their habitat	<ul style="list-style-type: none"> To avoid impacts on nesting raptors and migratory birds in accordance with the Migratory Bird Treaty Act, the project will incorporate a CDOT Special Specification 240 (Protection of Migratory Birds) as part of the final plan set. Specification 240 will be modified, as needed, to require surveys for any nesting migratory birds or raptors that may be present outside the typical breeding season.

Location	Activity	Impact	Mitigation
			<ul style="list-style-type: none"> A qualified biologist will conduct a nest survey before construction. If active nests are found, coordination with CPW and the USFWS is required to determine an appropriate course of action, which may include, but is not limited to, a delay in construction to avoid the breeding season.
Within Project limits	Nighttime construction lighting	Impacts to movement of nocturnal species and birds that migrate at night	Reduce nighttime lighting to minimum levels necessary and use shielded lighting.
In the East Section	Construction of additional I-70 travel lanes	Potential for increased animal-vehicle collisions	<p>Permanent wildlife fencing will be installed on the north and south side of I-70 from the Hyland Hills/Floyd Hill interchange to Soda Creek Road (approximately MP 249).</p> <p>The fencing will include associated wildlife guards at interchanges, escape ramps (at least four per mile; ramps should be located near the fence ends and around the Beaver Brook/Floyd Hill interchange), and, if needed, pedestrian access gates. In conjunction with the design of fence ends at Soda Creek Road, other improvements (e.g., pathways, vegetation enhancements) will be considered to improve the functionality of the existing Soda Creek Road bridge for wildlife passage during final design.</p>
Within Project limits	Construction of additional I-70 travel lanes and frontage road; installation of guardrails, rock cuts, and retaining walls; and increased traffic volumes through identified wildlife LIZs	Habitat fragmentation, loss of connectivity between populations, decreased genetic diversity	Provide new wildlife crossings along the I-70 Mountain Corridor within CDOT Region 1 boundary (east of the Eisenhower-Johnson Memorial Tunnels) but outside the Project limits based on ALIVE recommendations and FHWA Ecological guidance. The ALIVE ITF evaluated and prioritized six potential crossing locations for the new crossing(s), which will be revisited during final design of the Project. New wildlife crossings will be designed, funded, and constructed before the Project closeout is completed. Investment

Location	Activity	Impact	Mitigation
			in mitigation will be commensurate with the cost of a wildlife overpass in the Floyd Hill project area, which is currently estimated at \$17.6 million.
In the Central Section	Construction of additional I-70 travel lanes	Potential for increased animal-vehicle collisions	Bridges replaced at the US 6 interchange will incorporate a wildlife bench adjacent to Clear Creek so wildlife can cross more easily from one side of the bridge to the other.
In the East Section, Johnson Gulch culvert (MP 244.9)	Construction of additional I-70 travel lanes and frontage road; installation of guardrails, rock cuts, and retaining walls; and increased traffic volumes	Habitat fragmentation, loss of connectivity between populations, decreased genetic diversity	Any improvements to the Johnson Gulch (MP 244.9) culvert will consider opportunities for wildlife passage for carnivores and medium-sized fauna during Project design.
Within Project limits	Staging, heavy equipment access, earthmoving activities, widening the pavement, increasing guardrail and cement barriers, erosion and sedimentation of soils and construction of retaining walls	Permanent and temporary removal of upland trees and vegetation and loss of wildlife habitat	A landscape plan will be developed for this Project. The plan will include the following measures: <ul style="list-style-type: none"> Temporarily disturbed areas will be reseeded with native grasses and forbs, and certain areas will be planted with native trees and shrubs. The spatial extent of disturbance will be minimized. The amount of time that disturbed areas are allowed to remain non-vegetated will be minimized.
In the Central and West Sections	Rock blasting and hauling away bedrock, jackhammering for bridge pier and abutment construction, grading, excavation, other earth moving activities, slope stabilization, and retaining wall construction	Permanent impacts to bighorn sheep winter range, summer range, and severe winter range	Rock blasting activities in bighorn sheep habitat locations will be discussed with the ALIVE ITF during construction planning to determine whether measures can be taken to mitigate impacts during construction.
In the West Section	Relocation of a 1,400-foot section of Clear Creek near MP 242.5. Temporary potential increase in mobility and delivery of sediments. Temporary increase in turbidity. Accidental chemical spills during construction.	Fish and invertebrate mortality. Smothering of downstream spawning gravel beds, eggs, and emerging fry. Downstream pools, used for fish over wintering, could be destroyed or filled in. Macroinvertebrate mortality. Temporary impacts to fish migration and access	In addition to the Section 404 Individual Permit mitigation plan, which will be developed in coordination with the SWEEP ITF, mitigation will include the following measure: <ul style="list-style-type: none"> In order to protect brown trout spawning habitat, work in the existing channel of Clear Creek shall not occur between October 1 and May 31. If work must occur during this time frame CDOT will

Location	Activity	Impact	Mitigation
		to upstream spawning habitat.	obtain prior written approval from CPW for any construction in the channel.
Within Project limits where rock will be excavated	Use of rock retaining material (wire mesh, similar)	Inadvertently trap birds, including small forest owls, within the mesh	Rockfall mitigation will be discussed with the ALIVE ITF, and BMPs to reduce trapping of birds will be developed and implemented as practical.

7.3. Canyon Viaduct Alternative

Recommended mitigation measures for the Canyon Viaduct Alternative are very similar to those listed above for the Tunnel Alternative (see Exhibit 38).

Exhibit 38. Recommended Mitigation Measures for Permanent and Temporary Impacts of the Canyon Viaduct Alternative

Location	Activity	Impact	Mitigation
Within Project limits	Removal of riparian trees and shrubs and impacts to riparian habitats	Permanent and temporary loss of riparian vegetation and habitats, including within SB 40 jurisdictional areas	<p>Develop and implement restoration plan for affected riparian and aquatic habitats in consultation with the USACE, CPW, and CDOT biologist. Plan will include the following measures:</p> <ul style="list-style-type: none"> • Survey riparian areas subject to SB 40 certification with CPW. • Develop and implement SB 40 planting plan to replace trees and shrubs according to SB 40 requirements. • Riparian trees and shrubs removed during construction will be replaced at a ratio of 1:1 based on a stem count of all trees with diameter at breast height of 2 inches or greater for riparian trees. • Riparian shrubs removed during construction, whether native or non-native, will be replaced with native species, based on their preconstruction areal coverage. • Riparian areas will be protected during construction by installing temporary construction fencing.

Location	Activity	Impact	Mitigation
Within Project limits	Construction-related disturbance between February 1 and August 31	Possible effect to raptors, including temporary displacement, auditory disturbance, and habitat loss	<ul style="list-style-type: none"> Raptor nest surveys will be required if construction activities are scheduled between February 1 and August 31 and will include a 0.5-mile buffer from the construction site. If raptor nests are identified within the buffer, coordination with CPW and the USFWS is required to determine an appropriate course of action, which may include, but is not limited to, a delay in construction to avoid the breeding season. The project shall follow CPW Recommended Buffer Zones and Seasonal Restrictions for Colorado raptors (CPW 2020).
Within Project limits	Construction-related disturbance between April 1 and August 31	Potential impacts to migratory birds and/or their habitat	<ul style="list-style-type: none"> To avoid impacts on nesting raptors and migratory birds in accordance with the Migratory Bird Treaty Act, the project will incorporate a CDOT Special Specification 240 (Protection of Migratory Birds) as part of the final plan set. Specification 240 will be modified, as needed, to require surveys for any nesting migratory birds or raptors that may be present outside the typical breeding season. A qualified biologist will conduct a nest survey before construction. If active nests are found, coordination with CPW and the USFWS is required to determine an appropriate course of action, which may include, but is not limited to, a delay in construction to avoid the breeding season.
Within Project limits	Nighttime construction lighting	Impacts to movement of nocturnal species and birds that migrate at night	Reduce nighttime lighting to minimum levels necessary and use shielded lighting.
Within Project limits	Construction of additional I-70 travel lanes and frontage road; installation	Habitat fragmentation, loss of connectivity between populations,	Provide new wildlife crossings along the I-70 Mountain Corridor within CDOT Region 1 boundary

Location	Activity	Impact	Mitigation
	of guardrails, rock cuts, and retaining walls; and increased traffic volumes through identified wildlife LIZs	decreased genetic diversity	<p>(east of the Eisenhower-Johnson Memorial Tunnels) based on ALIVE recommendations and FHWA Ecological guidance (Appendix C).</p> <ul style="list-style-type: none"> • Investment in crossing(s) will be commensurate with the cost of a wildlife overpass in the Floyd Hill project area, which is currently estimated at \$17.6 million. • Revisit and refine designs for six potential crossing locations outside the Project area that the ALIVE ITF evaluated and prioritized for the new crossing(s). • Design, fund, and construct new wildlife crossing(s) before the Project closeout is completed
In the East Section, Johnson Gulch culvert (MP 244.9)	Construction of additional I-70 travel lanes and frontage road; installation of guardrails, rock cuts, and retaining walls; and increased traffic volumes	Habitat fragmentation, loss of connectivity between populations, decreased genetic diversity	Consider opportunities for wildlife passage for carnivores and medium-sized fauna at the Johnson Gulch (MP 244.9) culvert during Project design. Coordinate with ALIVE ITF to review potential improvements.
In the East Section	Construction of additional I-70 travel lanes	Potential for increased animal-vehicle collisions	Permanent wildlife fencing will be installed on the north and south side of I-70 from the Hyland Hills/Floyd Hill interchange to Soda Creek Road (approximately MP 249) in accordance with recommendations in Appendix C. The fencing will include associated wildlife guards at interchanges, escape ramps (at least four per mile; ramps should be located near the fence ends and around the Beaver Brook/Floyd Hill interchange), and, if needed, pedestrian access gates. In conjunction with the design of fence ends at Soda Creek Road, other improvements (e.g., pathways, vegetation enhancements) will be considered to improve the functionality of the existing Soda Creek Road bridge for wildlife passage during final design.
In the Central Section	Replacement of US 6 bridges over Clear Creek	Potential for increased animal-vehicle collisions	Incorporate a wildlife bench under new US 6 bridges adjacent to

Location	Activity	Impact	Mitigation
			Clear Creek to improve the creek bottom to allow wildlife passage under I-70.
Within Project limits	Staging, heavy equipment access, earthmoving activities, widening the pavement, increasing guardrail and cement barriers, erosion and sedimentation of soils and construction of retaining walls	Permanent and temporary removal of upland trees and vegetation and loss of wildlife habitat	A landscape plan will be developed for this Project. The plan will include the following measures: <ul style="list-style-type: none"> Temporarily disturbed areas will be reseeded with native grasses and forbs, and native trees and shrubs will be planted where possible. The spatial extent of disturbance will be minimized. The amount of time that disturbed areas are allowed to remain non-vegetated will be minimized.
In the Central and West Sections	Rock blasting and hauling away bedrock, jackhammering for bridge pier and abutment construction, grading, excavation, other earth moving activities, slope stabilization, and retaining wall construction	Permanent impacts to bighorn sheep winter range, summer range, and severe winter range	Rock blasting activities in bighorn sheep habitat locations will be discussed with the ALIVE ITF to determine whether measures can be taken to minimize impacts of rock excavation on bighorn sheep during construction.
In the West Section	Work in the existing channel of Clear Creek	Fish and invertebrate mortality. Smothering of downstream spawning gravel beds, eggs, and emerging fry. Downstream pools, used for fish over wintering, could be destroyed or filled in. Macroinvertebrate mortality. Temporary impacts to fish migration and access to upstream spawning habitat.	<ul style="list-style-type: none"> Construction work in the existing channel of Clear Creek between October 1 and May 31 will be prohibited without prior written approval from CPW to protect brown trout spawning habitat. Implement Section 404 Individual Permit requirements.
Within Project limits where rock will be excavated	Use of rock retaining material (wire mesh, similar)	Inadvertently trap birds, including small forest owls, within the mesh	Develop and implement rockfall mitigation, as practical, in coordination with the ALIVE ITF to reduce trapping of birds.

8. Agency Coordination

The lead agencies, CDOT and FHWA, have coordinated with and are continuing to coordinate with CPW, USFS, Clear Creek County, Jefferson County, and the USFWS on issues related to wildlife species habitat during the NEPA process.

An ALIVE ITF was formed for this Project and has met six times to provide input on wildlife activity in the Study Area and wildlife mitigation for the Project. Coordination with the ALIVE ITF included the review of WVC data and connectivity conflicts and potential mitigation measures to address those conflicts (potential crossing locations and designs) that could be implemented in the Study Area.

Presentations and meeting minutes from the ALIVE ITF meetings and field investigations, along with recommendations for wildlife connectivity, are further documented in Appendix C, which also includes information on adjacent land uses, a mitigation matrix, and the decision-making process for determining feasibility of potential mitigation measures. The ALIVE ITF will continue to meet through the Summer of 2020 to finalize recommendations on wildlife mitigation elements for the proposed action alternatives.

The lead agencies also have been coordinating with CPW, USFWS, USFS, BLM, Upper Clear Creek Watershed Association, Trout Unlimited, and local agencies via the SWEEP ITF, which has met four times since the start of the Project. For more information on the SWEEP ITF process and mitigation strategies for wetlands and streams, please refer to the *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020a).

Additionally, a site visit was held on May 20, 2020, with Paul Winkle (CPW Fish Biologist) and Joseph Walter (CPW District Wildlife Manager) and the Project Team to identify locations where in-stream channel improvements could be located to improve fish habitat.

9. References

- Charry, B. and J. Jones. 2009. "Traffic Volume as a Primary Road Characteristic Impacting Wildlife: A Tool for Land Use and Transportation Planning." Pages 159-172, in P. J. Wagner, D. Nelson and E. Murray (eds). *Proceedings of the 2009 International Conference on Ecology and Transportation*. Center for Transportation and the Environment, Raleigh, NC.
- Colorado Department of Transportation (CDOT). 2020a. *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report*. Denver, CO: CDOT.
- CDOT. 2020b. *I-70 Floyd Hill to Veterans Memorial Tunnels Vegetation and Noxious Technical Report*. Denver, CO: CDOT.
- CDOT. 2020c. *I-70 Floyd Hill to Veterans Memorial Tunnels Threatened and Endangered Species Technical Report*. Denver, CO: CDOT.
- CDOT. 2020d. *I-70 Floyd Hill to Veterans Memorial Tunnels Alternatives Analysis Technical Report*. Denver, CO: CDOT.
- CDOT. 2020e. Traffic and Safety Data. Includes Law Enforcement Crash Reports with Wildlife Vehicle Collision data from 2011 to 2017 on I-70 from MP 240 to MP 248, as reported through CDOT's DiExSys Intelligent Transportation System (ITS).
- CDOT. 2020f. Maintenance records for I-70 from MP 240 to MP 249 for removed wildlife carcasses. Denver, CO: CDOT.
- CDOT. 2020g. *I-70 Floyd Hill to Veterans Memorial Tunnels Noise Technical Report*. Denver, CO: CDOT.
- CDOT. 2019. Personal communication with Francesca Tordonato, CDOT Region 1, Senior Wildlife Biologist, Denver, CO: CDOT.
- CDOT. 2018. *Categorical Exclusion, WB I-70 Peak Period Shoulder Lane*. Available at: <https://drive.google.com/file/d/1O1yxXdC3l-pqgIUQGboH8DYjcrqsbWBZ/view>.
- CDOT. 2017a. CDOT Online Maps, C-Plan online mapping platform. Available at: <http://cdot.maps.arcgis.com/home/index.html>.
- CDOT. 2014a. *Westbound Twin Tunnels Categorical Exclusion*. January.
- CDOT. 2014b. *Eastbound I-70 Peak Period Shoulder Lane Categorical Exclusion—Biological Resources Technical Report*. Denver, CO: CDOT.
- CDOT. 2012. *I-70 Frontage Road Improvements Categorical Exclusion*. March.
- CDOT. 2011a. *Twin Tunnels Environmental Assessment—Terrestrial Wildlife Technical Memorandum*. Denver, CO: CDOT.
- CDOT. 2011b. *I-70 Mountain Corridor PEIS—Biological Resources Technical Report, Revised*. Denver, CO: CDOT.
- CDOT. 2010. *Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding* among the Colorado Department of Transportation, Federal Highway Administration, U.S. Fish and Wildlife Service, USDA Forest Service, U.S. Bureau of Land Management, Colorado Department of Natural Resources Division of Wildlife, Upper Clear Creek Watershed Association, and Colorado Trout Unlimited. December 20, 2010.

- CDOT. 2008. *ALIVE Memorandum of Understanding* among the Colorado Department of Transportation, Federal Highway Administration, U.S. Fish and Wildlife Service, USDA Forest Service, U.S. Bureau of Land Management, and Colorado Department of Natural Resources Division of Wildlife.
- CDOT and Colorado Parks and Wildlife (CPW). 2013a. Memorandum of Agreement by and among the Colorado Department of Natural Resources and the Department of Transportation Regarding Senate Bill 40 Certification. Signed July 8, 2013.
- CDOT and CPW. 2013b. Guidelines for Senate Bill 40 Wildlife Certification Developed and Agreed upon by Colorado Parks and Wildlife and the Colorado Department of Transportation. April 1, 2013.
- CDOT and the Federal Highway Administration (FHWA). 2012. *Twin Tunnels—Finding of No Significant Impact and Section 4(f) Finding*. CDOT Project Number C0703-379. Denver, CO: CDOT.
- Colorado Natural Heritage Program (CNHP). 2011. *Terrestrial Ecological System Patches*. Available at: <http://www.cnhp.colostate.edu/download/gis.asp#tesp>.
- Colorado Parks and Wildlife (CPW). 2020a. Personal communication with Paul Winkle, Aquatic Biologist with CPW, Denver, CO: CPW.
- CPW. 2020b. Fish sampling data requested for Upper and Lower locations near the Veterans Memorial Tunnels. For years 2012 through 2019. Denver, CO: CPW.
- CPW. 2020c. CPW GIS Species Activity Mapping Definitions—Publicly Available Data. Available at: <https://cpw.state.co.us/learn/Maps/CPW-Public-GIS-Species-Activities-Definitions.pdf>.
- CPW. 2019. Personal communication with Joe Walter, Mark Lamb, and Brandon Marette. July 8, 2019 email and phone calls.
- CPW. 2017a. Colorado Species Profiles. Available at: <http://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx>.
- CPW. 2017b. Species Activity Mapping. Available through ArcGIS Online Group at: <https://www.arcgis.com/home/item.html?id=190573c5aba643a0bc058e6f7f0510b7>.
- CPW. 2017c. Clear Creek Fish Survey and Management Data. Available at: <http://cpw.state.co.us/thingstodo/Fishery%20Survey%20Summaries/ClearCreek.pdf>.
- CPW. 2015. Colorado's 2015 State Wildlife Action Plan. Available at: <http://cpw.state.co.us/aboutus/Pages/StateWildlifeActionPlan.aspx>.
- CPW. 2011. Clear Creek Benthic Invertebrate Sampling Results. 2004-2009. Unpublished data summary from Paul Winkle, CPW Aquatic Biologist.
- Evergreen Audubon. 2017. Bear Creek Watershed Breeding Bird Atlas results (online). Available at: <http://www.evergreenaudubon.org/nature-conservation/bird-monitoring/bear-creek-breeding-bird-atlas/>.
- Federal Emergency Management Agency (FEMA). 2020. FEMA's National Flood Hazard Layer (NFHL) Viewer. Accessed at <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html>
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History. Boulder, CO: University Press of Colorado.
- Google. 2020. Google Maps aerial imagery. Accessed at <https://www.google.com/maps/@39.7344978,-105.4341902,4242m/data=!3m1!1e3>.

- Huwer, S. L. 2015. *Population Estimation, Survival Estimation and Range Delineation for the Georgetown Bighorn Sheep Herd: Final Report*. Technical Publication No. 46. Denver, CO: Colorado Parks and Wildlife.
- Kintsch, J., P. Singer, M. Huijser, J. Crane, and A. Huyett. 2011. *A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor in Colorado: An Ecological Field Test*. Report to the Federal Highway Administration and the Colorado Department of Transportation. Denver, CO.
- National Audubon Society. 2016. Christmas Bird Count. Available at: <http://www.audubon.org/conservation/science/christmas-bird-count>.
- U.S. Environmental Protection Agency (EPA). 2013. *Level III and IV Ecoregions of the Continental United States: Corvallis, Oregon, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1:3,000,000*. Available at: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>.
- U.S. Fish and Wildlife Service (USFWS). 2017. Mountain-Prairie Region Endangered Species Profiles. Available at: <https://www.fws.gov/mountain-prairie/es/endangered.php>.
- USFWS. 2013. *Migratory Bird Treaty Act Protected Species (10.13 List)*. Available at: <https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php>.
- U.S. Fish and Wildlife Service (USFWS). 2020. USFWS National Wetland Inventory. Accessed at <https://www.fws.gov/wetlands/data/mapper.html>
- USFWS. 2003. Destruction and Relocation of Migratory Bird Nest Contents. FWS/DMBM/AMB/0628029. Available at: <https://www.fws.gov/policy/m0407.pdf>
- U.S. Geological Survey (USGS). 2017a. National Land Cover Database. Available at: <https://viewer.nationalmap.gov/basic/>.
- USGS. 2017b. National Hydrography Dataset as viewed on the National Map. Available at: <https://viewer.nationalmap.gov/advanced-viewer/>
- Wilson, Herb. 2011. "Nocturnal Migration." *Maine Birds—A Resource for Maine Birds and Birding*. Available at: <https://web.colby.edu/mainebirds/2011/11/09/nocturnal-migration/>

Appendix A. Site Photographs

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Photo 1. Looking southwest from the south side of I-70 at the eastern end of the Study Area near the top of Floyd Hill at MP 247 during the Summer of 2017.



Photo 2. Looking southwest from the south side of I-70 at the eastern end of the Study Area. An unnamed tributary to Beaver Brook is adjacent to the highway at this location near MP 246.5 during the Summer of 2017.



Photo 3. Picture of the Beaver Brook channel and riparian corridor northeast of the I-70 Beaver Brook/Floyd Hill interchange looking east near MP 248 during the Summer of 2018.



Photo 4. Picture of the Beaver Brook channel and riparian corridor northeast of the I-70 Beaver Brook/Floyd Hill interchange looking east at the property boundary for Adam's Acres buffalo ranch near MP 248 during the Summer of 2018.



Photo 5. Picture looking east from the culvert that connects Beaver Brook on either side of I-70. The Adams Acres building is in the background.



Photo 6. Looking west from the east side of the Beaver Brook/Floyd Hill interchange bridge over I-70 during the Summer of 2017.



Photo 7. Looking east from the west side of the Hyland Hills/Floyd Hill interchange bridge in the I-70 highway right of way near MP 246.5 during the Summer of 2017.



Photo 8. Looking south from the I-70 highway right of way, east of the Hyland Hills/Floyd Hill interchange. A large water quality pond is shown that drains into Beaver Brook to the east near MP 247 during the Summer of 2017.



Photo 9. Picture of a Black-billed Magpie observed in the Study Area adjacent to Clear Creek near MP 244.5 during the Summer of 2017.



Photo 10. Evidence of a deer roadkill found adjacent to I-70 in the highway right of way near MP 247 during the Summer of 2017.



Photo 11. Looking west. Example vegetation and topography found in/adjacent to the I-70 Mountain Corridor in the Study Area. The bottom of Floyd Hill is in the background near MP 244 during the Summer of 2017.



Photo 12. Looking east from the bottom of Floyd Hill at the vegetation and topography leading to the top of Floyd Hill near MP 245 during the Summer of 2017.



Photo 13. Example of slopes and drop-off of several gulches (Sawmill and Johnson) that intersect I-70 in the Study Area near MP 245 during the Summer of 2018.



Photo 14. Evidence of deer that have movement patterns that parallel or intersect the highway. This track was photographed in the I-70 highway right of way near MP 245 during the Summer of 2018.



Photo 15. Photo of a quaking aspen stand that is present on the north side of I-70 on the west side of Floyd Hill near MP 245.8 during the Summer of 2018.



Photo 16. An example of Clear Creek and its narrow riparian corridor. Photo taken at the west end of the Study Area near MP 243 during the Summer of 2018.



Photo 17. Photo looking east at the US 6/Golden interchange, with Clear Creek on the left near MP 244.5 during the Summer of 2017.



Photo 18. Picture looking east from the Valero Gas Station at the Hidden Valley/Central City interchange near MP 243 during the Summer of 2017.



Photo 19. Picture looking west along the East Idaho Springs Road/I-70 Frontage Road, south of I-70 and the Veterans Memorial Tunnels near MP 242.3 during the Summer of 2017. This ridge is a large rock outcrop in the Project Corridor.



Photo 20. Photo looking west along East Idaho Springs Road west of the Veterans Memorial Tunnels near MP 242 during the Summer of 2017. Shows how close Clear Creek (middle) is to I-70 (right), the narrow riparian corridor, and the steep banks separating the highway and Clear Creek.



Photo 21. Looking east, from the Game Check Area Park, at Clear Creek and sparsely vegetated slopes south and east of the Veterans Memorial Tunnels near MP 242.3 in May of 2020.



Photo 22. Looking east from East Idaho Springs Road/I-70 Frontage Road at the forested southern slopes with retaining walls. Very little vegetation present in a grassy area between the road and the Clear Creek Greenway. Near MP 242.5 in May 2020.



Photo 23. Looking west along the East Idaho Springs Road/I-70 Frontage Road, south of I-70 and east of the Veterans Memorial Tunnels near MP 242.6 in May 2020. Example of sparsely vegetated slopes north of I-70 and more forested slopes south of I-70 and Clear Creek. Narrow vegetated buffers exist between the frontage road and the Clear Creek Greenway and Clear Creek.



Photo 24. Picture looking east along East Idaho Springs Road west of the Hidden Valley/Central City interchange near MP 242.7 in May of 2020. Shows the narrow riparian corridor and the steep riprapped banks.



Photo 25. Picture looking east at the Central City Parkway Bridge over Clear Creek near MP 242.8 north of I-70. Example of the narrow riparian corridor adjacent to Clear Creek.



Photo 26. Picture looking east from the east side of the Central City Parkway Bridge over Clear Creek near MP 242.8 in May of 2020. Example of sparsely vegetated slopes and narrow riparian corridor north of I-70.



Photo 27. Picture looking west along the Clear Creek Greenway, south of I-70 and Clear Creek near MP 243.3 in May of 2020.



Photo 28. Photo looking west from the Clear Creek Greenway near MP 243.5 in May of 2020. Shows where the riparian corridor has more space for overflow events and wider wetland bench areas.



Photo 29. Picture looking east from the Clear Creek Greenway near MP 243.5 south of I-70. Example of the narrow riparian corridor and forested north-facing slopes south of I-70.



Photo 30. Picture looking west from the Clear Creek Greenway near MP 243.7 in May of 2020. Example of sparsely vegetated slopes and narrow riparian corridor south of I-70. The several straight sections of Clear Creek in the "W" section of the highway provide rapids preferred by local white-water rafting companies.



Photo 31. Picture looking east along the Clear Creek Greenway, south of I-70 and Clear Creek near MP 244 in May of 2020. Example of sparsely vegetated south-facing slopes north of I-70, narrow riparian corridor, and forested north-facing slopes south of Clear Creek.



Photo 32. Picture looking west from the Clear Creek Greenway near MP 244.3 in May of 2020. Shows the slope/ridge where the tunnel alternative would start.

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Appendix B. List of Observed Flora & Fauna

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During field visits in the Summer of 2017 and the Summer of 2018, plant and wildlife species with potential to occur in the Study Area were documented (see Table B-1). For information on other wildlife and plant species present in the Study Area, refer to the *I-70 Floyd Hill to Veterans Memorial Tunnels Vegetation & Noxious Weeds Technical Report* (CDOT, 2020b), *I-70 Floyd Hill to Veterans Memorial Tunnels Threatened & Endangered Species Technical Report* (CDOT, 2020c), and *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020a).

Table B-1. Observed Flora and Fauna

Common Name	Species Name
Woody Plants	
Blue spruce	<i>Picea pungens</i>
Engelmann spruce	<i>Picea engelmannii</i>
Lodgepole pine	<i>Pinus contorta</i>
Mountain mahogany	<i>Cercocarpus montanus</i>
Narrowleaf cottonwood	<i>Populus angustifolia</i>
Quaking aspen	<i>Populus tremuloides</i>
Peachleaf willow	<i>Salix amygdaloides</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Rubber rabbitbrush	<i>Ericameria nauseosa</i>
Russian olive*	<i>Elaeagnus angustifolia</i>
Sandbar willow	<i>Salix interior</i>
Wax currant	<i>Ribes cereum</i>
Willow species	<i>Salix</i> spp.
Herbaceous Plants	
Blackeyed Susan	<i>Rudbeckia hirta</i>
Canada thistle*	<i>Cirsium arvense</i>
Cattail species	<i>Typha</i> spp.
Chinese clematis*	<i>Clematis orientalis</i>
Common dandelion	<i>Taraxacum officinale</i>
Common mullein*	<i>Verbascum thapsus</i>
Common sunflower	<i>Helianthus annuus</i>
Curlycup gumweed	<i>Grindelia squarrosa</i>
Curly dock	<i>Rumex crispus</i>
Diffuse knapweed*	<i>Centaurea diffusa</i>
Downy brome*	<i>Bromus tectorum</i>
Engelmann's spikerush	<i>Eleocharis engelmannii</i>
Evening primrose	<i>Oenothera</i> spp.
Fairy trumpet/Scarlet gilia	<i>Ipomopsis aggregata</i>
Field bindweed*	<i>Convolvulus arvensis</i>
Field pennycress	<i>Thlaspi arvense</i>

Common Name	Species Name
Foxtail barley	<i>Hordeum jubatum</i>
Fringed sage	<i>Artemisia frigida</i>
Hoary cress*	<i>Cardaria draba</i>
Japanese brome	<i>Bromus japonicus</i>
Jim Hill mustard	<i>Sisymbrium altissimum</i>
Lambsquarters/Goosefoot	<i>Chenopodium</i> spp.
Musk thistle*	<i>Carduus nutans</i>
Purple lupine	<i>Lupinus argenteus</i>
Reed canarygrass	<i>Phalaris arundinacea</i>
Rocky Mountain goldenrod	<i>Solidago multiradiata</i>
Rocky Mountain juniper	<i>Juniperus scopulorum</i>
Rush species	<i>Juncus</i> spp.
Sedge species	<i>Carex</i> spp.
Scotch thistle*	<i>Onopordum acanthium</i>
Showy milkweed	<i>Asclepias speciosa</i>
Smooth brome	<i>Bromus inermis</i>
Western wheatgrass	<i>Pascopyrum smithii</i>
Yarrow	<i>Achillea millefolium</i>
Yellow sweetclover	<i>Melilotus officinalis</i>
Yellow toadflax*	<i>Linaria vulgaris</i>
Yucca species	<i>Yucca</i> spp.

*Noxious weed species

Appendix C. ALIVE Mitigation Report

1. Background

2 This report provides background on wildlife conflicts and connectivity in the Floyd Hill Project area. It
3 also includes an analysis of and recommendations for mitigation measures to reduce those impacts.

4 1.1. I-70 Mountain Corridor Wildlife-highway Conflict

5 The Interstate 70 (I-70) Mountain Corridor is considered a major barrier to wildlife due to its large
6 footprint, high traffic volumes and speeds, with direct and indirect impacts to wildlife, including,
7 wildlife mortality and driver safety concerns due to wildlife-vehicle collisions (WVC), habitat loss,
8 habitat fragmentation, and reduced landscape permeability. The Colorado Department of
9 Transportation (CDOT) and its partners recognize that “the benefits derived from a transportation
10 system can come at a cost to other resources,
11 including interference with the ability of
12 wildlife to use the landscape in a manner that
13 maintains population effectiveness” (CDOT,
14 2008). Barriers for wildlife along the corridor
15 include structural (road footprint, median and
16 shoulder barriers, retaining walls, cut and fill
17 slopes), operational (traffic volumes and
18 speeds) and behavioral (light and noise)
19 impediments to wildlife movement. Traffic
20 volumes in the Floyd Hill Project area between
21 Idaho Springs and the top of Floyd Hill range
22 from 44,000 to 53,000 average annual daily
23 traffic (AADT) (CDOT, 2018). At these volumes,
24 the entire Project area may be considered a
25 near-complete barrier for the terrestrial
26 wildlife species present in the project area (Charry and Jones, 2016).

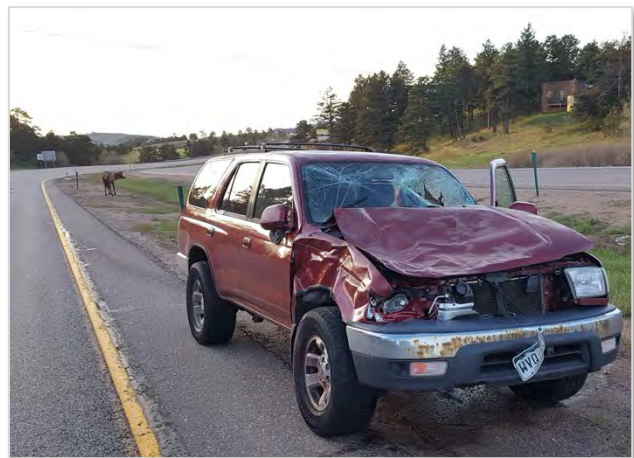


Photo 1. Elk-vehicle collision on I-70

27 Under current conditions, there are few opportunities for wildlife and, in particular, large mammals
28 such as mule deer and elk, to safely cross I-70 within the Project area. There are several existing
29 bridges over Clear Creek in the western portion of the Project area where wildlife could cross under
30 the highway; however, the area beneath these bridges is dominated by riprap slopes adjacent to the
31 creek, which are not traversable by hooved animals. Even small, generalist species that may otherwise
32 be able to pass through ephemeral drainage culverts are generally hindered from such movements due
33 to the length of these culverts beneath multiple traffic lanes in either direction. Existing road
34 overpasses at the Beaver Brook and Hyland Hills interchanges are also unsuitable, although wildlife is
35 known to make occasional movements across these types of structures.

36 1.2. Wildlife Connectivity in the I-70 Mountain Corridor

37 In 2001 as part of initiating the I-70 Mountain Corridor Programmatic Environmental Impact Statement
38 (PEIS), CDOT and the Federal Highway Administration (FHWA) convened an interagency group of
39 wildlife professionals called A Landscape Level Inventory of Valued Ecosystem Components (ALIVE) to
40 reduce WVC and increase habitat connectivity for terrestrial and aquatic wildlife. The ALIVE
41 Committee was tasked with considering the impacts of existing and proposed transportation systems on
42 wildlife habitat and movement patterns and guiding the development of mitigation strategies as a part

1 of the I-70 PEIS in order to promote timely environmental clearances for projects prioritized under the
2 PEIS. Agencies engaged in the ALIVE Committee include those responsible for the protection and
3 management of wildlife habitats and threatened and endangered species along the corridor - the
4 Colorado Division of Wildlife (now Colorado Parks and Wildlife [CPW]), the Bureau of Land Management
5 (BLM), the US Forest Service (USFS), and the US Fish and Wildlife Service (USFWS).

6 The ALIVE Committee reviewed existing data and information using a landscape-based, ecosystem
7 approach to identify wildlife habitat of high ecological integrity, wildlife habitat linkages, and barriers
8 to wildlife movement between Golden (west of Denver) and Glenwood Springs. The committee defined
9 13 Linkage Interference Zones (LIZs), or roadway segments where “evidence suggests that the highway
10 impedes important wildlife migration, movement, and dispersal” (CDOT 2011a, 1-9). The identification
11 of the LIZs was based on WVC data, knowledge of historic wildlife movement patterns, and
12 observations of wildlife activity by agency personnel (CDOT, 2004). The LIZs highlighted areas for
13 prioritizing mitigation efforts and, for each LIZ, the ALIVE Committee recommended preliminary
14 mitigations, including wildlife crossings, fencing, and land conservation strategies.

15 The final objective of ALIVE was to develop cooperative agreements among FHWA, CDOT, and the
16 regulatory and resource agencies to streamline consultation under Section 7 of the Endangered Species
17 Act for Tier 2 projects in the corridor, and to create a coordinated program for species and habitat
18 conservation across the corridor with the maximum benefit to wildlife (CDOT, 2008). Accordingly, in
19 2008, FHWA, CDOT, USFWS, USFS, BLM and CDOT signed the ALIVE Memorandum of Understanding
20 (MOU) committing the signatories to follow the processes outlined in the MOU to implement strategies
21 for reducing WVC and increasing habitat connectivity through mitigation measures such as dedicated
22 wildlife underpasses or overpasses, wildlife-exclusion fencing, habitat improvements, signage to alert
23 motorists, or other measures (CDOT, 2008). The ALIVE MOU establishes a commitment among the
24 signatory agencies to work together, across jurisdictional boundaries, toward the long-term protection
25 and restoration of wildlife habitat or habitat linkages that intersect the I-70 Corridor.

26 **1.3. Eco-Logical Regional Ecosystem Framework**

27 In 2009, CDOT received a grant from FHWA to field test the concept of ecosystem-based mitigation as
28 described in the guidance document *Eco-Logical - an Ecosystem Approach to Developing Infrastructure*
29 *Projects* (Brown, 2006). Building on the premise that transportation infrastructure can be developed in
30 ways that are more ecologically sensitive, the Eco-Logical approach promoted 1) interagency
31 collaboration and partnerships that are engaged from the earliest stages of transportation planning and
32 visioning, and 2) implementing mitigation where it will have the greatest ecological benefits and need
33 not be constrained to the boundaries of a transportation project. This process-oriented approach was
34 designed to bring agency and stakeholder concerns into view during the earliest stages of
35 transportation planning; maximize mitigation effectiveness; remove uncertainty in environmental
36 review; and avoid delays in project development and delivery by supporting greater flexibility in
37 addressing ecosystem concerns, while meeting regulatory requirements in a timely and cost-effective
38 manner.

39 The I-70 Eco-Logical study was led by ECO-resolutions and Rocky Mountain Wild and sought to develop
40 solutions for mitigating transportation impacts on wildlife habitat connectivity and WVC rates along the
41 I-70 Mountain Corridor from Golden (MP 258, west of Denver) to west of Dotsero (MP 130). The
42 objectives of the study were to: 1) compile baseline information on the presence of and use of existing
43 crossing structures by wildlife along I-70; 2) update the LIZs originally identified by the ALIVE
44 Committee in 2004; 3) develop recommendations for mitigating the impacts of roads and traffic on
45 wildlife, specifically road mortality and connectivity, in each of the LIZs; and 3) facilitate the

1 environmental review processes for future Tier 2 projects and provide an enhanced forum for
2 stakeholder involvement.

3 When the ALIVE MOU was signed in 2008, the agencies understood that transportation improvements to
4 the Corridor would occur over many years and recognized that the LIZs and recommended mitigation
5 strategies may be subject to change. The Eco-Logical study provided such an update by compiling and
6 updating data and developing a systematic process to update and refine the 13 LIZs originally
7 delineated in 2004. This updated analysis resulted in the identification of 17 LIZs, totaling
8 approximately 51 miles of the 144-mile I-70 Mountain Corridor (Kintsch et. al., 2011).

9 **1.4. Commitment for Wildlife Crossing Structures**

10 The I-70 Mountain Corridor Biological Opinion (USFWS, 2011) states: “A minimum of 13 wildlife
11 crossings will be installed with a maximum number of 25 possible, after which the program will be
12 assessed for effectiveness.... These crossings will be installed in the 13 LIZs identified by the ALIVE
13 Committee or subsequent documents”. Since the completion of the PEIS, the I-70 Eco-Logical study
14 identified 17 LIZs in the Corridor (Kintsch et al. 2011). The original minimum of 13 crossing structures
15 was based on a recognized need for at least one crossing in each of the originally identified 13 LIZs. In
16 its response to comments in the Record of Decision, CDOT noted that “the necessary number of
17 crossings in each LIZ needs to be determined through assessment of the connectivity needs of wildlife
18 in that area, not set arbitrarily” and concludes that, despite the statement in the Biological Opinion, a
19 maximum number of crossings that would be provided has not been determined (CDOT 2011b, p. 70).
20 CDOT further committed, in coordination with the ALIVE Committee, to continue examining wildlife
21 permeability in the corridor and incorporating new data as it becomes available.

22 **1.5. Project Area LIZs**

23 The following two LIZs are within the Floyd Hill Project area (see maps in the *I-70 Floyd Hill to*
24 *Veterans Memorial Tunnels Terrestrial Wildlife and Aquatic Species Technical Report* for reference on
25 the geographic limits of the LIZs):

26 **LIZ O: Clear Creek Junction** is located between MP 243.0 and MP 244.9 and is two miles long. The
27 target species in this LIZ are elk and mule deer, as well as bighorn sheep, mountain lion and Canada
28 lynx, and was identified primarily to highlight connectivity along Clear Creek through the canyon. WVC
29 are moderately low through this LIZ. There are two existing bridges over Clear Creek in the LIZ;
30 however, neither of these structures provides suitable pathways for terrestrial wildlife under I-70 due
31 to their size and/or the presence of riprap beneath the bridges. This LIZ was newly identified in the
32 Eco-Logical study.

1 LIZ P: Beaver Brook is located between
 2 MP 245.5 and MP 250.2 and is five miles
 3 long, overlapping with the eastern end of
 4 the project area for 2.5 miles. The
 5 primary target species in this LIZ are elk
 6 and mule deer; secondary target species
 7 include black bear, Canada lynx, mountain
 8 lion, and Preble’s meadow jumping
 9 mouse. WVC are very high in this LIZ. The
 10 only existing structure in this segment that
 11 may allow some terrestrial wildlife
 12 passage under I-70 is the bridge over Soda
 13 Creek Road (MP 249), a low volume, dirt
 14 road. This segment of roadway was mostly
 15 included in the Mount Vernon Canyon LIZ
 16 (Zone 13; MP 246.5-258.1) that was
 17 defined by the ALIVE Committee in 2004.
 18 At that time, the LIZ was ranked a low
 19 priority in the I-70 Mountain Corridor; however, the 2004 rankings were heavily influenced by Canada
 20 lynx, and this LIZ is outside of lynx habitat. It was noted that this zone experienced the highest rate of
 21 WVC in the Corridor (J.F. Sato and Associates, 2007).



Photo 2. Elk herd near the top of Floyd Hill attempting to cross I-70

22 There are two perennial drainages intersected by I-70 in LIZ P, Beaver Brook (MP 247.5) and Soda Creek
 23 (MP 249.1). At both locations there are existing corrugated metal pipes that only function for drainage
 24 purposes and do not provide aquatic or riparian connectivity.

25 1.6. Wildlife-vehicle Collisions in the Project Area

26 WVC crashes reported to law enforcement within the Project limits (Soda Creek Road to Idaho Springs)
 27 identified a rate of 2.1 WVC per mile per year, although, notably, the majority of these WVC crashes
 28 occurred in the eastern portion of the Project area, between the top of Floyd Hill (milepost [MP] 246.6)
 29 and Soda Creek Road (MP 249), which has a WVC rate of 4.5 WVC/mile/year. The majority of reported
 30 WVCs involved mule deer (56 percent) and elk (38 percent). Other species involved include bighorn
 31 sheep, black bear, and mountain lion. In addition to reported crashes, CDOT maintenance crews
 32 remove wildlife carcasses involved in WVC that may not have been reported to law enforcement. While
 33 the majority of carcass pickups are deer and elk, other medium-sized and smaller fauna that are also
 34 subject to roadkill but not represented in crash reports are also recorded, including bobcat, coyote,
 35 red fox, and raccoon. Multiple bighorn sheep WVC mortality were documented around the I-70/United
 36 States Highway 6 (US 6) junction in a collaring study conducted by CPW (Huwer, 2015). For an in-depth
 37 analysis of WVC in the Project Area, readers are referred to Section 5.4.3 of the *I-70 Floyd Hill to
 38 Veterans Memorial Tunnels Terrestrial Wildlife and Aquatic Species Technical Report*.

2. ALIVE Process for the Floyd Hill to Veterans Memorial Tunnels Project

2.1. ALIVE Issue Task Force Participants

As part of the I-70 Mountain Corridor Context Sensitive Solutions (CSS) process and ALIVE MOU, ALIVE Issue Task Forces (ITFs) are established for Tier 2 processes that affect wildlife. The ALIVE ITF was convened six times between April 2018 and May 2020 to review the potential impacts of the Project on connectivity for wildlife and wildlife-vehicle collisions and to make recommendations for mitigating these impacts, per the requirements of the ALIVE MOU. Participants in each of the six meetings are listed in Exhibit 1, along with which meetings they attended.

Exhibit 1. ALIVE ITF Participants

Name	Affiliation	ALIVE Meeting Participation					
		#1	#2	#3	#4	#5	#6
Chelsea Beebee	Jefferson County			X	X		X
Lauren Boyle	CDOT	X	X	X			
Carol Coates	Atkins				X	X	X
Aurelia DeNasha	USFS					X	X
Stephanie Gibson	FHWA	X		X	X	X	X
Vanessa Henderson	CDOT	X	X		X	X	X
Keith Hidalgo	Atkins	X	X	X			
Julia Kintsch	ECO-resolutions	X	X	X	X	X	X
Tyler Larson	Atkins			X			
Alison Michael	USFWS	X	X	X	X	X	
Alex Nelson	CDOT		X				
Neil Ogden	CDOT	X	X		X	X	X
Anthony Pisano	Atkins	X	X	X	X	X	X
Kristin Salamack	USFWS						X
Amy Saxton	Clear Creek County				X		X
JoAnn Sorenson	Clear Creek County	X	X	X			
Adam Springer	Clear Creek County	X	X		X	X	
Doreen Sumerlin	USFS	X	X	X			
Martha Tableman	Clear Creek County		X				
Francesca Tordonato	CDOT	X	X	X	X	X	X
Melinda Urban	FHWA					X	X
Carrie Wallis	Atkins	X	X				
Joe Walter	CPW	X			X		X
Mandy Whorton	Peak Consulting Group			X	X	X	X

1 2.2. ALIVE ITF Meetings

2 Six meetings of the ALIVE ITF were convened between April 2018 and May 2000 to determine wildlife
3 mitigation solutions for the Floyd Hill Project. The primary objectives and outcomes of each these
4 meetings are listed below. Complete meeting notes are available in Attachment A.

5 **ALIVE Meeting #1 – April 20, 2018.** At this first meeting of the ALIVE ITF, CDOT and the
6 consultant team described the project background, purpose and proposed actions; provided an
7 overview of the two LIZs (Beaver Brook and Clear Creek) that overlap the Project area; identified
8 wildlife concerns in the Project area; and the reviewed the project's anticipated effects on wildlife,
9 including a potential increase in WVC; habitat loss due to new alignments and highway widening; and
10 an increase in the barrier effect on wildlife movement due to more traffic lanes, higher traffic
11 volumes, additional retaining walls, median and shoulder barriers, and new lighting. The group
12 reviewed maps of the proposed highway alternatives and discussed potential wildlife and connectivity
13 issues in the Project area.

14 The need to incorporate updated information was confirmed at the first ALIVE Task Force meeting for
15 the Floyd Hill Project, during which the Committee agreed to use the LIZs identified through the 2011
16 Eco-Logical study

17 **Decisions:** The Committee agreed to use the updated 2011 LIZs to guide mitigation efforts for
18 the Floyd Hill Project.

19 **Outcomes:** This meeting resulted in the initial identification of potential mitigation strategies
20 and considerations.

21 **ALIVE Meeting #2 – June 5, 2018.** The purpose of this meeting was to conduct a field
22 review of potential mitigation locations in the Clear Creek and Beaver Brook LIZs.

23 **Outcomes:** This site visit resulted in the identification of specific issues and opportunities at
24 potential mitigation locations.

25 **ALIVE Meeting #3 – October 16, 2018.** The objective of this meeting was to review
26 each of the potential mitigation locations in the Beaver Brook LIZ (five locations) and Clear Creek LIZ
27 (three locations) and to receive additional input from the ALIVE ITF. For each of the locations
28 evaluated, information regarding biological value, WVC rates, landownership, land use, and
29 construction feasibility were compiled in a mitigation matrix.

30 **Outcomes:** As the result of this meeting, the group identified which locations to carry forward
31 for further evaluation and which locations to eliminate from further consideration.

32 **ALIVE Meeting #4 – January 9, 2020.** This meeting was the first reconvening of the
33 ALIVE ITF following a nine-month break in Project activities due to funding constraints. The purpose of
34 this meeting was to present and discuss two mitigation alternatives for the Beaver Brook LIZ: Mitigation
35 Option A, Floyd Hill Overpass, and Mitigation Option B, a new alternative mitigation plan, consisting of
36 both onsite mitigation and off-site mitigation in another LIZ within the CDOT Region 1 portion of the I-
37 70 Mountain Corridor (see Section 3). The new Canyon Viaduct Alternative in the Clear Creek LIZ was
38 also presented in this meeting.

1 **Outcomes:** The group agreed that additional follow up was needed to further discuss the
2 wildlife impacts of each of the alternatives in the Clear Creek LIZ and to further explore Option
3 B for the Beaver Brook LIZ.

4 **ALIVE Meeting #5 – February 26, 2020.** The objectives of this meeting were, 1) to
5 obtain the ITF’s consensus on whether to pursue Mitigation Option A or B, and 2) to obtain the ITF’s
6 input on the three alternative Project designs (Tunnel Alternative, North and South Frontage Road
7 Options; and Canyon Viaduct Alternative) in the Clear Creek LIZ for inclusion in the Technical Team’s
8 CSS Matrix.

9 **Decisions:** Based on the challenges associated with Mitigation Option A (a wildlife overpass at
10 Floyd Hill), the group decided to move forward with Option B, although more information was
11 needed to determine appropriate compensatory mitigation. The ALIVE ITF concluded based on
12 a high-level review of the alternatives/options in the Clear Creek LIZ, the Canyon Viaduct
13 Alternative provides the most opportunity for wildlife movement and habitat access.

14 **ALIVE Meeting #6 – May 19, 2020.** The purpose of this meeting was to prioritize the
15 alternative mitigation options and obtain the ALIVE ITF’s recommendation on which combination of
16 mitigation options to pursue as equivalent mitigation for the Floyd Hill Project. As a part of this
17 review, the consultant team provided the ALIVE ITF with design concepts and high-level costs estimates
18 for each of the crossing structure locations under consideration. CDOT noted that the Floyd Hill Project
19 design and cost estimate is still evolving but roughly \$17.6 million is anticipated to be available for
20 alternative wildlife mitigation.

21 **Decisions:** The group identified the following top three mitigation locations in the Region 1
22 portion of the I-70 Mountain Corridor: 1) Genesee underpass, 2) US 40 Empire overpass, and 3)
23 Ruby Ranch Road underpass.

24 **Outcomes:** The outcome of this meeting was a ranked list of mitigation options that will be used to
25 determine mitigation actions for the Project based on the final Project design and cost estimate.

26

3. ALIVE Mitigation Recommendations

3.1. ALIVE Mitigation Considerations and Alternatives Evaluation

This section describes the processes used to evaluate mitigation alternatives and the considerations and recommendations for wildlife crossing locations that were considered for mitigation in the Clear Creek and Beaver Brook LIZs.

3.1.1. Evaluation Criteria

The primary criteria used to evaluate mitigation locations were centered on biological and safety values. Other criteria that may affect the feasibility of implementation were also considered. These mitigation criteria were summarized for each of the potential mitigation locations in the Clear Creek and Beaver Brook LIZs. Although the criteria evolved somewhat over the course of ALIVE ITF meetings, all of the evaluations considered these general criteria, which evolved along with the mitigation matrix to meet the group's needs at each point in the process and are presented below.

Biological and Wildlife Considerations describe the wildlife connectivity value and the wildlife populations that would be served by a wildlife crossing structure at the location. This criterion encompasses the elements that promote or inhibit wildlife habitat and movement such as, high value habitat areas, the presence of a frontage road or other infrastructure, human activity, or other characteristics.

Wildlife-vehicle Collisions and Safety Considerations include both WVC crash rates and carcass reports, and the potential for wildlife crossing mitigation to lessen WVC impacts with benefits to wildlife mortality and driver safety.

Land Use and Land Ownership Considerations describe human activity (e.g., residential or commercial development; recreational trails) and land ownership (e.g., public vs. private; zoning and development potential) in the area immediately surrounding a potential wildlife crossing location. Landownership and parcel maps in the vicinity of each potential mitigation location were detailed in a Land Use Report (Attachment B).

Design Considerations outline site-specific mitigation requirements at each location, including structure type, dimensions and fencing needs based on target species needs, terrain, roadway footprint and other characteristics.

Constructability and Feasibility Considerations identify specific challenges and needs that must be addressed to implement wildlife mitigation at each location. For example, the need for detours or highway closures during construction, or compliance from adjacent landowners.

High-level Costs were calculated to compare the relative cost of mitigation across the potential mitigation locations.

The evaluations were documented in the Mitigation Matrix. This matrix evolved over the course of the ALIVE process, from one meeting to the next. Each iteration of the matrix is included in the meeting notes in Attachment A, and the final ALIVE ITF recommendations included in Attachment C.

3.2. Clear Creek LIZ Mitigation

The consultant team, CDOT, and the ALIVE ITF reviewed three mitigation locations in the Clear Creek LIZ in the context of the Project alternatives: the Tunnel Alternative and the Canyon Viaduct Alternative. In the Clear Creek LIZ, these alternatives include the same bridge improvements, and, therefore, mitigation potential is similar. Notably, the Canyon Viaduct Alternative with the frontage road on the north side of Clear Creek is preferable because south side of the creek would be more accessible by wildlife. In this alternative, two new roadway bridges spanning the creek are elevated high above the creek corridor and adjacent slopes, allowing continued east-west movement along Clear Creek. Additional crossing locations in this LIZ were considered but only the US 6 (Two Bears) option was carried forward as described below.

MP 244.9 Johnson Gulch. This location was identified as a potential location for a wildlife underpass. Wildlife improvements at this location were challenged by constructability issues and the presence of US 40 immediately to the east of the interstate, which acts as an additional barrier to wildlife movement. In addition, an I-70 wildlife crossing at this location would likely result in greater risk of WVC for drivers on US 40. *Decision: Remove from further consideration.*

MP 244.2 Two Bears. The bridges spanning Clear Creek and the parallel recreation trail transporting eastbound and westbound traffic will be replaced at this location. The group determined that pathways for terrestrial wildlife should be incorporated to the design of the new spans. *Decision: Carry forward for further design refinements.*

MP 242.8 Clear Creek. This location east of the Veterans Memorial tunnels is located outside of the LIZ, but because there was a planned bridge realignment as a part of the Project, the group considered this location as an opportunity to improve wildlife passage under I-70. *Decision: Remove from further consideration.*



Photo 2. Existing bridges over Clear Creek and the recreation trail at MP 244.2

Several additional areas were discussed and eliminated from further consideration during the site visit, including:

- MP 244.4 where the Project will construct a new westbound bridge; however, wildlife would still have to traverse eastbound I-70 and US-40.
- MP 243, where I-70 crosses over Clear Creek. These bridges are not part of the Project and are part of a complex of bridges at this location, all of which have limited clearance and steep riprap slopes, prohibiting passage by ungulates and other wildlife.

These mitigation options and the issues and opportunities at each location were discussed during ALIVE Meetings #2 and #3 and are included in an earlier version of the I-70 Floyd Hill ALIVE Mitigation Matrix (see Attachment A for meeting notes).

1 Despite channelization of the creek, there are no aquatic connectivity issues in Clear Creek. The creek
2 is stocked for recreational fishing, and there are no connectivity or dewatering concerns for native fish
3 species.

4 **3.3. Beaver Brook LIZ Potential Mitigation Locations**

5 The action alternatives in the East Section of the Project, which overlaps with the Beaver Brook LIZ,
6 are the same. The action alternatives affect the segment of I-70 from the top of Floyd Hill, west to US
7 6 and the Hyland Hills/Floyd Hill and Beaver Brook/Floyd Hill interchanges. The consultant team, CDOT
8 and the ALIVE ITF initially evaluated five potential mitigation locations in this LIZ, including one
9 location outside of the Project boundary; these locations are summarized below in Section 3.3.1.

10 **3.3.1. Initial Evaluation of In Project Mitigation**

11 The ALIVE ITF identified the segment of I-70
12 between the Hyland Hills/Floyd Hill and
13 Beaver Brook/Floyd Hill interchanges as the
14 most important for wildlife connectivity within
15 the Beaver Brook LIZ. Elk commonly use the
16 meadow-wetland complex on the south side of
17 the interstate and regularly attempt to cross I-
18 70 in this segment. Due to the local terrain
19 and the situation of the roadway in this
20 landscape, a wildlife overpass is the only
21 feasible crossing structure type.

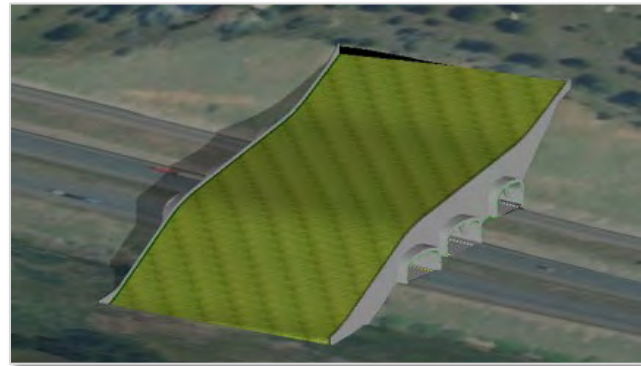


Photo 4. Overpass design concept spanning eastbound and westbound I-70 and US 40.

22 Three potential mitigation locations near MP
23 247 were evaluated to connect the meadow-
24 wetland complex to forested habitat north of
25 I-70, all of which require spanning US 40 as
26 well as I-70. Two additional crossing structure
27 locations west and east of the meadow-
28 wetland complex within this LIZ were also
29 evaluated.

30 **MP 250 Ruby Ranch.** This location is
31 characterized by a small drainage from the
32 south that is bisected by I-70 and a large fill
33 slope along the north side of the interstate. A
34 crossing structure at this location would not
35 benefit elk crossing activity around the
36 meadow-wetland complex, but would provide a
37 safe passage for deer and other wildlife in the
38 eastern portion of the LIZ, where there is a
39 high rate of WVC and which has been identified
40 by CPW as a highway conflict zone for mule
41 deer. *Decision: Carry forward for further*
42 *design refinements if other locations in the Project area are determined to be infeasible.*



Photo 3. Meadow-wetland complex on the south side of I-70 looking west from near the Beaver Brook interchange towards the top of Floyd Hill

1 **MP 247.3 Floyd Hill Overpass - Show Home.** This location is at the eastern end of the meadow-
2 wetland complex. It is situated near a show home on the south side of I-70. Of the three overpass
3 locations considered in this area, it would have the least amount of wetland impact. *Decision: Carry*
4 *forward for further design refinements.*

5 **MP 247.2 Floyd Hill Overpass - Storage Units.** This location is located just uphill of the Show Home
6 location. An overpass at this location would ascend from a low point below I-70 on the south side to a
7 cut slope on the north side of I-70. *Decision: Carry forward for further design refinements.*

8 **MP 247 Floyd Hill Overpass - High School.** This location near Clear Creek High School is situated
9 around the center of the meadow-wetland complex and, as such, would incur greater wetland impacts
10 than the other two locations in this area. An overpass at this location would also require a longer span
11 than the other locations. *Decision: Eliminate from further consideration.*

12 **MP 246.3 Floyd Hill West Overpass.** This location is west of the Hyland Hills/Floyd Hill interchange. At
13 this location, I-70 is below grade and an overpass bridge could be constructed spanning I-70 and US 40
14 from the south bench to the north. However, this location would require fencing from the meadow-
15 wetland complex commonly used by elk and directing animals across the interchange to the overpass.
16 This location has a relatively low WVC and was considered to have a lower value for wildlife. *Decision:*
17 *Eliminate from further consideration.*

18 At ALIVE Meeting #3, the group also discussed design considerations for a wildlife overpass spanning six
19 lanes of I-70 and US 40. Based on wildlife overpass dimensions at other locations across western states,
20 a 200' is the minimum recommended width (animal perspective) for a 300foot--long overpass to ensure
21 use by elk and other wildlife. This recommendation is influenced by the target species (elk, which are
22 known to be warier of crossing structures than deer), the residential nature of this elk herd; and
23 existing development and habituation by wildlife to human activity. The estimated high-level cost for a
24 wildlife overpass of these dimensions is \$17.6 million.

25 These mitigation options and the issues and opportunities at each location were discussed during ALIVE
26 Meetings #2 and #3 and are included in an earlier version of the I-70 Floyd Hill ALIVE Mitigation Matrix
27 (see Attachment A for meeting notes).

28 At the conclusion of ALIVE Meeting #3, the group determined to carry forward two of overpass locations
29 in the meadow-wetland complex area for further consideration and evaluation (the Show Home
30 location and the Storage Units location). Ultimately, the Show Home location was eliminated from
31 consideration to ongoing development, lighting and human activity around the Show Home property.

32 **3.3.2. Alternative Mitigation**

33 **3.3.2.1. Purpose**

34 The evaluation of mitigation locations within the Beaver Brook LIZ brought forth a number of concerns
35 regarding future development on both sides of I-70 between the Hyland Hills/Floyd Hill and Beaver
36 Brook/Floyd Hill interchange, and the high cost of a wildlife overpass at MP 247.2 relative to the
37 anticipated benefits to local wildlife populations and long-term genetic connectivity. As a result, the
38 consultant team and CDOT developed an alternative mitigation plan for consideration at the ALIVE ITF
39 at Meeting #4 in lieu of constructing a wildlife crossing at MP 247.2. This alternative mitigation plan
40 was initially proposed in three parts:

- 41 1. Create and contribute funds to an I-70 Mountain Corridor Connectivity Mitigation Fund to fund
42 wildlife crossings elsewhere in the Region 1 portion of the Mountain Corridor.

- 1 2. Pursue a conservation purchase or easement in the meadow-wetland complex on the south side
- 2 of I-70 at the top of Floyd Hill.
- 3 3. Install wildlife exclusion fencing and associated wildlife guards, escape ramps, and pedestrian
- 4 access gates along both sides of I-70 from the Hyland Hills/Floyd Hill interchange to east of
- 5 Soda Creek Road to prevent WVC.

6 This early concept for alternative mitigation was later revised to address the complexities involved
7 both up setting up a mitigation fund and potential issues with right-of-way acquisition and
8 condemnation for mitigation. In addition, because it is unlikely that such a fund for alternate crossing
9 locations would be used on future projects, CDOT decided that it would be better to pursue alternate
10 crossing projects(s) concurrent with the Floyd Hill Project rather than investing the time and effort in
11 the creation of a fund for a one-time mitigation option.

12 The revised alternative mitigation plan is detailed in Exhibit 2. At ALIVE Meetings #4 and #5, the ALIVE
13 ITF evaluated the benefits and challenges of constructing a wildlife overpass at 247.2 (Option A) versus
14 the alternative mitigation plan (Option B). These discussions are outlined in the respective meeting
15 notes and accompanying iterations of the mitigation matrix. As a result of these discussions, the group
16 determined to pursue compensatory mitigation via the alternative mitigation plan. The consultant
17 team was then tasked with creating a list of potential crossing structure locations on the I-70 Mountain
18 Corridor in Region 1, and the benefits and challenges of each location.

19 **Exhibit 2. Components of the Alternative Mitigation Plan**

Mitigation Strategy	Description	Considerations
Wildlife crossings mitigation outside of the Project area on I-70 in Region 1	Apply the equivalent costs to constructing a wildlife overpass at MP 247.2 to construct a wildlife crossing at one or more locations where such mitigation will have a greater benefit to wildlife and reducing WVC	The funding and commitment to construct alternate wildlife crossing(s) would be part of the Floyd Hill Project and would need to be completed before the Project could be closed out
Habitat protection of the meadow-wetland complex	Purchase 1 to 4 of the parcels that comprise the meadow wetland complex on the south side of I-70 at the top of Floyd Hill to protect high quality elk habitat in the Project area	CDOT Right-of-Way staff estimated that it could cost \$6 million to \$8 million to purchase the four properties (assuming they are available for purchase)
In Project area wildlife fencing mitigation to reduce WVC	Install wildlife-exclusion fencing on the north and south sides of I-70 from the Floyd Hill exit to east of Soda Creek and associated wildlife guards, escape ramps and pedestrian access gates	Wildlife fencing is included in both the Floyd Hill Overpass option (A) and the alternative mitigation option (B)

20 **3.3.2.2. Evaluation of Crossing Structure Locations Outside Project Area**

21 The next task for the ALIVE ITF was to rank potential alternative wildlife crossing locations. Based on a
22 review of previous assessments and wildlife crossings recommendations for the I-70 Mountain Corridor
23 (Kintsch et al., 2011; CDOT, 2014), the consultant team proposed six alternative crossing locations for
24 the ALIVE IFT to consider and prioritize (listed from east to west):

25 **MP 254.4 Genesee.** This location is within the Mt. Vernon LIZ and it has the highest rate of WVC within
26 the I-70 Mountain Corridor in Region 1. CPW has identified this location as an important wildlife
27 crossing zone, and CDOT has identified it as a WVC hot spot that could benefit from safety
28 improvements. Camera monitoring conducted by Singer et al. (2011) documented elk, mule deer, and

1 other species here. The crossing considered for this location is a bridge underpass, offset to the west
 2 side of the existing Mt Vernon Creek drainage culvert to shorten the structure length; it could
 3 potentially be constructed entirely within CDOT right of way (see Photo 4). Land on the south side of
 4 the interstate is Homeowner Association (HOA) open space. On the north side, there is a vacant parcel
 5 that is for-sale-by-owner.



Photo 4. Concept for bridge underpass at MP 254.4 Genesee

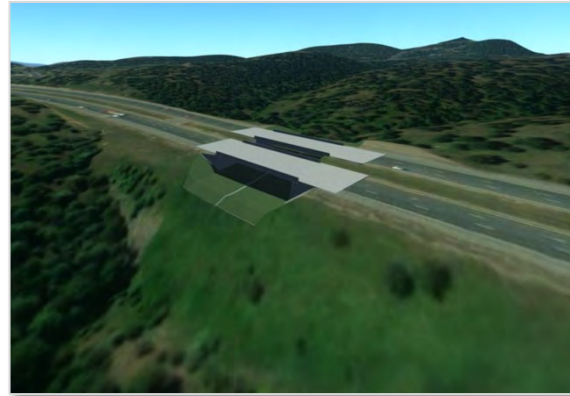


Photo 5. Concept for bridge underpass at MP 250 Ruby Ranch Road

7 **MP 250 Ruby Ranch Road.** This location is within the Beaver Brook LIZ but outside of the Project area.
 8 A high rate of WVC crashes in this area have been reported to law enforcement. Mule deer is the
 9 primary target species, although other wildlife would also benefit. It would not serve the elk
 10 population at the top of Floyd Hill, but elk could opportunistically use a crossing structure at this
 11 location. The crossing structure considered for this location is a bridge underpass through a large fill
 12 slope west of the El Rancho (Evergreen) eastbound exit (see Photo 5). The structure could potentially
 13 be constructed entirely within CDOT right-of-way. There is a 30-foot-wide median between opposing
 14 traffic lanes, but the highway could be realigned to eliminate the median to reduce the width of the
 15 roadway and length of a crossing structure. This location is surrounded by private lands with low
 16 density residential development. There are three partial parcels adjacent to the proposed crossing
 17 (excluding the portions of each parcel with a residence) that could be considered for acquisition in
 18 conjunction with the construction of a wildlife underpass.

19 **MP 249 Soda Creek.** This location is within the Beaver Brook LIZ and within the Project area. There are
 20 existing eastbound and westbound bridges at this location over Soda Creek Road, a low volume dirt
 21 road used for local, residential access (see Photo 6). CPW has reported that deer and other species
 22 including elk occasionally cross under the roadway bridge. Improvements (e.g., pathways, vegetation
 23 enhancements) could be made to the existing bridge to improve its functionality for wildlife passage.
 24 Traffic volumes and speeds are not expected to increase on Soda Creek Road in the future given local
 25 land use and zoning so conflicts between wildlife and vehicle use are expected to continue to be
 26 minimal. Alternatively, a new bridge underpass could be built spanning Soda Creek itself, which is
 27 approximately 300 feet east of the existing bridge. A dedicated wildlife crossing at Soda Creek would
 28 also improve riparian and aquatic connectivity at this location. In either case, the underpasses would
 29 be expected to function for deer, elk, and other species, but a crossing at this location is not expected
 30 to serve the elk herd at the top of Floyd Hill. There is existing wildlife fencing on the north side of the
 31 interstate that would be replaced/extended as part of the Project whether or not a crossing structure
 32 is built in this location.

1 **US 40 MP 257.4 Empire.** This location is not on I-70 but is connected to the I-70 / US 40 Empire
 2 Junction interchange and part of the Empire Junction LIZ. This location primarily targets the
 3 Georgetown bighorn sheep population, which is the largest herd in the state. This herd ranges along
 4 the north side of I-70 from the Eisenhower-Johnson Memorial Tunnels to Clear Creek Canyon. This
 5 location has long been identified by CPW as the most important place for bighorn along the I-70



Photo 6. Existing bridge over Soda Creek Road MP 249

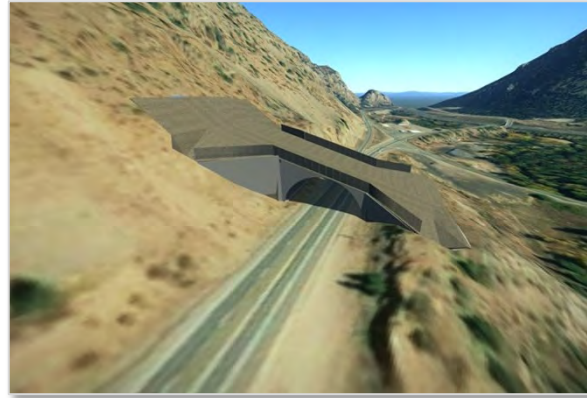


Photo 7. Concept for arch overpass at US 40 Empire MP 257.4

6 Mountain Corridor because of its value for long-term genetic connectivity between multiple sub-herds.
 7 In addition to bighorn sheep, elk and other wildlife are present in the area, a wildlife crossing would be
 8 designed to provide a safe passage for all of these species. The concept considered for this location is
 9 an arch overpass connecting the steep slopes north of US 40 to the riparian drainage along the West
 10 Fork of Clear Creek (see Photo 7). The parcel adjacent to the crossing location to the south was
 11 previously proposed (and rejected) for a quarry and the landowner has expressed interest in a
 12 conservation easement for the property; recently, CPW applied for a grant through CPW's Habitat
 13 Stamp Program to purchase a conservation easement for this parcel. CPW noted that other landowners
 14 on both the south and north sides of the proposed overpass may also be interested in putting
 15 easements on their properties.

16 **MP 220.5 Kearney Gulch and MP 217.4 Dry Gulch.** Both of these locations are in the Bakerville LIZ
 17 and were primarily identified for Canada lynx. This LIZ was ranked 'high' in the 2004 LIZ prioritization,
 18 due to the high value for lynx connectivity, which had recently been reintroduced in the state. At the
 19 time of the 2004 LIZ prioritization, two dispersing lynx were killed in this area (2003 and 2005), and
 20 biologists anticipated that a breeding population of lynx would establish in the area, though this
 21 predication has not borne out. WVCs are low throughout the LIZ, ranging from 0.3-0.5 WVCs per mile
 22 per year. Placing a wildlife crossing structure in this LIZ is challenged by uneven terrain on either side
 23 of the interstate, steeper grades, and the proximity of I-70 to Clear Creek. Recreational use in the area
 24 is high (especially at the Dry Gulch location), which could reduce the effectiveness of wildlife use.
 25 Additionally, the I-70 Mountain Corridor Record of Decision includes improvements in this area,
 26 including six lane highway capacity, a westbound auxiliary lane, and an Advanced Guideway System,
 27 but the timing and design of these improvements is unknown; future projects would include a wildlife
 28 crossing per the Biological Opinion and PEIS commitments.

29 **3.3.2.3. Priorities**

30 The six potential alternative crossing locations were entered into a matrix and evaluated and
 31 prioritized. Each of the four private parcels comprising the meadow-wetland complex were also

1 included in the matrix. However, while habitat protection is important for wildlife crossing success,
2 habitat protection alone would not mitigate for the wildlife barrier impacts associated with the
3 Project. Given the cost of the four meadow-wetland complex parcels (estimated by CDOT Right-of-Way
4 to be \$6 million to \$8 million), purchasing all four parcels was eliminated from further consideration.
5 However, purchasing one or two parcels was considered still an option, combined with the construction
6 of at least one wildlife crossing structure in a different location along the corridor, and each of the
7 four parcels were included independently in the matrix. In addition, private parcels associated with the
8 several of the potential crossing locations listed above were also included in the matrix, including a
9 parcel that is currently listed for sale that is directly adjacent to the Genesee crossing location, and
10 portions of three parcels associated with the Ruby Ranch Road crossing location. This prioritization
11 matrix summarized, for each location, biological value, wildlife-vehicle collision rates, land ownership
12 and land use, construction feasibility and a high-level cost-estimate for constructing a crossing at that
13 location (see Meeting #6 notes).

14 The ALIVE ITF then reviewed the matrix and discussed the factors influencing priorities for the options
15 presented in the mitigation matrix. The final ranking is presented in Exhibit 3. This ranking will guide
16 decision-making for selecting and developing equivalent Floyd Hill Project mitigation and may also be
17 used to help inform future mitigation projects in the I-70 Mountain Corridor in Region 1.

1 Exhibit 3. I-70 Mountain Corridor (Region 1) Mitigation Locations Ranking

Mitigation Option*	Ranking Notes	Rank
Genesee	<ul style="list-style-type: none"> • The target species for this location are elk and mule deer. CPW has identified this area as a highway crossing zone for elk. • This location has been consistently identified as one of the highest WVC segments in the I-70 Mountain Corridor in Region 1 (3.4 WVC accidents per mile per year). • Supplementary funding may be available through CODT Traffic and Safety, which has identified this segment as a WVC problem area. • A future transportation project at this location is unlikely as CDOT has no planned improvements in the area (I-70 is already three lanes in both directions through this LIZ). • The parcel on the south side of this location is HOA-owned open space and will not be developed. • The parcel on the north side of this location is listed for sale, which may offer an opportunity to protect the habitat immediately adjacent to the crossing structure location, to the benefit of the long-term connectivity and crossing success <ul style="list-style-type: none"> ○ The acquisition of this parcel or other long-term conservation agreement is important and recommended for this mitigation in addition to the crossing, The ALIVE ITF agreed that purchasing this parcel should be a package component since the opportunity is available now. • The cost for a 100-foot-wide (span) bridge underpass is estimated at \$4.5 million to \$5.5 million; the additional cost for the purchase of the adjacent parcel to the north is estimated at \$800,000. 	1
US 40 Empire	<ul style="list-style-type: none"> • High biological value for Georgetown bighorn sheep herd and high species diversity; however, a crossing at this location does not target elk or deer, which are the target species for the Floyd Hill Project and the Beaver Brook LIZ. • Not on I-70 but within the LIZ and would improve connectivity within the Mountain Corridor. • This location has been a long-time priority for CPW due to the importance of this location for genetic connectivity between sub-herds and herd population viability due to high levels of vehicular mortality, particularly in winter and early spring. • CPW has applied for a grant for a conservation easement on the property adjacent to crossing location on south side; other adjacent property owners may also be interested in potential conservation easements, so there is excellent potential for habitat protection around crossing. • The cost for a 100-foot-wide (length along roadway) arch overpass is estimated at \$3 million to \$4 million. 	2

Mitigation Option*	Ranking Notes	Rank
Ruby Ranch	<ul style="list-style-type: none"> • The target species for this location are mule deer and elk. CPW has identified this area as a highway crossing zone for mule deer. • WVC are high in this area (2.8 WVC/mile/year). • Due to the land use and zoning in this area (which does not allow for additional development) and the width of the CDOT right-of-way, the acquisition of these partial parcels is not essential for construction or the long-term functionality of the wildlife crossing. If a wildlife crossing structure were to be constructed at this location, landowners would need to be coordinated with to ensure habitat connectivity through the properties. • Site considerations may make this location potentially less effective and/or require additional considerations: <ul style="list-style-type: none"> ○ There is a very large and steep embankment on the north side of I-70 in this location. Mule deer are very adaptable and would not likely be bothered by the slope; could encourage use of the crossing by building game trails into the embankment. Elk and other less adaptable species are expected to learn to use it over time. ○ US 40 conflicts. In this location, US 40 is north of the I-70 Corridor; while US 40 in this location has very low traffic volumes (most traffic is on I-70, with US 40 only supporting local accesses), some wildlife conflict could occur on US 40. These conflicts are not considered significant but signage could be installed to alert US 40 drivers if a crossing is constructed here. • Ruby Ranch was ranked a higher priority than Soda Creek because it would be a new crossing location, whereas Soda Creek already has a crossing opportunity at the roadway bridge. • The cost for a 100-foot- wide (span) bridge underpass is estimated at \$4.5 million to \$5.5million. 	3
Soda Creek	<ul style="list-style-type: none"> • Area of high WVCs (2.8 WVC/mile/year). Fencing already included in the Project mitigation is expected to be effective in reducing WVCs and directing wildlife to cross under the interstate at the roadway bridge. <ul style="list-style-type: none"> ○ Some wildlife activity observed by CPW under the roadway bridge. CPW trail camera under the bridge 2018 captured mostly deer, who used the middle of the road; some foxes on camera, evidence of elk (tracks), and observation of turkeys. ○ The area around Soda Creek Road crossing is already planned to be fenced, and the fencing will help direct more animals to it; a separate structure in addition to the road underpass is less of a priority since a crossing opportunity, though not ideal, already exists in this location. ○ Species potentially using this crossing are generalist species that will likely use the low-volume road crossing without additional enhancements. 	<p>New crossing is a lower “next” priority</p> <p>Including cover for small fauna at the existing roadway is a priority and could be implemented</p>

Mitigation Option*	Ranking Notes	Rank
	<ul style="list-style-type: none"> ○ Some cover might be beneficial to smaller species. ○ Because this is a dry crossing (not associated with a drainage) with a dirt/gravel surface, benches or other enhancements are not needed. ○ CDOT Bridge may be sensitive to embankment or slope changes to retrofit for enhanced wildlife use. ● A dedicated wildlife crossing would provide more value than current road crossing: <ul style="list-style-type: none"> ○ Providing a new crossing designed for wildlife is a better solution than funnelling animals to use a road crossing (although the road is low volume). ○ Elk herd at Beaver Brook could potentially find and use once fencing is constructed from Floyd Hill to Soda Creek (nearly 2 miles between Soda Creek and the Floyd Hill meadow-wetland complex). ○ A crossing at Soda Creek would also improve riparian and aquatic connectivity. ○ Although Preble’s Meadow Jumping Mouse habitat on Soda Creek is not contiguous with occupied range or high value based on data and map review, a new crossing at the creek could potentially benefit Preble’s Meadow Jumping Mouse. ○ Residences close to Soda Creek may complicate land use around a new crossing at the creek. ● The cost for a 100-foot-wide (span) bridge underpass is estimated at \$4.5 million to \$5.5 million. 	<p>independent of a new crossing</p>
<p>Floyd Hill (habitat protection)</p>	<ul style="list-style-type: none"> ● Four parcels on south side of I-70 between the Floyd Hill/Hyland Hills and Floyd Hill/Beaver Brook interchanges identified with habitat value and are currently home to a large elk herd (see maps in meeting notes). <ul style="list-style-type: none"> ○ Parcels may or may not be able to be acquired; unknown if landowners would be interested in selling. ○ Parcels 1 and 3 are more likely to be protected. Parcel 1 was recently acquired (by the Frei family), who may be interested in protection/conservation. Parcel 3 comprises the wetland complex and likely has development restrictions. These two parcels present opportunities to develop partnerships with landowners or land trusts/NGOs to pursue land conservation. ○ Parcel 4 is slated for high-density development and is a concern for habitat protection. ○ Of the parcels under consideration for land acquisition, parcels 2 and 4 would be highest priorities because those are most at risk; parcel 3 may be more available due to the presence of wetlands and lack of development potential ● Habitat protection is valuable but not as valuable without a crossing, and the other locations represent new crossings and more appropriate for connectivity mitigation across I-70 in line with ALIVE MOU. ● The cost to acquire all four parcels is estimated at \$6 million to \$8 million. 	<p>Lower “next” priority</p> <p>Pursuing partnership (e.g., Mountain Areas Land Trust) discussions is a priority</p>

Mitigation Option*	Ranking Notes	Rank
Kearney Gulch	<ul style="list-style-type: none"> • High biological value for landscape connectivity and species diversity. • Wildlife crossings mitigation will be included in a future I-70 Mountain Corridor PEIS project (highway or Advanced Guideway System) in this segment, though the timing of a project is unknown. • High cost structures that could be throw-away if a wildlife crossing constructed in the near-term is not compatible with a future project. • Compared to Dry Gulch, this may be a better location given the high recreation use at Dry Gulch and location being farther from the land bridge over the Eisenhower-Johnson Memorial tunnels, which already provides a high alpine crossing opportunity. • The cost for a 200-foot-wide (length along roadway) arch overpass is estimated at \$13.5 million to 14.5 million. 	Lower priority for Project mitigation than Floyd Hill and Soda Creek
Dry Gulch	<ul style="list-style-type: none"> • High biological value for landscape connectivity and species diversity. • Wildlife crossings mitigation will be included in a future I-70 Mountain Corridor PEIS project (highway or Advanced Guideway System) in this segment, though the timing of a project is unknown. • High cost structures that could be throw-away if a wildlife crossing constructed in the near-term is not compatible with a future project. • The cost for a 200-foot-wide (length along roadway) arch overpass is estimated at \$13.5 million to 14.5 million. 	Lowest priority for Project mitigation

1 *All crossings would include wildlife-exclusion fencing of about one mile in each direction depending on site-specific conditions; fencing costs are included in the cost
2 estimates presented in Exhibit 3.

3

3.4. ALIVE Commitments/Agreements for the Floyd Hill to Veterans Memorial Tunnels Project

The six ALIVE ITF meetings and accompanying discussions resulted in specific recommendations for mitigation commitments for the Project's impacts on connectivity for wildlife and WVCs. The ALIVE recommendations and Project mitigation commitments and agreements are presented in the following two sections.

3.4.1. Clear Creek LIZ

The ALIVE ITF recommends the Canyon Viaduct Alternative, North Frontage Road Option as the alternative with the least amount of impact to wildlife movement and the greatest potential for improving east-west connectivity along Clear Creek.

Project improvements around the US 6 interchange (MP 244.2) include replacing the I-70 westbound and eastbound bridges and the westbound off-ramp bridge and adding a new I-70 eastbound on-ramp over Clear Creek. The ALIVE ITF recommends a wildlife bench be constructed under all the bridges along the riparian corridor adjacent to the Greenway.

In addition, while MP 244.9 Johnson Gulch was eliminated as a potential location for wildlife underpass for deer and elk, the ALIVE ITF recommends continued consideration of this location for a smaller culvert for carnivores and medium-sized fauna during Project design.

3.4.1.1. Mitigation Commitments

CDOT will design and construct a wildlife bench under the US 6 bridges over Clear Creek to facilitate wildlife movement along the riparian corridor adjacent to the Greenway.

CDOT will consider opportunities for Johnson Gulch improvements to improve movement for carnivores and medium sized fauna in final design.

3.4.2. Beaver Brook LIZ Commitments

For the Beaver Brook LIZ, the ALIVE ITF recommends a combination of in-project wildlife fencing to reduce WVCs, pursuing land conservation agreements for the elk habitat in the meadow-wetlands complex, and, in lieu of constructing an overpass at the top of Floyd Hill or other crossing in the Beaver Brook LIZ, alternative mitigation in the form of new wildlife crossings outside the Project area within CDOT Region 1 of the I-70 Mountain Corridor.

3.4.2.1. Mitigation Commitments

Wildlife-exclusion Fencing

CDOT will install wildlife-exclusion fencing on the north and south sides of I-70 from the Floyd Hill/Hyland Hills interchange to east of Soda Creek Road. The fencing will include associated wildlife guards at interchanges, escape ramps (at least four per mile; ramps should be located near the fence ends and around the Beaver Brook interchange), and, if needed, pedestrian access gates. A conceptual plan for the wildlife fence design is included in the ALIVE ITF Meeting #5 notes.

1 **Land Conservation**

2 CDOT and the ALIVE stakeholders will engage potential partners such as the Mountain Areas Land Trust
3 to pursue habitat protection of the meadow-wetland complex.

4 **New Wildlife Crossing(s)**

5 CDOT will design and construct at least one new wildlife crossing on the I-70 Mountain Corridor in
6 Region 1. The crossing locations in rank order include I-70 MP 254.5 (Genesee bridge underpass and
7 habitat protection; US 40 MP 247.4 (Empire arch overpass), and I-70 MP 250 (Ruby Ranch Road bridge
8 underpass).

9 These crossing(s) will be funded using the budget for constructing a wildlife overpass at I-70 MP 247.3
10 near the top of Floyd Hill in the Beaver Brook LIZ (estimated at \$17.6 million). CDOT will design and
11 develop these crossings, in rank order, to determine the number of alternative mitigation locations
12 that may be constructed. CDOT will involve the ALIVE Committee in the design of the alternative
13 crossings. These alternative crossings will be included in the Floyd Hill Project budget and will be
14 constructed prior to the closeout of the Project.

15 **3.5. Next Steps**

16 The ALIVE ITF will be reconvened once Project construction funding is identified. At that time, the
17 ALIVE ITF will review the alternative crossing locations, designs, and cost estimates. CDOT will identify
18 contracting methods and timing for the development of the alternative crossing(s). ALIVE will also
19 review Project plans related to wildlife movement, such as the benches at US 6 bridges and the
20 Johnson Gulch culvert improvements, if any.

4. References

- 1
- 2 Brown, J. 2006. Eco-logical: An Ecosystem Approach to Developing Infrastructure Projects. Report No.
3 FHWA-HEP-06-011. Federal Highway Administration. Washington, D.C. Available:
4 <http://www.environment.fhwa.dot.gov/ecological/ecological.pdf>
- 5 Charry, B. and J. Jones. 2009. "Traffic Volume as a Primary Road Characteristic Impacting Wildlife: A
6 Tool for Land Use and Transportation Planning." Pages 159-172, in P. J. Wagner, D. Nelson and E.
7 Murray (eds). Proceedings of the 2009 International Conference on Ecology and Transportation.
8 Center for Transportation and the Environment, Raleigh, NC.
- 9 Colorado Department of Transportation (CDOT). 2018. "Online Transportation Information System."
10 Accessed 6/22/20. <http://dtdapps.coloradodot.info/otis>
- 11 Colorado Department of Transportation (CDOT). 2014. Interstate 70 Mountain Corridor Traffic and
12 Revenue Study. Prepared by Parsons. October 14. Available at
13 <https://i70solutions.org/files/3514/2982/3950/traffic-revenue-study-Oct-2014.pdf>.
- 14 Colorado Department of Transportation (CDOT). 2011a. I-70 Mountain Corridor Final Programmatic
15 Environmental Impact Statement and Section 4(f) Discussion. Project IM 0703-244. U.S.
16 Department of Transportation, Federal Highway Administration and the Colorado Department of
17 Transportation, Aurora, CO. Available: [https://www.codot.gov/projects/i-](https://www.codot.gov/projects/i-70mountaincorridor/final-peis/final-peis-file-download.html)
18 [70mountaincorridor/final-peis/final-peis-file-download.html](https://www.codot.gov/projects/i-70mountaincorridor/final-peis/final-peis-file-download.html)
- 19 Colorado Department of Transportation (CDOT). 2011b. I-70 Mountain Corridor Record of Decision. U.S.
20 Department of Transportation, Federal Highway Administration and the Colorado Department of
21 Transportation, Aurora, CO. Available: [https://www.codot.gov/projects/i-70-old-](https://www.codot.gov/projects/i-70-old-mountaincorridor/i-70-record-of-decision.html)
22 [mountaincorridor/i-70-record-of-decision.html](https://www.codot.gov/projects/i-70-old-mountaincorridor/i-70-record-of-decision.html)
- 23 Colorado Department of Transportation (CDOT). 2008. ALIVE Memorandum of Understanding. FS
24 Agreement No. 08-MU-11021000-013. Colorado Department of Transportation, Aurora, CO.
- 25 Colorado Department of Transportation (CDOT). 2004. I-70 Mountain Corridor Draft Programmatic
26 Environmental Impact Statement and Section 4(f) Evaluation. Project IM 0703-244. U.S.
27 Department of Transportation, Federal Highway Administration, and the Colorado Department of
28 Transportation, Aurora, CO. Available: http://www.i70mtncorridor.com/I70_ViewOnline.asp
- 29 J.F. Sato and Associates. 2007. A Landscape Level of integrated Valued Ecosystems Program and its
30 Contribution to the I-70 Mountain Corridor Programmatic Environmental Impact Statement.
31 Unpublished Report to Southern Rockies Ecosystem Project and the Colorado Department of
32 Transportation, Denver, CO.
- 33 Kintsch, J., P. Singer, M. Huijser, J. Crane and A. Huyett. 2011. A regional ecosystem framework for
34 terrestrial and aquatic connectivity along the I-70 mountain corridor in Colorado: An Eco-Logical
35 field test. U.S. Department of Transportation, Federal Highway Administration and the Colorado
36 Department of Transportation, Aurora, CO.
- 37 Singer, P., A. Huyett, J. Kintsch and M. Huijser. 2011. Interstate 70 Eco-Logical monitoring and I-70
38 wildlife watch report. Final Report to the Colorado Department of Transportation, Denver, CO.

- 1 US Fish and Wildlife Service. 2011. I-70 Mountain Corridor Biological Opinion. May 24. Available as
- 2 Appendix A to the Record of Decision: [https://www.codot.gov/projects/i-](https://www.codot.gov/projects/i-70mountaincorridor/final-peis/final-peis-file-download.html)
- 3 [70mountaincorridor/final-peis/final-peis-file-download.html](https://www.codot.gov/projects/i-70mountaincorridor/final-peis/final-peis-file-download.html)

4

1 **Attachment A: ALIVE Meeting Notes**

- 2 ALIVE Meeting #1 - April 20, 2018
- 3 ALIVE Meeting #2 (Site Visit) - June 5, 2018
- 4 ALIVE Meeting #3 - October 16, 2018
- 5 ALIVE Meeting #4 - January 9, 2020
- 6 ALIVE Meeting #5 - February 26, 2020
- 7 ALIVE Meeting #6 - May 19, 2020

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Meeting Notes



I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to VMT
Meeting: ALIVE Issue Task Force Meeting
Date: April 20, 2018; 10:00 am to 12:00 pm
Location: CDOT Region 1, 425 Corporate Circle, Golden, CO

Attendees:
See Attached Sign-in Sheet

Summary of Action Items	Responsibility	Status
1. Follow up to see if there are site specific locations that may still be using sand for treatment	Neil Ogden	
2. Look into designs for rockfall netting that minimize entanglement	Julia Kintsch and Stephanie	
4. Check with drone footage used for rock fall to see if it caught any issues with entanglement or animals	Neil Ogden	
5. Provide preliminary crossing design and or schematics to Clear Creek County to facilitate opportunities for partnerships with local development	Neil Ogden	
6. Look into opportunities for conservation easements	Neil Ogden, add to agenda for ROW meeting	
7. Coordinate with Joe Walter on additional wildlife carcass information to add into reporting	Julia Kintsch and Keith Hidalgo	

SUMMARY OF DISCUSSION

[Note: Action items are in [blue](#).]

1) Welcome / Introductions

Self-introductions were done by the group

2) Project Overview

Vanessa Henderson (CDOT) gave a project overview as shown in the attached presentation.

3) ALIVE MOU and Previous Studies

Julia Kintsch (ECO-Resolutions) provided background on the ALIVE MOU, roles of members of the ALIVE committee, and described the Linkage Interference Zones and mortality data in the Floyd Hill Study Area as shown in the attached presentation. For more information on the ALIVE MOU refer to: https://www.codot.gov/projects/i-70-old-mountaincorridor/final-peis/final-peis-documents/20_App_E_ALIVE_MOU_Rev50.pdf

The ALIVE MOU came out of the Context Sensitive Solutions process and was part of the I-70 EcoLogical project that was a Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor.

<https://www.codot.gov/projects/i70twtunnels/other-documents/plt-technical-team/issued-task-forces/waterresources/A%20Regional%20Ecosystem%20Framework%20for%20Terrestrial%20and%20Aquatic%20Wildlife%20Along%20the%20I-70%20Mountain%20Corridor.pdf>.

Included the identification of 17 Linkage Interference Zones (2011) that updated the original 13 LIZs (2004). Requested agreement on using 2011 LIZ. ALIVE representatives present agreed to use the 2011 LIZs.

ALIVE Implementation Matrix <https://www.codot.gov/resolveuid/0928f54fb1e94dfa8a57a996edcc7e77> (what questions should be asked at each stage of the project life cycle, currently in project development)

I-70 EcoLogical Guidelines for Enhancing Wildlife Permeability:
<https://www.codot.gov/resolveuid/34aa4c925fb245f0848e7473e6f9325d>

Clear Creek Junction LIZ from MP 243.0 – 244.9

Julia Kintsch presented the Wildlife-Vehicle Collision rate, carcass collection numbers and other connectivity issues in this LIZ to the ALIVE committee. Identified improving bridges over Clear Creek and wildlife crossing at 244.9.

Stephanie Gibson (FHWA): Recommendation on fencing? Julia Kintsch responded that yes, fencing should always be considered when structures are discussed.

Beaver Brook LIZ from MP 245.5 – 250.2 (project area ends MP 248)

Julia Kintsch presented the Wildlife-Vehicle Collision rate, carcass collection numbers, Preble's habitat, and other connectivity issues in this LIZ to the ALIVE committee. Identified crossing opportunities at MP's 246.5, 247, 247.5 and 248.2.

Aquatic Connectivity (included to see what the needs are)

Julia Kintsch presented on aquatic connectivity as identified in the presentation

Julia Kintsch presented the ALIVE Implementation Matrix as shown in the presentation.

Jo Ann Sorensen (Clear Creek County): Should we also be asking the same questions under project design (phasing in the matrix)? Yes, we should be asking the questions listed under the first 3 phases, up to project design.

Alison Michael (USFWS): ALIVE came out of one of the core values from the original CSS process. These are things that the collaborative effort came up with to improve conditions in the corridor.

I-70 Traffic and Revenue Study (<https://www.codot.gov/projects/i-70mountaincorridor/trafficrevenuestudy>) An overview of the study is provided, but a link to download the report isn't available. For further information about the project, contact Benjamin Acimovic, CDOT project manager at Benjamin.Acimovic@state.co.us, phone 720-497-6936.

Julia Kintsch provided an overview of the wildlife connectivity issues discussed during the study.

Neil Ogden (CDOT): Was cost determined for the crossing at 247? Where it was headed, but not finished.

Alison Michael: Where is 247? Located between Hyland and Beaver Brook exits.

4) Wildlife Connectivity Issues and Concerns

Julia Kintsch presented on the various wildlife issues and concerns identified in previous studies and for the Floyd Hill Study Area, data needed, effects on wildlife, and initial mitigation recommendations. Extended discussion on Bighorn Sheep.

Jo Ann Sorenson: Are there issues related to the maintenance of the highway? Yes, but these issues came from the public meeting last summer.

Doreen Sumerlin (USFS): Did anything come up related to the increase of more sand in the creek due to more pavement lanes? Yes, came up at SWEEP.

Jo Ann Sorenson: Do we have a clear understanding of the maintenance activities? And what is used on the corridor.

Neil Ogden: Areas treated by traction sand recently changed – now being used from Empire Junction to 241 interchange (east Idaho Springs), magnesium chloride is being used from 241 to Denver. **Neil will follow up to see if there are site specific locations that may still be using sand.**

Francesca Tordonato (CDOT): Was there a high number of bears picked up?

Joe Walter (CPW): Not last year, but 4 or 5 the year before. May be due to population and weather. Not a lot of opportunity for hunters on the Front Range. Not on the steep part of Floyd Hill, but typically between Floyd Hill and El Rancho. Bears don't have consistent crossing (like lions). Tend to be more adaptable in crossings.

Wildlife-vehicle collision issue:

Julia Kintsch provided an overview of wildlife-vehicle collisions and carcass data for the Floyd Hill Project area and which species made up the majority of reporting.

A lot of the data is not reported. Not seeing all of the numbers, but can see patterns. **Joe has more informal data which he can provide on other locations on wildlife carcasses that he has collected in the study area.**

Canada Lynx issues:

Julia Kintsch provided an overview of lynx and likely habitat for lynx for the Floyd Hill Study Area.

Preble's Meadow Jumping Mouse issues:

Julia Kintsch provided information on the Preble's habitat located in the Floyd Hill Study Area.

Jo Ann Sorenson: When you're talking about rip-rap, is there an advantage to using rocks that are more difficult to climb on? Tend to use a standard material, rather than something like river rock that may not be able to interlock and stay there and help avoid erosion. For wildlife passage, creating a bench or small pathway through the rip-rap may be helpful. Where it is really steep, there may not be many opportunities. Maybe there are ways to span wider.

Jo Ann Sorenson: Rafting access issues with the steep banks, could we make slopes more accommodating for them too? Need to find opportunities for mutual benefit, although in some places may want to avoid human activity.

Connectivity issues for Terrestrial Fauna:

Julia Kintsch provided information on connectivity issues for elk and mule deer in the Floyd Hill Study Area.

Bighorn Sheep issues:

Julia Kintsch provided information on connectivity issues for bighorn sheep in the Floyd Hill Study Area.

Doreen Sumerlin: Important to point out lambing areas, project could potentially impact and should be considered from a cumulative effect from previous impacts. There were timing restrictions for blasting on Twin Tunnels. Timing restrictions on blasting to avoid lambing will be similarly imposed here.

Doreen Sumerlin: Are the sheep kills on I-70 or on US 6? Mainly on US 6 (not crossing), but cannot tell from the map. Due to curves and sight distance. Sheep are everywhere now that the area is starting to green up. They will cross US 6, rarely will they cross I-70.

Aquatic connectivity issues:

Julia Kintsch provided information on aquatic connectivity issues in the Floyd Hill Study Area. Only issue is at Beaver Brook.

Keith Hidalgo (Atkins): Noted in conversations with Paul Winkle (CPW Aquatic Biologist) that the only fish on Beaver Brook is at a stocked reservoir upstream, but no fish in Beaver Brook until much further downstream, closer to Clear Creek. Joe noted that there is no need for aquatic connectivity at this location.

Raptor entanglement issues:

Julia Kintsch presented on concerns that raptors may become entangled in rock fall mitigation netting as shown in the presentation.

Francesca Tordonato: How does it relate to rockfall mitigation, last recommendation may not work. May be competing interests in design. Follow up with Mark or Jeff Peterson. Having more information may be able to help us balance all of the needs. Need to continue to design rockfall nets with these incidents in mind. Look at design to minimize entanglement. [Julia and Stephanie to follow up.](#)

Jo Ann Sorenson: When drones were being used to check rockfall, did they pick up information? [Neil to follow up.](#)

5) Mitigation Considerations

Julia Kintsch presented on mitigation considerations in the Floyd Hill Study Area.

Wildlife Overpass

Julia Kintsch presented on possible wildlife overpass locations in the Floyd Hill Study Area.

Wildlife Underpasses

Julia Kintsch presented on possible wildlife underpass locations in the Floyd Hill Study Area and discussed it needs to be in conjunction with fencing.

6) Map Review

Maps of the corridor were reviewed by the group. An overview of the discussion for each of the four maps is described below.

Study Area Overall

- Tiered rock walls where rock cuts are so that the walls are not impassible for wildlife, where feasible
- Upsize culverts where possible with natural bottoms?
- Ramps/shelves in pipes, culverts, etc?
- Better roadside visibility of wildlife = good

Western Segment

- Reduce vegetation along roadway to increase visibility of wildlife (bighorn sheep)
- Straightening out w-curves also improves visibility of wildlife, reduces safety risk
- Can Clear Creek move north of the highway?
- Higher walls along $\frac{3}{4}$ and $\frac{1}{4}$ with balanced?
- Sheep mortality on east side of VMT
- Gold mine shafts?

Central Segment

- Tunnel good for wildlife (bighorn sheep)
- Tiered potential wildlife impact
- Operations at bridges to span wider for wildlife?
- Locations for underpass?
- Locations for overpasses/crossings?
- Sheep and bear use areas at US 6 Junction
- Deer jumping off bridge?
- Erosion – reduce average grade?

Eastern Segment

- Partnership with Developer for wildlife overpass structure?
- Bridge for connectivity or tubes w/ramps?
- Construction easement possible?
- Two locations for an overpass?
- PMJM trapped here in 2004 downstream on Beaver Brook

Map 1 (Veteran Memorial Tunnels area)

Anthony Pisano (Atkins): Options in the west include tunnel or rock cut. Rock cut would involve moving the creek slightly to the south. Does not change the angle of the road going into the tunnels.

Central City Parkway – one or both bridges over Clear Creek are likely to be replaced, depending on how the frontage road ties in.

Doreen Sumerlin: Are there issues with the extent of the vertical walls? Look for opportunities for animals to get around. A tiered wall may make more sense than a vertical wall. Would be great for Geotech and ALIVE recommendations to be the same for walls.

Julia Kintsch: Straightening the curve east of the tunnels is helpful for bighorn mortality rate. Wildlife fencing would also be a help to mortality. Tunnels added wildlife friendly fencing on west side. Top and bottom are smooth, middle are barbed for wildlife friendly fencing in this area.

Map 2 (around US 6 interchange)

Anthony Pisano: Not too many changes in this area. Not sure about property impacts yet. A lot of the alignment changes are within CDOT right of way. Still working out the details of how the greenway comes through. Trying not to impact the interchange. Tiered rock cut to the east of the interchange. Then a tunnel (for westbound) and rock cut for eastbound.

Doreen Sumerlin: What does tiered mean? Like Glenwood Canyon? More like stair stepped rock, soil nail walls. Need to consider how the animals can get out or escape the highway. Will have an extra wide ditch for sight distance and catching rocks.

Alison Michael: Can a crossing structure be located over the eastbound section where westbound is in a tunnel? May be challenges but could be considered. Would have to cross EB lanes and frontage road.

Joe Walter: Don't want sheep crossing the road.

Doreen Sumerlin: Tunnel is huge benefit to wildlife over non-tunnel alternatives.

Julia Kintsch: Need to consider the crossing at US 6 and the suggested location – these might be better crossing locations than opposite the new WB tunnel.

Doreen Sumerlin: How feasible are having larger spans for bridges? Think there are opportunities for that. May depend on the frontage road connection and other things. Rafters have requested some of the walls under the interchange at US 6 remain.

Neil Ogden: How would having the greenway underneath conflict with wildlife crossing? Mainly lighting issues, but may not conflict. Would be better for a separate connection. Some examples in Region 1 without lighting. Hasn't been a big issue with leaving it dark, but could be safety issues. One at C 470 and South Platte River.

Julia Kintsch: Would be good to have some of the culverts upsized to provide for crossing. (e.g., every ¼ mile). Does not need to be a box culvert, can be pipes.

Keith Hidalgo: Pointed out some of the features from SWEEP for the drainage system could be enhanced/upsized for smaller wildlife as well.

Doreen Sumerlin: Agreed and liked the idea of shelving for small rodents in new or existing culvert pipes.

Vanessa Henderson: Curious about the gulch. Sheep are using for moving, and in the Frei area. Sheep are mostly on US 6.

Map 3 (west side of Floyd Hill)

Anthony Pisano: Adding a third lane westbound, may end up with small sections of wall. Most if not all widening to occur on south side and moving the EB lanes over.

Julia Kintsch: At 244.9 potential underpass location. Right under the WB pullout, close to 245. How feasible would it be in this location, would still have to cross US 40. A bridge or arch would be good. Shorter lengths are definitely better. Over 120 feet usage drops off. Don't need to add areas for additional light. This may be a preferred location over the crossing in Map 4, and would offer better spacing between crossing opportunities at the bottom of Floyd Hill and top of Floyd Hill, but both locations have challenges.

Overpass option right next to the underpass from the cut slope on the south side to the wide pullout on the north side of I-70. Connection to Clear Creek junction. But will have to consider other needs, such as use of the pullout by law enforcement and maintenance.

Map 4 (Floyd Hill summit)

Anthony Pisano: Adding a third lane westbound, along the slope. Will add a full diamond at one of the interchanges.

Julia Kintsch: Overpass at 247, would have to figure out land use in this area. On the south proposing 400-unit development. Maybe an opportunity for partnership with development, and right of way may be needed from the developer. **Adam Springer (Clear Creek County) will follow up when more is known about what is needed. May advance design for crossing in this area.**

Mountain bike and hiking trails going in nearby on open space properties north of 246.5. Also looking for pedestrian access to open space. But need to discourage pedestrian use on a wildlife overpass. Hwy 9 cost was 1.8M (66-foot span). Most comparable structures would be on South I-25, but design and costs are not finalized.

Doreen Sumerlin: Are conservation easements possible with the project? **Maybe, Neil will look into it with the right of way group.**

Neil Ogden: If an additional off-ramp is added at CR 65 over Beaver Brook, what could the issues and opportunities be? Bridge rather than fill would be a better option in this area.

Consider upsizing Beaver Brook culvert and adding a dry shelf (with vole/mouse tube) for small fauna passage.

7) Next Steps

Next steps for the project include:

- Conduct field reconnaissance and address data gaps to refine mitigation recommendations
- Create table of mitigation options for evaluation
- Coordinate with design team
- Partnership opportunities
- Next ALIVE meeting – late summer/early fall

8) Project Schedule

Upcoming dates for future tasks include:

- Existing Conditions/Data Collection
 - Fall 2017 through 2018
- NEPA/30% Design
 - Winter 2017/2018 through Spring 2020
- Final Design followed by Construction (pending funding availability)

- Spring/Summer 2020
- Construction 2021-2024

9) Questions

Field visits before the next meeting. No additional questions.

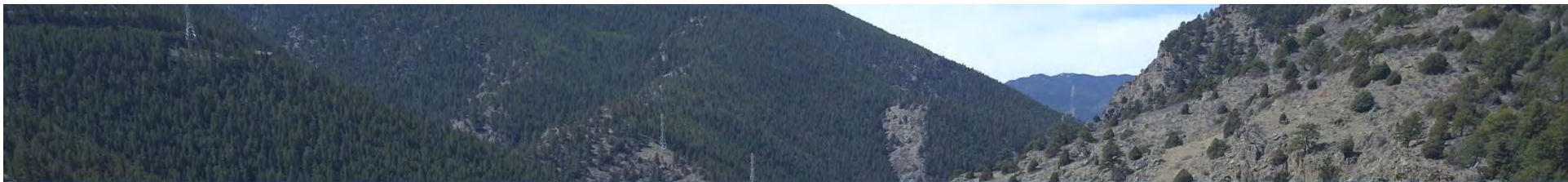
Sign-In Sheet



I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to Veterans Memorial Tunnels EA
Meeting: ALIVE Issues Task Force Meeting
Date/Time: April 20, 2018; 10:00 am to 12:00 pm
Location: CDOT Region 1, 425 Corporate Circle, Golden, CO

Initial	Name	Agency	Address	Phone	E-Mail
SPG	Stephanie Gibson	FHWA	12300 W Dakota Ave Suite 180 Lakewood CO 80228	720-963-3013	Stephanie.Gibson@dot.gov
AMM	Alison Michael	USFWS		303 236 4758	alison-michael@fws.gov
AW	Carrie Wallis	Atkins			Carrie.wallis@atkinsglobal.com
JS	JoAnn Sorensen	CCA	PO Box 2000 GT 80444	303.679-2409	jsorensen@co.deer-creek.co.us
DF	Doreen Sumertlin	USFS	POB 10 Granby CO 80446	9702274179	dsumertlin@fs.fed.us
NO	Neil Ogden	CDOT	425A Corp. Circle	720 497 6928	neil.ogden@state.co.us
LB	Lauren Boyle	CDOT	" " "	720 497 6964	Lauren.Boyle@state.co.us
JW	Joe Walter	CPW	6060 Broadway Denver	303-916-1180	joseph.walter@state.co.us
AP	Anthony Pisano	Atkins	7604 technology way Suite 400 Denver, CO 80237	720-475-7013	Anthony.Pisano@Atkinsglobal.com
SK	S. Keith Hidalgo	Atkins	7604 Technology Way, Ste 400 Denver, CO 80237	303-214-0825	Keith.Hidalgo@atkinsglobal.com
J	Julia Kintzsch	ECO-resolutions		3/818-1460	julia@eco-resolutions.com
VH	Vanessa Henderson	CDOT		71497-6924	vanessa.henderson@state.co.us
AS	Alan Springer	Deer Creek		3/679-2361	aspringer@co.deer-creek.co.us



I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS



ALIVE Meeting

April 20, 2018



I-70 Floyd Hill to Veterans Memorial Tunnels

Agenda

- Welcome / Introductions
- Project Overview
- ALIVE MOU and Previous Studies
- Wildlife Connectivity Issues and Concerns
- Mitigation Considerations
- Next Steps
- Project Schedule



I-70 Floyd Hill to Veterans Memorial Tunnels

Project Overview and Background



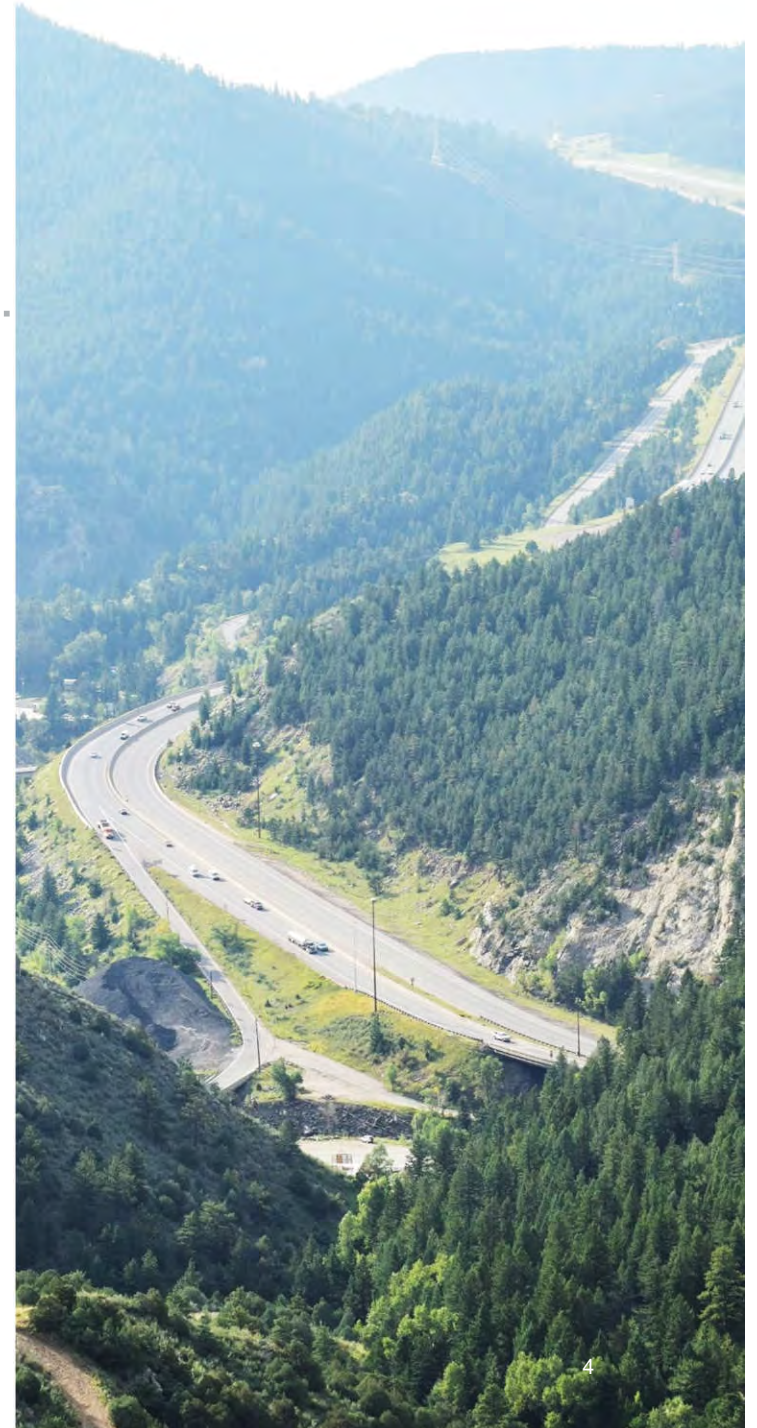


I-70 Floyd Hill to Veterans Memorial Tunnels

Purpose

The purposes of the I-70 Floyd Hill to Veterans Memorial Tunnels project are to:

- Improve travel time reliability, safety, and mobility and address the deficient infrastructure on westbound I-70 through the Floyd Hill area of the I-70 Mountain Corridor.
- Improve multimodal connectivity and provide an alternate route parallel to the interstate mainline in case of emergency or severe weather conditions.





I-70 Floyd Hill to Veterans Memorial Tunnels

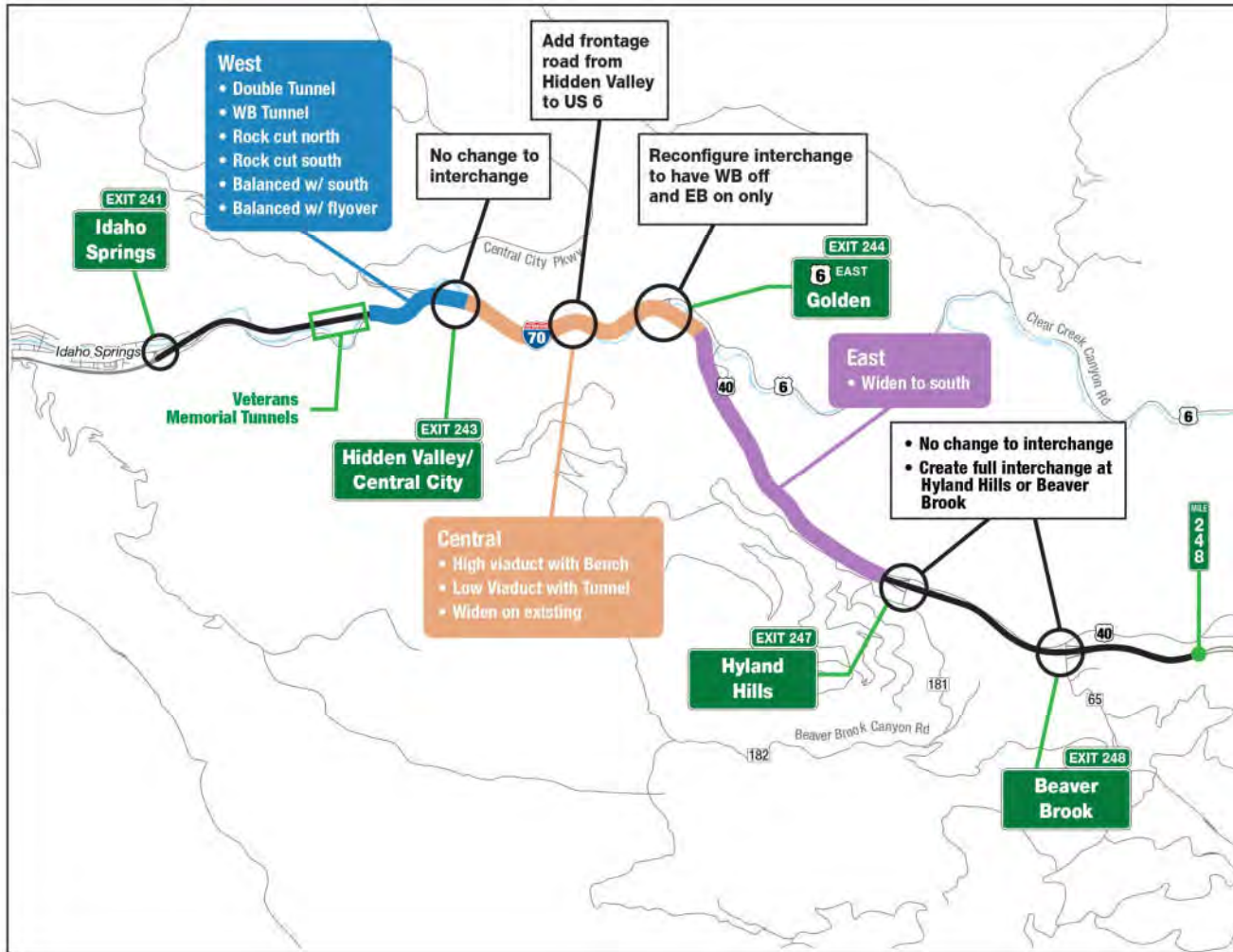
Proposed Action

- Provides a 3rd lane from the top of Floyd Hill through the tunnel (2011 ROD)
 - Evaluating options for tunneling, rock cuts, and benches at two locations (bottom of Floyd Hill and just west of Hidden Valley)
 - Evaluating west terminus (dropping 3rd lane and tie-in with WB PPSL)
 - Evaluating need for truck climbing/acceleration lane with eastbound on-ramp addition at US 6
 - Evaluating additional intersection and interchange improvement needs throughout
- Addition of trail and frontage road between tunnel and US 6 (2011 ROD)
- Evaluating eastbound curve safety improvements



I-70 Floyd Hill to Veterans Memorial Tunnels

Design Options





I-70 Floyd Hill to Veterans Memorial Tunnels

ALIVE MOU

- Background
 - Objective of streamlining coordination and improving connectivity for terrestrial and aquatic wildlife.
 - Signed 2008
- Commitments
 - Ensures agencies' cooperation in early and full implementation of corrective actions to solve permeability problems in identified LIZs.
 - 'Full implementation of a successful ALIVE outcome would require the participation by all Parties and other stakeholders in the commitment of resources beyond those meant for transportation mitigation.'



I-70 Floyd Hill to Veterans Memorial Tunnels

I-70 EcoLogical

- *A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor*
 - Identification of Linkage Interference Zones (2011)
 - Update of original LIZs (2004)
 - ALIVE Implementation Matrix
- *Guidelines for Improving Connectivity for Terrestrial and Aquatic Wildlife in the I-70 Mountain Corridor*



I-70 Floyd Hill to Veterans Memorial Tunnels

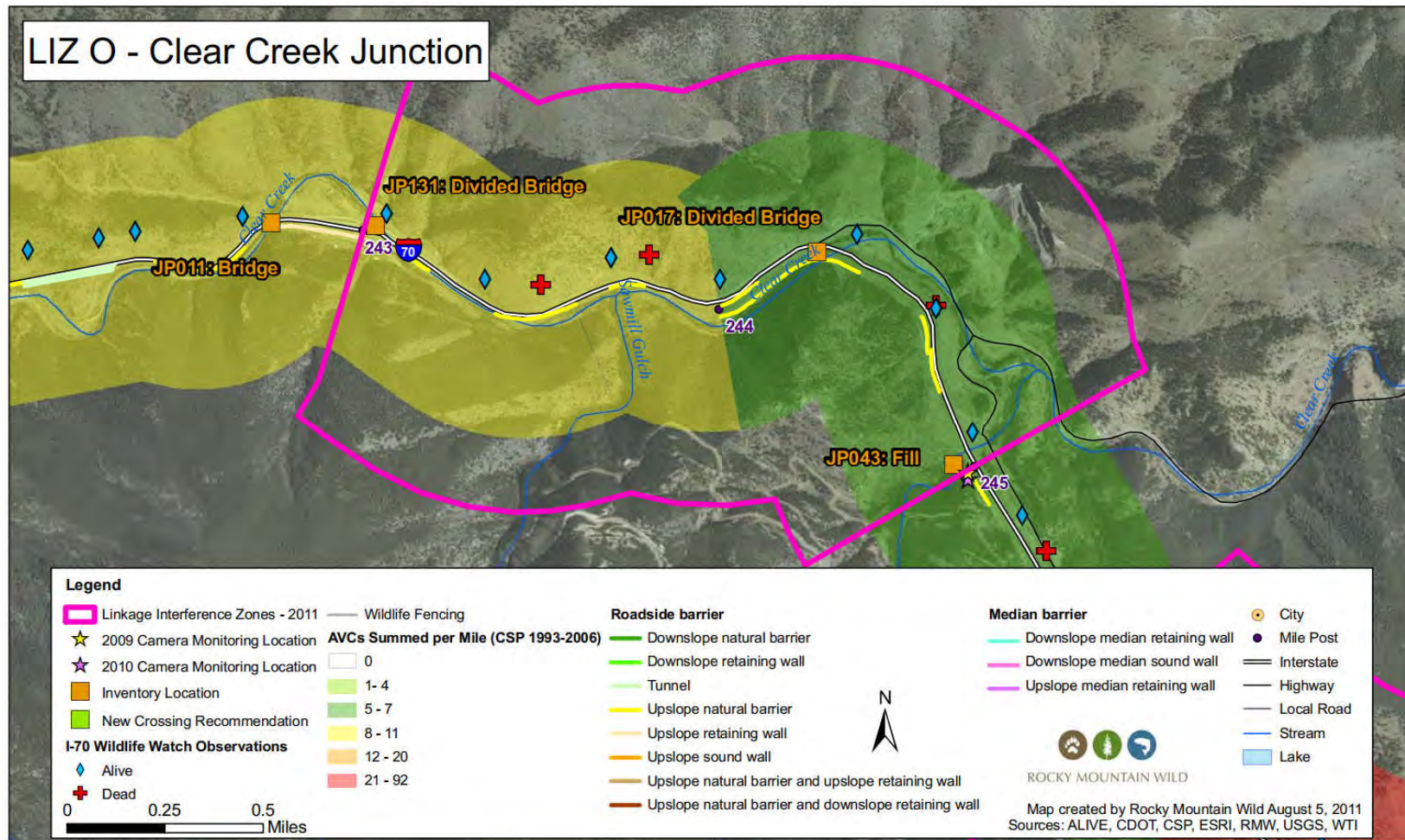
Clear Creek Junction LIZ

- MP 243.0 – 244.9
- Elk and mule deer; also bighorn sheep, Canada lynx, mountain lion, Preble's meadow jumping mouse
- WVC rate: Moderate-low
- Land Status: Private both sides of I-70
- Existing bridges provide little opportunity for wildlife passage
- Concrete median barrier throughout LIZ
- EcoLogical mitigation recommendations:
 - Improve passage under existing bridges over Clear Creek at Central City Parkway and bottom of Floyd Hill
 - Install new wildlife crossing ~MP 244.9 (note, wildlife monitoring conducted at this location)



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek Junction LIZ Map





I-70 Floyd Hill to Veterans Memorial Tunnels

Existing bridges in the Clear Creek LIZ



Clear Creek/Central City Parkway

Clear Creek/ US 6 Interchange





I-70 Floyd Hill to Veterans Memorial Tunnels

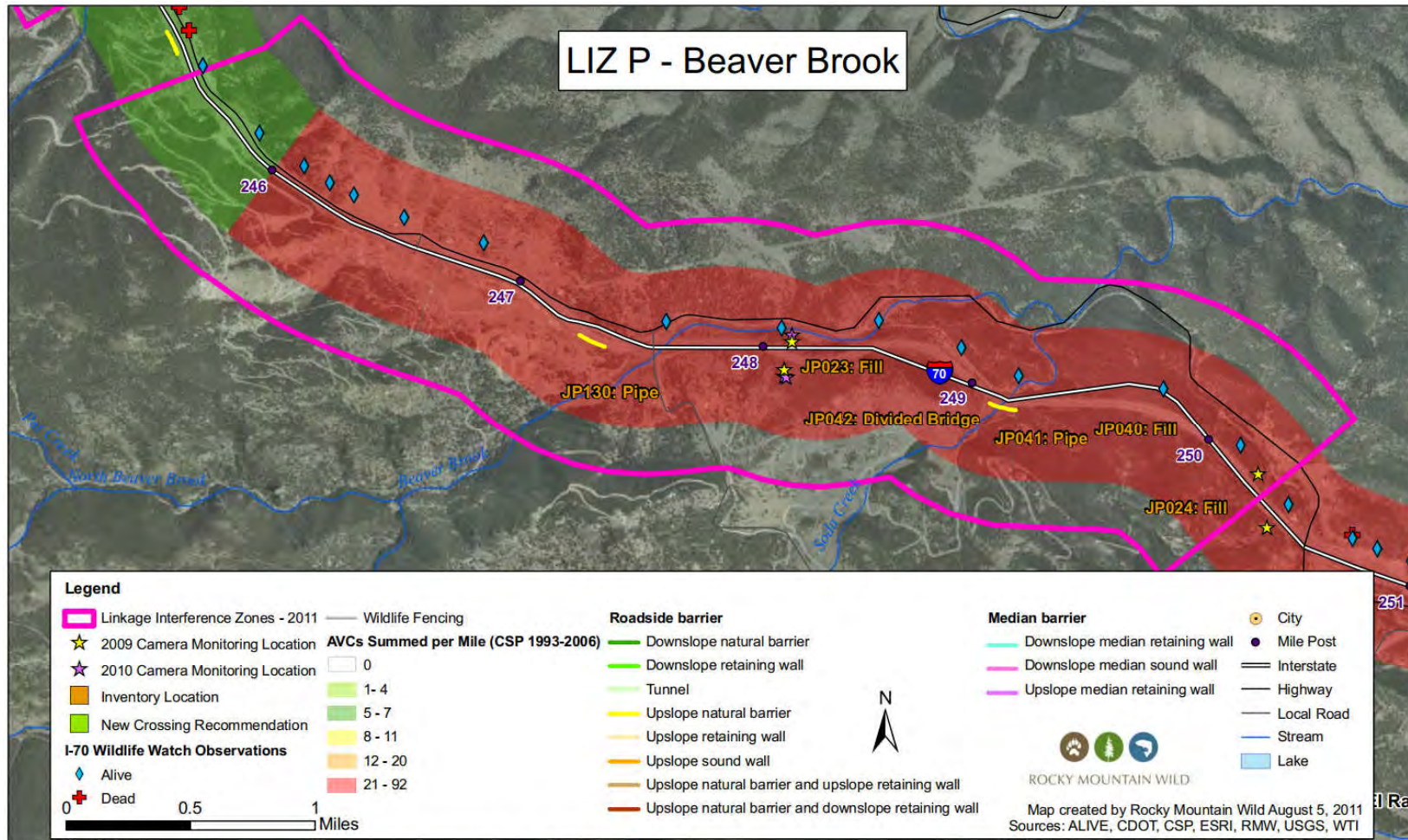
Beaver Brook LIZ

- MP 245.5 – 250.2 (project area ends MP 248)
- Elk, mule deer; also black bear, Canada lynx, mountain lion, northern leopard frog, Preble's meadow jumping mouse
- WVC rate: Very high
- Land Status: Private both sides of I-70
- Concrete median barrier MP 245.5 – 246.6
- EcoLogical mitigation recommendations:
 - Investigate opportunities to install new wildlife crossings, e.g., MP 246.5; MP 247; MP 247.5 (Preble's occupied habitat along Beaver Brook); MP 248.2 (monitoring location)



I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ Map





I-70 Floyd Hill to Veterans Memorial Tunnels

Aquatic Connectivity

- MP 243 – Bridge over Clear Creek, Hidden Valley interchange
 - Currently good aquatic connectivity; maintain
- MP 244.2 – Clear Creek, US 6 interchange
 - Currently good aquatic connectivity; maintain
- Beaver Brook
 - CMP provides drainage only



I-70 Floyd Hill to Veterans Memorial Tunnels

ALIVE Implementation Matrix

- Developed for I-70 EcoLogical project
- Considerations during project development:
 - Target species movement needs; barriers to movement; opportunities?
 - Changes or potential changes to wildlife habitat or movements?
 - Permeability concerns outside of LIZs?
 - Potentially conflicting mitigation actions?



I-70 Floyd Hill to Veterans Memorial Tunnels

I-70 Traffic and Revenue Study

- Initiated in 2013 to explore solutions to congestions on I-70 Mountain Corridor
- Study terminated in 2014
- ALIVE Committee revisited mitigation recommendations from EcoLogical
 - Highlighted wildlife overpass at MP 247 as a feasible location
 - Confirmed value of connectivity at Clear Creek/US6



I-70 Floyd Hill to Veterans Memorial Tunnels

Wildlife Issues Discussion

- Identify:
 - Initial list of issues and concerns
 - Information and data needs
 - Initial mitigation recommendations





I-70 Floyd Hill to Veterans Memorial Tunnels

Project's Effects on Wildlife

- Habitat loss due to expanded highway footprint
 - Highway widening, new alignment, rock cuts
- Increase in barrier effect:
 - Increased number of traffic lanes
 - Increasing traffic volumes
 - Retaining walls, median and shoulder barriers
 - Lighting at interchanges and signs
- Potential increase in wildlife-vehicle collisions



I-70 Floyd Hill to Veterans Memorial Tunnels

Initial Stakeholder Concerns

- Threatened and Endangered Species
 - Canada lynx
 - Preble's meadow jumping mouse
- Bighorn sheep winter range and mortality
- Connectivity for terrestrial wildlife
- Reduce wildlife-vehicle collisions
- Clear Creek is a high value fishery
 - Improve fish passage and reduce channelization



I-70 Floyd Hill to Veterans Memorial Tunnels

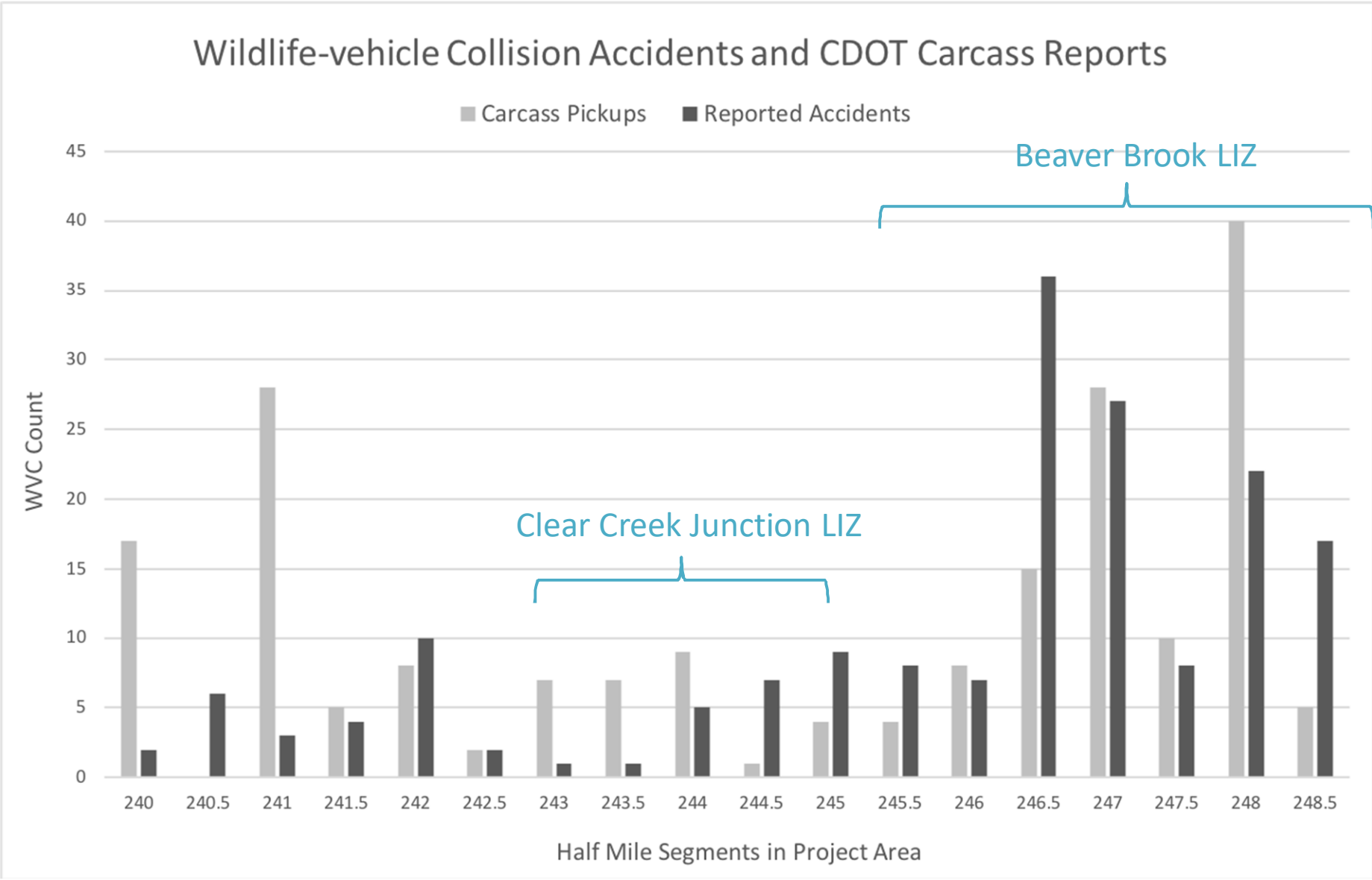
Issue: Wildlife-Vehicle Collisions

- 2.5 WVC/mile/year (carcass pickups recorded by CDOT Maintenance, 2007-2016)
- 175 reported accidents (10 years, MP 240-248)
- Primarily mule deer (46%) and elk (26%); also black bear, bighorn sheep, mountain lion, other medium sized fauna





I-70 Floyd Hill to Veterans Memorial Tunnels

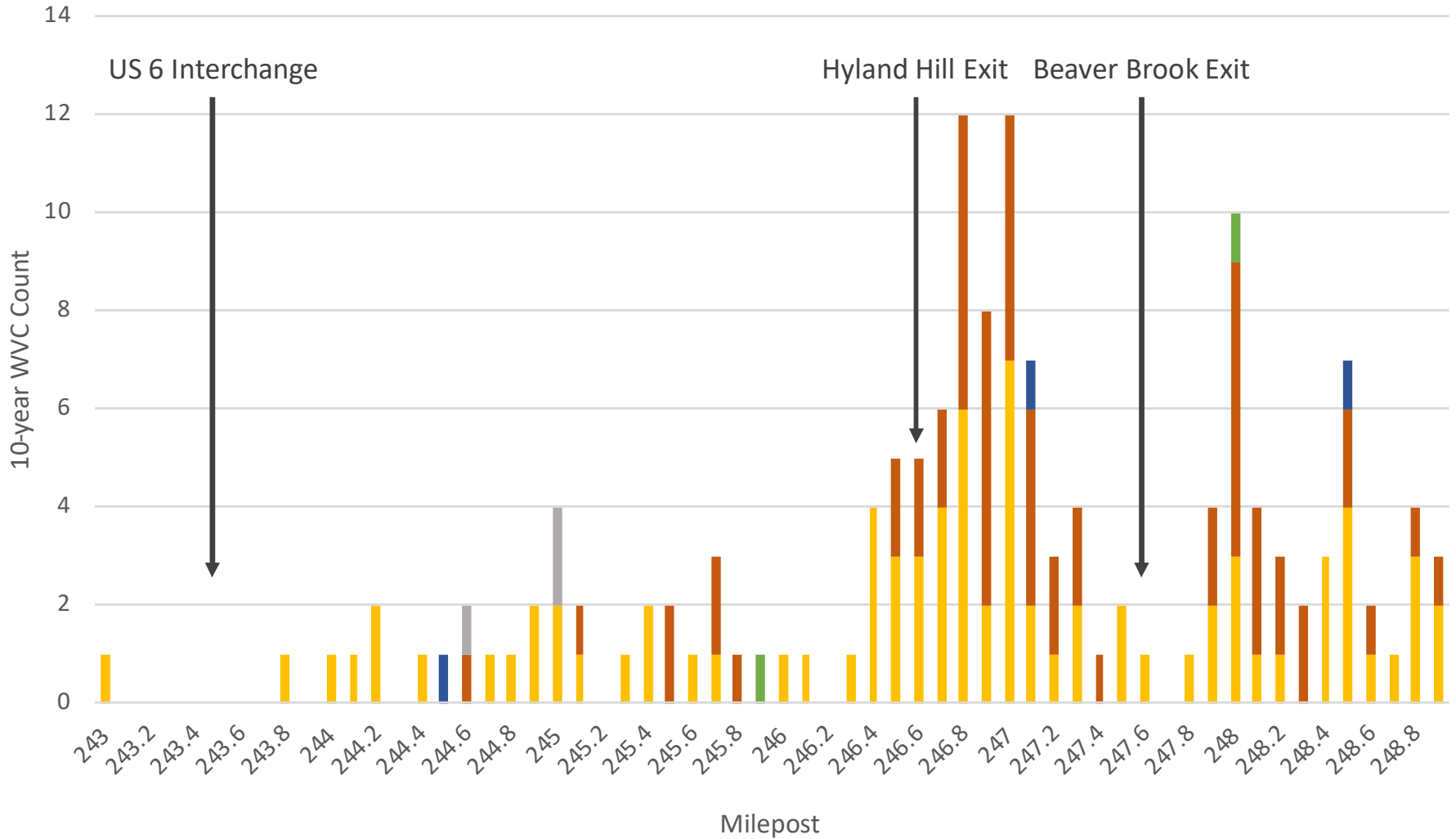




I-70 Floyd Hill to Veterans Memorial Tunnels

WVC Reported Accidents 2007-2016

■ DEER ■ ELK ■ BEAR ■ LION ■ UNKNOWN

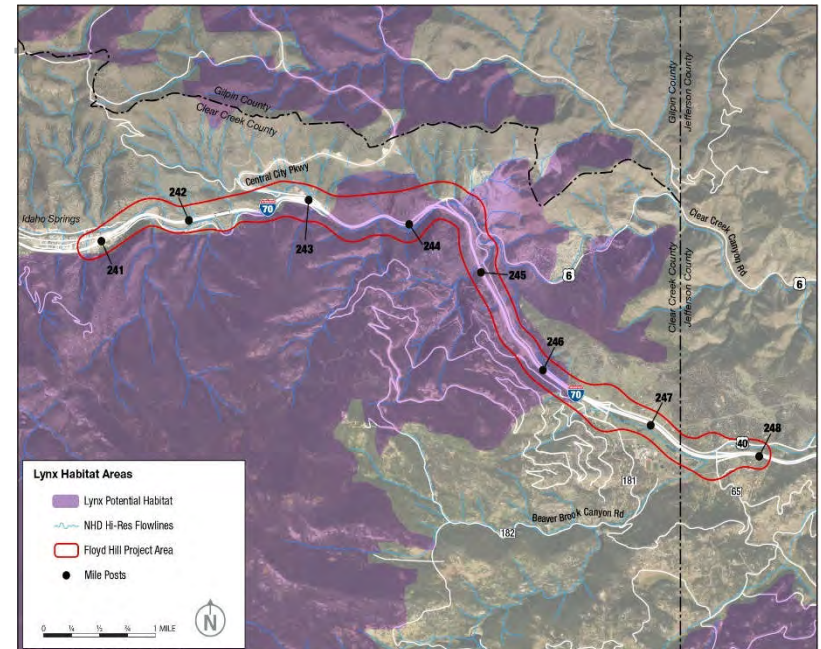




I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Canada Lynx

- Suitable lynx habitat
 - Mostly low probability of lynx highway crossing; high probability around Hidden Valley and middle of Floyd Hill (Baigas et al. 2017)
- Barriers to movement:
 - Highway footprint and traffic volume
 - Retaining walls, median & shoulder barriers
 - Lighting (primarily at interchanges) & lighted signs
- Cumulative effects

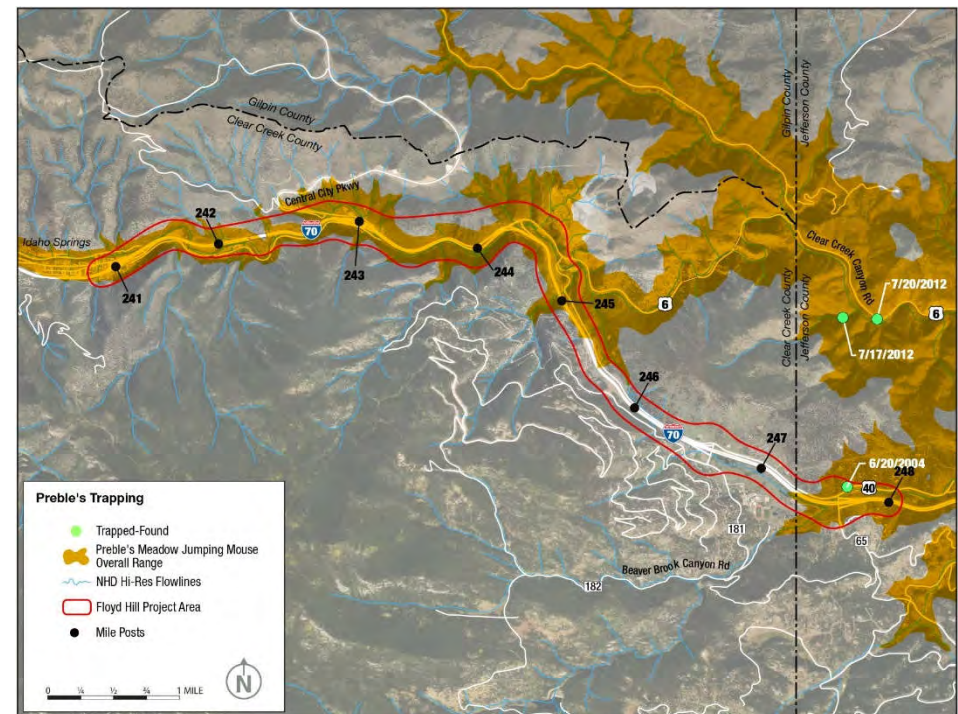




I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Preble's Meadow Jumping Mouse

- Overall range
 - Occupied habitat in Beaver Brook watershed (upstream of I-70); no riparian connectivity under I-70
 - No suitable habitat along Clear Creek
 - No critical habitat

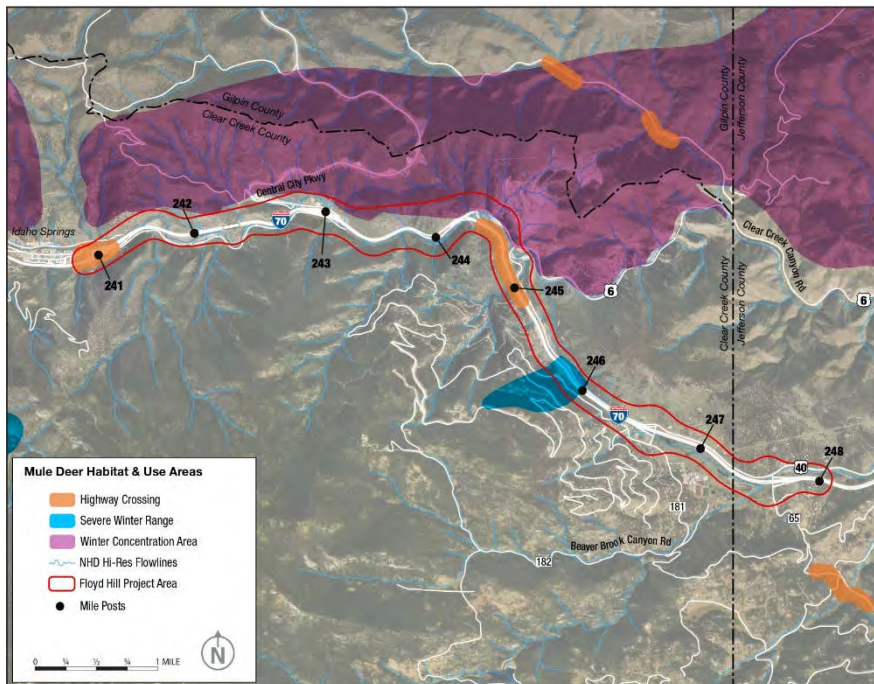
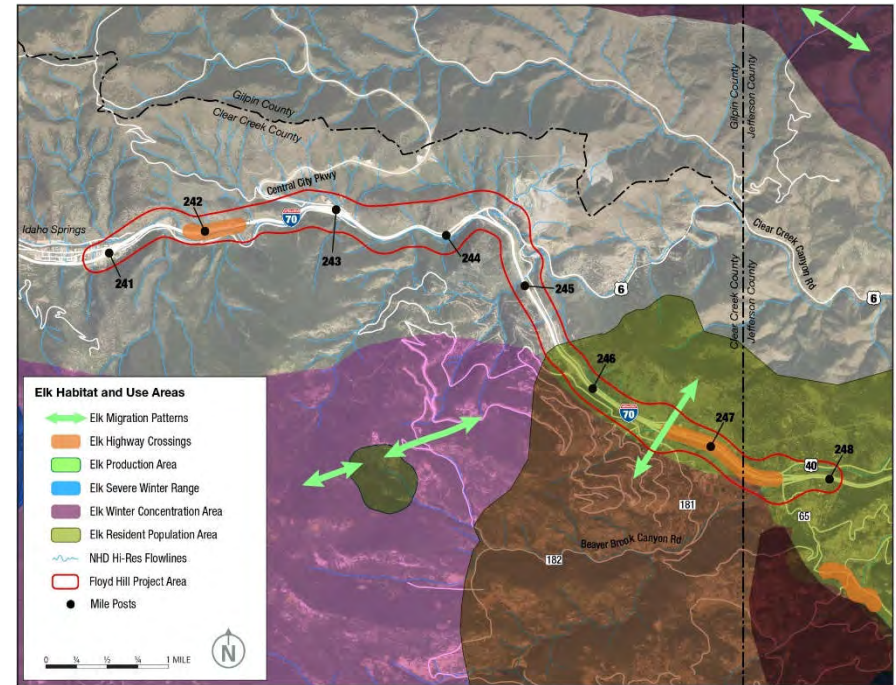




I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Connectivity for Terrestrial Fauna

Elk migration top of Floyd Hill; resident population
 – WVC hotspot east side of Floyd Hill



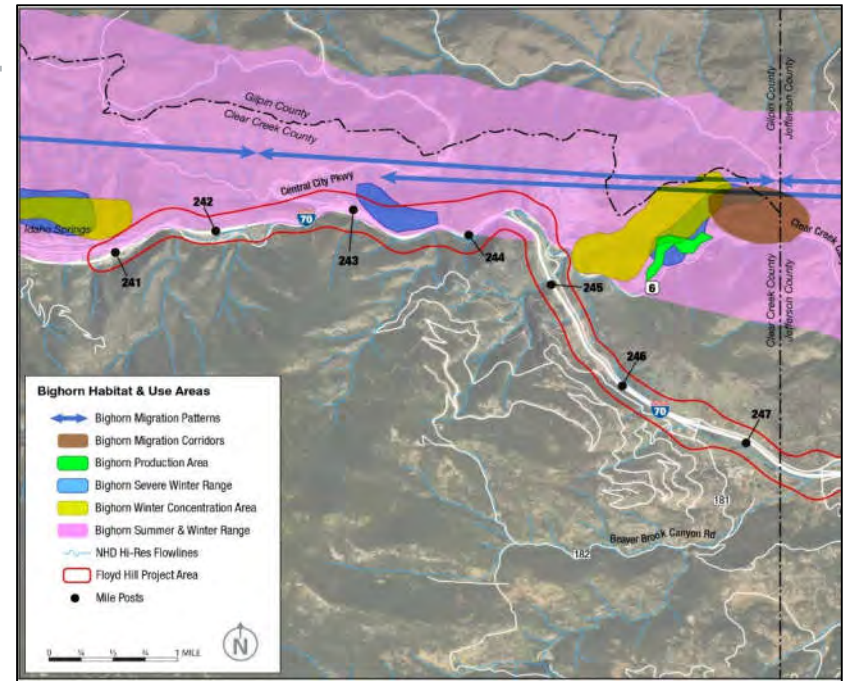
Mule deer winter concentration, severe winter range and highway crossing zones



I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Bighorn Sheep

- Bighorn sheep overall and winter range north of I-70
- Mortality due to WVC
 - Primary source of mortality for Georgetown herd
 - Hotspots:
 - East side of VM Tunnels
 - I-70/US 6 junction
 - De-icing minerals and spring green-up act as attractants to road shoulders
- Previous mitigation:
 - Decreased upland trees adjacent to road (Twin Tunnels project)
 - Replaced barbed-wire with wildlife-friendly fence west of tunnels (EBPPSL)





I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Bighorn Sheep



Bighorn sheep WVC 2006-2011, Huwer 2015



I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Aquatic Connectivity

- Fish passage
 - Clear Creek is stocked.
No connectivity or dewatering issues for native fish species





I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Raptor Entanglement

- Concern that raptors may become entangled in rock fall mitigation netting.
 - Two incidents previously reported (Steamboat Springs & Durango)
 - Further research needed to determine scope of this problem across the state.
 - Recommend, when feasible, pin down the top of the mesh to be flush with or close to the rock wall to avoid large openings.



I-70 Floyd Hill to Veterans Memorial Tunnels

Potential Wildlife Mitigation Summary

MILEPOST	RECOMMENDATION	CHALLENGES
243	Improve passage for wildlife under existing bridges, including CDOT access road	Limited feasibility to improve passage for large fauna without replacing bridges
244.2	Integrate wildlife movement into new interchange/bridges	Extensive infrastructure including interchange & trail
244.9	Wildlife underpass at fill slope under I-70	Outside of LIZs; Challenging terrain
246.5	Wildlife overpass	Challenging terrain, land ownership
247	Wildlife overpass	Potential development on north side
247.5	Riparian crossing	Limited feasibility; Extensive restoration required



I-70 Floyd Hill to Veterans Memorial Tunnels

Mitigation Considerations

- Wildlife Overpass
 - Given highway footprint & US 40, overpass will be most effective structure type for elk
 - Greatest need for elk crossing structure around the top of Floyd Hill
- Wildlife Underpasses
 - Improve wildlife passage at Clear Creek/US 6 interchange
 - May consider large culverts for deer, bear, mountain lion and other fauna
- Install wildlife-exclusion fencing in conjunction with crossing structures



I-70 Floyd Hill to Veterans Memorial Tunnels

Mitigation Considerations

- Bighorn activity mostly north of I-70; Need to reduce roadside attractants & improve driver visibility
 - West side of Veterans Memorial Tunnels
- Partner & Stakeholder Roles
 - Explore need and opportunities for additional complementary mitigation funding, conservation easements, landowner coordination



I-70 Floyd Hill to Veterans Memorial Tunnels

MAP REVIEW

- Considerations for Central Section
- Considerations for West Section



I-70 Floyd Hill to Veterans Memorial Tunnels

Next Steps

- Conduct field reconnaissance and address data gaps to refine mitigation recommendations
- Create table of mitigation options for evaluation
- Coordinate with design team
- Partnership opportunities
- Next ALIVE meeting – late summer/early fall



I-70 Floyd Hill to Veterans Memorial Tunnels

Schedule

- **Existing Conditions/Data Collection**
 - Fall 2017 through 2018
- **NEPA/30% Design**
 - Winter 2017/2018 through Spring 2020
- **Final Design followed by Construction***
 - Spring/Summer 2020
 - Construction 2021-2024



**Pending funding availability*



I-70 Floyd Hill to Veterans Memorial Tunnels

Questions



Meeting Notes



I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to Veterans Memorial Tunnels (VMT) NEPA and 30% Design
Meeting: ALIVE Site Visit #1
Date: June 5, 2018
Location: Site Visit

Attendees:

Lauren Boyle, CDOT
Vanessa Henderson, CDOT
Keith Hidalgo, Atkins
Julia Kintsch, ECO-resolutions
Alison Michael, USFWS
Alex Nelson, CDOT
Neil Ogden, CDOT
Anthony Pisano, Atkins
JoAnn Sorenson, Clear Creek County
Adam Springer, Clear Creek County
Doreen Sumerlin, USDA Forest Service
Martha Tableman, Clear Creek County
Francesca Tordonato, CDOT
Carrie Wallis, Atkins

Summary of Action Items	Responsibility	Status
1. Contact Clear Creek County Road and Bridge re: WVC on Saddleback Road	Julia	
2. Provide guidance and specifications for wildlife crossing designs (e.g., dimensions, slopes, substrate, bench width)	Julia	
3. Develop cross section of potential wildlife crossings	Anthony	
4. Provide traffic analysis demonstrating how I-70 realignment is projected to affect truck traffic from the quarry on US 40	Neil	
5. Preble's habitat assessment and coordination with USFWS and CDOT regarding potential mitigation.	Keith	

Summary of Discussion

[Note Action Items are in [blue](#).]

General comments:

- Herds around the I-70 corridor in the Floyd Hill project area are more accustomed to traffic noise and people.
- Different herds and species concerns at the top of Floyd Hill vs at the bottom, in Clear Creek Canyon.
- Wildlife overpass considerations
 - The longer the span, the wider it needs to be.

- Ungulates, in general, and elk, in particular, require good visibility across or through a crossing structure. Elk are extremely predator wary.
- Prohibit human use of wildlife crossing structures; where human use inevitable, design trails to limit impacts to wildlife movement. Note, Clear Creek County can incorporate seasonal or nightly closures on open space properties.
- Maintain or improve existing small culverts for carnivores (e.g., black bear, mountain lion) and other medium and small sized fauna throughout the project area; May also consider new small culverts for these species to reduce WVC involving these species.
- When replacing bridges, increase bridge spans to create space for a wildlife bench of pathway.
- [Julia will provide more detailed specifications and guidelines to assist in design.](#)

The group visited eight locations to discuss potential mitigation solutions and the challenges and opportunities at each location. Below, the challenges and opportunities of each potential mitigation location are summarized.

Top of Floyd Hill Segment/Beaver Brook LIZ (~MP 245.5-248)

- Lots of elk movement and elk WVC
- Daily movements across I-70 for deer and elk (not a migration corridor).

1. MP 247, Potential overpass location

- Elk commonly use the meadow on the south side of I-70.
- WVC hotspot for elk as well as deer.
- Challenges:
 - Private lands and potential development including potential to build out office park on the north side, and a proposal to develop undeveloped lands between the wetlands and the high school south of I-70. Constructing a large overpass at this location would require assurances that lands on either side are protected from development.
 - An overpass at this location would need to span 6 lanes of I-70 with a grassy median, 2 lanes of US 40, and the wetlands on the south side of I-70. Given this long span, the overpass would need to be 200' wide.
 - Wetlands on the south side of I-70.
- Opportunities:
 - The proposal to build a residential development is in the very early stages and the developer has indicated a willingness to include a wildlife corridor in the development plan. Continued coordination with Clear Creek County planning (Adam Springer) can get this included in the development.
- [Consider both this location and the location to the east \(from cut slope to west of the log home builder\). Anthony to create cross sections for both of these locations.](#)

2. MP 246.5, Potential overpass location

- WVC hotspot for elk as well as deer.
- Issues:
 - An overpass at this location would need to span 6 lanes of I-70 (no grassy median) and 2 lanes of US 40; while it is a shorter span than at MP 247, the overpass would still need to be 150-200' long.
 - Requires coordination with landowner of 35-acre parcel on the north side where the overpass would connect to adjacent to the open space.
 - Mountain bike/hiking trail development on open space will increase human activity on north side.
 - Saddleback Road immediately to south (residential access road) where wildlife would enter/exit overpass.

- Opportunities:
 - Overpass could be constructed from bench on the south side to cut slope on the north side – site offers good visibility across the overpass.
 - 108-acre open space on north side, which connects to additional open space in Clear Creek Canyon (Oxbow Open Space).
 - Could implement traffic calming measures or animal detection system on Saddleback Road, and conduct neighborhood outreach to mitigate potential increase in WVC on Saddleback Road. Martha noted that residents of this area are used to living with wildlife and looking for wildlife as they're driving.

3. MP 245.6, Potential overpass location

- Issues:
 - Steep slopes from I-70 to US 40.
 - Private lands on east side of US 40 and west side of I-70.
 - Outside of the highest WVC area.
- Opportunities:
 - Cut slopes on either side of US 40 and I-70

Clear Creek Canyon Segment/Clear Creek Junction LIZ (MP 243-244.9)

- Target species include bighorn sheep as well as elk and mule deer
- I-70 is largely a barrier to ungulate movement through this segment, although crossings are still attempted. Bighorn sheep movement is primarily east-west on the north side of I-70.

4. MP 244.9, Potential over- or underpass locations

- Potential underpass through fill at Johnson Gulch, or overpass from cut slope north of the gulch to bench/pullout along westbound I-70.
- Issues:
 - East side drops immediately on to US 40, which has high traffic speeds coming downhill
 - An underpass at Johnson Gulch would require removing the pullout along eastbound I-70 over the structure to reduce the length of the underpass.
- Opportunities:
 - Large, natural drainage with limited development.
 - Would it be possible to continue the wildlife crossing under or over US 40?

5. MP 244.4, Planned WB bridge

- Issues:
 - East side drops immediately on to US 40. Traffic speeds slower than at location 4, but wildlife would still have to navigate across US 40. Alternatively, could fence US 40 (both sides, but this would create a fencing maze on the east side of the wildlife crossing that would direct animals down to Clear Creek/US 6 or up US 40, where there are no safe crossings.
- Opportunities:
 - Westbound I-70 will be on a bridge from here to the westbound tunnel; Eastbound lanes will move on to current westbound alignment; Current eastbound lanes will be removed. Could also put eastbound I-70 on a bridge to create a wildlife crossing at this location.

6. MP 244.2, Clear Creek bridges

- Issues:
 - High human activity (bike path, rafters)

- Opportunities:
 - Both eastbound and westbound bridges will be replaced – replace with a wider span to create a natural bench for wildlife passage separate from the bike path on the south side of the creek.
 - Dirt parking lot on the south side of the creek (accessed from the I-70 eastbound off-ramp) will be removed.

7. MP 243, Central City Parkway, bridges over Clear Creek

- Issues:
 - These bridges are not currently part of the project.
 - There are multiple bridges at this location, including the I-70 mainline, the westbound off-ramp, eastbound on-ramp and an adjacent access road on the north side of I-70. All of the bridges have riprap slopes and limited clearance, prohibiting passage by ungulates and other wildlife.
- Opportunities:
 - If adjustments to the Hidden Valley interchange are required then there will be an opportunity to improve wildlife passage under the bridges.

8. MP 242.7, Clear Creek bridges

- The group did not visit location but discussed it.
- Issues:
 - Central City Parkway bridge over Clear Creek immediately to north has steep riprap banks with no pathways for wildlife passage. Would it be possible to create pathways through the riprap on either side of the bridge to improve the functionality of this structure for wildlife passage?
- Opportunities:
 - In order to flatten the curves east of the Veterans Memorial Tunnels, these bridges will be realigned. Replace with a wider span to create natural benches for wildlife passage on either side of the creek.
 - The greenway trail will likely follow along the frontage road rather than following the creek under the bridges at this location.

Preble's Meadow Jumping Mouse Habitat & Connectivity

9. Beaver Brook

- Issues:
 - Existing pipe culvert is very long and crosses under the Beaver Brook interchange at an angle.
 - Riparian connectivity under I-70 would be very difficult and expensive to restore.
 - Private landowner at culvert outlet has removed riparian vegetation and built a barn and domestic livestock yard just adjacent to the riparian corridor.
- Opportunities:
 - Investigate opportunities to restore riparian habitat.
- [Atkins to conduct habitat assessment upstream and downstream.](#)
- [Francesca, Alison and Keith to coordinate on Preble's assessment, including the magnitude of the project's impacts to upstream habitat and the need for connectivity under I-70.](#)

Meeting Notes



I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to Veterans Memorial Tunnels (VMT) NEPA and 30% Design
Meeting: ALIVE Issue Task Force Meeting
Date: October 16, 2018; 9:00 am to 11:00 am
Location: CDOT Region 1, 425 Corporate Circle, Golden, CO

Summary of Action Items	Responsibility	Status
1. Set up a meeting with Joe Walter to review decisions made to date and to get CPW input on locations that are being advanced for further consideration	Julia (coordinate with Vanessa & Francesca)	
2. Meet with the show home landowner to discuss the idea of a wildlife crossing structure at Location #2	Vanessa (with support from Keith and Julia)	
3. Overlay parcel boundaries with the mitigation locations being carried forward. Review relative to Locations #2 & 3, as well as location #7 once the alignments for the new bridges are available	Keith	
4. Integrate Preble's habitat mapping into the T&E report	Keith	
5. Scheduler Preble's trapping for late Spring 2019	Keith & Francesca	
6. Explore sizing a box culvert for bears and other carnivores at Location #6 (Johnson Gulch)	Anthony, Tyler	
7. Coordinate with the Clear Creek County Greenway Authority and Open Space Department regarding Location #7	Julia & Keith	
8. Identify appropriate measures to prevent wildlife from getting onto the bridge decks at the bottom of Floyd Hill	ATKINS Team	
9. Ensure features to minimize barriers to bighorn sheep movements at the tunnel portals, particularly the east portal	ATKINS Team	
10. Determine fence alignment and fence end treatments to minimize wildlife incursions onto the highway	ATKINS Team	
11. Schedule ALIVE Meeting #4 to review wildlife mitigation and roadway designs	Vanessa	

Participants

Chelsea Beebe, Jefferson County	Alison Michael, US Fish and Wildlife Service
Lauren Boyle, CDOT, Region 1	Anthony Pisano, ATKINS
Stephanie Gibson, Federal Highway Administration	JoAnn Sorenson, Clear Creek County
Keith Hidalgo, ATKINS	Doreen Summerlin, USDA Forest Service
Julia Kintsch, ECO-resolutions	Francesca Tordonato, CDOT, Region 1
Tyler Larson, ATKINS	Mandy Whorton, Peak Consulting Group

Summary of Discussion

[Note Action Items are in [blue](#).]

1) Welcome and Introductions

Lauren Boyle gave an introduction and started off the meeting. She identified her role as CDOT project manager under Neil Ogden and explained that Vanessa Henderson and Neil were attending a tunneling short-course at the Colorado School of Mines and sent apologies for missing the meeting.

2) Meeting Objectives

Julia Kintsch started the presentation.

The objective of this meeting was to review the challenges and opportunities at each potential mitigation location in the Beaver Brook and Clear Creek Linkage Interference Zones (LIZs) and to receive input from the ALIVE Committee regarding which mitigation locations are recommended to carry forward for further evaluation and which are recommended to defer or eliminate.

- The CMGC process allows for additional flexibility as new information or new design elements may allow new opportunities to emerge to enhance or refine the wildlife mitigation recommendations, particularly related to constructability.

3) Action Items Review

Action Items that carry over from previous meetings include:

- Provide preliminary crossing design and or schematics to Clear Creek County to facilitate opportunities for partnerships with local development (Neil Ogden). This action item will be addressed once the mitigation locations are finalized and preliminary designs completed.
- Look into opportunities for conservation easements (Vanessa Henderson). This action item will be addressed once the mitigation locations are finalized.
- Coordinate with Colorado Parks and Wildlife (Joe Walter) on additional wildlife carcass information to add into reporting (Julia Kintsch and Keith Hidalgo). This action item is being pursued.

Stephanie Gibson had a question about use of sand in the corridor (regarding a previous action item to determine locations that may be still using sand for treatment). Mandy responded that this issue was related to effects on fish habitat and also raised by the SWEEP Committee regarding water quality. CDOT maintenance has confirmed that magnesium chloride is used primarily east of the Veterans Memorial Tunnels but that sand is still used for traction along Floyd Hill, particularly in the uphill sections (adjacent to Clear Creek).

4) Review of ALIVE Concerns and Project Updates

Julia gave a review of the Beaver Brook LIZ and the Clear Creek LIZ, target species and wildlife-vehicle collisions (WVC) in each LIZ. She identified that Beaver Brook LIZ extends east outside of the Floyd Hill Project study area.

The I-70 Mountain Corridor Biological Opinion (I-70 ROD and FPEIS, Attachment A, pp. 9-11) states: "A minimum of 13 wildlife crossings will be installed with a maximum number of 25 possible, after which the program will be assessed for effectiveness... These crossings will be installed in the 13 LIZs identified by the ALIVE Committee or subsequent documents." Since the PEIS, subsequent research has identified 17 LIZs.

Mandy requested more background about goals for the Beaver Brook and Clear Creek LIZs and how many wildlife crossings are required. Julia responded that there are different populations of wildlife at each LIZ; that across the I-70 Mountain Corridor LIZs are of varying lengths; and that depending on the LIZ, more than one wildlife crossing per LIZ may be warranted. The Beaver Brook LIZ, for example, is 4.7 miles long and even within that LIZ, different wildlife populations are supported (primarily elk in the western portion; primarily mule deer in the eastern portion of the LIZ).

Alison Michael: Is this the final design step for this segment of the I-70 mountain corridor, or is this an interim measure like some of the recent projects? Mandy identified that this project addresses the preferred alternative specific highway improvements from the PEIS. This will be the final improvements for the Floyd Hill area for the near term unless additional projects and budgeting comes forward, which is unlikely in this area since there are many other unmet needs in the rest of the corridor, as identified in the PEIS. Discussion identified that there would be a separate element for transit to meet long-term needs. Additional highway capacity will be unlikely to be included further. It is unlikely to have future capacity improvements or wildlife mitigation from future projects. Alison commented that it is unfortunate that there will not be any improvements at Beaver Brook for Preble's (assuming they are present). Francesca Tordonato noted that if this project results in impacts to Beaver Brook, mitigation would be included. She also noted that CDOT may conduct trapping next summer (2019) and DNA testing to determine if Preble's are present.

5) Mitigation Matrix: Review of Potential Mitigation Actions

The group reviewed the mitigation matrix and the roll plot for the following discussion.

a. Beaver Brook LIZ

Five mitigation locations were presented:

#1 – MP 250, Ruby Ranch Road – underpass location in large fill slope. This location is in the Beaver Brook LIZ but outside of the Floyd Hill Project study area. It was developed based on concerns with disturbing the wetland complex in the Beaver Brook area (Locations #2 through #5), where potential fen wetlands were identified (testing confirmed that the wetlands do not qualify as fens but are of high quality). Location #1 is not recommended because it is

outside of the project area but was investigated and will be carried forward as an alternative mitigation location if neither Location # 2 nor # 3 are feasible.

#2 – MP 247.3, Meadow/Show Home – overpass location. Recommend that this location be carried forward for further design refinements.

#3 – MP 247.2, Meadow/Storage Units – overpass location. Recommend that this location be carried forward for further design refinements.

#4 – MP 247.0, Meadow/High School – overpass location. The group agreed that this location be eliminated from further consideration. The primary impediments to this location are the wetland impacts and that this location is most likely to be impacted by potential development on both the south and north sides of I-70.

#5 – MP 246.3, Floyd Hill West – overpass location. The group agreed that this location be eliminated from further consideration. The primary impediments to this location is that it is not a primary wildlife habitat area or I-70 crossing location and it would require funneling elk from the east side of the Floyd Hill exit and over Hyland Hills Interchange road to the overpass location.

Mandy: All of the locations at the top of Floyd Hill (Locations #2-5) serve the same wildlife populations.

Julia provided an overview of the two possible overpass designs for Locations # 2 & 3:

- Arches: Composed of three arch structures over the opposing lanes of I-70 and US 40. Arch structures are designed to be buried with soil and can accommodate variable slopes on the approaches and across the length of the structure. Arches could potentially look like tunnels to drivers, which may cause bottlenecks for traffic moving through the arches if drivers slow down on approach.
- Bridges: Composed of a single slab with multiple spans. Soil depth on a bridge structure increases cost. Bridges have a more open appearance for drivers, and as a result, drivers approaching the structures are less likely to slow down.

Stephanie: What are the issues regarding weight and structure design? Mandy and Julia responded that soil (up to 5 feet deep to prevent vegetation roots from freeze and thaw cycles), snowpack and snowmelt all add weight to a structure, and that the static weight of soil requires a higher level of engineering than the temporary weight of a semi-truck crossing a bridge. Julia noted that foam blocks have been used in some structures to allow landscaping on structures with lower soil loads.

In follow-up research, Julia confirmed that the soil depth used on a wildlife overpass in Ontario is 60cm (2') and has grasses and shrubs. In addition, the 19th St Lid in Golden has 18-24" soil depth where grasses were planted. However, the landscape architect noted that the Golden lid design is based on limited experience as the 'park deck' is newer to Colorado. The 19th St Lid also used an air cavity in the deck support to help insulate the soil. It should

be noted that damage to the vegetation occurs when there are multiple freeze/thaw cycles in a given season.

Stephanie Gibson noted that the 19th Street Lid used foam blocks. Julia confirmed with the landscape architect that foam blocks were used on landscaping berms with plantings. Similarly, an overpass in Yoho National Park in Canada used buried foam blocks along the sides of the overpass to provide noise and light attenuation for animals on the structure.

Stephanie asked if we could do tall, open arches like the VMT to prevent the tunnel effect for drivers. Tyler responded about limitations of the height and size of the tunnels at this location. Lauren identified that if traffic analysis suggests the arch design could cause a bottleneck, then CDOT would look strongly at a bridge to avoid pinch-point. Mandy also pointed out that a wildlife overpass is not nearly as long as the VMT and the tunnel effect would not be as significant.

Julia reviewed considerations for an overpass structure. A 200' wide overpass is recommended to ensure wildlife use (particularly elk) of a 300' long structure. However, she noted that a narrower overpass could be considered, although there would be tradeoffs:

- Resident and wintering animals may be able to adapt to a narrower structure better than if the structure was being designed for migratory populations.
- These populations are already habituated to human activity and may be more tolerant of a narrower structure than a wilder population.
- A narrower structure would provide some level of connectivity over I-70, but it would be expected to receive lower levels of use and, in particular, may limit use by both sexes and across age groups (e.g., individual males or small bachelor groups may be more likely to use the structure than a cow with a calf).

Mandy: What is more important for the width, the approach, the middle, or where? Julia identified that not only the approach but also at the top of the approach before an animal has committed to crossing are the most common places where animals repel. Julia identified that hour-glass shaped bridges have worked in other locations and saved costs.

Julia mentioned narrower overpasses can work where the span length is much shorter, or depending on the target species; however, elk require wider structures (underpasses or overpasses) than many other species. Lauren identified that engineers want the minimum identified but that recommendations will help discussions with contractors later on. Anthony also provided input that being open to changes during later discussions is beneficial.

Francesca noted that it would be helpful to compare the costs of wider structure vs a narrower one – if the cost difference isn't that much greater, then the added benefit is worth a higher cost. Mandy also identified that the effort to look at narrowing the structure was also a focus to minimize the wetland impacts when there was a concern of fen wetlands. It has since been confirmed that the wetlands are not fens, although they are still high-quality wetlands.

Lauren Boyle shared an email from Adam Springer (Clear Creek County) regarding the proposed development in the meadows on the south side of I-70. The developer has received push back from the neighborhood regarding plans for high-density apartments and commercial development at the meadows property (Location #3). The status of the proposal remains uncertain. Further research provided by JoAnn Sorensen (Clear Creek County) indicated that both Locations #2 and #3 are on the show home property but the status of development of the meadows property is still concerning given the high wildlife use on this parcel.

Alison: Could the parking lot at the show home be moved to the other side of the structure, away from the approach to an overpass? JoAnn noted that the visibility of the show home to I-70 is the primary marketing for the show home. Similarly, the owner may be reluctant to reduce lighting at the show home. Regardless, these items should be broached in a discussion with the landowner. **The group agreed that a conversation with the land owner is an important next step for this location before moving forward with design.** After the meeting, JoAnn provided the owner's contact information to CDOT, and **Vanessa Henderson (CDOT) will contact the owner to set up a discussion.**

Julia asked for each of the stakeholders present to share their thoughts and additional considerations regarding Locations # 2 & 3:

- JoAnn Sorensen (Clear Creek County) – After clarifying that the south approach of an overpass at Location # 2 would be at a lower elevation than the show home, she noted that the landowner may be open to a decreased width overpass, or a design that angles the bulk of the approach slope towards the meadow and away from the show home. Location # 3 will depend more on the plans for development of the meadows property. **Recommended action item to overlay parcel boundaries with mitigation locations.**
- Francesca Tordonato (CDOT) – Recommended engaging with the meadows developer to get assurances that Location #3 is good long-term mitigation investment. #2 and #3 are the best options, but further investigations are required to determine which of the two is best. She also noted that wetland impacts have an option to do on-site mitigation or existing banks in other places.
- Stephanie Gibson (FHWA) – Noted that we are dealing with something that is existing (Show Home) that we know will be problematic (#2) and the unknown development (#3). #3 looks longer, more expensive. #2 is shorter but the brightly lit show home would limit use. She recommended obtaining easements to get longer-term assurances for wildlife use.
- Alison Michael (USFWS) – In addition to what others had already state, she wanted to know what the potential is for Preble's habitat upstream from Locations #2 and #3 – is there a habitat connection between Beaver Brook and the meadow wetlands? **Recommended action item to determine whether the wetlands may provide Preble's habitat.**

- Chelsea Beebe (Jefferson County) – What is the future land use of the surrounding area, beyond the immediate crossing locations? What are the long-term habitat protection needs in the broader landscape? She also noted that Location #3 offers a better sight distance for drivers. She asked whether human use of an overpass would be prohibited? Julia identified that yes, want to keep it to wildlife use, not humans.
- Julia confirmed with the group that filtering down to Locations # 2 and 3 and eliminating Locations # 4 & 5 is agreed upon by the group.

b. Clear Creek LIZ

Five mitigation locations were presented:

6, MP 244.9, Johnson Gulch – underpass location. This location was eliminated for a large crossing structure due to constructability issues and because US 40 is immediately to the east.

#7, MP 244.2, Two Bears Bridges – add wildlife bench under bridges. The bench would be adjacent to and set slightly above the greenway with a vegetated buffer between the wildlife bench and the greenway. Recommend that this location be carried forward for further design refinements.

#8, MP 242.8, Clear Creek Bridges (east of VMT) – add wildlife pathways. This location was eliminated because the future bridge alignment will not support complete north-south movements.

*Francesca noted that Location #6 could still have value as a smaller carnivore crossing and should be retained as a mitigation recommendation during drainage design. **Carry Location # 6 forward for further consideration as a carnivore crossing.***

The group noted that wildlife moving to/from the south side of the bridges will have to come off the slopes immediately adjacent to the western-most bridge. On the north/east side of the bridges, the bench should continue beneath the westbound off-ramp bridge. There is room to clear out a pathway beneath the existing span.

Stephanie asked about changing the stream shape and improving resiliency. Clear Creek is channelized with steep rip rap banks. Mandy provided input on other sections of the stream that have been discussed for improvements. This location is a concern for rafting use. Many other users of the creek as well. Fishing, rafting, pull-out between easy to moderate/difficult rafting.

Stephanie identified that based on the photos, there are opportunities to enhance the conditions and make it more aesthetically pleasing and more wildlife/habitat friendly.

*Francesca made a note of deer deaths from getting on these bridges and getting to a pinch-point and jumping off and dying. **It was noted that measures should be taken to prevent***

wildlife from getting onto the bridges.

Stephanie asked if we had a 3D model. Tyler answered we do not have it yet.

JoAnn requested that the **Project Team coordinate with the Clear Creek County Greenway Authority regarding the wildlife bench at Location #7, as well as Clear Creek County Open Space.**

Stephanie and others emphasized that we are also avoiding additional impacts by choosing the tunnel alternative versus expanding the road footprint and making additional rock cuts.

Doreen noted that the east tunnel portal design should be reviewed by the ALIVE Committee for recommendations to minimize impacts to bighorn sheep habitat and movements.

Consider a stair-step design or other features to facilitate bighorn sheep movement and reduce barriers at the tunnel portals.

Francesca asked about the ability to keep Location #1 in the progression if there are fatal flaws with Location #2 and Location #3. The ATKINS Project Team stated that the objective is to mitigation within the project limits; however, it will be kept as a backup if the others don't meet the requirements. Julia identified that additional sites were looked at because of the initial concerns regarding the presence of the fens. During that process both Locations # 1 & 2 were added to the mitigation matrix as potential wildlife crossing mitigation locations.

In addition to these notes, the project team summarized the issues and actions associated with the crossings being carried forward. That summary is attached to these notes for the ALIVE Committee information and input.

The next ALIVE meeting is projected for winter 2018/19. At this meeting ALIVE members will provide comment on initial wildlife mitigation and roadway designs.

Summary of Agreements

1. Agreed to eliminate Locations # 4, 5 and 8 from further consideration. Location #1 will be retained as an alternative pending a decision on Locations # 2 and 3. Location #6 will be retained for consideration for a medium-sized culvert.
-

Attachments – Presentation slides and Locations #2 and #3 summary

I-70 Floyd Hill to Veterans Memorial Tunnels - Potential Wildlife Crossings

Map ID	Location	MP	STA	LIZ	Wildlife Considerations	Terrain & Other Landscape Characteristics	Land Use	Design Considerations	Constructibility	Recommendation
1	Ruby Ranch Road Underpass Location	250.0	n/a	BB	<ul style="list-style-type: none"> Deer and elk highway crossing zone. Resident and wintering animals. Very high WVC. Site not topographically distinct - wildlife may need to be guided more to this location. 	<ul style="list-style-type: none"> Outside of project area Would require expanding NEPA evaluation and additional resource surveys 	<ul style="list-style-type: none"> Private property both sides of I-70 Wide CDOT ROW at this location Dispersed residential development 	<ul style="list-style-type: none"> Shortest road footprint - structure does not need to span US 40 Steep fill on north side. Consider how to grade north side approach or build trails into the slope leading to the structure 	<ul style="list-style-type: none"> New underpass construction challenging and requires long-term road closure with shoo-fly (detour) road 	<ul style="list-style-type: none"> Carry forward for further design refinements
2	Floyd Hill Far East Overpass Location (Show Home)	247.3	275	BB	<ul style="list-style-type: none"> Elk commonly use the meadow on the south side of I-70 just west of this location WVC hotspot for deer and elk. Location has the highest elk-vehicle collision rate in the project area Proposed development may divert more animals to this area Human use possible 	<ul style="list-style-type: none"> South approach would fit between wetland areas; would require culvert for ditch under approach Uneven grade between EB and WB I-70 and I-70 and US 40 Road begins to curve here - road footprint wider and may affect sight distances 	<ul style="list-style-type: none"> Proposed 400 unit development on south side; developer unlikely to be able to develop wetlands & location is east of primary developable area Show home >100' from south side approach North side approach privately owned - development potential? Dispersed residential development on south side Location is in Jefferson County 	<ul style="list-style-type: none"> Overpass spanning I-70 & US 40; Consider hourglass shape, i.e., widen approach slopes. As much as 5' soil depth to prevent freeze/thaw Place wildlife fence along guard rail, out of wetlands. Site escape ramps near fence ends, near driveways on north side and between wetlands on south side. Location is closer to the Beaver Brook interchange - are sight distances in advance of interchange for EB traffic ok? May require long approach slope on south side, extending beyond current ROW 	<ul style="list-style-type: none"> Overpass construction requires short-term closures 	<ul style="list-style-type: none"> Carry forward for further design refinements
3	Floyd Hill East Overpass Location (Storage Units)	247.2	269	BB	<ul style="list-style-type: none"> Elk commonly use the meadow on the south side of I-70 just west of this location WVC hotspot for deer and elk. Location has the highest elk-vehicle collision rate in the project area Proposed development may divert more animals to this area Human use possible 	<ul style="list-style-type: none"> High quality wetlands on south side Uneven grade between EB and WB I-70 and I-70 and US 40 	<ul style="list-style-type: none"> Proposed 400 unit development on south side; developer willing to consider including wildlife corridor & unlikely to be able to develop wetlands North side approach owned by storage company - development potential? Dispersed residential development on south side Location lies on Jefferson/Clear Creek County line 	<ul style="list-style-type: none"> Overpass spanning I-70 & US 40; Consider hourglass shape, i.e., widen approach slopes. Structure must ascend from a low point below the grade of I-70 on the south side to a cut slope on the north side of US 40 Consider variable, undulating slopes to address grade difference across the length of the span and to shorten the approach slopes. As much as 5' soil depth to prevent freeze/thaw Place wildlife fence along guard rail, out of wetlands. Site escape ramps near fence ends, near driveways on north side and between wetlands on south side. May require long approach slope on south side, extending beyond current ROW 	<ul style="list-style-type: none"> Overpass construction requires short-term closures 	<ul style="list-style-type: none"> Carry forward for further design refinements

I-70 Floyd Hill to Veterans Memorial Tunnels - Potential Wildlife Crossings

Map ID	Location	MP	STA	LIZ	Wildlife Considerations	Terrain & Other Landscape Characteristics	Land Use	Design Considerations	Constructibility	Recommendation
4	Floyd Hill Middle Overpass Location (High School)	247.0	248	BB	<ul style="list-style-type: none"> • Elk commonly use the meadow on the south side of I-70 • WVC hotspot for elk as well as deer • Human use possible (wetlands may impede access) 	<ul style="list-style-type: none"> • Large complex of high quality wetlands at south side structure approach • Uneven grade between EB and WB I-70 and I-70 and US 40 	<ul style="list-style-type: none"> • Proposed 400 unit development on south side; developer willing to consider including wildlife corridor & unlikely to be able to develop wetlands • Potential to build out office park on north side • High School and dispersed residential development on south side 	<ul style="list-style-type: none"> • Overpass spanning I-70 & US 40; Consider hourglass shape, i.e., widen approach slopes. • This location requires a longer span than other locations. • Consider variable, undulating slopes to address grade difference across the length of the span and to shorten the approach slopes. • As much as 5' soil depth to prevent freeze/thaw • Place wildlife fence along guard rail, out of wetlands. Site escape ramps near fence ends, near driveways on north side and between wetlands on south side. • May require long approach slope on south side, extending beyond current ROW 	<ul style="list-style-type: none"> • Overpass construction requires short-term closures 	<ul style="list-style-type: none"> • Eliminate from further consideration (location has greater wetland impacts and is more likely to be impacted by proposed development)
5	Floyd Hill West Overpass Location	246.3	220	BB	<ul style="list-style-type: none"> • This location is west of the meadow commonly used by elk on the south side of I-70 • WVC rate is lower west of the Floyd Hill exit (in part due to habitat, in part due to roadway situation) • Human use likely 	<ul style="list-style-type: none"> • I-70 lies well below grade 	<ul style="list-style-type: none"> • Overpass could be constructed entirely in ROW • Saddleback Road immediately beyond south approach; Currently very low WVC on this residential road (2 in 10 years) • Private property on south side, both sides of Saddleback Road • Trail development on north side Open Space (increased human activity, mostly daytime) • Dispersed residential development on south side 	<ul style="list-style-type: none"> • Overpass spanning I-70 & US 40 from bench to bench. Consider flat bridge instead of multiple arches. Consider hourglass shape, i.e., widen approach slopes. • As much as 5' soil depth to prevent freeze/thaw • The roadway footprint for I-70 & US 40 is narrower at this location, necessitating a shorter total span • Would require fencing from the Beaver Brook Exit, including deer guards at the Floyd Hill Exit to direct animals to crossing location • Place wildlife fence along guard rail, out of wetlands. Site escape ramps near fence ends, near driveways on north side and between wetlands on south side. 	<ul style="list-style-type: none"> • Overpass construction requires short-term closures 	<ul style="list-style-type: none"> • Eliminate from further consideration (lower wildlife value and WVC rate; Requires fencing from meadow area to direct animals to crossing)

I-70 Floyd Hill to Veterans Memorial Tunnels - Potential Wildlife Crossings

Map ID	Location	MP	STA	LIZ	Wildlife Considerations	Terrain & Other Landscape Characteristics	Land Use	Design Considerations	Constructibility	Recommendation
6	Johnson Gulch	244.9	140+75	CC	<ul style="list-style-type: none"> • No logical place for wildlife to go on the north/east side? • Conflict with US 40 would remain, and may necessitate a second crossing for US 40 or fence between highways to east and west • At edge of CC LIZ and would not serve populations at the top of Floyd Hill 	<ul style="list-style-type: none"> • Large drainage with a large amount of fill under I-70. 	<ul style="list-style-type: none"> • US 40 immediately to north/east has high traffic speeds coming downhill • Large natural drainage with limited development • Private lands both sides; much of land on east/north side is single land owner 	<ul style="list-style-type: none"> • Minimum 80' W x 14' H with 2:1 slopes • Consider situating structure higher in fill, offset to north/west side; extend existing drainage pipe • May consider other dimensions depending on feasibility of constructing an overpass at the top of Floyd Hill • Requires additional mitigation on US 40 	<ul style="list-style-type: none"> • Underpass construction requires long-term road closure with detour 	<ul style="list-style-type: none"> • Eliminate from further consideration (very difficult to construct and need for additional mitigation on US 40)
7	Clear Creek Bridges (Two Bear's)	244.2	104	CC	<ul style="list-style-type: none"> • Integrate wildlife movement opportunity into multi-use structure • Provide crossing opportunity for deer, elk, bear and other carnivores. • High human activity (bike path, rafters) - will the existing gravel parking area be removed? 	<ul style="list-style-type: none"> • Uneven grade between opposing lanes and US 6 	<ul style="list-style-type: none"> • I-70 WB off-ramp bridge immediately to east of this location. 	<ul style="list-style-type: none"> • 8-10' wide wildlife bench on the south side of each span, beyond the greenway path • Still no safe crossing opportunity over US 6 for a true north/south habitat connection but existing off-ramp bridge may be able to accommodate continuation of wildlife bench along the south side of the Clear Creek 	<ul style="list-style-type: none"> • Bridges will be replaced anyway so no new construction required 	<ul style="list-style-type: none"> • Carry forward for further design refinements
8	Clear Creek Bridges (east of VM Tunnels)	242.8	n/a	CC	<ul style="list-style-type: none"> • Outside of LIZ; However may provide additional opportunity for wildlife movement under I-70 • Provide limited opportunity/value for wildlife movement under I-70 	<ul style="list-style-type: none"> • Steep banks on either side of Clear Creek 	<ul style="list-style-type: none"> • Limited human activity under the bridges; outside of greenway route • Central City Parkway and ROW to north; private to south. County parcel both sides of I-70 immediately west of this location. 	<ul style="list-style-type: none"> • Recommend 4' wide wildlife pathways on either side of Clear Creek; these paths must lead to suitable habitat • Wildlife pathways must continue under Central City Parkway bridge immediately to north • Grade differences between I-70 and frontage road, and need for retaining walls restrict wildlife access on south side 		<ul style="list-style-type: none"> • Eliminate from further consideration (does not provide complete connection across I-70 and frontage road)



I-70 Floyd Hill to Veterans Memorial Tunnels

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ALIVE Meeting #3

October 16, 2018



I-70 Floyd Hill to Veterans Memorial Tunnels

Agenda

- Welcome / Introductions
- Action Items Review
- Project Updates
- Mitigation Matrix: Review of Potential Mitigation Actions
 - Beaver Brook LIZ
 - Clear Creek Junction LIZ
- Next Steps & Review of Action Items



I-70 Floyd Hill to Veterans Memorial Tunnels

Meeting Objectives

- Review Mitigation Matrix
 - Challenges and opportunities at each potential mitigation location in the Beaver Brook and Clear Creek Linkage Interference Zones
 - New locations added to mitigation matrix
- Refine List of Potential Mitigation Actions
 - Recommendations for mitigation locations to carry forward or eliminate



I-70 Floyd Hill to Veterans Memorial Tunnels

Wildlife Mitigation

- Beaver Brook LIZ
 - 4.7 miles long
 - Very high WVC – mostly elk WVC in western portion of LIZ; mostly deer WVC in eastern portion
- Clear Creek Junction LIZ
 - 1.9 miles long
 - Moderately-low WVC through canyon
- ALIVE Goals:
 - Improve connectivity for wildlife across I-70 and reduce WVC
 - At least one wildlife crossing per LIZ (Biological Opinion)



I-70 Floyd Hill to Veterans Memorial Tunnels

Action Items Checklist (April meeting)

Summary of Action Items	Responsibility	Status
1. Follow up to see if there are site specific locations that may still be using sand for treatment	Neil Ogden	✓
2. Look into designs for rockfall netting that minimize entanglement	Julia Kintsch and Stephanie Gibson	✓
4. Check with drone footage used for rock fall to see if it caught any issues with entanglement or animals	Neil Ogden	✓
5. Provide preliminary crossing design and or schematics to Clear Creek County to facilitate opportunities for partnerships with local development	Neil Ogden	
6. Look into opportunities for conservation easements	Vanessa Henderson	
7. Coordinate with Joe on additional wildlife carcass information to add into reporting	Julia Kintsch and Keith Hidalgo	



I-70 Floyd Hill to Veterans Memorial Tunnels

Action Items Checklist (June Site Visit)

Summary of Action Items	Responsibility	Status
1. Contact Clear Creek County Road and Bridge re: WVC on Saddleback Road	Julia	✓
2. Provide guidance and specifications for wildlife crossing designs (e.g., dimensions, slopes, substrate, bench width)	Julia	✓
3. Develop cross section of potential wildlife crossings	Anthony	✓
4. Provide traffic analysis demonstrating how I-70 realignment is projected to affect truck traffic from the quarry on US 40	Neil	✓
5. Preble's habitat assessment and coordination with USFWS and CDOT regarding potential mitigation.	Keith	✓



I-70 Floyd Hill to Veterans Memorial Tunnels

Project Area





I-70 Floyd Hill to Veterans Memorial Tunnels

Initial Stakeholder Concerns

- Threatened and Endangered Species
 - Canada lynx
 - Preble's meadow jumping mouse
- Bighorn sheep winter range and mortality
- Connectivity for terrestrial wildlife
- Reduce wildlife-vehicle collisions
- Clear Creek is a high value fishery
 - Improve fish passage and reduce channelization



I-70 Floyd Hill to Veterans Memorial Tunnels

Project's Effects on Wildlife

- Habitat loss due to expanded highway footprint
 - Highway widening, new alignment, rock cuts
- Increase in barrier effect:
 - Increased number of traffic lanes
 - Increasing traffic volumes
 - Retaining walls, median and shoulder barriers
 - Lighting at interchanges and signs
- Potential increase in wildlife-vehicle collisions



I-70 Floyd Hill to Veterans Memorial Tunnels

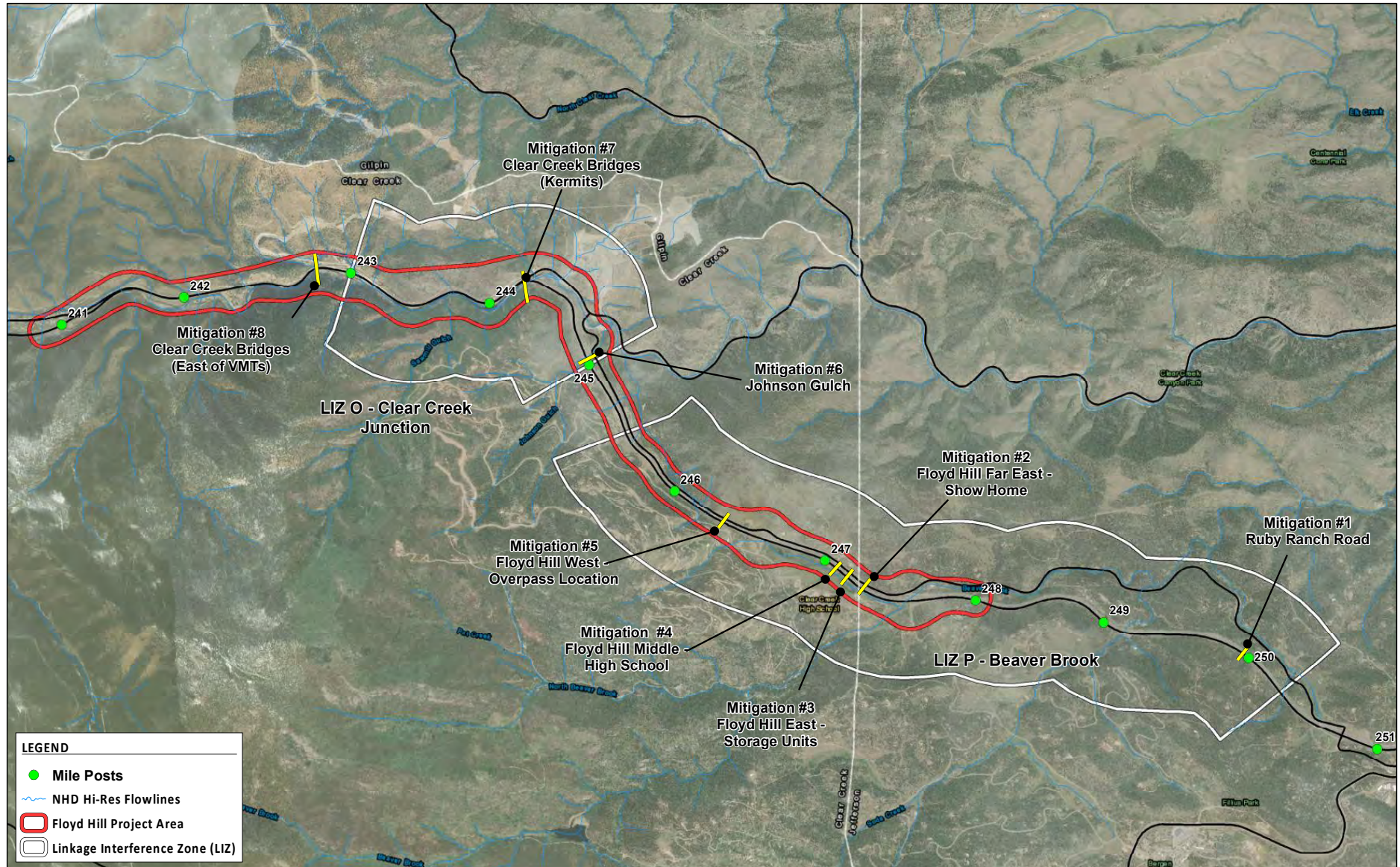
Updates Since June Site Visit

- CDOT/Consultant meeting to review conceptual designs, challenges and opportunities at each location
 - Created Mitigation Matrix
 - Opportunities for mitigation outside of project boundary in eastern portion of Beaver Brook LIZ?



I-70 Floyd Hill to Veterans Memorial Tunnels

Mitigation Locations Considered





Beaver Brook LIZ Mitigation Locations

- 1 – MP 250, Ruby Ranch Road – Underpass (outside of study area)

- 2 – MP 247.3, Meadow/Show Home – Overpass

- 3 – MP 247.2, Meadow/Storage Units – Overpass

- 4 – MP 247.0, Meadow/High School – Overpass

- 5 – MP 246.3, Floyd Hill West - Overpass



I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ – Locations Considered

1 – MP 250, Ruby Ranch Road – Underpass (outside of study area)

2 – MP 247.3, Meadow/Show Home – Overpass

3 – MP 247.2, Meadow/Storage Units – Overpass

4 – MP 247.0, Meadow/High School – Overpass

5 – MP 246.3, Floyd Hill West – Overpass



I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ: Locations Eliminated

- #4: MP 247.0, Meadow/High School Overpass
 - Eliminated due to greater wetland impacts and potential for this site to be more impacted by planned development on south side of I-70.

- #5: MP 246.3, Floyd Hill West Overpass
 - Eliminated due to lower wildlife value & WVC; Would require fencing and deer guards across Floyd Hill Exit to direct animals to crossing location.

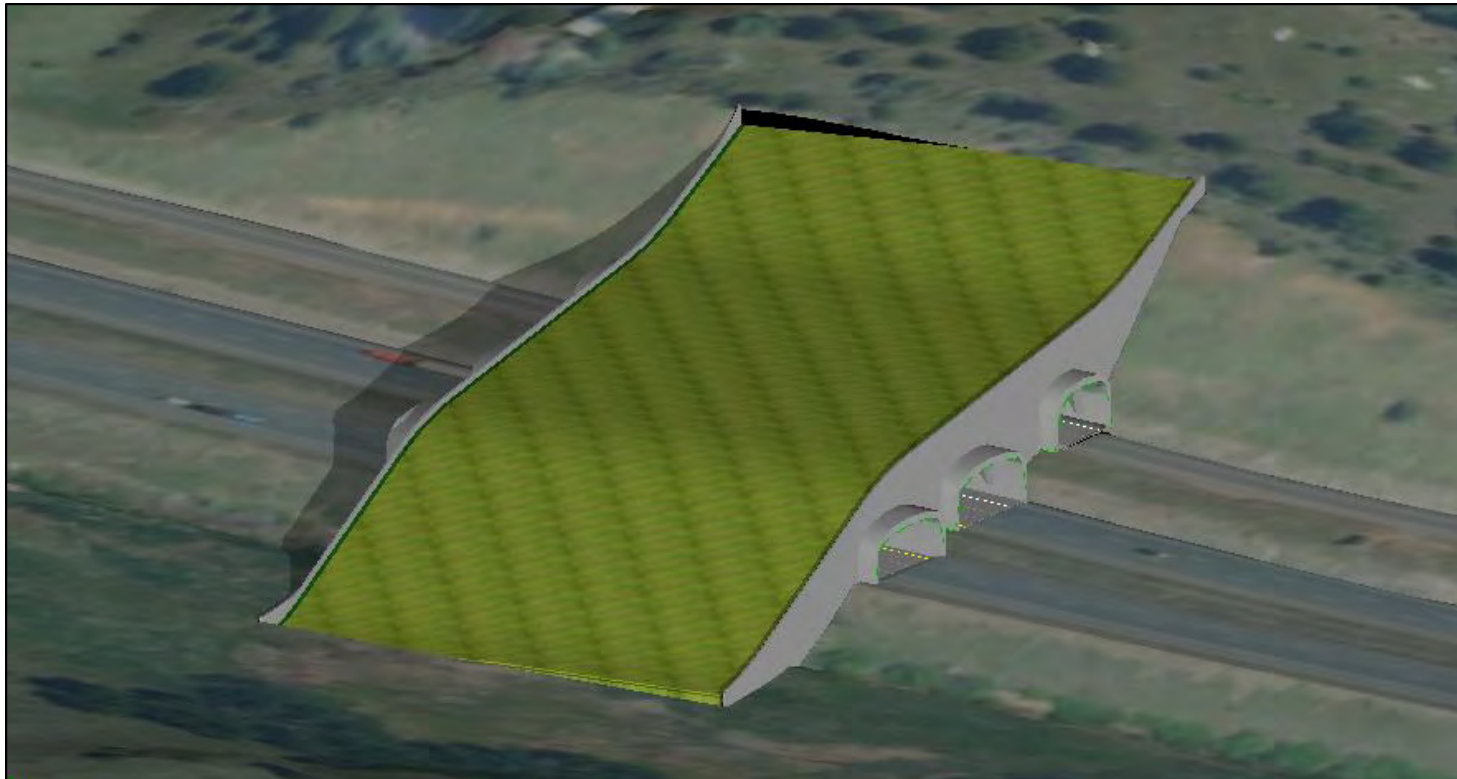


I-70 Floyd Hill to Veterans Memorial Tunnels

Wildlife Overpass Options

Arches

- Three arches over opposing I-70 lanes and US 40
- Designed to be buried; Allows variable slopes





I-70 Floyd Hill to Veterans Memorial Tunnels

Wildlife Underpass Options

Bridges

- Single bridge with multiple spans
- Bridge/fill weight will increase cost
- More open appearance





Beaver Brook LIZ Considerations

- Overpass Width
 - Given the length of an overpass spanning I-70 and US 40, recommended overpass width is 200'
 - However, residential and wintering animals may be more likely to adapt to a narrower structure, also because these populations are already habituated to human activity
 - A narrower structure would not be expected to receive high levels of use, but would provide some connectivity across interstate barrier



I-70 Floyd Hill to Veterans Memorial Tunnels

MP 247.2 Meadow Overpass (#2)





I-70 Floyd Hill to Veterans Memorial Tunnels

MP 247.2 Meadow Overpass (#3)





I-70 Floyd Hill to Veterans Memorial Tunnels

Design Concepts

- View concepts, wetlands, parcel boundaries



Beaver Brook LIZ Discussion

- Are there any fatal flaws associated with Location #2 or #3?
- What alternative design refinements might improve locations carried forward? e.g., narrower structures?
- Is there additional information that would help in determining the best location(s) or design of wildlife-highway mitigation?
- Do any of the locations need habitat protection to be successful?



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ – Locations Considered

6 – MP 244.9, Johnson Gulch

- Possible location for wildlife underpass

7 – MP 244.2, Two Bears

- Add wildlife bench under new bridges

8 – MP 242.8, Clear Creek bridges east of VMT

- Location is outside of LIZ, but planned bridge realignment considered as opportunity for wildlife passage under I-70



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ Mitigation Locations

6 – MP 244.9, Johnson Gulch

- Possible location for wildlife underpass

7 – MP 244.2, Two Bears

- Add wildlife bench under new spans

8 – MP 242.8, Clear Creek bridges east of VMT

- Location is outside of LIZ, but planned bridge realignment considered as opportunity for wildlife passage under I-70



Clear Creek LIZ: Locations Eliminated

- #6: MP 244.9 Johnson Gulch
 - Eliminated due to constructability issues, and US 40 immediately to east with high traffic speeds leaves wildlife with nowhere to go on north/east side; May increase WVC risk on US 40.
- #8: MP 242.8, Clear Creek bridges east of VMT
 - Eliminated because future bridge alignment leaves nowhere for wildlife to go on the south side between bridges and frontage road walls.



I-70 Floyd Hill to Veterans Memorial Tunnels

MP 244.2 Two Bears (#7)





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek Junction LIZ Discussion

- Are there any fatal flaws associated with Location #2 or #3?
- What alternative design refinements might improve locations carried forward? e.g., narrower structures?
- Is there additional information that would help in determining the best location(s) or design of wildlife-highway mitigation?
- Do any of the locations need habitat protection to be successful?



I-70 Floyd Hill to Veterans Memorial Tunnels

Next Steps and Action Items



Clear Creek LIZ Crossing

Crossing Location # 7: One location for **underpass**, incorporating a dedicated wildlife bench into multiuse greenway/wildlife/creek crossing under the US 6/I-70 bridges

Primary use = mule deer

Secondary use = carnivores, bighorn sheep



Existing I-70 bridges spanning the bike path, Clear Creek & the I-70 westbound on-ramp.

INITIAL QUESTIONS TO ANSWER

Design

- What are the vertical and horizontal profiles? Vertical clearance and shared width with greenway?
- Where / how does the bench continue on the north side to direct animals away from I-70, US 6 and US 40 and prevent animals from going back onto the highway?
- What additional elements may be needed to ensure wildlife use, e.g., vegetation enhancements, guide fencing?

Land Use

- What are the existing and future land uses and property ownership for habitat on north and south side of I-70 (and US 6 and US 40)?
- What are the conflicts, if any, with Two Bears, trailhead, or rafting uses?
- How would the crossing work with the greenway? How can human and wildlife uses be buffered?

Biology

- How can the wildlife crossing be most open and inviting to deer and carnivores?
- How do we prevent animals from getting onto the highway – e.g., fencing, trails, approach treatments?
- Where would the wildlife bench be located, and are stream improvements (reduced channelization) possible/necessary?
- Are there additional measures that need to be incorporated to minimize impacts to bighorn sheep (or deer) that get trapped on bridges (above the crossing)?

Other considerations in this LIZ

- Bighorn sheep conflicts at the tunnel entrance/exits
- Where possible, design or create culverts that accommodate bear or smaller animal passage, in particular, a box culvert at Location #6 Johnson Gulch.

Beaver Brook LIZ Crossing

Crossing Locations #2 and #3: Two locations under review for **overpass**, both in the Beaver Brook meadow near CR 65

Primary use = elk

Secondary use = mule deer, carnivores

Location #2 extends from the low point on the center right of the photo on the north side of the frontage road across I-70; Location #3 would run from the cut slope to the meadow.



INITIAL QUESTIONS TO ANSWER

Land Use and Right of Way

- What are the existing and future land uses and property ownership for habitat on north and south side of I-70 (and US 40)?
- What are the conflicts with the Show Home? Initial conflicts identified = parking lot, lighting, human activity.
- Are there other development plans on the north side properties?
- What are the activities / conflicts that occur at the storage unit site, and what are plans for the property in future?
- What is the status of development of the Beaver Brook meadow?
- Are conservation easements possible to protect the lands around the crossing from development?
- What is the temperature of the land owners? Is land owner opposition a fatal flaw to one or both locations?

Design

- What are the loading requirements for the overpass with soil, and are there alternatives, such as foam blocks or hollow sections?
- What is the skew of the bridges, and how does that affect site distance on I-70?
- How significant is the potential “tunnel effect” creating a new bottleneck from drivers slowing through the tunnel, and what are options to reduce this potential problem?
- What are strategies to minimize impacts to wetlands on the south side – options to minimize width and fill? Incorporate culverts or other features to maintain hydrologic connectivity for wetland complex.

Biology

- How can the approaches be most inviting for elk use?
- What will be the fence alignment and what measures will be employed to prevent end-arounds? Where will escape ramps be located? Where are deer guards are needed and what design will best meet mitigation and landowner needs?
- What are the movement patterns of the existing herds, and how might the crossing change patterns?
- What are the human and land use conflicts that may limit use of the crossings?
- Does the layout of CR 65 ramp affect the crossing?

Agenda

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Project: I-70 Floyd Hill to VMT
Meeting: ALIVE Meeting #4
Date: January 9, 2020, 9:00-11:00am
Location: CDOT Region 1, 425A Corporate Circle, Golden, CO, Lookout Mountain Room

Meeting Objectives:

- Review Mitigation Option A (Wildlife Overpass) design and considerations
- Present and discuss Mitigation Option B (Alternative) in the Beaver Brook LIZ
- Obtain consensus from the ALIVE Committee on which Option to pursue in the Beaver Brook LIZ
- Update the ALIVE Committee on the new Canyon Viaduct Alternative in the Clear Creek LIZ and obtain input for inclusion in the CSS Alternatives Matrix

Agenda:

- 1) Welcome / Introductions
- 2) Project Status Review
- 3) Beaver Brook LIZ
 - a) Mitigation Option A: Overpass
 - i) Preferred location, visualizations, and discussion of matrix
 - b) Mitigation Option B: Alternative Mitigation
 - i) Description, map exhibit, and discussion of matrix
- 4) Clear Creek LIZ
 - a) Present Tunnel Alternative: North and South Frontage Road Design Options
 - i) Alignment and visualizations
 - b) Canyon Viaduct Alternative
 - i) Alignment and visualizations
 - c) Discussion of alternatives
- 5) Next Steps / Action Items



Floyd Hill - ALIVE ITF Meeting #4 Summary
January 9, 2020, 9 AM to 11 AM
CDOT Golden - Lookout Mountain Conference Room

Welcome and Introductions

Vanessa Henderson, CDOT, welcomed the group and reviewed the agenda. Self-introductions followed. Attendees are listed at the end of the notes and on the attached sign-in. Meeting materials are also attached; suggested updates from the ALIVE ITF to the mitigation matrices discussed at this meeting have been included in attachments.

Project Status and Updates

Vanessa provided an overview of project status and the development of a second, non-tunnel alternative called the Canyon Viaduct Alternative, as well as the previously developed Tunnel Alternative that has two design options (North Frontage Road and South Frontage Road). CDOT has secured about half of the anticipated construction funding and is moving forward with NEPA. Impact analysis will be starting this month. A second public meeting is planned for Thursday, February 27, and the EA and public hearing are planned for the fall, with the NEPA process completed early in 2021 pending funding.

Meeting Objectives

Julia Kintsch with Eco-Resolutions reviewed the meeting objectives and noted that CDOT is looking for concurrence from the ALIVE committee on which mitigation options to move forward in the Beaver Brook Linkage Interference Zone (LIZ) and provide input for the Technical Team's CSS matrix on the wildlife considerations for each of the alternatives in the Clear Creek LIZ.

Beaver Brook LIZ

Option A: Crossing Structure west of County Road 65

Julia introduced the crossing option (Option A) for the Beaver Brook LIZ. She reviewed the map showing the refined crossing location and fencing and then reviewed the matrix comparison (attached) regarding the wildlife and biological considerations, political considerations, economic considerations, social support, and feasibility for this mitigation option.

Question: It seems like there are a lot of challenges with this location. Why was it selected and what else was considered?

Response: Previously, the ALIVE ITF conducted a site visit and explored all possible locations for a crossing within the LIZ. After much discussion, the group agreed that this location is the most suitable for a crossing based on land use, wildlife presence (direct access to the habitat that the elk herd uses the most adjacent to I-70), and wildlife-vehicle collisions (WVCs), among other factors.

Question: Can the number of animals using the crossing be predicted?

Response: The density of animals in this location is lower than other locations in Colorado where wildlife crossings have been implemented (such as State Highway 9) because it is not a wildlife migration corridor. As a result, wildlife numbers using this crossing are anticipated to be much lower than other crossings. However, the team is confident that animals will use a well-designed crossing provided that future development and human activity does not inhibit wildlife activity in this area.

Comment: The lower density description in the matrix is a neutral consideration and should be changed to black, not red, in the matrix. The group agreed and the matrix was revised accordingly.

Land Use Considerations: Adam Springer/Clear Creek County gave an update on the development plans for the commercially zoned property near the meadow. The property was recently purchased by the Frei Corporation but their plans are unknown. There is potential for development of single-family residential units; however, water supply is an issue in this area. Preserving habitat in this area would be important to ensuring long-term success of the crossing.

Political considerations: The recent Colorado executive order on wildlife crossings is another political consideration that should be added to the matrix. The group agreed, and this was added to the matrix.

Feasibility: It was decided that the word “unfavorable” should be changed to “less favorable.” The matrix was revised for this change in wording.

Question: Are there other examples of human impacted landscapes where wildlife crossings have been implemented?

Response: Generally, wildlife crossings are found in more “wild” areas, but it is not unprecedented. In Park City, there is a wildlife crossing in a residential area but it is a much smaller crossing and the buildings are farther away.

General comment about Option A Matrix: The matrix seems a little negative in tone. If this is going to be a public document and this option is selected, the wording should be rephrased.

Response: Agree. The team is confident that the wildlife crossing could be designed to be effective and that animals would use it. However, it is important to consider that the numbers for use would not be high and the costs would be very high. This reality was the primary reason for developing another option.

Option B: Onsite Mitigation and Mitigation Fund to Develop Wildlife Crossing(s) in a Different Location in the Mountain Corridor

After considering the challenges of Option A, the team began to question if there was a better mitigation option that would achieve the goals of improving wildlife passage across the Mountain Corridor. Julia reviewed the Option B components, which include habitat preservation, wildlife fencing to reduce WVCs, and contribution to a wildlife crossing mitigation fund used to develop wildlife crossing in another LIZ within the CDOT Region 1 section of the I-70 Mountain Corridor, particularly one where another transportation project is not planned. The approach of building mitigation and wildlife crossings in locations outside project boundaries is supported by FHWA’s Ecological guidance,

Question: Have we installed wildlife fencing without crossings before?

Response: This is generally not recommended but, yes, much of I-70 through Eagle County includes fencing with very limited crossing opportunities. However, there are some specific cases where fencing alone may be warranted to mitigate WVCs that occur in areas where connectivity for wildlife is not necessary. The matrix notes that this is generally not a best practice. Option B does provide some opportunity for animals to cross at the existing undercrossing at Soda Creek Road. Joe Walters/CPW said animals do and would likely use that crossing.

Question: How would the funding for the mitigation fund be determined?

Response: The contribution to the mitigation fund would be the same dollar amount as the cost of constructing the crossing (Option A), which has an early estimate of \$15 million. The money would be dedicated to constructing a crossing in a different LIZ within CDOT Region 1. Several potential locations have been identified that could be pursued with the funding. (Purchasing and conserving the habitat on the south side of I-70 at the Option A crossing location to the extent possible is included in both Option A and Option B.)

The group suggested that protecting land around or otherwise improving the Soda Creek crossing might also be another option.

The group noted some interest in Option B but identified some questions that need to be answered before they could provide concurrence on which option to pursue in NEPA. The group felt more information was needed about the on-site mitigation and the process for determining and implementing offsite mitigation. Some of the questions that need to be addressed:

- Are conservation easements possible at the meadow property?
- What additional improvements are needed/feasible at Soda Creek?
- How long would it take to get an agreement on a new crossing location? What would be the timeframe for implementing a new crossing, and how would CDOT manage that as a separate project?
- How would the mitigation fund be structured? How would it work? How do projects get triggered? How would CDOT spend the money?
- How does the ALIVE MOU need to be changed?
- How would mitigation commitments be addressed later (if not included as part of this project)?

Clear Creek LIZ

Julia provided a brief overview of the roadway alternatives in the Clear Creek LIZ, including visualizations of how the roadway infrastructure relates to Clear Creek and riparian habitat. She noted that the Clear Creek LIZ has some north-south connectivity issues, but the primary consideration is access to and movement along the riparian habitat east-west through the project area, with connectivity north at the US 6 junction.

Comment: Shading should be considered for all bridges.

Comment: The South Frontage Road option of the Tunnel Alternative seems like a lot of roadway infrastructure on both sides of the creek. The North Frontage Road option seems better because more of the roadway is away from the creek.

Comment: The Canyon Viaduct Alternative may provide more opportunity for riparian mitigation.

Comment: Clear Creek County has plans for a park on the north side of the knob cut with the Canyon Viaduct Alternative.

Comment: The South Frontage Road option may have some issues with flood resiliency.

Comment: The South Frontage Road option has lots of roadway where there could be habitat. It also cuts off wildlife access from the south.

Comment: Specify that the connectivity goal for this LIZ is east-west along the riparian corridor rather than north-south across I-70.

Next Steps

The group agreed that a follow up was needed to further discuss the Clear Creek LIZ and Option B for the Beaver Brook LIZ. The project team will work on gathering additional data requested by the ALIVE ITF and follow up in 6 to 8 weeks.

The following actions are needed:

- Mitigation Fund: Develop parameters for where and how money could be used.
 - Determine if a long-term fund is desirable or if a new crossing project should be developed concurrent with the Floyd Hill project.
 - Determine how the amount of the fund contribution is set and committed.
 - Determine if changes to the ALIVE MOU are needed.
 - Develop a preliminary list of alternative wildlife crossing locations that could be developed in the Region 1 portion of the I-70 Mountain Corridor to evaluate the benefits.
- On-site mitigation: Clarify possibilities for on-site mitigation for Option B.
 - Soda Creek improvements
 - Evaluate potential enhancements to the existing structure.
 - Consider costs and benefits of a bridge replacement spanning the creek/riparian area to provide a better wildlife pathway under the bridge.
 - Review wildlife habitat and movement in this area and relate to land use.
 - Get traffic info from Clear Creek County for Soda Creek Road.
 - Further information on habitat protection
 - Coordinate with CDOT right-of-way to initiate conversations with the four landowners to determine willingness to collaborate and costs associated with conservation easement/purchase.
 - If these parcels are not available, are there other potential properties available around Soda Creek or south towards Bergen Park where conservation protections would benefit wildlife?
 - Overpass location (Option A)

- Coordinate with Jefferson County regarding zoning for parcels north and east of the crossing location.
- Determine fence alignments, particularly fence ends and wildlife guards.

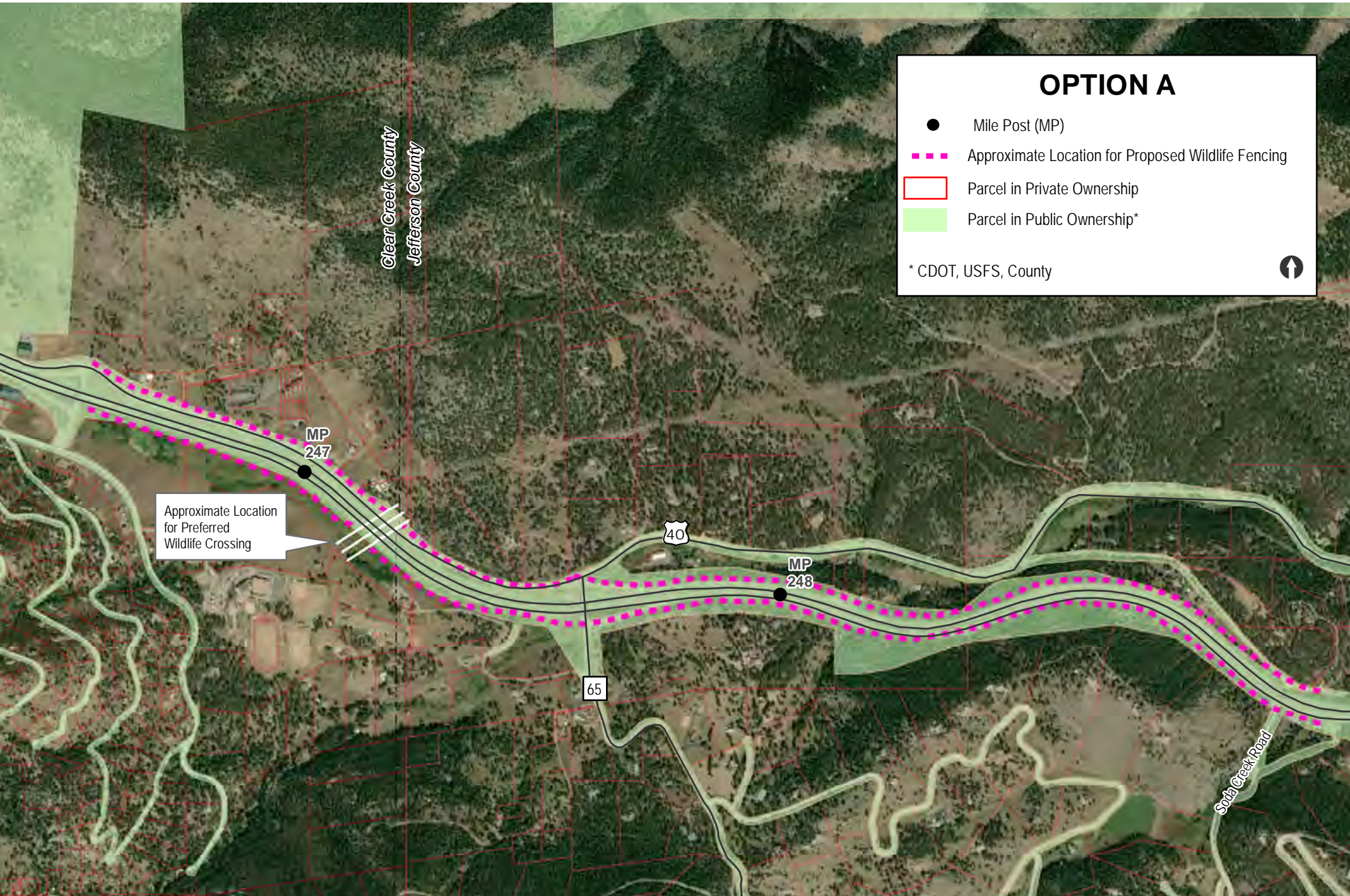
Attendees

Amy Saxton and Adam Springer (Clear Creek County); Chelsea Beebe (Jefferson County); Stephanie Gibson (FHWA); Vanessa Henderson, Neil Ogden and Francesca Tordonato (CDOT); Alison Dean Michaels (USFWS); Joe Walter (CPW); Aurelia Denasha (USFS); Anthony Pisano and Carol Coates (Atkins); Julia Kintsch (ECO-resolutions); Mandy Whorton (Peak Consulting Group).

OPTION A

- Mile Post (MP)
- Approximate Location for Proposed Wildlife Fencing
- Parcel in Private Ownership
- Parcel in Public Ownership*

* CDOT, USFS, County



Approximate Location for Preferred Wildlife Crossing

MP 247

40

MP 248

65

Soda Creek Road

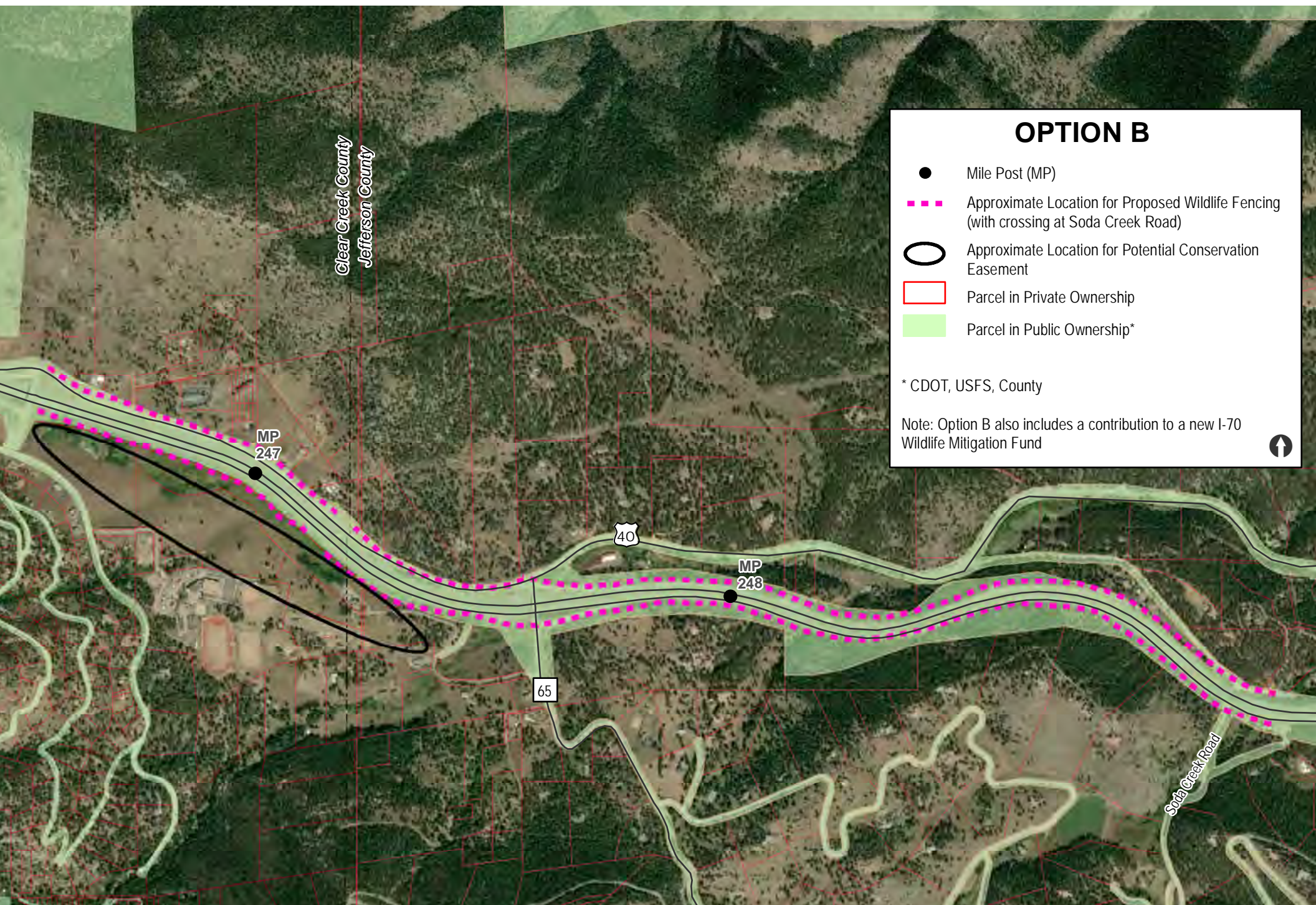
Clear Creek County
Jefferson County

I-70 Floyd Hill Mitigation Alternatives Summary for the Beaver Brook Linkage Interference Zone (LIZ)

Revised 1/15/2020

Mitigation Option	Mitigation Description	Wildlife & Biological Considerations	Political Considerations	Economic Considerations	Social Support	Feasibility	Next Steps to Advance
A. Wildlife Crossing Mitigation	Construct a wildlife overpass over I-70 & US 40 at MP 247.2 (Storage Units location). Mitigation includes wildlife exclusion fencing, escape ramps and wildlife guards along I-70 from west of the Floyd Hill exit to east of Soda Creek Road to prevent wildlife-vehicle collisions (WVC)	<ul style="list-style-type: none"> Restores landscape connectivity over I-70 & US 40, and provides greater wildlife access for resident elk south of I-70 in the Beaver Brook area to open space and undeveloped parcels north of I-70 at both the overpass location and Soda Creek Fencing mitigation along I-70 will reduce incidence of WVC and encourage safe wildlife passage under I-70 at Soda Creek Road bridge Beaver Brook LIZ is a lower connectivity priority (2003 LIZ assessment) on the Mountain Corridor; it is not a migration corridor, winter range or genetic corridor Chronic wasting disease is present in elk and deer herds in Game Management Units (GMUs) 38 & 39 Narrow, unprotected wildlife corridor due to extensive dispersed residential development and a proposed 400 unit development immediately on south side. Concern that wildlife use of the overpass will become restricted by potential future development and recreation north and south of I-70 Due to lower density wildlife populations the crossing will not have usage rates as high as other successful crossing structures (e.g., SH 9, US 160) 	<ul style="list-style-type: none"> Record of Decision (ROD) commits CDOT to wildlife crossings mitigation Governor's Executive Order in Sept 2019 supports wildlife crossings Wildlife crossing awareness is high due to other successful projects (e.g., SH 9) Highly visible and very costly mitigation project in human impacted landscape would be subject to extensive scrutiny; May impact future wildlife crossing projects in the state 	<ul style="list-style-type: none"> Overpasses will be very costly (bridge spanning eastbound and westbound I-70 and US 40) 	<ul style="list-style-type: none"> Public not clamoring for a wildlife crossing in this area (perception of costly solution to a small or non-existent problem) 	<ul style="list-style-type: none"> Very complex human landscape renders this area less favorable for a large investment in wildlife crossings infrastructure Wildlife crossings with fencing are the most effective mitigation method for reducing WVC Construction is complicated by multiple factors: Bridge over eastbound and westbound I-70 and US 40; Bridge must be 'oversized' to maintain flexibility for future operations; and will likely require short-term closures on I-70 & US 40 	<ul style="list-style-type: none"> Refine preliminary design: <ol style="list-style-type: none"> approaches geometry/roadway criteria right of way needs refined cost estimate Follow up with ALIVE ITF in Spring

LEGEND: Green = Potential Benefit
 Red = Potential Challenge
 Black = Neutral



OPTION B

- Mile Post (MP)
- Approximate Location for Proposed Wildlife Fencing (with crossing at Soda Creek Road)
- Approximate Location for Potential Conservation Easement
- Parcel in Private Ownership
- Parcel in Public Ownership*

* CDOT, USFS, County

Note: Option B also includes a contribution to a new I-70 Wildlife Mitigation Fund



I-70 Floyd Hill Mitigation Alternatives Summary for the Beaver Brook Linkage Interference Zone (LIZ)

Revised 1/15/2020

Mitigation Option	Mitigation Description	Wildlife & Biological Considerations	Political Considerations	Economic Considerations	Social Support	Feasibility	Next Steps to Advance
B. Alternative Mitigation Plan	In lieu of constructing a wildlife crossing in the Beaver Brook LIZ, pursue a multi-part mitigation strategy consisting of: 1. Contribute to an I-70 Mountain Corridor Connectivity Mitigation Fund to construct a wildlife crossing elsewhere in the Region 1 portion of the Mountain Corridor [e.g., the Mt. Vernon Creek LIZ (MP 252.8-257.6) - according to the 2011 EcoLogical Report this area had the highest WVC rate in the Mountain Corridor; or around Soda Creek (~MP 250) in the Beaver Brook LIZ, which had the highest WVC from 2012 to 2016] 2. Pursue a conservation purchase or easement in the meadow/wetland complex area on the south side of I-70 at the top of Floyd Hill 3. Install wildlife exclusion fencing and associated wildlife guards, escape ramps, and pedestrian access gates along I-70 west of the Floyd Hill exit to east of Soda Creek Road to prevent WVC	<ul style="list-style-type: none"> •Connectivity value of LIZ is more historical than current - habitat protection is a greater need for this herd than connectivity across I-70 •Potential to permanently protect high quality wetlands and meadow habitat, one of the last vestiges in this landscape; these parcels are important for this elk herd, whose habitat has already been severely restricted and fragmented by development and roads •Fencing mitigation along I-70 will reduce incidence of WVC and encourage safe wildlife passage under I-70 at Soda Creek Road bridge •Direct mitigation funding towards higher priority LIZs in the Mountain Corridor •This option does not include a wildlife crossing structure and no connectivity improvements will be made in this portion of the LIZ across I-70 & US 40 at the top of Floyd Hill •Land use will only become more complex and challenging in the futures 	<ul style="list-style-type: none"> •This is the first opportunity to comply with the ALIVE MOU and restore connectivity with a new wildlife crossing in the I-70 Mountain Corridor •May require future ALIVE MOU revisions to address alternative mitigation options and priorities, if needed, for future projects. Must keep the intent of the ALIVE MOU intact •FHWA EcoLogical approach supports mitigation in the best place even if it's outside of project boundaries 	<ul style="list-style-type: none"> •May leverage wildlife mitigation funding to offer greater conservation benefits on the Mountain Corridor for similar costs 	<ul style="list-style-type: none"> •Option requires agreement by the project ALIVE ITF •Local community support anticipated as this option could conserve the meadow/wetland complex area 	<ul style="list-style-type: none"> •Setting up a connectivity mitigation fund is new for CDOT and will require planning among R1, R3, ALIVE and FHWA •CDOT may not be able to protect the meadow & wetland properties •Minimal design and construction (only for fencing, wildlife guards, and escape ramps) •Wildlife fencing mitigation is very feasible and effective for reducing WVC 	<ul style="list-style-type: none"> •Assess property ownership; approach County and property owners regarding conservation easement/purchase •Identify whether there are other large parcels available for a conservation purchase that would benefit connectivity to the south (Mt Evans, Bergen Peak) •Refine cost estimate for Option A (to inform funding available for Option B) •Develop Mitigation Fund •Follow up with ALIVE ITF in Spring

LEGEND: Green = Potential Benefit
Red = Potential Challenge
Black = Neutral



I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS

Member of the SNC-Lavalin Group

ALIVE Meeting

January 9, 2020



Meeting Objectives

- Beaver Brook LIZ
 - Review Mitigation Option A (Wildlife Overpass) design and considerations
 - Present and discuss Mitigation Option B (Alternative)
 - Obtain consensus from the ALIVE Committee
- Clear Creek LIZ
 - Update the ALIVE Committee on the new Canyon Viaduct Alternative
 - Obtain input for inclusion in the CSS Alternatives Matrix



Introductions

- Name
- Position
- Agency/Company



I-70 Floyd Hill to Veterans Memorial Tunnels

Project Status Review





I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ Mitigation Option A – Overpass





I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ Mitigation Option A – Overpass





I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ

Mitigation Option B – Alternative Mitigation

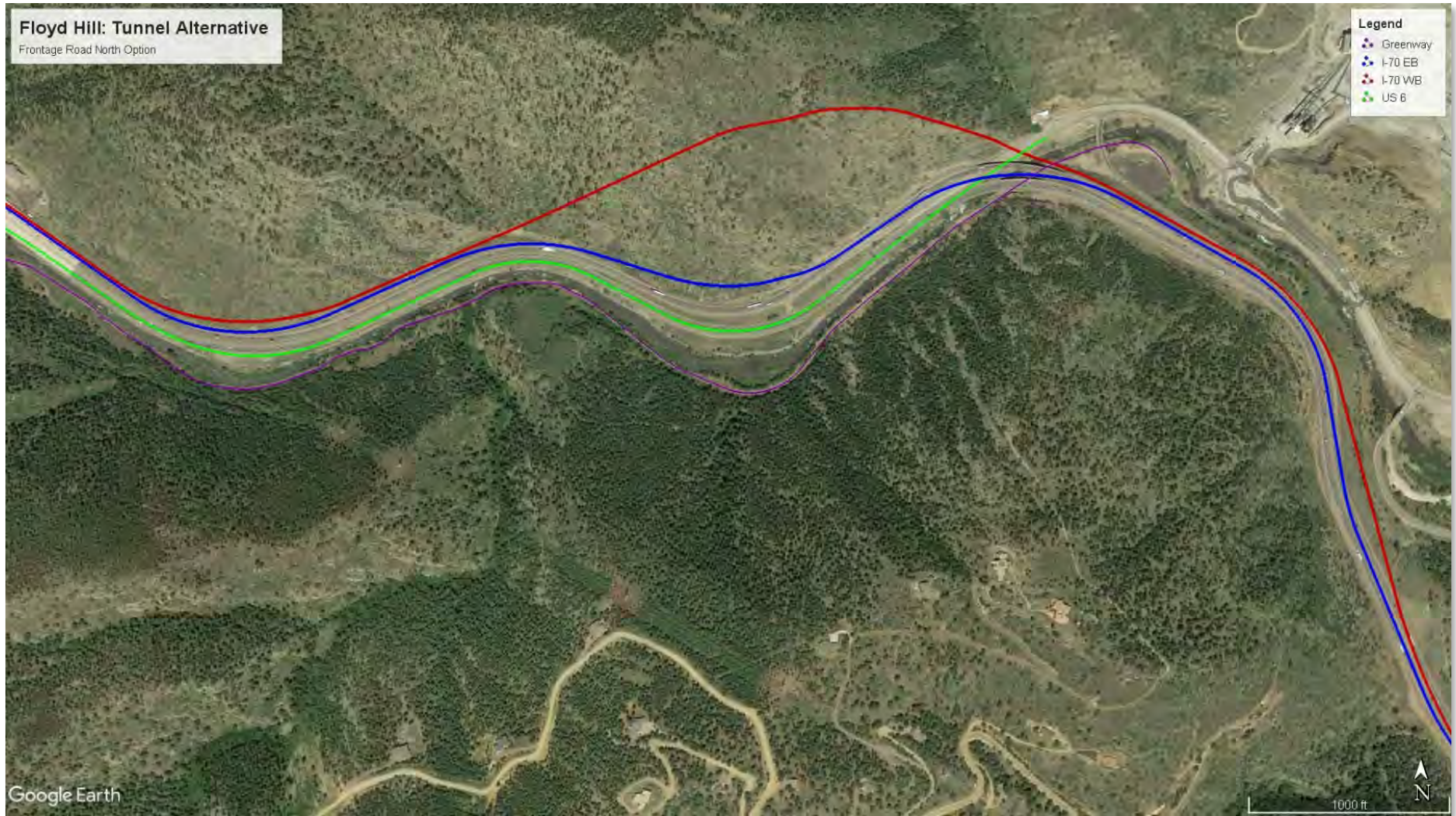




I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – North Frontage Road Design Option





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – North Frontage Road Design Option



East Portal – Looking West (Figure 1)



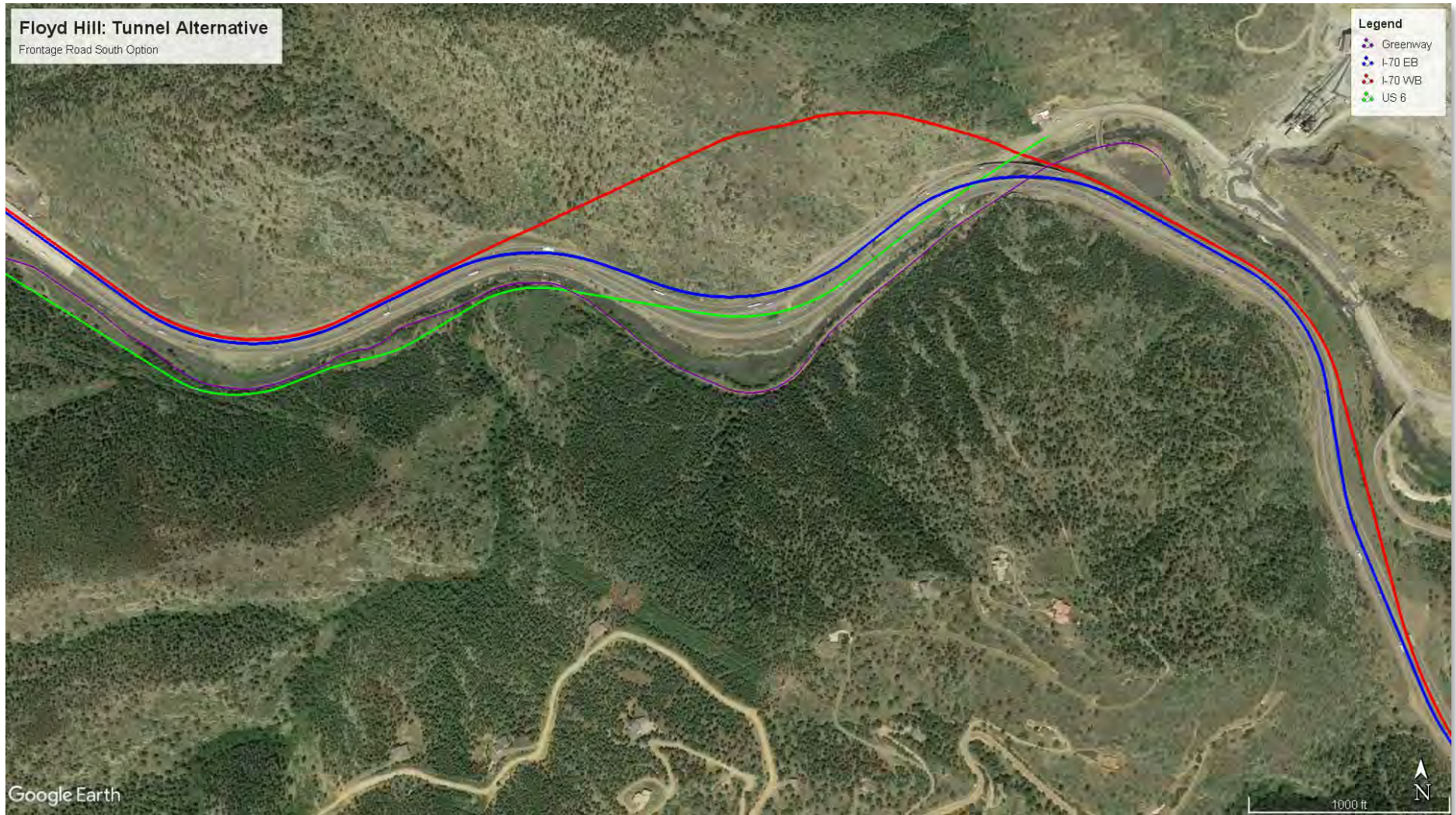
West Portal – Looking East (Figure 2)



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – South Frontage Road Design Option



Clear Creek LIZ

Tunnel Alternative – South Frontage Road Design Option



East Portal – Looking West (Figure 1)

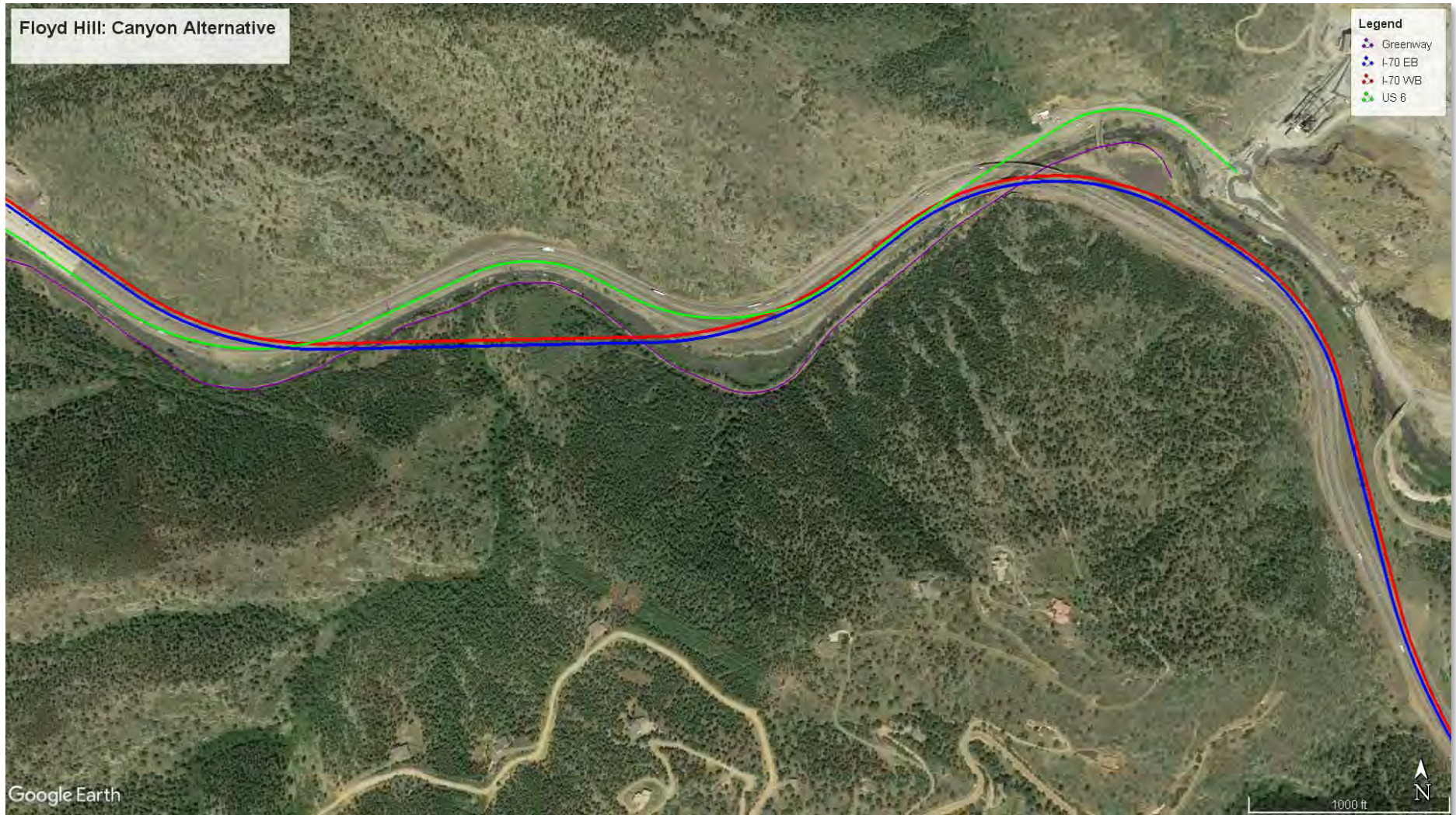


West Portal – Looking East (Figure 3)



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ Canyon Viaduct Alternative





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ Canyon Viaduct Alternative



East Portal – Looking West (Figure 4)



West Portal – Looking East (Figure 5)



I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives East Portal



Canyon Viaduct Alternative (Figure 4)

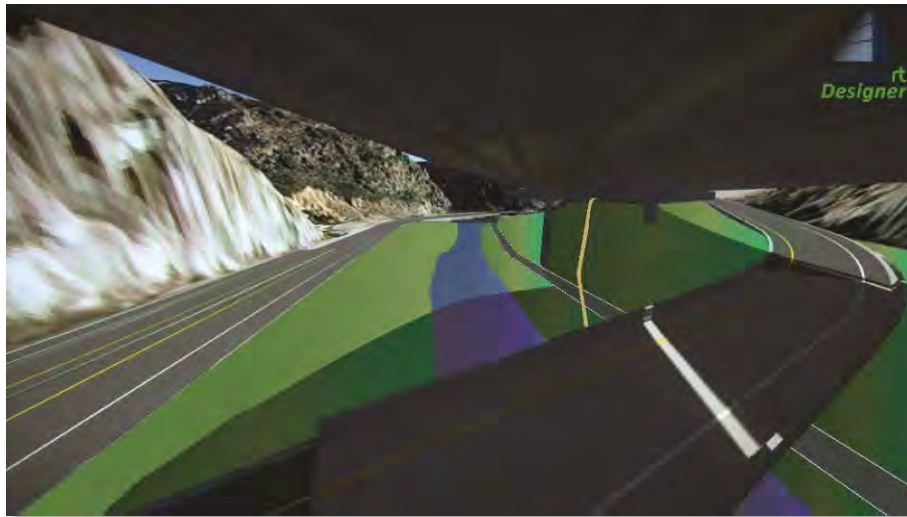


Tunnel Alt. – North and South Frontage Road Options
(Figure 1)

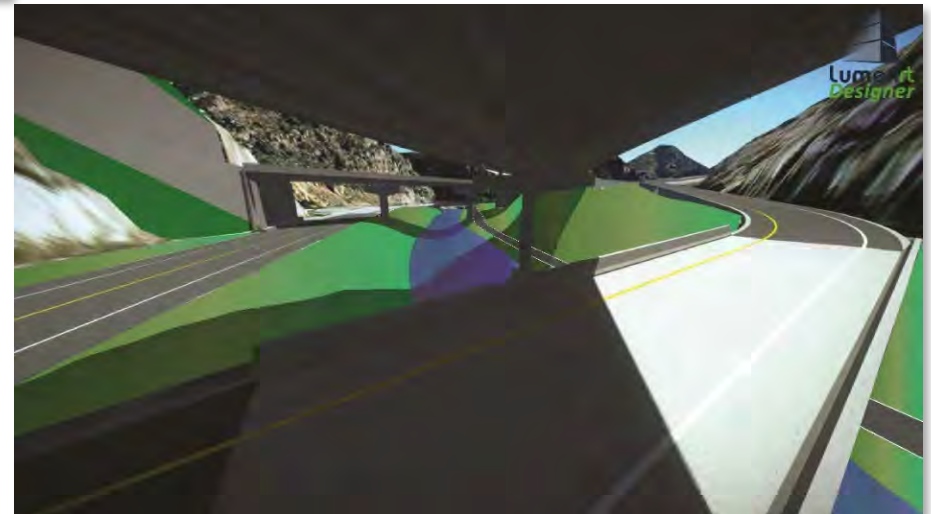


I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives East Portal - Riparian



Canyon Viaduct Alternative (Figure 6)



Tunnel Alt. – North & South Frontage Road Options (Figure 7)



I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives West Portal



Canyon Viaduct Alternative (Figure 5)



Tunnel Alt. – North Frontage Road Option (Figure 2)



Tunnel Alt. – South Frontage Road Option (Figure 3) ¹⁶

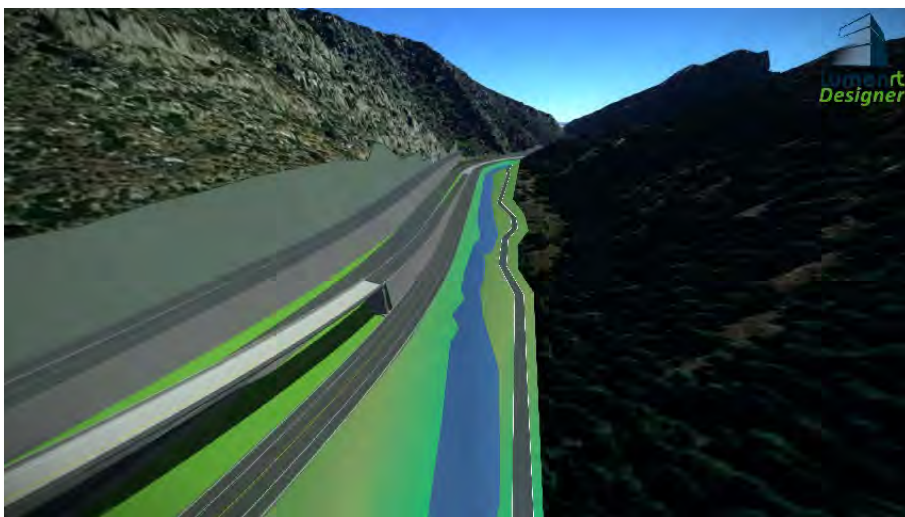


I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives West Portal - Riparian



Canyon Viaduct Alternative (Figure 8)



Tunnel Alt. - North Frontage Road Option (Figure 9)



Tunnel Alt. - South Frontage Road Option (Figure 10)¹⁷



Next Steps

- If pursuing Option A:
 - Refine preliminary design for Overpass
- If pursuing Option B:
 - Approach County and property owners regarding conservation easement/purchase
 - Identify whether there are other large parcels available for conservation easement/purchase
 - Refine cost estimate for Option A to inform funding available for Option B
 - Develop Mitigation Fund
- Follow up with ALIVE ITF in Spring 2020



I-70 Floyd Hill to Veterans Memorial Tunnels

Questions



Meeting Notes



Project: I-70 Floyd Hill to VMT
Meeting: ALIVE Meeting #5
Date: February 26, 2020, 9:00am-12:00pm
Location: CDOT Region 1, 425A Corporate Circle, Golden, CO, Lookout Mountain Room

Meeting Objectives:

- Present and discuss in detail Mitigation Option B (Alternative) in the Beaver Brook LIZ
- Obtain consensus from the ALIVE Committee on which Option to pursue in the Beaver Brook LIZ
- Review and discuss wildlife considerations for the three alternative alignments (Tunnel Alternative, North and South Frontage Road Options; and Canyon Viaduct Alternative) in the Clear Creek LIZ and obtain input for inclusion in the CSS Alternatives Matrix

Agenda:

- 1) Welcome / Introductions
- 2) Follow-up on Action Items from January ALIVE Meeting
- 3) Beaver Brook LIZ
 - a) Review Mitigation Option A: Overpass
 - b) Mitigation Option B: Alternative Mitigation
 - i) Potential alternative location(s) for wildlife crossings mitigation outside of the project area on I-70 in R1 (matrix)
 - ii) In project area wildlife fencing mitigation to reduce wildlife-vehicle collisions
 - c) ALIVE recommendation for Beaver Brook LIZ mitigation
- 4) Clear Creek LIZ
 - a) Review Alternatives / Options
 - i) Tunnel Alternative: North and South Frontage Road Design Options
 - ii) Canyon Viaduct Alternative
 - b) Discussion of wildlife connectivity values, challenges, and priorities
- 5) Next Steps / Action Items



Floyd Hill - ALIVE ITF Meeting #5 Notes
February 26, 2020, 9 AM to 12 PM
CDOT Golden - Lookout Mountain Conference Room

Welcome and Introductions

The meeting began with Vanessa Henderson, Colorado Department of Transportation's (CDOT) I-70 Mountain Corridor Environmental Manager, welcoming the group, which was followed by roundtable self-introductions. Attendees are listed at the end of these notes. Alison Deans Michael, US Fish and Wildlife Service (USFWS), is retiring and was recognized as the longest standing member of the ALIVE Committee. Colorado Parks and Wildlife (CPW) members were not able to attend the meeting so Julia Kintsch with ECO-resolutions, and Francesca Tordonato, CDOT's Region 1 Environmental Program Manager, will follow up with them and to obtain input on items presented during the meeting.

Follow-up on Action Items from January 2020 ALIVE meeting

Many of the action items from the January 2020 ALIVE meeting were discussed as part of the meeting and are included in these notes. However, two items were discussed up front as information learned during the follow-up process affects the discussion about Mitigation Option B: 1) setting up a mitigation fund and 2) purchasing property at the top of Floyd Hill.

1) Mitigation Fund

To determine the applicability of a wildlife crossing mitigation fund for the I-70 Mountain Corridor, Vanessa and Francesca consulted with Jeff Peterson, CDOT Wildlife Program Manager. Jeff said it took several years to set up the existing CDOT Lynx In-lieu Fee Mitigation Fund and explained that mitigation dollars could remain unused in the fund for years before mitigation is constructed. With this information and given that it is unlikely that CDOT would use this fund for alternate crossing locations on future projects (i.e. this would be a one time or rare event), CDOT decided that it would be better to pursue alternate crossing project(s) concurrent with the Floyd Hill project rather than investing the time and effort in the creation of a fund for a one-time mitigation option.

Question: What if the mitigation funding doesn't line up? What if there is a surplus or not enough?

Answer: Clarifying the budget and identifying an actual substitute project would reduce the uncertainty about equivalent costs. CDOT's intention is to dedicate the same amount of money on Option B as would be required for Option A. This may result in more than one crossing being constructed.

Question: How would the new crossing or crossings be constructed? Would they be part of the Project or separate?

Answer: There are options to construct as part of the project with the same contractor or separately, but the funding and commitment would be part of this Project. The mitigation commitment would be included in the Project and would need to be completed before the Project could be closed out.

2) Property Purchases at the Top of Floyd Hill

The Colorado Attorney General advised against early discussions with property owners since the Project timing and right-of-way needs are uncertain. However, CDOT Right-of-Way staff provided information on the property values for discussion purposes. It could cost approximately \$7 to \$9 million to purchase

the four properties around the elk meadow. Purchasing these properties would reduce funds available for the construction of a crossing structure(s). Habitat availability and protection is an important consideration for wildlife crossing success; however, habitat protection alone does not mitigate for the wildlife barrier impacts associated with the project. Therefore, purchasing all four parcels has been eliminated from further consideration. However, purchasing 1-2 parcel(s) may still be an option combined with construction of a wildlife crossing structure in a different location along the corridor, depending on costs and the availability of funds.

Beaver Brook LIZ, Mitigation Option A: Floyd Hill Wildlife Overpass

Julia reminded the group of the location for Mitigation Option A, the proposed crossing (overpass) at the top of Floyd Hill. The current cost estimate for the crossing is \$17.6 million.

Julia provided information on surrounding land uses adjacent to the proposed crossing. On the north, there is a lot of protected land or low-density residential. Adam Springer, Clear Creek County, said that on the south side of I-70 in Clear Creek County there is potential for higher density commercial development but there are some water infrastructure constraints in this area.

Mitigation Option B: Alternative Wildlife Crossings Mitigation

Julia presented six alternative wildlife crossing locations on I-70 that were in the boundaries of CDOT Region 1 (see attached matrix). These locations were identified by reviewing previous recommendations (e.g., I-70 EcoLogical Study; 2014 Traffic and Revenue Study) and considering, for each location, biological value, wildlife-vehicle collision rates, land ownership and land use, construction feasibility and a cost estimate for constructing a crossing at that location. These costs are high-level estimates for comparative purposes and have not been formally reviewed, so these values are subject to change.

Julia noted that the 2003 rankings of each Linkage Interference Zone (LIZ) were included in the matrix for reference; however, these rankings were developed over 15 years ago and need to be viewed in the context of the ALIVE Committee's thinking at the time. Julia suggested the rankings weighted wildlife value more heavily than wildlife-vehicle collisions (WVCs). Alison agreed and explained that in 2003, the ALIVE Committee didn't think much could be done in the high WVC areas because there were multiple access points in those locations. Since 2003, however, crossings had been successfully implemented in these types of landscapes with access points through the fencing controlled with wildlife guards. Julia also suggested that Canada lynx reintroductions may have influenced the 2003 rankings. The species had recently been reintroduced in Colorado, and individual populations and animal movements were not well established. Alison confirmed that the rankings were geared toward lynx and explained that a breeding population of lynx has not established in this area despite earlier predictions.

Crossing Location 1 - Genesee

This location is within the Mt. Vernon LIZ and it has the highest rate of WVCs within the corridor. CPW has identified this location as an important wildlife crossing zone and CDOT has identified it as a WVC hot spot for safety improvements. The 2011 EcoLogical study documented elk, mule deer, and other species here.

The crossing would be an underpass situated near Mt Vernon creek through a large embankment.

Question: Would the crossing replace the culvert?

Answer: No. The culvert would not necessarily need to be replaced. There are examples of crossings above or adjacent to drainages that keep the existing drainage culverts in place. The riparian

corridor still attracts wildlife to the location.

A structure in this location could potentially be constructed entirely within CDOT right-of-way. Land on the south side of the interstate appears to be HOA open space. On the north side there is a vacant parcel that is for-sale-by-owner. If land in these areas could be protected it would be very beneficial to the wildlife in this area. Jefferson County zoning is not indicative of future development plans and a lot of land is zoned as “potential development” even where there are no immediate development plans or an area is already built out. If this location is selected, additional investigation would be needed to assess land use suitability.

Crossing Location 2 - Ruby Ranch

This location is within the Beaver Brook LIZ but outside of the Project area. A high rate of WVCs in this area have been reported to law enforcement. Mule deer is the primary target species, although other wildlife would also benefit. It would not serve the elk population at the top of Floyd Hill but elk could opportunistically use a crossing structure at this location.

The structure would be a wildlife underpass and it could potentially be constructed entirely within the existing CDOT right-of-way. There is a 30-foot-wide median between opposing traffic lanes. The surrounding zoning is primarily defined as 'suburban rural' with some parcels zoned for planned development. If this location is selected, additional investigation would be needed to assess land use suitability.

Crossing Location 3 - Soda Creek

This location is within the Beaver Brook LIZ and within the Project area. It would serve deer but is not expected to serve the elk herd at the top of Floyd Hill. There are two options for the crossing. The existing bridge could be lengthened, or a new bridge could be built at the creek crossing, which is approximately 300 feet east of the existing bridge. The existing bridge can function for wildlife passage but it is not ideal because it is a low-volume road. CPW has reported that some deer and other species cross under the roadway bridge. There is existing wildlife fencing on the north side of the interstate that will need to be replaced/extended as part of the Project whether or not a crossing structure is built.

Alison noted that Soda Creek is within potential Preble's meadow jumping mouse (PMJM) habitat. Constructing a new riparian crossing could potentially improve PMJM habitat connectivity. **Follow-up: After the meeting, Francesca looked up PMJM habitat maps and determined that this location is not contiguous with PMJM occupied range. She also noted that no trapping has occurred at Soda Creek and determining PMJM presence would require further investigation.**

Question: What is the date range of the WVC data?

Answer: Julia will follow up. It is either 5 or 10 years; she will confirm and add the note in the matrix. **Follow-up response: the calculation of WVC crashes per mile per year is based on the most recent five years of available data, from 2014-2018.**

Crossing Location 4 - US 40

This location is within the Empire Junction LIZ on US 40. The target species for this location is bighorn sheep. It is a very important location for sheep movement and provides a genetic connection between two subpopulations of the large Georgetown herd, which is the largest in the state. CPW has identified this location as a high priority crossing area. It is recommended that a crossing at this location be designed to accommodate movement by other species as well as bighorn sheep.

There are private lands on the north and south sides of US 40 in this location. The north side is undevelopable due to steep slopes. Adam said the landowner on the south was originally planning on developing a quarry but that did not pan out and now he is interested in finding a new use for the property and may be willing to consider a conservation easement.

The cost of this crossing is less than the others because it would span a much narrower roadway footprint but there are constructability issues with rock cuts and blasting.

Question: What about the WVC area further south, along the I-70 westbound on-ramp? Would WVCs increase in this location if a wildlife crossing was constructed over US 40? Would the crossing result in more bighorn sheep movement to this area?

Answer: The specific issues with WVCs along the on-ramp to I-70 are unique to that location and are complicated because of the merge where drivers are looking over their left shoulders to enter the highway. The habitat and road salt attractants that result in bighorn WVC at the end of the on-ramp occur regardless of the proposed new crossing and would not be anticipated to increase.

The purpose of this proposed crossing would be to preserve east-west connections on the north side of I-70. This location is in the Empire Junction LIZ but does not address movement across I-70. Wildlife movement across I-70 and WVC impacts to bighorn and other wildlife would still need to be addressed and would be part of the future Empire Junction project.

Question: Could there be additional mitigation at the I-70 on-ramp hotspot as part of developing this crossing?

Answer: The Westbound Peak Period Shoulder Lane project added warning signs. The fence alignment that would be part of the overpass design may consider WVCs in this location.

Crossing Locations 5 and 6

These crossings are located on the western end of the Region 1 boundary, near the Eisenhower-Johnson Memorial Tunnels (EJMT) and are in the Bakerville LIZ. Lands on either side of the interstate are owned by the U.S. Forest Service (USFS) and managed as lynx Linkage Areas. This segment of I-70 was identified as a lynx crossing area because two lynx WVCs occurred here in the early 2000s. However, over the last 15 years lynx activity has remained low in this area.

There are important wetland areas (mapped fens) and boreal toad habitat in these locations. Julia pointed out that creating toad connectivity in this area is an option. Both locations were selected, in part, because they are situated between chain-up stations that have lighting and human activity, which are disruptive for wildlife.

There are a number of challenges to crossings in this location. First, the road grade is steep and would be challenging for building an overpass. Second, there will likely be future interstate improvements in these areas. Any structure built now would have a high probability of being rebuilt to accommodate future highway designs. Additionally, Aurelia Denasha, USFS, said that Loveland Ski Area is planning parking lot expansions and increased snow cat activity in these areas.

Alison asked if providing a crossing in this location would encourage goat population expansion, which would conflict with CPW's goal of reducing disease transmission. CPW's input will be requested to answer this question.

Wildlife Fencing in Project Area

Wildlife fencing from the top of Floyd Hill to east of Soda Creek Road is pertinent to both Mitigation

Options A and B. Julia reviewed the conceptual fencing layout for the Project. She noted that fence ends are often problematic and recommended tying the western extent of the fencing into the Highland Hills interchange. On the north side of I-70, fencing would be installed between US 40 and I-70 because there are multiple access points along US 40 which would diminish the effectiveness of the fencing. Wildlife guards would be needed at each access point but they are not impenetrable and their effectiveness is reduced by snow pack accumulation in the winter. While there is less wildlife activity from the north to south and WVCs have been less of an issue on US 40, WVCs that do occur on US 40 would not be addressed by this fence alignment.

Fencing is more challenging at the east end of the Project because of the steep slopes and guardrail. There is no room to install the fencing at the top of the hill along the north side of I-70 and fencing installed part-way down the slope would be subject to damage from plowed snow and other debris. There is existing fencing at the bottom of the slope on the north side; however, the fence end is open and animals can get around it. This will need to be addressed. On the south side of I-70, the fence end can tie into a rock feature on the cut slope east of Soda Creek Road.

Beaver Brook LIZ ALIVE Recommendations and Discussion

The attendees were asked whether they supported moving forward with Mitigation Option A or Option B.

Question: Are Option B locations more valuable for wildlife than the Option A location?

Answer: Potentially, because more than one crossing could be built and because several of the alternate crossing locations are expected to have a greater benefit for wildlife connectivity and reducing WVCs.

Question: Is it a good idea to fence the entire length of the Project without providing crossing opportunities?

Answer: We would not fence the entire length of the Project; just the area around the elk meadow at the top of Floyd Hill east to Soda Creek. This segment has the highest WVCs in the Project area.

Question: What is the value of Option A?

Answer: It would be used by the Floyd Hill elk herd and would have value in connecting the herd with habitat on the north of I-70. The migration patterns of the elk and deer herds in this area have already been disrupted by past development, so there is limited ecological or genetic benefit for the cost. However, Option A is the best way to address connectivity needs within the Project area.

There are tradeoffs with each consideration.

The group decided that Option B has greater potential and provided the following input:

- US 40 has the highest wildlife value for bighorn sheep
- The Genesee location is the only location where elk is the primary target species. While it doesn't serve the same herd on Floyd Hill, it does serve the same species.
- The Project Team is leaning toward Empire and Genesee as best options.
- The Empire location does not address the impacts of this Project because bighorn sheep movements are not being impacted. This is a problem with all the Option B alternatives. Mitigation is usually tied to project-specific impacts.

- The FHWA EcoLogical framework provides guidance to support putting mitigation in the best place even if it is outside of project boundaries.
- Option B sounds like a good idea, but we need to determine how to be equitable. There was some concern about mitigating outside of the county in which the impacts occur. Francesca noted that the Genesee location would improve safety for all drivers, including Clear Creek County residents.
- One benefit of Option A is that it would be very visible. Selecting Option B would eliminate that benefit. However, one potential downside to Option A is also that because of its visibility it may be subject to more criticism on account of its location in very residential and human-impacted landscape.
- CDOT will ensure the cost of the final mitigation package is the same as the cost of Option A.
- The Genesee and Ruby Ranch Road locations should be ranked higher than the Empire location. The Genesee location provides mitigation for the same species that would be impacted by the Project; the Ruby Ranch Road location is in the same LIZ as the Floyd Hill project area.
- Soda Creek should remain on the table because it is within the Project area and fencing would direct animals to this location. There is also potential for PMJM habitat improvements to be made at this location.
- The two Bakerville locations should be eliminated from further consideration. They are expensive, subject to a throwaway investment, and do not address project-specific impacts.

Based on the challenges associated with Mitigation Option A and the input provided for Mitigation Option B, the group decided to move forward with Option B. The next step for the ALIVE Committee will be to consider and rank the alternative crossing locations to determine the best allocation of mitigation funds.

Clear Creek LIZ

Wildlife Considerations

Julia reviewed the designs for the Tunnel Alternative (both North and South Frontage Road Design Options) and the Canyon Viaduct Alternative. For this LIZ, the opportunities for wildlife connectivity improvements are largely to improve east-west connectivity along the riparian corridor. Both alternatives are similar with respect to US 6. In general, the high I-70 bridges are not a concern. The concerns are primarily around the lower US 6 off-ramp onto I-70 eastbound and the I-70 westbound off-ramp onto US 6. The Canyon Viaduct Alternative would reconstruct the off-ramp, which might provide more opportunity for improved wildlife passage, but the existing bridges are tall (20 feet high), and even with the bridges remaining in place, there are opportunities to excavate under the eastern end spans and improve height and width of the passageway under the existing bridge.

The frontage road options have different impacts for wildlife. In general, the location of the frontage road north of Clear Creek is better for concentrating infrastructure. It is better for recreational purposes and better for wildlife as well. It might also be better for resiliency because there would be less riprap and more opportunity for creek improvements.

The group discussed potential issues with water quality and habitat/creek quality. There are concerns about the use of mag chloride and shading of the creek/riparian habitat. Mandy Whorton, Peak Consulting, noted that this is something the Stream and Wetland Ecological Enhancement Program (SWEEP) Committee will be addressing. Aurelia asked if the USFS was represented on SWEEP. Vanessa

said USFS was represented and she will follow up with Aurelia on who the current representative is.

The group indicated interest in how rock cuts may affect bighorn sheep habitat.

Next Steps

- Refine plans for Genesee, Ruby Ranch Road, Soda Creek, and Empire crossings.
- Refine cost estimates to determine equivalent mitigation to the Option A crossing at the top of Floyd Hill.
- Follow up with Jefferson County on land use and development plans for lands surrounding proposed crossings.
- Update the matrix to support the ALIVE committee in ranking the remaining crossing locations and determining how mitigation funds could be allocated. The updated matrix will include the Floyd Hill crossing for comparison purposes. It will also include the individual parcels that comprise the meadow-wetland complex at the top of Floyd Hill as well as the parcel for sale on the north side of the Genesee crossing location.

Attendees

Adam Springer (Clear Creek County); Stephanie Gibson and Melinda Urban (FHWA); Vanessa Henderson, Neil Ogden and Francesca Tordonato (CDOT); Alison Dean Michaels (USFWS); Aurelia DeNasha (USFS); Anthony Pisano and Carol Coates (Atkins); Julia Kintsch (ECO-resolutions); Mandy Whorton (Peak Consulting Group).

I-70 Mountain Corridor Region 1 Alternative Wildlife Crossing Locations

Revised March 10, 2020

Milepost	Location Name	LIZ Name	Crossing Type	Biological Value	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††
254.5	Genesee	Mt. Vernon	Underpass at fill slope	<ul style="list-style-type: none"> Primary target species: Elk and mule deer. CPW identified highway crossing zone. Secondary target species: Black bear, mountain lion, fox, coyote, bobcat. Monitored location for the I-70 EcoLogical Study (2009-2010) detected elk, mule deer, coyote, fox, skunk. 	Low	Very High (3.4 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: High Location identified by CDOT Traffic & Safety as a WVC hotspot. 	<ul style="list-style-type: none"> Private ownership. Properties immediately adjacent to proposed structure location are undeveloped (possible to obtain conservation easements?), but residential development around the greater area. 	<ul style="list-style-type: none"> Location does not require a crossing over/under US 40, which runs farther north of this location. Offset structure to west side of drainage to shorten structure length. Possible Traffic & Safety funding. Future project is unlikely as I-70 is already 3 lanes in both directions through this segment. 	\$4.2M (bridge underpass)
250	Ruby Ranch Road	Beaver Brook	Underpass at fill slope	<ul style="list-style-type: none"> Primary target species: Mule deer & elk. CPW identified highway crossing zone. Secondary target species: Black bear, mountain lion, fox, coyote, bobcat. 	Low	High (2.8 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: Very high 	<ul style="list-style-type: none"> Private ownership with dispersed residential development 	<ul style="list-style-type: none"> Location is within the Beaver Brook LIZ. Location does not require a crossing over/under US 40, which runs farther north of this location. Steep fill on north side, but structure doesn't need to be at deepest part of fill. Consider how to grade north side approach or build trails into the slope leading to the structure. 30'-wide median between I-70 EB and WB lanes - could narrow median width to reduce structure length. Future project is unlikely as I-70 is already 3 lanes in both directions through this segment. 	\$4.2M (bridge underpass)
249	Soda Creek	Beaver Brook	Underpass at creek drainage	<ul style="list-style-type: none"> Primary target species: Mule deer Secondary target species: Elk, black bear, mountain lion, fox, coyote, bobcat. 	Low	High (2.8 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: Moderate (high within LIZ) 	<ul style="list-style-type: none"> Private ownership with dispersed residential development 	<ul style="list-style-type: none"> Creek is nearly 300' from the existing bridge Location is within the current project boundaries 	\$4.2M (bridge underpass)
US 40 MP 257.4	Empire	Empire Junction	Overpass just west of interchange spanning cliffs on N side to small cut slope on S side.	<ul style="list-style-type: none"> Primary target species: Bighorn sheep. Georgetown herd is the largest herd in CO. Location is important for genetic connectivity between 2 subpopulations. On US 40 (not I-70), but within the Empire Junction interchange area. This is the most important crossing site for bighorn along the corridor. Secondary target species: Canada lynx, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat. 	Medium	Low (0.4 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: Low Very high for bighorn sheep (Huwert 2015). 	<ul style="list-style-type: none"> Private. There is a willing landowner for a conservation easement on the south side (as of 2014). Nearby residences S & N sides of US 40 	<ul style="list-style-type: none"> A crossing structure at this location would need to accommodate future improvements around Empire Junction. US 40 has a narrower road footprint requiring a smaller crossing structure. Would require blasting/rock cut. 	\$3.1M (overpass)

I-70 Mountain Corridor Region 1 Alternative Wildlife Crossing Locations

Revised March 10, 2020

Milepost	Location Name	LIZ Name	Crossing Type	Biological Value	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††
220.5	Kearney Gulch	Bakerville	Overpass (Traffic and Revenue Study recommends MP 220.5-220.7; east of rock cut, but then the creek is much closer to I-70; consider west of rock cut ~MP 220.3-4)	<ul style="list-style-type: none"> Primary target species: Canada lynx. Ivan (2012) notes that 39% of lynx I-70 crossings occurred between the EJMT and Bakerville; segment identified as high probability of lynx highway crossing by Squires et al. (2013). Linkage has lower intensity lynx movements primarily used for summer dispersal movement; there are no breeding pairs in this area. Secondary target species: bighorn sheep, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat, and boreal toad. Monitored location for the I-70 EcoLogical Study (2009-2010) at MP 221.8 detected bighorn sheep, elk, mule deer. 	High (Herman Gulch)	Low (0.5 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: Low Two lynx WVCs have been recorded in this segment around MP 217.3 & MP 221 in 2000 & 2005. Moderate for bighorn sheep (Huwer 2015). Increasing moose conflict. 	<ul style="list-style-type: none"> Arapahoe National Forest on both sides of I-70; Managed as USFS lynx linkage area Bike path adjacent to creek on south side. 	<ul style="list-style-type: none"> Good location between chain-up stations (i.e., smaller road footprint and less affected by lights and activity) Feasibility challenged by uneven grades north and south of I-70. Creek parallel on south side, but with enough room for overpass wildlife approach ramp. Sensitive wetlands along Clear Creek. Future projects in this segment are planned but details are unknown. Preferred alternative includes 6 lanes, WB auxiliary lane, and AGS. 	\$13.8M (overpass)
217.4	Dry Gulch	Bakerville	Overpass recommended. An underpass would be very long and less preferable for bighorn sheep and elk.	<ul style="list-style-type: none"> Primary target species: Canada lynx. Ivan (2012) notes that 39% of lynx I-70 crossings occurred between the EJMT and Bakerville; segment identified as high probability of lynx highway crossing by Squires et al. (2013). Linkage has lower intensity lynx movements primarily used for summer dispersal movement; there are no breeding pairs in this area. Secondary target species: bighorn sheep, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat, and boreal toad (breeding site on north side of I-70). Monitored location for the I-70 EcoLogical Study (2009-2010) at MP 217.2 detected elk, mule deer, coyote, fox. Bike path/recreation impacts on lynx/wildlife movement (year-round but low winter intensity) 	High (Herman Gulch)	Low (0.3 WVC/mile/year)	<ul style="list-style-type: none"> WVC Carcass: Moderately low Two lynx WVCs have been recorded in this segment around MP 217 & MP 221 in 2000 & 2005. Moderately low for bighorn sheep (Huwer 2015). Increasing moose conflict. 	<ul style="list-style-type: none"> Arapahoe National Forest on both sides of I-70; Managed as lynx linkage area. Bike path adjacent to creek on south side. 	<ul style="list-style-type: none"> Feasibility challenged by road grade (~4%); uneven grades north and south of I-70; and proximity to creek on south side. Sensitive wetlands along Clear Creek. Future projects in this segment are unknown. Preferred alternative includes 6 lanes with WB auxiliary lane and AGS. 	\$13.8M (overpass)

NOTES

*2003 LIZ rankings based on potential and existing wildlife value at time of assessment (i.e., present and past utilization as a movement corridor, adjacency to suitable habitat and potential improvement value).

†WVC crash rate calculations based on data from 2014-2018.

††High level cost estimates have not been formally reviewed and are subject to change.

ACRONYMS

- AGS = Advanced Guideway System
- CDOT = Colorado Department of Transportation
- CPW = Colorado Parks and Wildlife
- LIZ = linkage interference zone
- MP = milepost
- USFS = United States Forest Service
- WVC = wildlife-vehicle collisions



I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS

Member of the SNC-Lavalin Group

ALIVE Meeting

February 26, 2020



Introductions

- Name
- Position
- Agency/Company



Meeting Objectives

- Beaver Brook LIZ
 - In depth presentation of Mitigation Option B (Alternative)
 - Obtain consensus from the ALIVE Committee
- Clear Creek LIZ
 - Review and discuss wildlife considerations for Tunnel Alternative (North & South Frontage Road Options) and Canyon Viaduct Alternative
 - Obtain input about wildlife connectivity values for inclusion in the CSS Alternatives Matrix



Follow-up on Action Items from January ALIVE meeting

- ✓ Cost for proposed wildlife overpass
- ✓ Map zoning around proposed wildlife overpass on Floyd Hill
- ✓ Further define Mitigation Option B:
 - Determine how to set up a mitigation fund and outline parameters, timeline for development
 - Evaluate Soda Creek bridge location for potential wildlife crossing upgrade
 - Create list of potential alternative crossing locations on I-70 in R1
 - Reach out to landowners regarding potential and cost of purchase for the 4 parcels comprising the meadow-wetland complex
- ✓ Wildlife fence alignment, wildlife guards and escape ramps



I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ

Mitigation Option A – Overpass



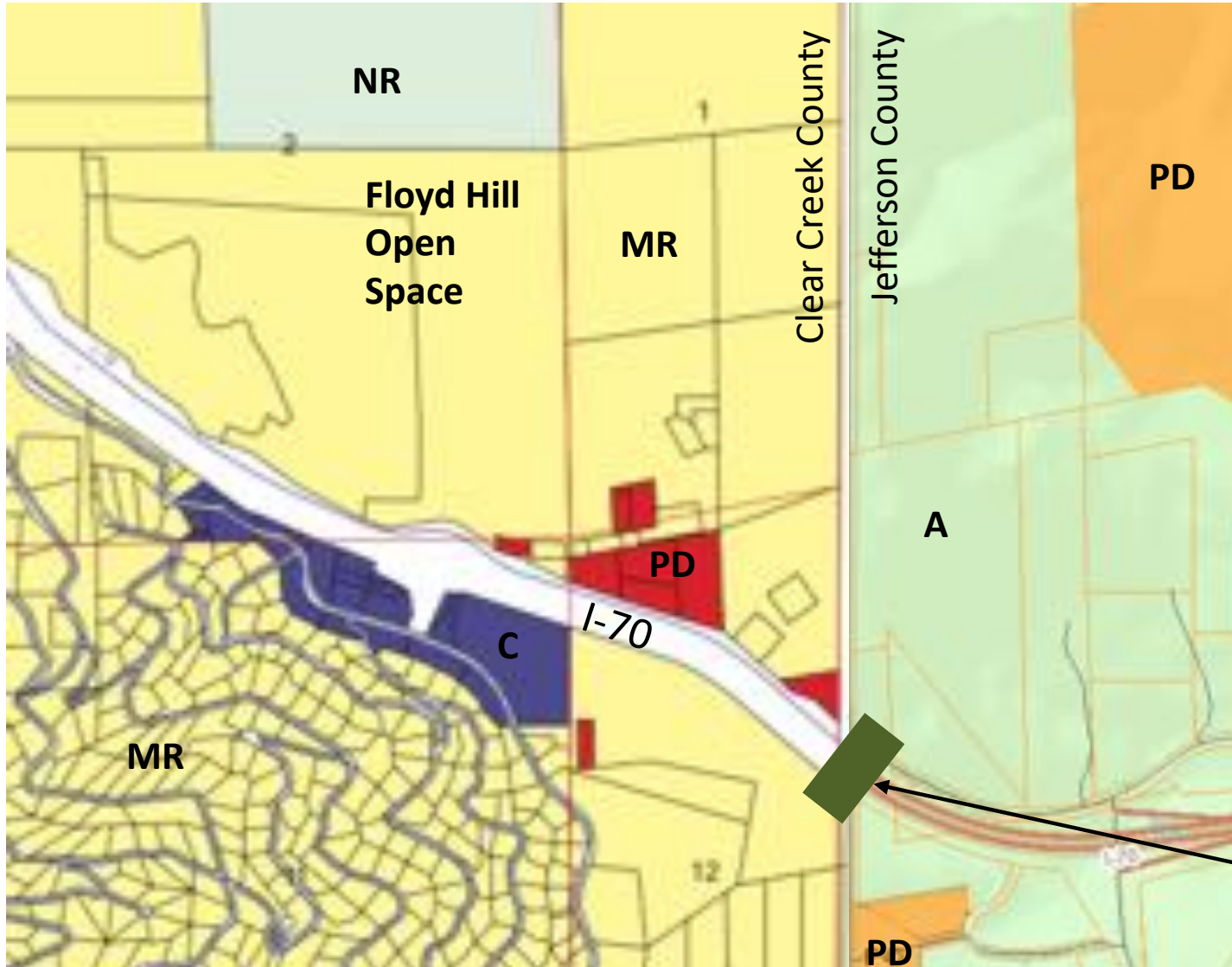
**Estimated Cost:
\$17.6 million**



I-70 Floyd Hill to Veterans Memorial Tunnels

Beaver Brook LIZ

Mitigation Option A – Wildlife Overpass at the Top of Floyd Hill



Zoning

Clear Creek County

- C Commercial
- MR Mountain Residential
- NR Natural Resource Protection
- PD Planned Development

Jefferson County

- A Agricultural
- SR Suburban Rural
- PD Planned Development

Wildlife Overpass



Beaver Brook LIZ

Mitigation Option B

1. Select alternative location(s) for wildlife crossings mitigation on I-70 in Region 1
2. Fencing to reduce WVC at the top of Floyd Hill

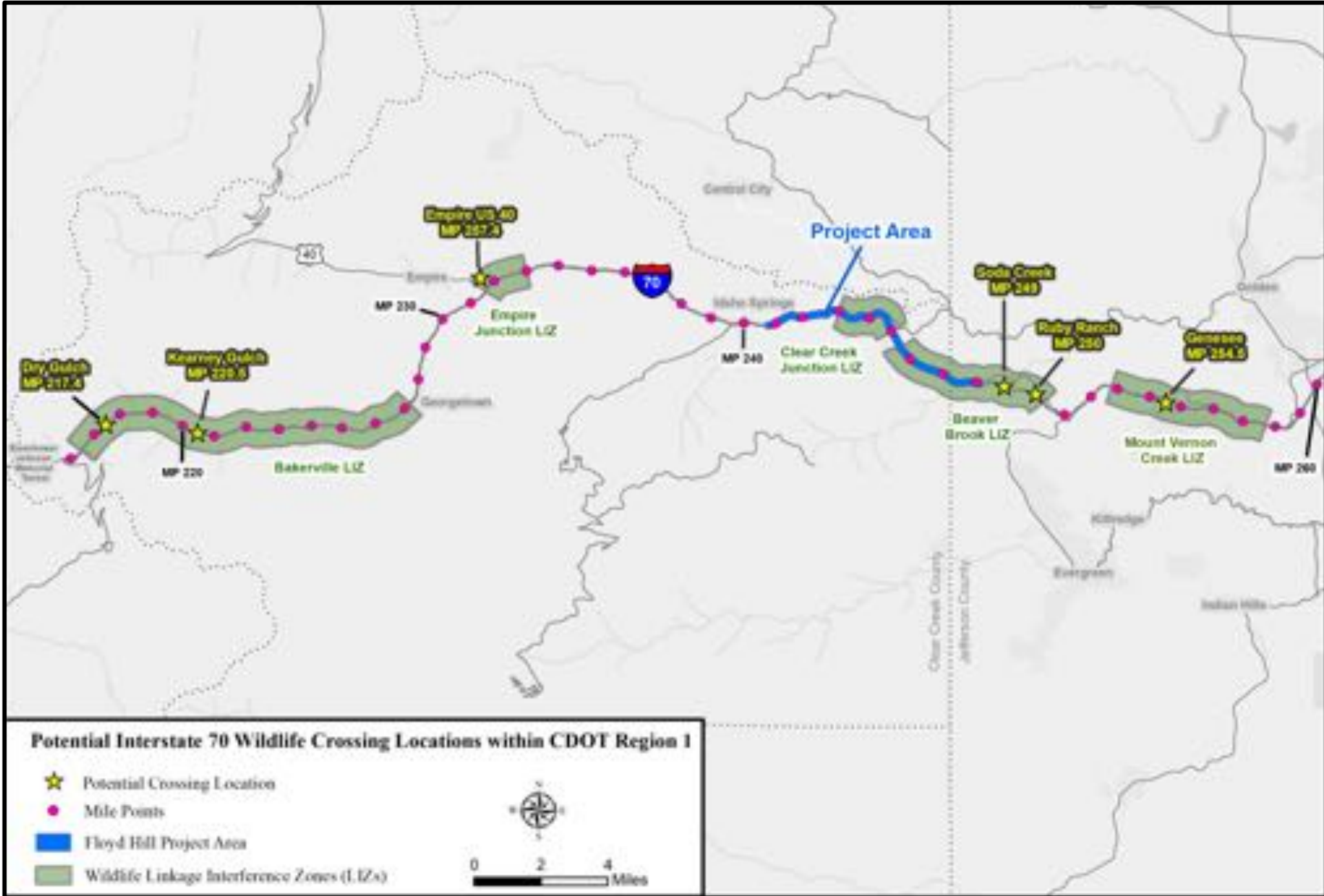


1. Alternative Wildlife Crossing Locations

- 12 locations reviewed; 6 selected for further consideration by ALIVE Committee (matrix)
- Consider:
 - Biological value
 - 2003 LIZ ranking
 - Safety (WVC crashes & carcass data)
 - Landownership & land use
 - Feasibility
 - High level cost estimate



I-70 Floyd Hill to Veterans Memorial Tunnels





MP 254.5 – Genesee

← 1 mile to Genesee Exit





I-70 Floyd Hill to Veterans Memorial Tunnels

MP 254.5 – Genesee

Looking southwest

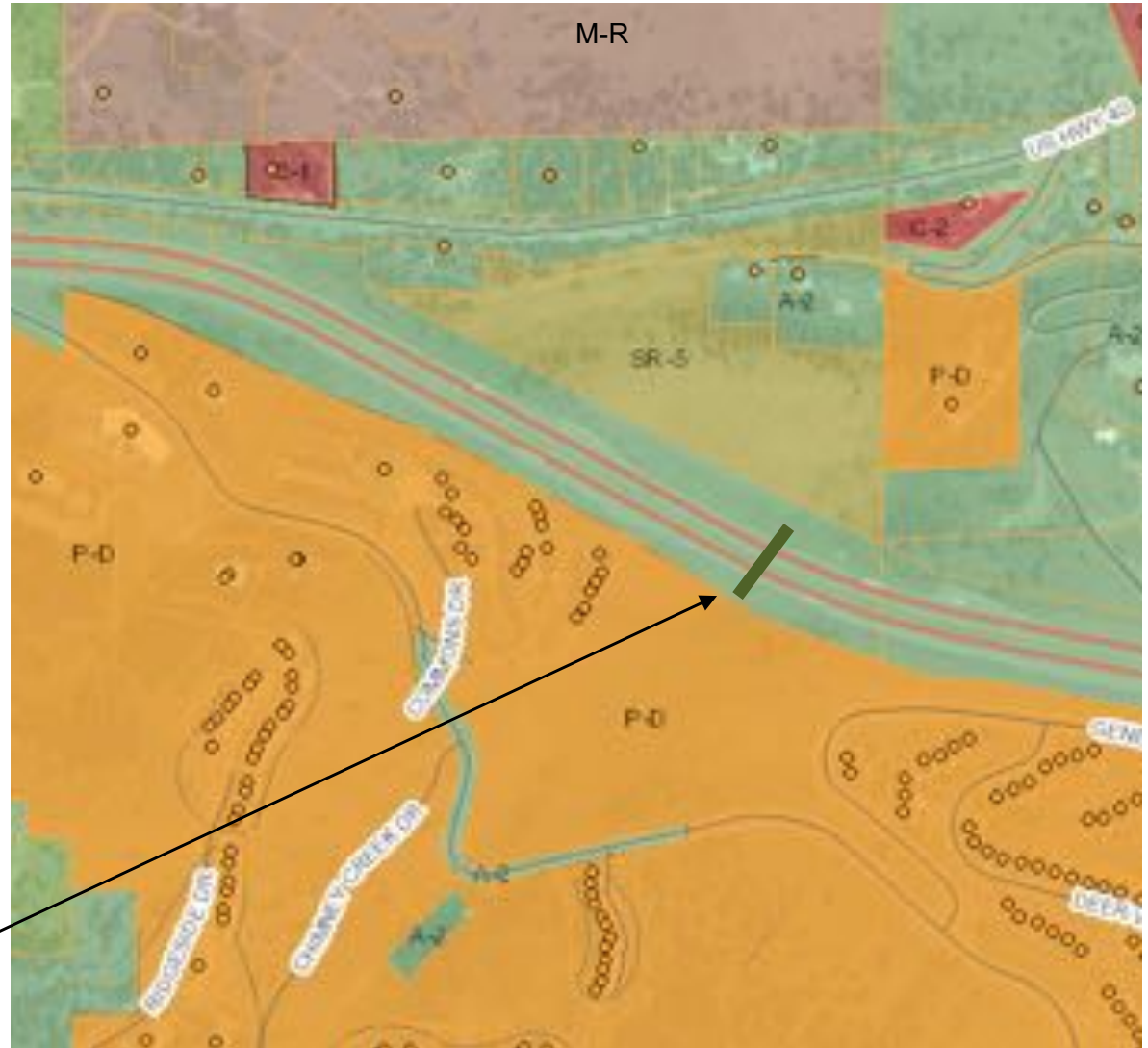




MP 254.5 – Genesee

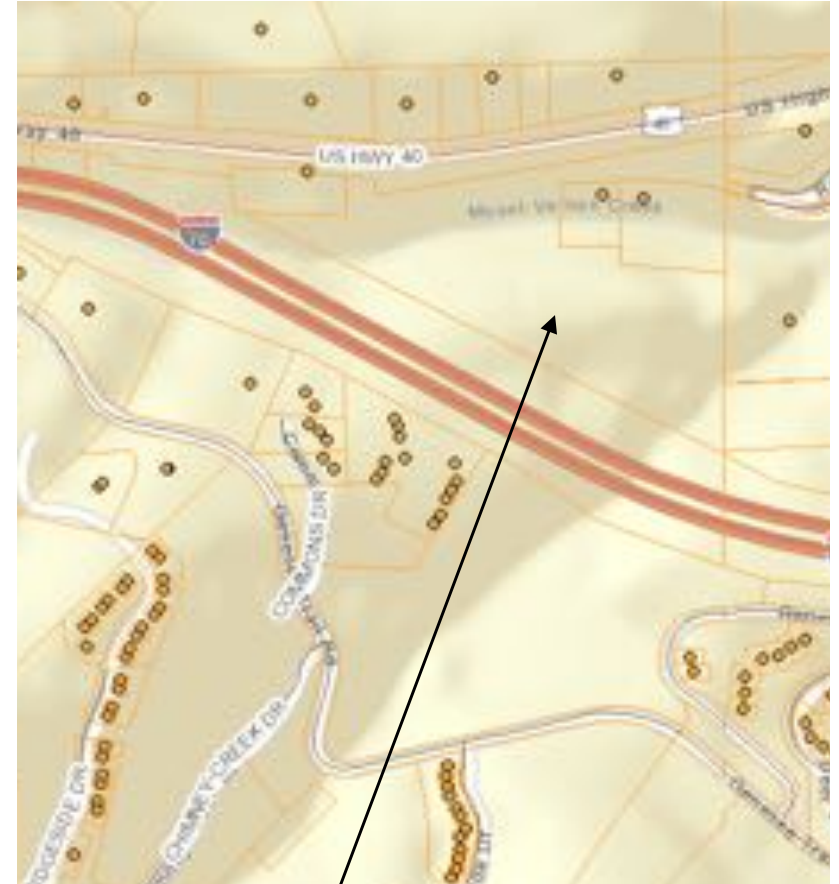
Legend

- A Agricultural
 - SR Suburban Rural
 - PD Planned Development
 - MR Mountain Residential
 - C Commercial
- Proposed Wildlife Underpass





MP 254.5 - Genesee



Vacant land for sale



MP 250 – Ruby Ranch Road



→
½ mile to
El Rancho Exit



MP 250 – Ruby Ranch Road





MP 250 – Ruby Ranch Road



Legend

A Agricultural

SR Suburban Rural

PD Planned Development

C Commercial

Proposed Underpass



MP 249 – Soda Creek

Mule deer – winter
and overall range

Elk – resident &
winter range.

Resident elk likely to
adapt with fencing in
place; wintering elk
driven by need, e.g.,
winter severity or
human pressures

Mountain lion –
overall range





I-70 Floyd Hill to Veterans Memorial Tunnels

MP 249 – Soda Creek

- Existing bridge is 137' wide; dirt road with riprap slopes
- Residence in front of south entrance



Would replacing this bridge with a larger structure appreciably increase wildlife passage under I-70?



MP 249 – Soda Creek

Legend

- A Agricultural
- SR Suburban Rural
- PD Planned Development

Soda Creek Bridge





US 40, MP 257.4 – Empire





US 40, MP 257.4 – Empire





I-70 Floyd Hill to Veterans Memorial Tunnels

MP 220.5 – Kearney Gulch



→
½ mile to
Bakerville Exit



MP 220.5 – Kearney Gulch





I-70 Floyd Hill to Veterans Memorial Tunnels

MP 217.4 – Dry Gulch



→ Herman Gulch

EJMT ←



I-70 Floyd Hill to Veterans Memorial Tunnels

MP 217.4 – Dry Gulch





2. Fencing to Reduce WVC at the top of Floyd Hill

- Install wildlife exclusion fencing along I-70 from the Floyd Hill exit to east of Soda Creek Road
 - 8 Escape Ramps
 - 1 Wildlife Guard on SH 65
 - Pedestrian Access Gates



Wildlife Fence End – Floyd Hill



2 Escape Ramps near west fence end



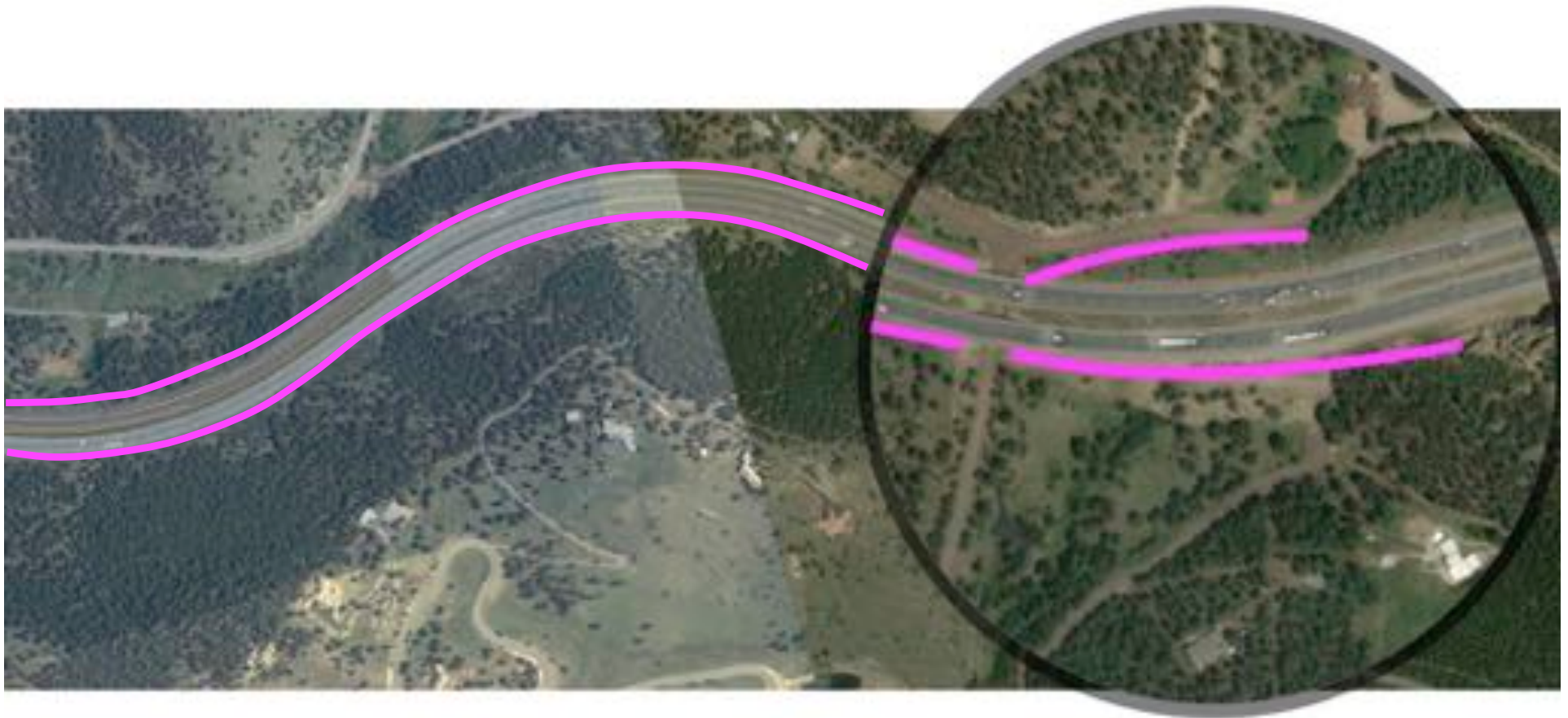
Wildlife Fence – Beaver Brook Interchange



4 Escape Ramps around interchange



Wildlife Fence End – Soda Creek



2 Escape Ramps near east fence end



East Fence End at Soda Creek





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – North Frontage Road Design Option





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – North Frontage Road Design Option



East Portal – Looking West (Figure 1)



West Portal – Looking East (Figure 2)



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ

Tunnel Alternative – South Frontage Road Design Option



Clear Creek LIZ

Tunnel Alternative – South Frontage Road Design Option



East Portal – Looking West (Figure 1)



West Portal – Looking East (Figure 3)



I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ Canyon Viaduct Alternative





I-70 Floyd Hill to Veterans Memorial Tunnels

Clear Creek LIZ Canyon Viaduct Alternative



East Portal – Looking West (Figure 4)



West Portal – Looking East (Figure 5)



I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives

East Portal



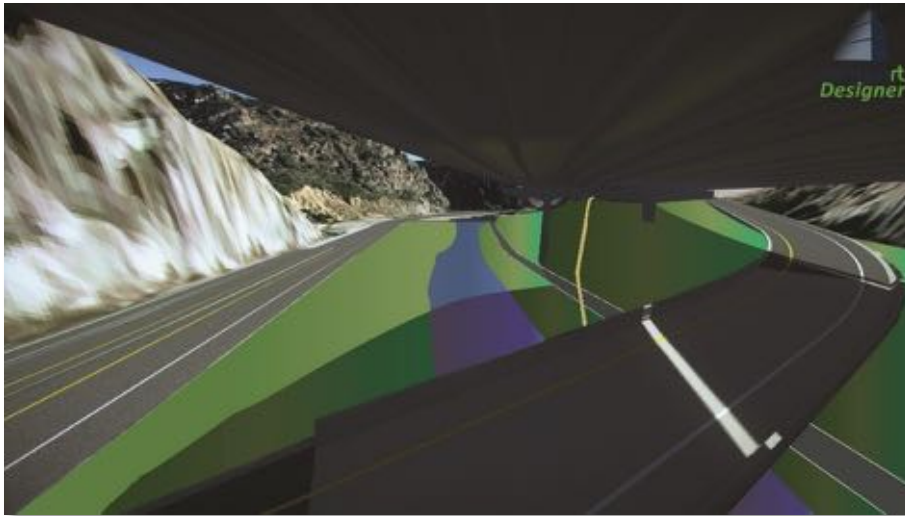
Canyon Viaduct Alternative (Figure 4)



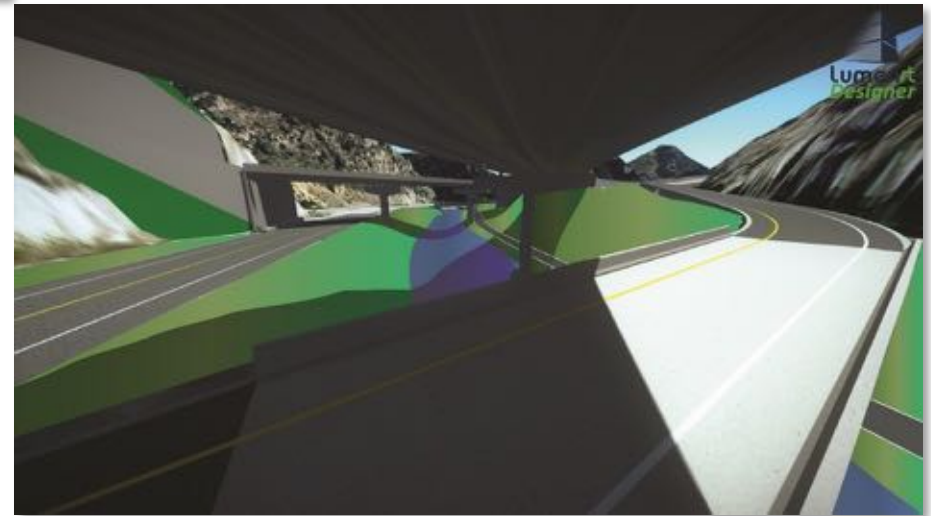
Tunnel Alt. – North and South Frontage Road Options (Figure 1)

Comparison of Alternatives

East Portal - Riparian



Canyon Viaduct Alternative (Figure 6)



Tunnel Alt. – North & South Frontage Road Options (Figure 7)



I-70 Floyd Hill to Veterans Memorial Tunnels

Comparison of Alternatives

West Portal



Canyon Viaduct Alternative (Figure 5)



Tunnel Alt. – North Frontage Road Option (Figure 2)

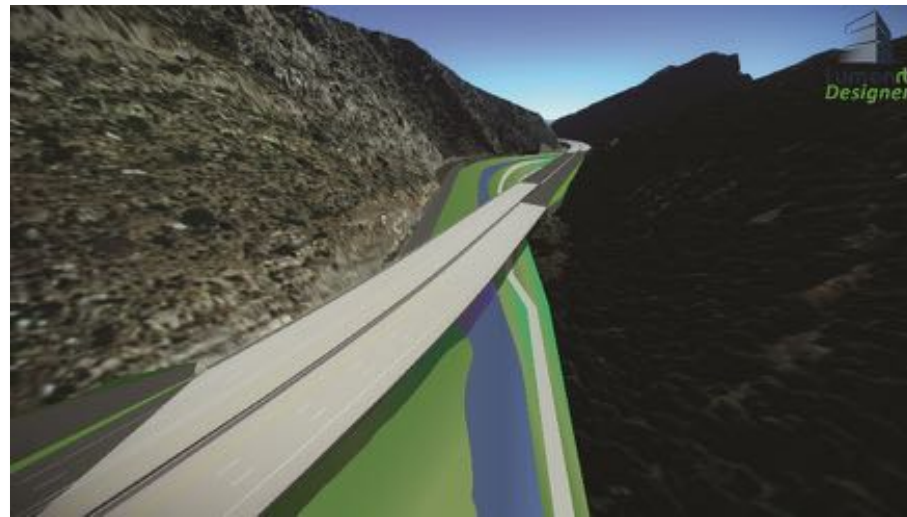


Tunnel Alt. – South Frontage Road Option (Figure 3) ³⁹

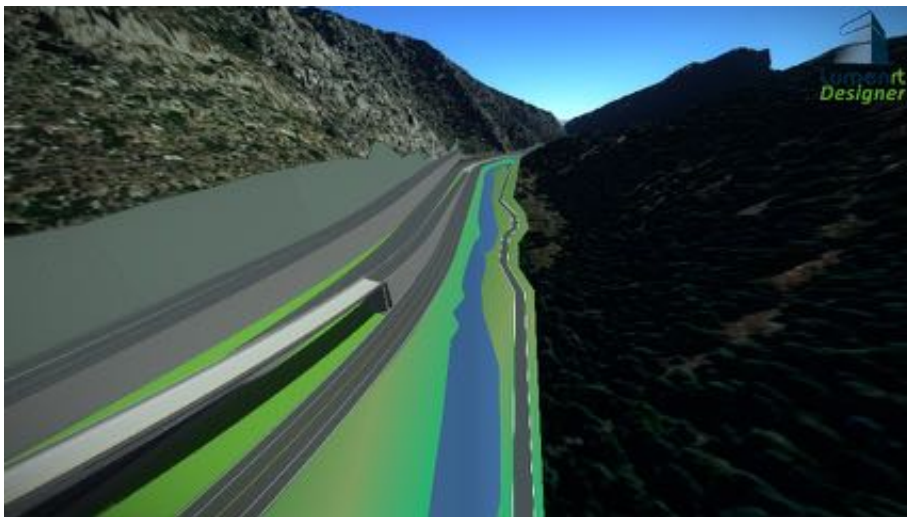


Comparison of Alternatives

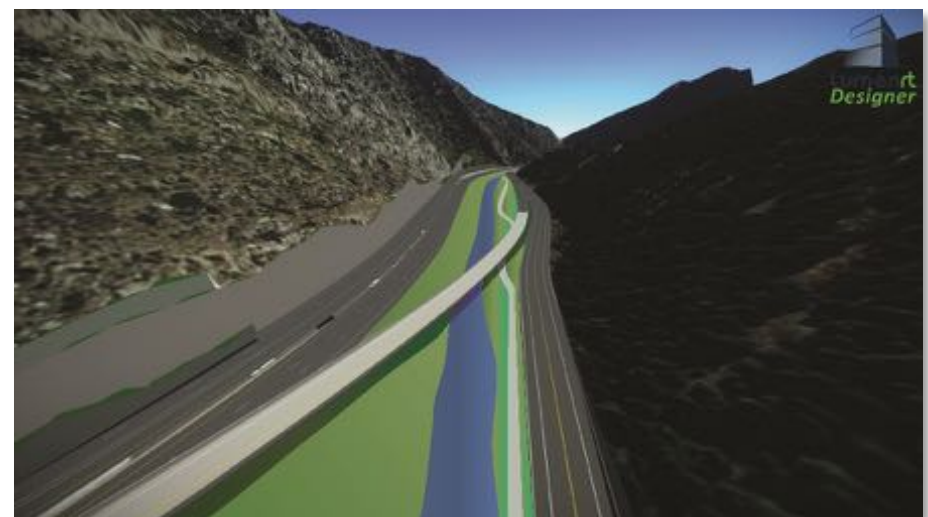
West Portal - Riparian



Canyon Viaduct Alternative (Figure 8)



Tunnel Alt. – North Frontage Road Option (Figure 9)



Tunnel Alt. – South Frontage Road Option (Figure 10)⁴⁰



Next Steps

- If pursuing Option A:
 - Refine preliminary design for Overpass
- If pursuing Option B:
 - Develop preliminary design for selected alternative wildlife crossing location(s)
- Follow up with ALIVE ITF in Spring 2020



Questions



Agenda



I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to VMT
Meeting: ALIVE Meeting #6
Date: May 19, 2020, 9:00am-12:00pm
Location: Zoom meeting
<https://zoom.us/j/93456111310?pwd=RnZVWDRHMEYzR3dwREFY2cFRXTFBHZz09>
Meeting ID: 934 5611 1310
Password: 471960

Meeting Objective:

- Obtain ALIVE Committee recommendation on which combination of mitigation options in the mitigation matrix to pursue as mitigation for the Floyd Hill project

Agenda:

- 1) Welcome / Introductions
- 2) Follow-up on Action Items from February ALIVE Meeting
- 3) Beaver Brook LIZ: I-70 Mountain Corridor Region 1 Evaluation of Mitigation Options
 - a) Mitigation Option A: Floyd Hill overpass (for comparison purposes)
 - b) Mitigation Option B:
 - i) Mitigation within project area
 - ii) Mitigation outside of project area
 - c) Discussion and prioritization of mitigation options
 - i) Short list of mitigation options for Beaver Brook LIZ mitigation
- 4) Next Steps / Action Items



Floyd Hill - ALIVE ITF Meeting #6 Notes
May 19, 2020, 9 AM to 12 PM
Zoom Meeting

Welcome and Introductions

This meeting was held as an online, virtual meeting due to restrictions related to COVID-19. The meeting began with Julia Kintsch, ECO-resolutions, welcoming the group, which was followed by roundtable self-introductions. Kristin Salamack provided a longer introduction as the newest member of the ALIVE Committee, replacing Alison Deans Michael as the Colorado Department of Transportation (CDOT)/US Fish and Wildlife Service (USFWS) Liaison. A complete list of attendees is provided at the end of these notes.

Review of Decisions to Date and Follow-up on Action Items from February 2020 ALIVE meeting

At the February 2020 ALIVE meeting, the Committee determined that Mitigation Option B (alternative mitigation on the I-70 Mountain Corridor in Region 1) offered greater potential benefits in terms of wildlife connectivity and reducing wildlife-vehicle collisions (WVCs) than Mitigation Option A (an overpass at Floyd Hill). It was noted that Mitigation Option B also included wildlife fencing from the top of Floyd Hill to east of Soda Creek to reduce incidence of WVCs in this segment of the Beaver Brook Linkage Interference Zone (LIZ).

Action items from the February 2020 ALIVE meeting were discussed as part of the meeting and are included in these notes.

Beaver Brook LIZ Mitigation: Evaluation of Mitigation Alternatives in the I-70 Mountain Corridor Region 1

Julia provided an overview of the updated mitigation matrix, presented in three categories, each of which is discussed below: 1) Mitigation Option A, for comparison purposes; 2) Mitigation Option B, within project area mitigation; and 3) Mitigation Option B, outside of project area mitigation.

Kristin asked for background on the 2003 LIZ rankings. Julia provided a brief history of the origins of the ALIVE Committee and the initial identification of LIZs in 2003, and the subsequent refinement of LIZ segments as a part of the 2011 I-70 EcoLogical Study. **Follow-up: After the meeting, Julia sent Kristin the I-70 EcoLogical Report and the FHWA EcoLogical guidance document.**

1) Mitigation Option A, Floyd Hill Overpass (for comparison purposes):

The cost of the Floyd Hill overpass and associated partial acquisition of properties immediately adjacent to the overpass is estimated between \$15-20 million. The Floyd Hill project design and cost estimate is still evolving but this is the amount (\$15-20M) that is anticipated to be available for alternative wildlife mitigation.

Julia noted that while high level cost estimates were being presented for context for each of the mitigation sites, the ranking of mitigation options should be based on biological and safety values rather than cost.

2) Mitigation Option B: Mitigation Within Project Area

Mitigation locations within the project area include habitat protection of the meadow-wetland complex at the top of Floyd Hill on the south side of I-70, and a wildlife underpass at Soda Creek.

- a) **MP 247: Floyd Hill Habitat Protection.** The meadow-wetland complex is comprised of four privately owned parcels, which, for discussion purposes, have been labeled parcels 1, 2, 3 and 4.
- b) **MP 249: Soda Creek Wildlife Underpass.** There are existing eastbound and westbound bridges at this location for Soda Creek Road, a low volume dirt road used for local, residential access. This mitigation option would construct a new, dedicated wildlife underpass east of the roadway bridge, spanning the Soda Creek drainage. Joe Walter, Colorado Parks and Wildlife (CPW), noted that CPW had a trail camera at the roadway crossing from February through April 2018, which documented mostly deer and some fox using the road bridge to cross under I-70. Joe has also observed turkeys and elk tracks beneath the bridge.

As a follow-up from the February 2020 meeting regarding the potential for Preble's Meadow Jumping Mouse (PMJM) habitat along Soda Creek, Francesca Tordonato, CDOT, reviewed habitat maps and reported that the Soda Creek drainage is not contiguous with the occupied range. She noted that no trapping has occurred in the Soda Creek drainage and determining the presence of PMJM (USFWS threatened, Tier 1, Species of Greatest Conservation Need) in this area would require further investigation.

Question: Chelsea Beebe, Jefferson County, asked whether there are opportunities to improve the Soda Creek Road bridge to enhance its functionality as a multi-use wildlife crossing?

Answer: Julia replied that large and medium-sized mammals in this area are generalist species (e.g., mule deer, elk, black bear, coyote, bobcat, fox). Existing conditions at the Soda Creek bridge are adequate for these species to use the road bridge as a crossing under I-70, and the frequency of use is expected to increase with the installation of wildlife fencing along this segment, which will help to guide animals to this location. Conditions at the road bridge could be enhanced for small mammal passage with the addition of woody debris along the sides of the roadway at the base of the riprap slopes to provide cover for smaller prey species. Such an action would require coordination with the Jefferson County Roads Department.

Question: Is directing animals to use a roadway crossing under I-70 a good idea? Would it increase WVCs, especially if traffic volumes increase on Soda Creek Road?

Answer: Soda Creek Road is a very low volume road with low traffic speeds, particularly around the intersection immediately north of the roadway bridge. Given local land use and zoning, it is highly unlikely that traffic volumes or traffic speeds will increase in the future. Joe stated that he was not aware of any WVCs on Soda Creek Road (although this segment of I-70 is a WVC hotspot).

3) Mitigation Option B: Mitigation Outside of Project Area

Design concepts and high-level cost estimates were presented for five locations in CDOT Region 1 of the I-70 Mountain Corridor:

- a) **MP 254.5: Genesee Wildlife Underpass and Habitat Protection.** The concept for this location is two bridge underpasses beneath the opposing traffic lanes with an open median. The dimensions of the crossing from the perspective of wildlife passing beneath is 16' high by 100' wide by 130' long. The estimated cost for this underpass is between \$4.5-5.5 million. The property adjacent to the crossing structure on the south side of I-70 is owned by Genesee Village Homeowner's Association (HOA) and is managed as open space. On the north side of I-70 there is a 17-acre vacant land parcel that is currently for sale. Julia recommended protecting this parcel be considered in conjunction with a wildlife underpass at this location.

- b) **MP 250: Ruby Ranch Wildlife Underpass and Habitat Protection.** This proposed wildlife crossing is located in a large fill slope west of the I-70 El Rancho (Evergreen) eastbound exit. The concept, dimensions, and cost estimate for this location are the same as the Genesee location. This location is also surrounded by private lands. Julia identified three partial parcels adjacent to the wildlife crossing (excluding the portions of each parcel with a residence) that could be considered for acquisition in conjunction with the construction of a wildlife underpass. None of the parcels are currently for sale and the landowners' willingness to sell is unknown. Julia noted that while land acquisition could be considered, due to the land use and zoning in this area and the width of the CDOT right-of-way, that acquisition of these partial parcels is not essential either for the long-term functionality of the wildlife crossing or to construct the crossing, which could be built entirely within the right-of-way.

Question: Vanessa Henderson, CDOT, asked whether the steep embankments would limit wildlife access to the underpass, particularly on the north side of the underpass?

Answer: Julia said that wildlife learn where crossings are located, and game trails could be constructed on the slope to help direct animals to the crossing. Stephanie Gibson, Federal Highway Administration (FHWA), noted that the North Underpass on State Highway 9 in Grand County also has a steep approach and poor visibility from the west entrance. Julia commented that despite this feature, deer, elk and a number of other species have regularly crossed through the underpass.

Question: Chelsea asked whether traffic on US 40 to the north of this location would present a conflict?

Answer: Joe commented that traffic volumes are very low on this section of US 40, and Amy Saxton, Clear Creek County, confirmed that traffic along this segment is primarily for residential access into this area, which is characterized by low density development. Julia said that if a wildlife crossing was constructed on I-70 at this location, complementary mitigation could be implemented on US 40, such as roadside vegetation clearing to improve driver visibility and targeted signage to alert drivers.

- c) **US 40, MP 257.4: Empire Wildlife Overpass.** The concept for this location is an arch overpass spanning US 40. The width of the overpass for wildlife crossing is 100 feet. The estimated cost for this overpass is between \$3-4 million. While the target species for the overpass is bighorn sheep, elk and other wildlife are also present in the area, and the overpass would be designed as a multi-species crossing. The parcel immediately south of this location that was previously proposed (and rejected) for a quarry. The Mountain Areas Land Trust (MALT) is now in conversations with the landowner regarding putting a conservation easement on the property. Francesca and Joe, who had a phone meeting with MALT representatives in the last week, reported that landowner is supportive, and MALT has applied for a grant to CPW's Habitat Stamp Program to purchase the conservation easement. Joe reported that other landowners on both the south and north sides of US 40 around the proposed overpass may also be interested in putting easements on their properties.
- d) **MP 220.5 and MP 217.4: Kearney Gulch Wildlife Overpass and Dry Gulch Wildlife Overpass.** These two potential crossing locations were discussed together. The primary target species for both of these crossing locations is Canada lynx. At the February meeting, the group had noted that future improvements in this segment are likely but, as of yet, undetermined. Consequently, wildlife mitigation at either of these locations could result in throw-away costs. In addition, a future transportation project in this area would require additional wildlife mitigation. Joe commented that when wildlife mitigation is pursued in this area, that the Kearney Gulch location should be prioritized over Dry Gulch because it is less impacted by

recreation activities and it is farther from the land bridge over the Eisenhower-Johnson Memorial Tunnels.

Question: Kristin asked if there have been any recent Canada lynx studies?

Answer: Joe replied that CPW has not conducted any lynx studies since 2016.

Question: Kristin asked if there are any projects that would come later in this segment?

Answer: Vanessa replied that both the Maximum Program and Advanced Guideway System (AGS) are planned in this area but the timing of these projects is unknown. If either is implemented, wildlife mitigation would be included with those projects in accordance with the ALIVE MOU.

Discussion and Prioritization of Mitigation Options

Mandy Whorton, Peak Consulting Group, conducted a Zoom poll to get an initial assessment of the group's preferences and to kick off the discussion about ranking each of the locations. Each meeting participant was asked to select their top 3 locations. The poll results were as follows:

- 70% identified Genesee and 30% identified Empire as their top location;
- 60% identified Empire, 30% identified Genesee, and 10% identified Ruby Ranch as their second location;
- 50% identified Ruby Ranch, 40% identified Soda Creek, and 10% identified Empire as their third location.

The group then discussed their rankings and that factors that influenced their initial prioritizations. These notes, along with previous discussion points about each of the locations, are captured in the ranking table below.

Julia noted that this ranking will guide decision-making for determining equivalent Floyd Hill project mitigation and may also be used to help inform future mitigation projects in the Mountain Corridor in Region 1.

I-70 Mountain Corridor - Mitigation Locations Ranking

General Notes

- All crossings would include fencing (about 1 mile in each direction)

Mitigation Option	Ranking Notes	RANK
Genesee	<ul style="list-style-type: none"> Confirmed that south parcel is HOA-owned open space (won't be developed) Wouldn't want to pursue habitat parcel alone (without the crossing) but if a crossing were developed, the "for sale" parcel could be a good opportunity to improve the long-term success of the crossing, and we know the landowner is willing since it is for sale <ul style="list-style-type: none"> The acquisition of parcel or other long-term conservation agreement is important and recommended in addition to the crossing; agreement that it should be a package component since the opportunity is there now. One of the highest WVC areas on the corridor Locations is on I-70 with high recorded WVCs Supplementary mitigation funding may be available through CODT Traffic and Safety, which has identified this segment as a WVC problem area (could potentially leverage safety funding) 	1
US 40 Empire	<ul style="list-style-type: none"> Long-time priority for CPW (genetic connectivity of herds) and herd protection (high mortality in winter/early Spring) Landowner of property adjacent to crossing location on south side has applied for a CPW grant for a conservation easement and other adjacent property owners may also be interested in potential conservation easements, so there is excellent potential for habitat protection around crossing High biological value for Georgetown bighorn sheep herd Not on I-70 but within the LIZ and would improve connectivity within the Mountain Corridor Does not address project impacts; nor does it target elk or deer (target species in the Beaver Brook LIZ), although the crossing would be designed for multi-species use High species diversity of anticipated use 	2
Ruby Ranch	<ul style="list-style-type: none"> Habitat protection: would not recommend full acquisition of parcels but just the undeveloped portions without any buildings (parcels are 5-6 acres); Current zoning would not allow additional development so land acquisition may have less value 	3

	<ul style="list-style-type: none"> ○ Land acquisition is not recommended because the land is already unlikely/unable to be further developed; may want to discuss with land owners but habitat is likely to be maintained anyway (without acquisition) ○ Landowner of large parcel on north side of US 40 could be subdivided, but there are currently no plans for development; if developed, it would be very low density. • Site considerations may make this location potentially less effective and/or require additional considerations: <ul style="list-style-type: none"> ○ Steep north embankment. Would it be hard for animals to find the crossing? Deer, which are the target species in this area, are adaptable and would quickly learn to use the crossing. Elk and other species are expected to learn to use it over time. ○ US 40 conflicts. In this location, US 40 has very low traffic volumes (most traffic is on I-70 in this location) so generally not an issue; may need signage to alert US 40 drivers if crossing is implemented. • Ruby Ranch is a higher priority than Soda Creek because it would be a new crossing location since Soda Creek already has a crossing opportunity at the roadway bridge 	
Soda Creek	<ul style="list-style-type: none"> • Area of high WVCs. Fencing already included in the Project mitigation is expected to be effective in reducing WVCs and directing wildlife to the roadway bridge <ul style="list-style-type: none"> ○ Soda Creek is already planned to be fenced; a separate structure in addition to the road underpass is less of a priority since a crossing opportunity already exists in this location ○ Species potentially using this crossing are generalist species that will likely use the low-volume road crossing without additional enhancements ○ Some cover might be beneficial to smaller species ○ Because this is a dry crossing (not associated with a drainage) with a dirt/gravel surface, benches or other enhancements are not needed ○ CDOT Bridge may be sensitive to embankment or slope changes to retrofit for wildlife use • A dedicated wildlife crossing would provide more value than current road crossing <ul style="list-style-type: none"> ○ Could potentially be something that elk herd at Beaver Brook might find and use once fencing is constructed from Floyd Hill to Soda Creek ○ Providing a new crossing designed for wildlife is a better solution than funneling animals to use a road crossing (although the road is low volume) ○ Residences close to Soda Creek may complicate land use around a new crossing at the creek • Some wildlife activity observed by CPW under the roadway bridge <ul style="list-style-type: none"> ○ Animals are using the crossing now, and the fencing will help direct them to it ○ Trail camera under the bridge 2018 captured mostly deer, who used the middle of the road; some foxes on camera and evidence of elk (tracks) and observation of turkeys 	<p>New crossing is a lower “next” priority</p> <p>Including cover for small fauna at the existing roadway is a priority</p>

	<ul style="list-style-type: none"> • PMJM potential <ul style="list-style-type: none"> ○ Habitat does not appear to be contiguous or high value based on data and map review ○ Field investigation would be needed to definitively determine presence of PMJM 	
Floyd Hill (habitat protection)	<ul style="list-style-type: none"> • Four parcels identified with habitat value and are currently home to a large elk herd. <ul style="list-style-type: none"> ○ Parcels may or may not be able to be acquired; unknown if land owners would be interested in selling ○ Some parcels may be protected by land owners (Frei's purchase of parcel 1) or development restrictions (wetlands on parcel 3) ○ May want to discuss conservation opportunities for parcel 1 since it seems the Freis may be interested in protection ○ Parcel 4 is slated for high-density development and remains a concern for habitat protection ○ Of the parcels under consideration, priorities, if land acquisition were pursued, would be 2 and 4 because those are most at risk; parcel 3 may be more available due to the presence of wetlands and lack of development potential ○ Could develop partnerships with land owners or land trusts/NGOs to pursue land conservation for these parcels • Habitat protection is valuable but not as valuable without a crossing, and the other locations represent new crossings and more appropriate for connectivity mitigation across I-70 in line with ALIVE MOU 	<p>Lower "next" priority</p> <p>Pursuing partnership (e.g., Mountain Areas Land Trust) discussions is a priority</p>
Kearney Gulch	<ul style="list-style-type: none"> • High biological value • Could be included in future project but timing is unknown • High cost structures that could be throw-away • Compared to Dry Gulch, this may be a better location given the high recreation use at Dry Gulch and location farther from EJMT, which already provides some crossing opportunity 	<p>Lower priority for Project mitigation than Floyd Hill and Soda Creek</p>
Dry Gulch	<ul style="list-style-type: none"> • High biological value • Could be included in future project but timing is unknown • High cost structures that could be throw-away 	<p>Lowest priority for Project mitigation</p>

Next Steps

- Document ALIVE agreements in the Wildlife Mitigation Technical Report, which will be included as an appendix to the Environmental Report for the Environmental Assessment (EA).
- Incorporate wildlife mitigation commitments into the EA mitigation.
- Reconvene the ALIVE Committee during final design of the wildlife crossings once construction funding is identified.

Attendees

Amy Saxton (Clear Creek County); Stephanie Gibson and Melinda Urban (FHWA); Vanessa Henderson, Neil Ogden and Francesca Tordonato (CDOT); Kristin Salamack (USFWS); Aurelia DeNasha (USFS); Joe Walter (CPW); Chelsea Beebe (Jefferson County); Anthony Pisano and Carol Coates (Atkins); Julia Kintsch (ECO-resolutions); Mandy Whorton (Peak Consulting Group).

Milepost	Location Name	LIZ Name	Crossing Type or Habitat Protection	Biological Value & Considerations	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††	ALIVE Rank
MITIGATION OPTION A (FOR COMPARISON PURPOSES ONLY)											
247.2	Floyd Hill	Beaver Brook	Overpass (storage units location) + partial acquisition of property adjacent to overpass	<ul style="list-style-type: none"> • Primary target species: Elk and mule deer. Resident elk commonly use the meadow on the south side of I-70 • Location addresses connectivity within the Beaver Brook LIZ and the Floyd Hill project area • Overpass construction impacts to wetlands 	Low	• High (2.9 WVC/mile/year)	• WVC Carcass: High (2.3 WVC/mile/year)	<ul style="list-style-type: none"> • Extensive dispersed residential development and a proposed 400 unit development immediately on south side. Concern that wildlife use of the overpass will become restricted by potential future development and recreation north and south of I-70 • Open space and undeveloped parcels to north • Human use possible 	<ul style="list-style-type: none"> • Very complex human landscape renders this area unfavorable for a large investment in wildlife crossings infrastructure • Wildlife crossings with fencing are the most effective mitigation method for reducing WVC • Construction is complicated by multiple factors: Bridge over eastbound and westbound I-70 and US 40; Bridge must be 'oversized' to maintain flexibility for future operations; and will likely require short-term closures on I-70 & US 40 	\$15-20M	n/a
MITIGATION OPTION B: WITHIN PROJECT AREA											
247	Floyd Hill - Parcel 1	Floyd Hill	Conservation purchase or easement	<ul style="list-style-type: none"> • Potential to permanently protect high quality wetlands and meadow habitat important for residential elk herd 	-	-	-	<ul style="list-style-type: none"> • Parcel recently purchased by owner of gravel mine at bottom of Floyd Hill, purportedly for conservation purposes • 17 acres 	<ul style="list-style-type: none"> • Property may not be available for purchase or easement 	\$3M	
247	Floyd Hill - Parcel 2	Floyd Hill	Conservation purchase or easement	<ul style="list-style-type: none"> • Potential to permanently protect high quality wetlands and meadow habitat important for residential elk herd 	-	-	-	<ul style="list-style-type: none"> • Upland parcel - owned by Frei (mine) family • 21 acres 	<ul style="list-style-type: none"> • Property may not be available for purchase or easement 	\$900,000	
247.1	Floyd Hill - Parcel 3	Floyd Hill	Conservation purchase or easement	<ul style="list-style-type: none"> • Potential to permanently protect high quality wetlands and meadow habitat important for residential elk herd 	-	-	-	<ul style="list-style-type: none"> • Show home at eastern end of property would need to be split out. • Parcel dominated by wetlands, which are not developable • 16 acres 	<ul style="list-style-type: none"> • Property may not be available for purchase or easement 	\$1M	
247.2	Floyd Hill - Parcel 4	Floyd Hill	Conservation purchase or easement	<ul style="list-style-type: none"> • Potential to permanently protect high quality wetlands and meadow habitat important for residential elk herd 	-	-	-	<ul style="list-style-type: none"> • Parcel slated for 400 unit development • 6 acres 	<ul style="list-style-type: none"> • Property may not be available for purchase or easement 	\$400,000	
249	Soda Creek	Beaver Brook	Underpass at creek drainage	<ul style="list-style-type: none"> • Primary target species: Mule deer • Secondary target species: Elk, black bear, mountain lion, fox, coyote, bobcat. 	Low	• High (2.8 WVC/mile/year)	• WVC Carcass: High (2.3 WVC/mile/year)	<ul style="list-style-type: none"> • Private ownership with dispersed residential development 	<ul style="list-style-type: none"> • Creek is nearly 300' from the existing bridge • Location is within the current project boundaries 	\$4.5-\$5.5M (bridge underpass)	

Milepost	Location Name	LIZ Name	Crossing Type or Habitat Protection	Biological Value & Considerations	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††	ALIVE Rank
MITIGATION OPTION B: OUTSIDE OF PROJECT AREA											
254.5	Genesee	Mt. Vernon	Underpass at fill slope	<ul style="list-style-type: none"> Primary target species: Elk and mule deer. CPW identified highway crossing zone. Secondary target species: Black bear, mountain lion, fox, coyote, bobcat. Monitored location for the I-70 EcoLogical Study (2009-2010) detected elk, mule deer, coyote, fox, skunk. 	Low	<ul style="list-style-type: none"> Very High (3.4 WVC/mile/year) Location identified by CDOT Traffic & Safety as a WVC hotspot. 	<ul style="list-style-type: none"> WVC Carcass: Very High (3.4 WVC/mile/year) 	<ul style="list-style-type: none"> Private ownership. Properties immediately adjacent to proposed structure location are undeveloped, but residential development around the greater area. 	<ul style="list-style-type: none"> Location does not require a crossing over/under US 40, which runs farther north of this location. Offset structure to west side of drainage to shorten structure length. Possible Traffic & Safety funding. Future project is unlikely as I-70 is already 3 lanes in both directions through this segment. 	\$4.5-\$5.5M (bridge underpass)	
254.5	Genesee	Mt. Vernon	Conservation purchase or easement	<ul style="list-style-type: none"> Potential to permanently protect habitat adjacent to proposed Genesee underpass 	-	-	-	<ul style="list-style-type: none"> Zoned Residential; recommended 1 dwelling/10 acres 17 acres 	<ul style="list-style-type: none"> Property currently for sale This action should only be pursued in conjunction with a wildlife underpass at MP 254.5 	\$800,000	
250	Ruby Ranch Road	Beaver Brook	Underpass at fill slope	<ul style="list-style-type: none"> Primary target species: Mule deer & elk. CPW identified highway crossing zone. Secondary target species: Black bear, mountain lion, fox, coyote, bobcat. 	Low	<ul style="list-style-type: none"> High (2.8 WVC/mile/year) 	<ul style="list-style-type: none"> WVC Carcass: High (2.6 WVC/mile/year) 	<ul style="list-style-type: none"> Private ownership with dispersed residential development Zoned Residential; recommended 1 dwelling/10 acres 	<ul style="list-style-type: none"> Location is within the Beaver Brook LIZ. Location does not require a crossing over/under US 40, which runs farther north of this location. Steep fill on north side, but structure doesn't need to be at deepest part of fill. Consider how to grade north side approach or build trails into the slope leading to the structure. 30'-wide median between I-70 EB and WB lanes - could narrow median width to reduce structure length. Future project is unlikely as I-70 is already 3 lanes in both directions through this segment. 	\$4.5-\$5.5M (bridge underpass)	
250	Ruby Ranch Road - Parcel 1	Beaver Brook	Conservation purchase or easement	<ul style="list-style-type: none"> Potential to permanently protect habitat adjacent to proposed Ruby Ranch underpass 	-	-	-	<ul style="list-style-type: none"> 5-cabin Bed & Breakfast Area of interest is ~2.5 acres 	<ul style="list-style-type: none"> This action should only be pursued in conjunction with a wildlife underpass at MP 250 	\$300,000 (partial acquisition)	
250	Ruby Ranch Road - Parcel 2	Beaver Brook	Conservation purchase or easement	<ul style="list-style-type: none"> Potential to permanently protect habitat adjacent to proposed Ruby Ranch underpass 	-	-	-	<ul style="list-style-type: none"> Zoned Residential; recommended 1 dwelling/10 acres Area of interest is ~2.5 acres 	<ul style="list-style-type: none"> This action should only be pursued in conjunction with a wildlife underpass at MP 250 	\$250,00 (partial acquisition)	

I-70 Mountain Corridor Region 1 Evaluation of Wildlife Mitigation Option

Revised May 11, 2020

Milepost	Location Name	LIZ Name	Crossing Type or Habitat Protection	Biological Value & Considerations	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††	ALIVE Rank
250	Ruby Ranch Road - Parcel 3	Beaver Brook	Conservation purchase or easement	<ul style="list-style-type: none"> Potential to permanently protect habitat adjacent to proposed Ruby Ranch underpass 	-	-	-	<ul style="list-style-type: none"> Zoned Residential; recommended 1 dwelling/10 acres Area of interest is ~3 acres 	<ul style="list-style-type: none"> This action should only be pursued in conjunction with a wildlife underpass at MP 250 	\$300,000 (partial acquisition)	
US 40 MP 257.4	Empire	Empire Junction	Overpass just west of interchange spanning cliffs on N side to small cut slope on S side.	<ul style="list-style-type: none"> Primary target species: Bighorn sheep. Georgetown herd is the largest herd in CO. Location is important for genetic connectivity between 2 subpopulations. On US 40 (not I-70), but within the Empire Junction interchange area. This is the most important crossing site for bighorn along the corridor. Secondary target species: Canada lynx, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat. 	Medium	<ul style="list-style-type: none"> Low (0.4 WVC/mile/year) 	<ul style="list-style-type: none"> WVC Carcass: Low Very high for bighorn sheep (Huer 2015). 	<ul style="list-style-type: none"> Private. There is a willing landowner for a conservation easement on the south side (as of 2014). Nearby residences S & N sides of US 40 	<ul style="list-style-type: none"> A crossing structure at this location would need to accommodate future improvements around Empire Junction. US 40 has a narrower road footprint requiring a smaller crossing structure. Would require blasting/rock cut. 	\$3-4M (overpass)	
220.5	Kearney Gulch	Bakerville	Overpass (Traffic and Revenue Study recommends MP 220.5-220.7; east of rock cut, but then the creek is much closer to I-70; consider west of rock cut ~MP 220.3-4)	<ul style="list-style-type: none"> Primary target species: Canada lynx. Ivan (2012) notes that 39% of lynx I-70 crossings occurred between the EJMT and Bakerville; segment identified as high probability of lynx highway crossing by Squires et al. (2013). Linkage has lower intensity lynx movements primarily used for summer dispersal movement; there are no breeding pairs in this area. Secondary target species: bighorn sheep, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat, and boreal toad. Monitored location for the I-70 EcoLogical Study (2009-2010) at MP 221.8 detected bighorn sheep, elk, mule deer. 	High (Herman Gulch)	<ul style="list-style-type: none"> Low (0.5 WVC/mile/year) 	<ul style="list-style-type: none"> WVC Carcass: Moderate (1.1 WVC/mile/year) Two lynx WVCs have been recorded in this segment around MP 217.3 & MP 221 in 2000 & 2005. Moderate for bighorn sheep (Huer 2015). Increasing moose conflict. 	<ul style="list-style-type: none"> Arapahoe National Forest on both sides of I-70; Managed as USFS lynx linkage area Bike path adjacent to creek on south side. 	<ul style="list-style-type: none"> Good location between chain-up stations (i.e., smaller road footprint and less affected by lights and activity) Feasibility challenged by uneven grades north and south of I-70. Creek parallel on south side, but with enough room for overpass wildlife approach ramp. Sensitive wetlands along Clear Creek. Future projects in this segment are planned but details are unknown. Preferred alternative includes 6 lanes, WB auxiliary lane, and AGS. 	\$13.5-14.5M (overpass)	

Milepost	Location Name	LIZ Name	Crossing Type or Habitat Protection	Biological Value & Considerations	2003 LIZ Rank*	WVC Crashes†	WVC Carcasses	Landownership & Land Use Considerations	Feasibility	High Level Cost Estimate††	ALIVE Rank
217.4	Dry Gulch	Bakerville	Overpass recommended. An underpass would be very long and less preferable for bighorn sheep and elk.	<ul style="list-style-type: none"> • Primary target species: Canada lynx. Ivan (2012) notes that 39% of lynx I-70 crossings occurred between the EJMT and Bakerville; segment identified as high probability of lynx highway crossing by Squires et al. (2013). Linkage has lower intensity lynx movements primarily used for summer dispersal movement; there are no breeding pairs in this area. • Secondary target species: bighorn sheep, black bear, mountain lion, mule deer, elk, moose, fox, coyote, bobcat, and boreal toad (breeding site on north side of I-70). • Monitored location for the I-70 EcoLogical Study (2009-2010) at MP 217.2 detected elk, mule deer, coyote, fox. • Bike path/recreation impacts on lynx/wildlife movement (year-round but low winter intensity) 	High (Herman Gulch)	• Low (0.3 WVC/mile/year)	<ul style="list-style-type: none"> • WVC Carcass: Moderate (1.1 WVC/mile/year) • Two lynx WVCs have been recorded in this segment around MP 217 & MP 221 in 2000 & 2005. • Moderately low for bighorn sheep (Huerfano 2015). • Increasing moose conflict. 	<ul style="list-style-type: none"> • Arapahoe National Forest on both sides of I-70; Managed as lynx linkage area. • Bike path adjacent to creek on south side. 	<ul style="list-style-type: none"> • Feasibility challenged by road grade (~4%); uneven grades north and south of I-70; and proximity to creek on south side. • Sensitive wetlands along Clear Creek. • Future projects in this segment are unknown. Preferred alternative includes 6 lanes with WB auxiliary lane and AGS. 	\$13.5-14.5M (overpass)	

NOTES

*2003 LIZ rankings based on potential and existing wildlife value at time of assessment (i.e., present and past utilization as a movement corridor, adjacency to suitable habitat and potential improvement value).

†WVC crash rate calculations based on data from 2014-2018.

††High level cost estimates have not been formally reviewed and are subject to change.

ACRONYMS

- AGS = Advanced Guideway System
- CDOT = Colorado Department of Transportation
- CPW = Colorado Parks and Wildlife
- LIZ = linkage interference zone
- MP = milepost
- USFS = United States Forest Service
- WVC = wildlife-vehicle collisions



I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS
Member of the SNC-Lavalin Group

ALIVE Meeting #6

May 19, 2020



Zoom Meeting Format

- Keep meeting handouts handy
- Will take pauses throughout today's meeting to ask for questions, comments
- Please remain on mute unless you have a question or comment
- We will also monitor the chat box for your questions & comments
- Poll feature (example)



Introductions

- Name
- Position
- Agency/Company



Meeting Objectives

- Obtain ALIVE Committee recommendation on which combination of mitigation options in the mitigation matrix to pursue as mitigation for the Floyd Hill project



Review of Decisions to Date

- At the February 2020 ALIVE meeting, the ALIVE Committee determined that Mitigation Option B (alternative mitigation on the I-70 Mountain Corridor in Region 1) offered greater potential benefits than Mitigation Option A (Floyd Hill overpass)
 - Mitigation Option B also includes wildlife fencing from the top of Floyd Hill to Soda Creek



Follow-up on Action Items from February ALIVE meeting

- ✓ Refine plans for Genesee, Ruby Ranch Road, Soda Creek and Empire crossings
- ✓ Refine cost estimates to determine equivalent mitigation to the Option A crossing at the top of Floyd Hill
- ✓ Follow up with Jefferson County on land use and development plans for lands surrounding proposed crossings
- ✓ Update the mitigation matrix to support the ALIVE Committee's ranking of how to allocate mitigation funds.
 - Include the Floyd Hill crossing for comparison purposes
 - Include parcels that are of interest for habitat protection:
 - Meadow-wetland complex at the top of Floyd Hill
 - Parcels adjacent to potential crossing structure locations



Mitigation Option A – Floyd Hill Overpass

For comparison purposes:



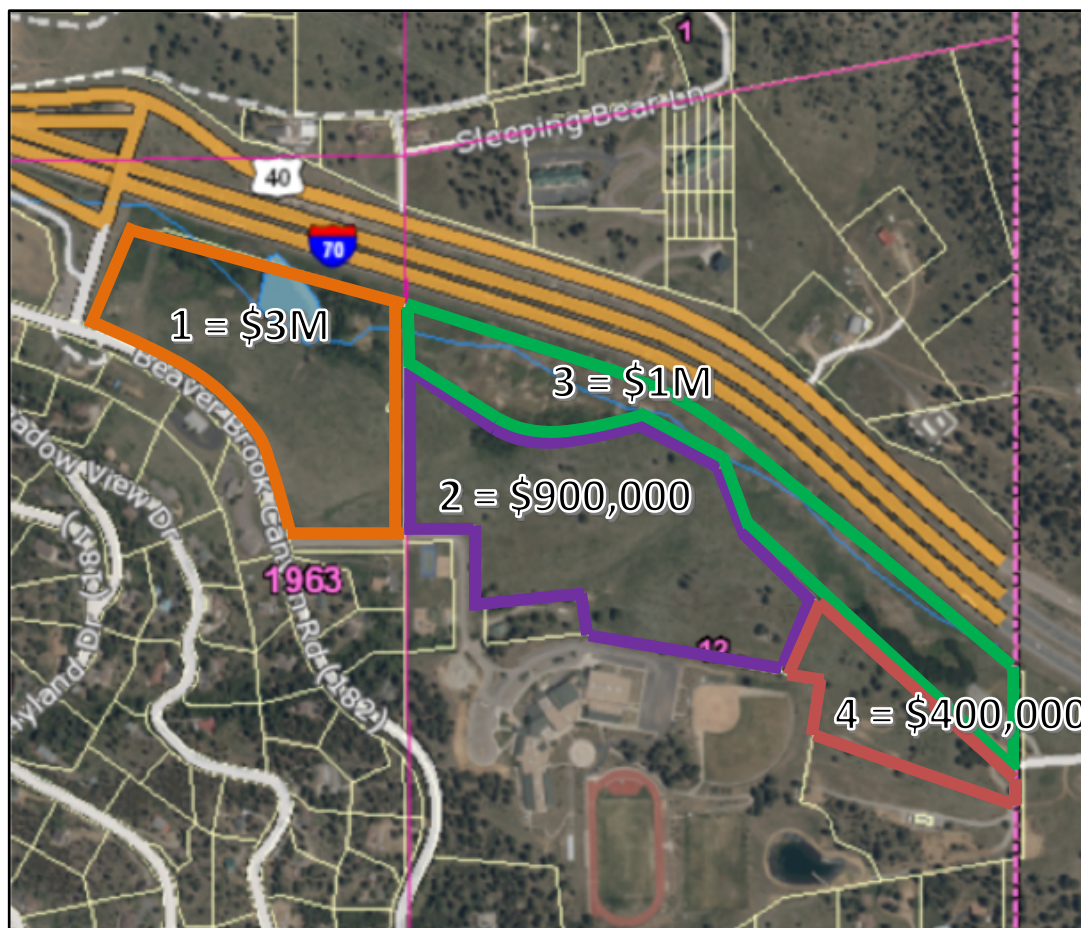
Estimated Cost:
\$15-20 million
For overpass and
partial acquisition of
property adjacent to
overpass



Mitigation Option B: Within Project Area

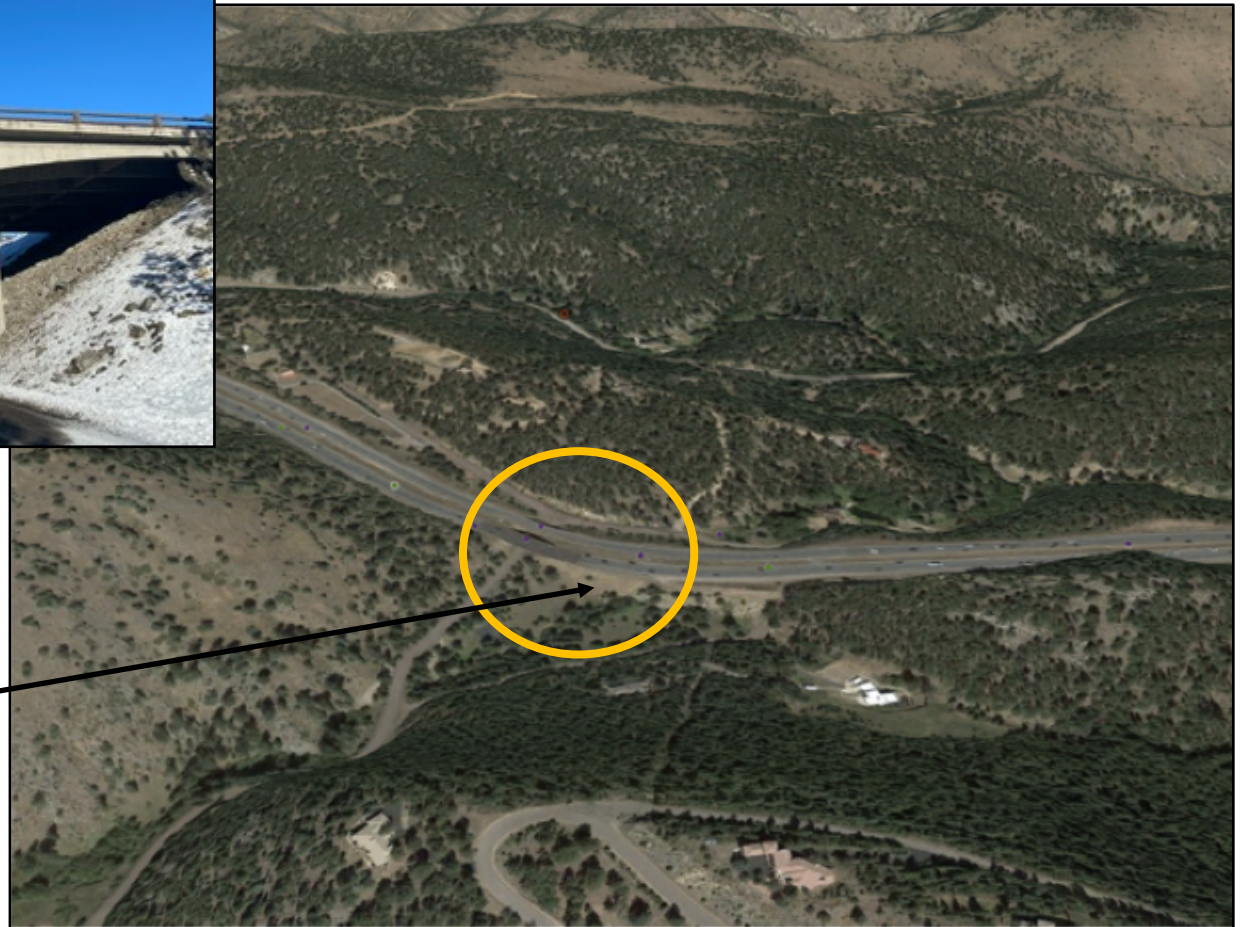
MP 247 Floyd Hill: Habitat Protection

- Meadow-wetland complex
 - 4 parcels





MP 249 – Soda Creek: Wildlife Underpass

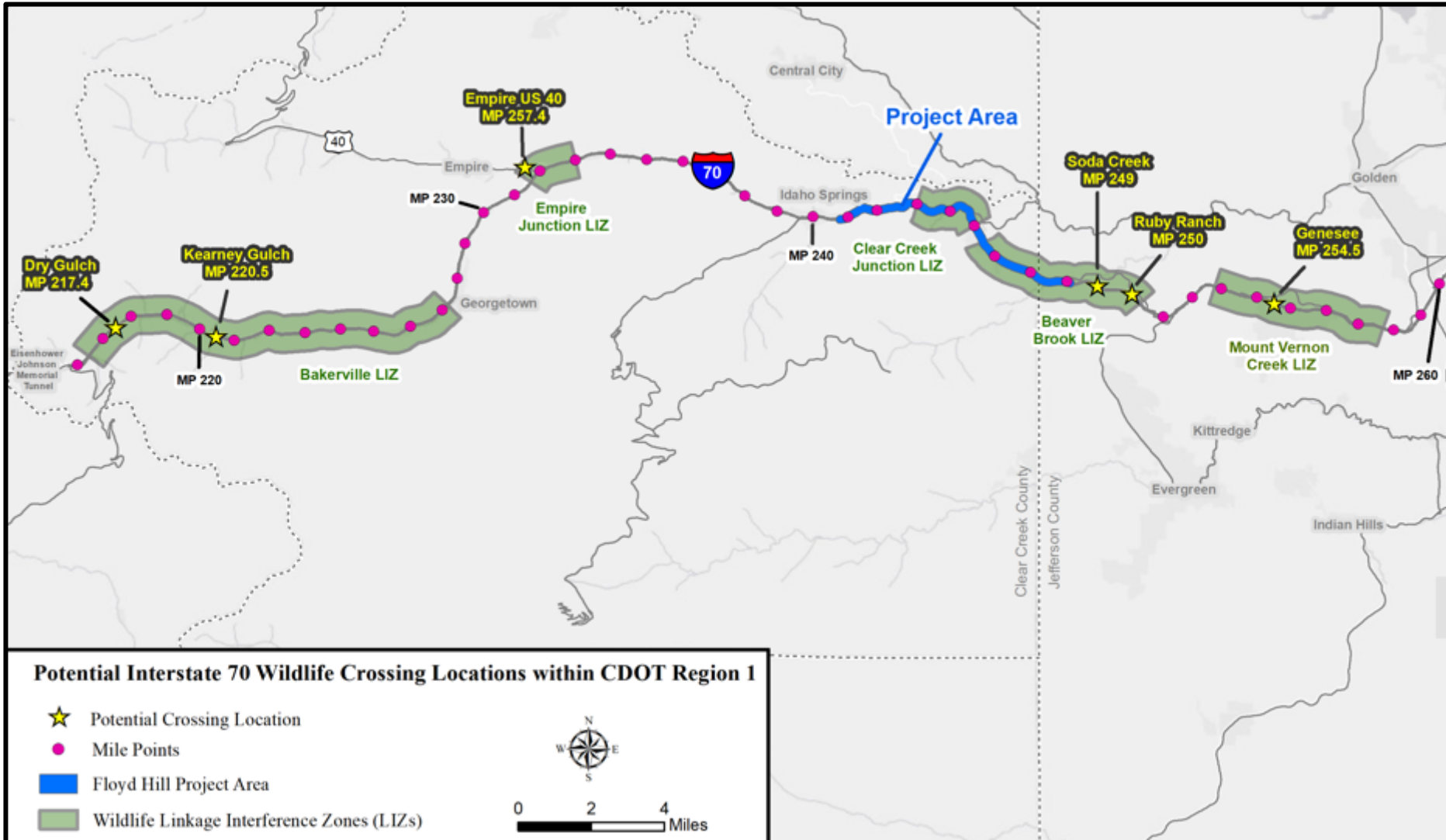


Estimated Cost:
\$4.5 – 5.5M

Construct new
wildlife underpass
at creek drainage



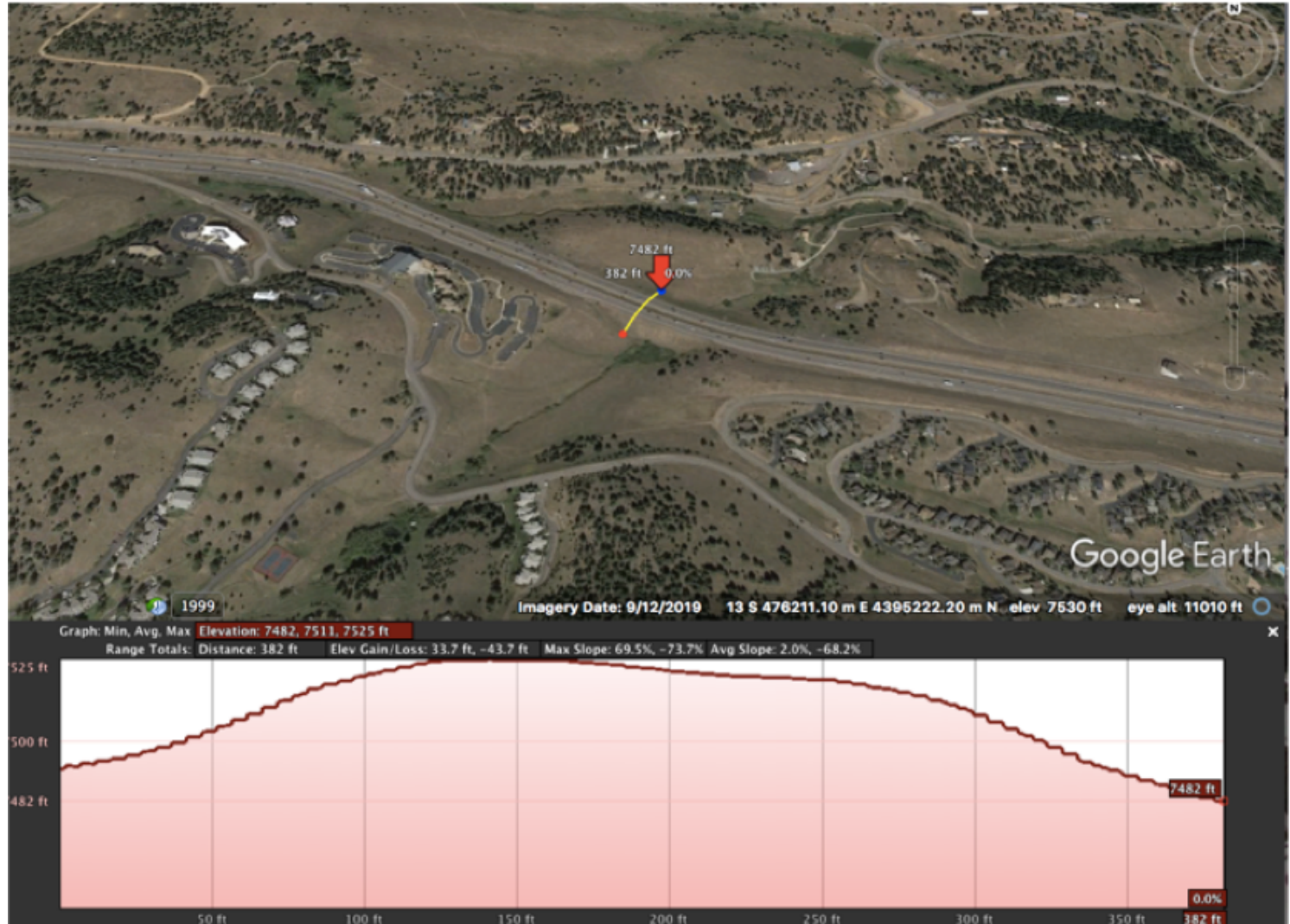
Mitigation Option B: Outside of Project Area





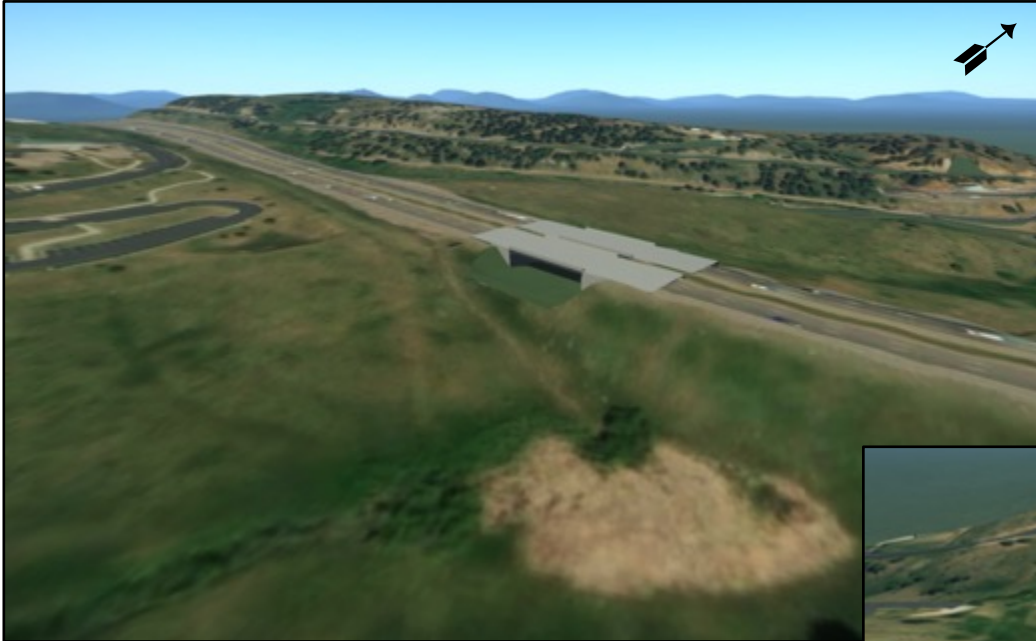
MP 254.5 – Genesee Wildlife Underpass

← 1 mile to Genesee Exit





MP 254.5 – Genesee: Wildlife Underpass



Estimated Cost:
\$4.5 – 5.5M

Bridge underpass
16'H x 100'W x 130' L
with open median (dimensions
are from wildlife perspective)

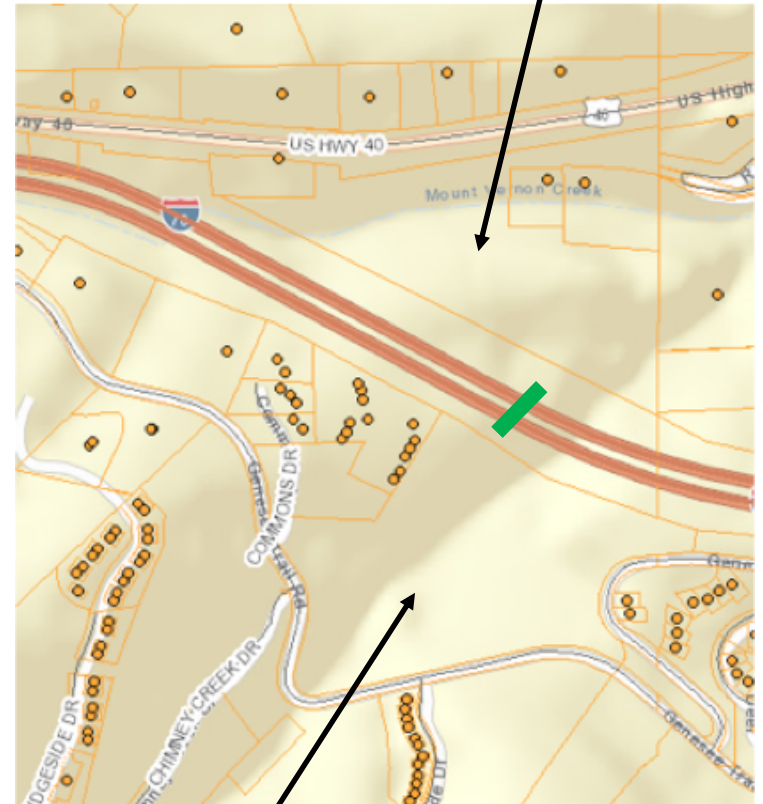




MP 254.5 – Genesee: Habitat Protection

← 1 mile to Genesee Exit

Vacant land for sale \$800,000



HOA (presumed open space)



MP 250 – Ruby Ranch Road: Wildlife Underpass

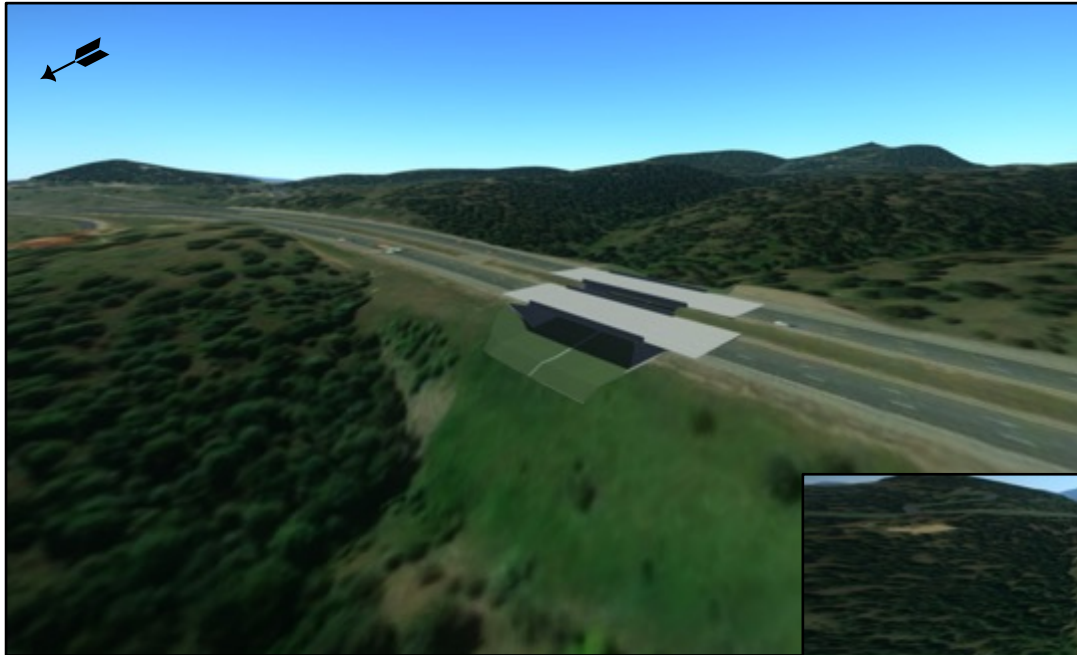


→
½ mile to
El Rancho Exit





MP 250 – Ruby Ranch Road: **Wildlife Underpass**



Estimated Cost:
\$4.5 – 5.5M

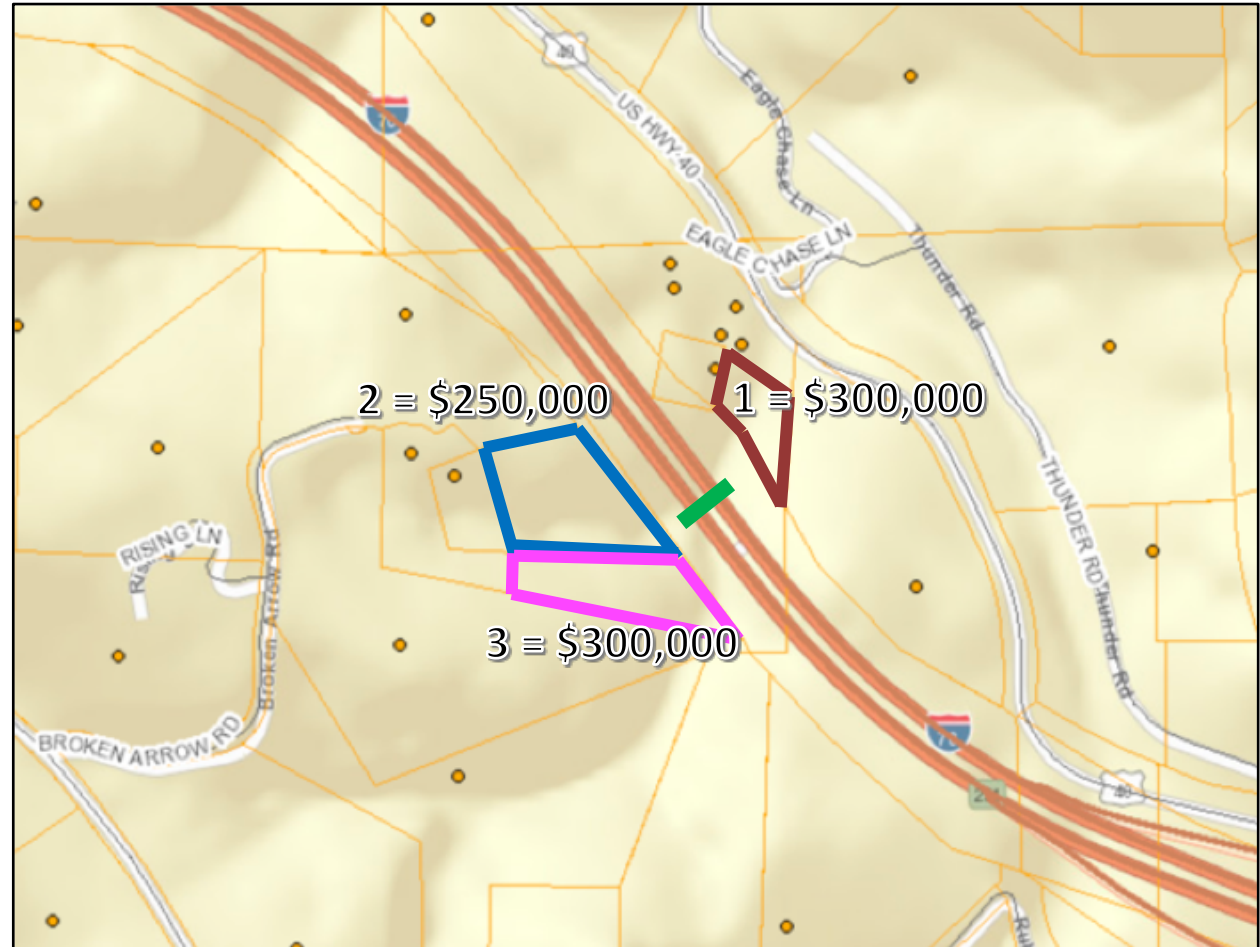
Bridge underpass
16'H x 100'W x 130' L
with open median (dimensions
are from wildlife perspective)





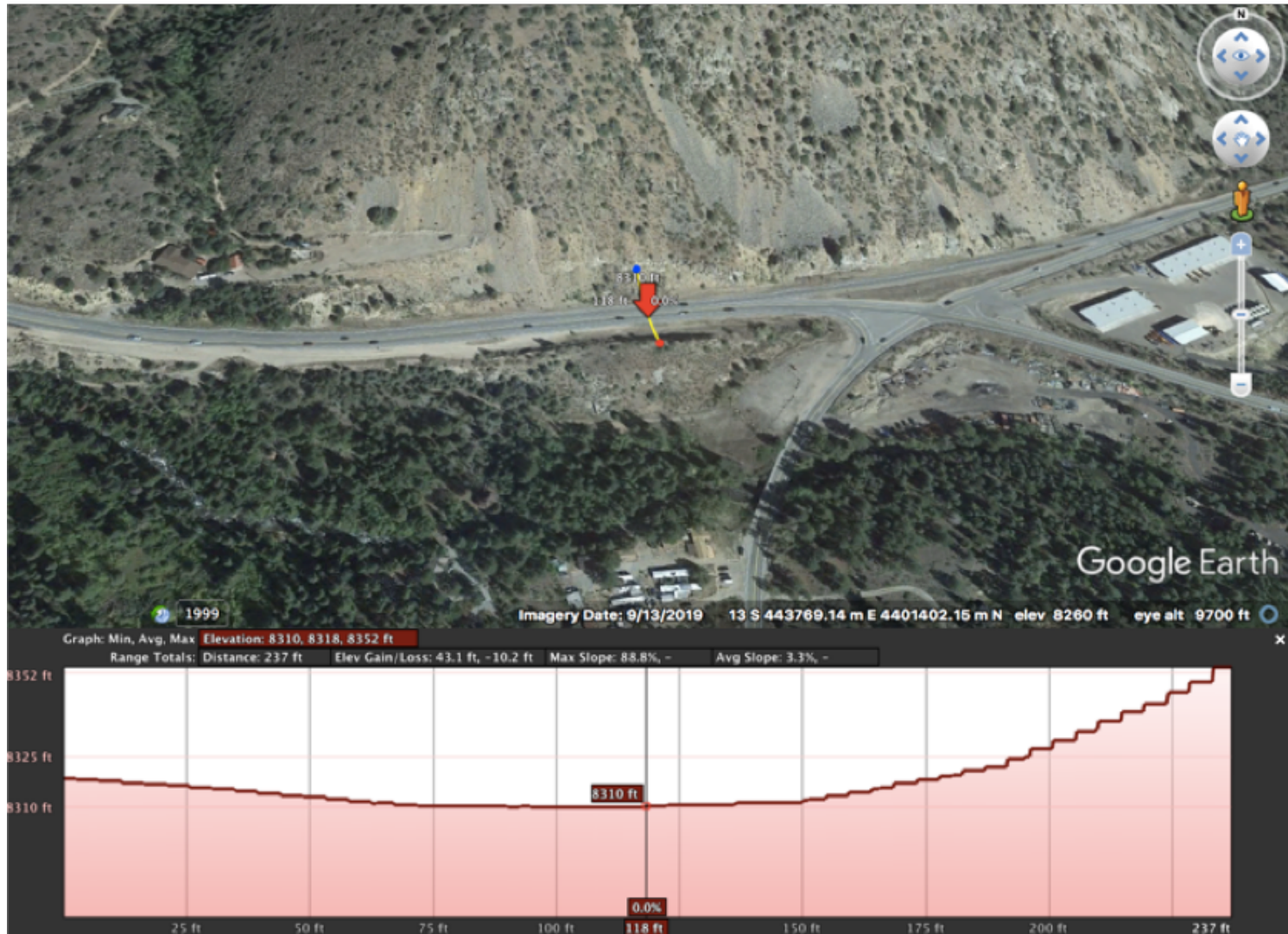
MP 250 – Ruby Ranch Road: Habitat Protection

3 partial parcels
around proposed
wildlife underpass





US 40, MP 257.4 – Empire: Wildlife Overpass





US 40, MP 257.4 – Empire: Wildlife Overpass





US 40, MP 257.4 – Empire: Wildlife Overpass

DOUGLAS MOUNTAIN RANCH AND PRESERVE PROPERTY MAP



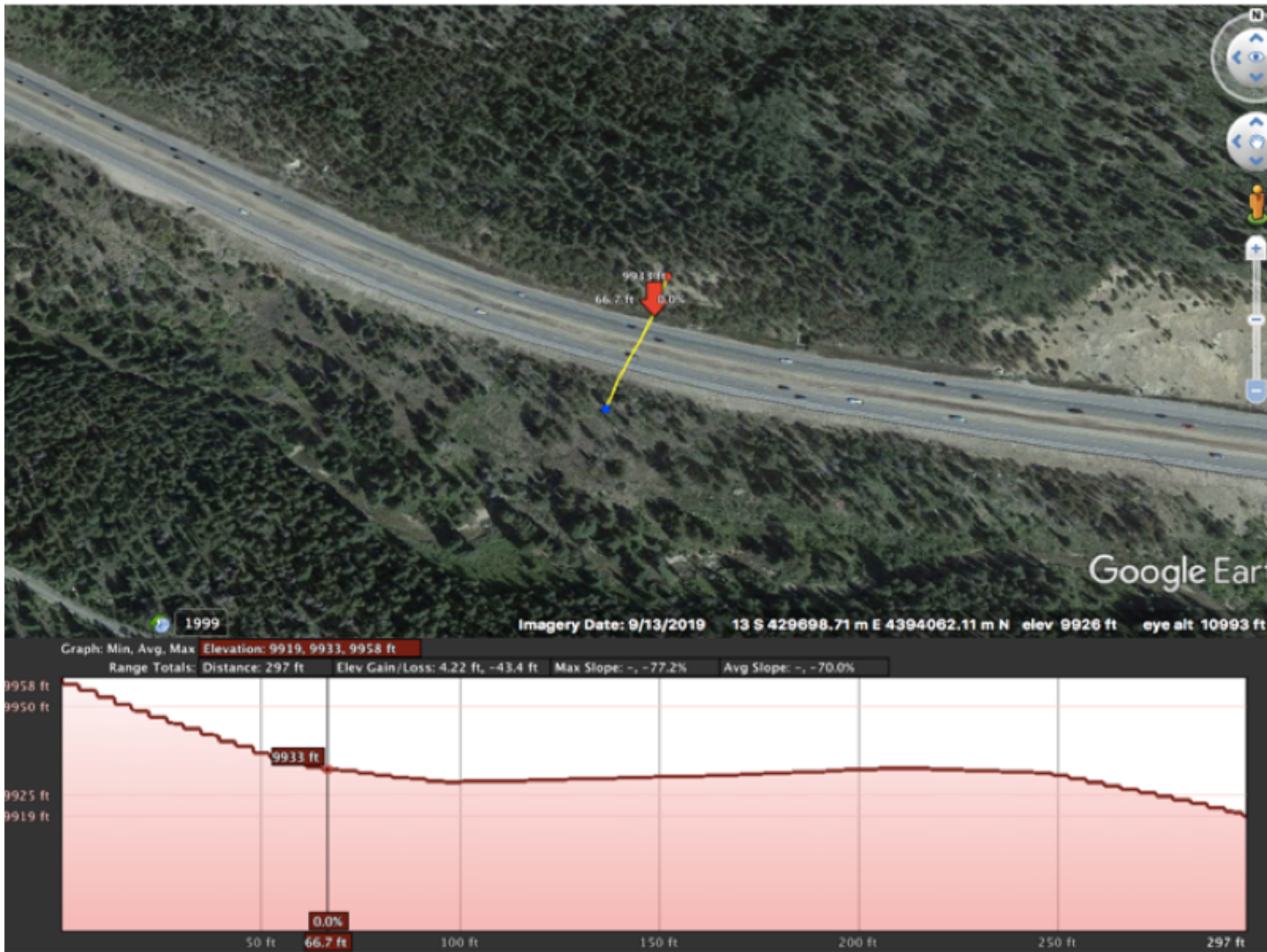
Proposed Overpass Location



- Fee Title Boundary
- Georgetown State Wildlife Area
- Clear Creek County Open Space



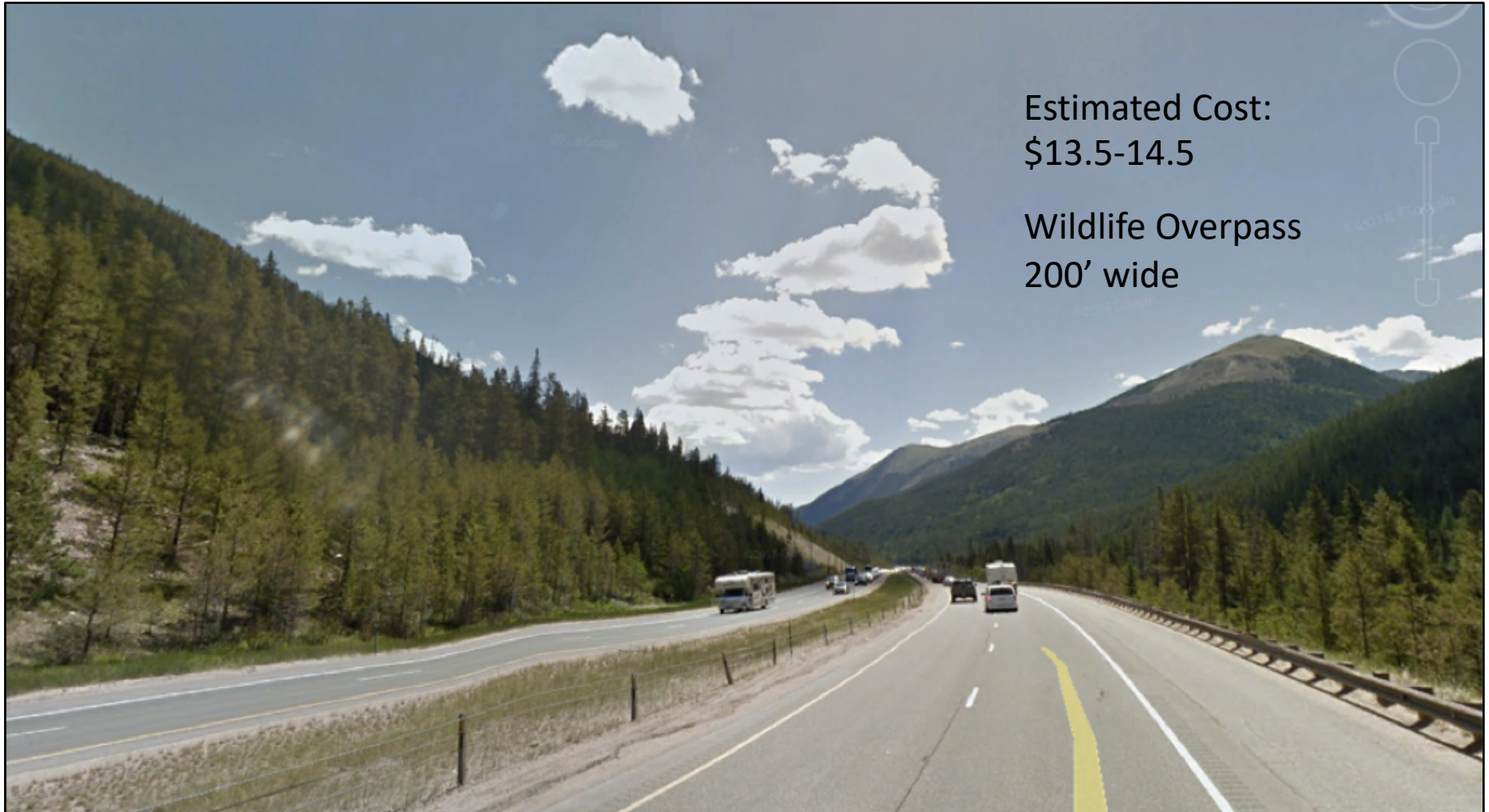
MP 220.5 – Kearney Gulch



½ mile to
Bakerville Exit



MP 220.5 – Kearney Gulch: Wildlife Overpass

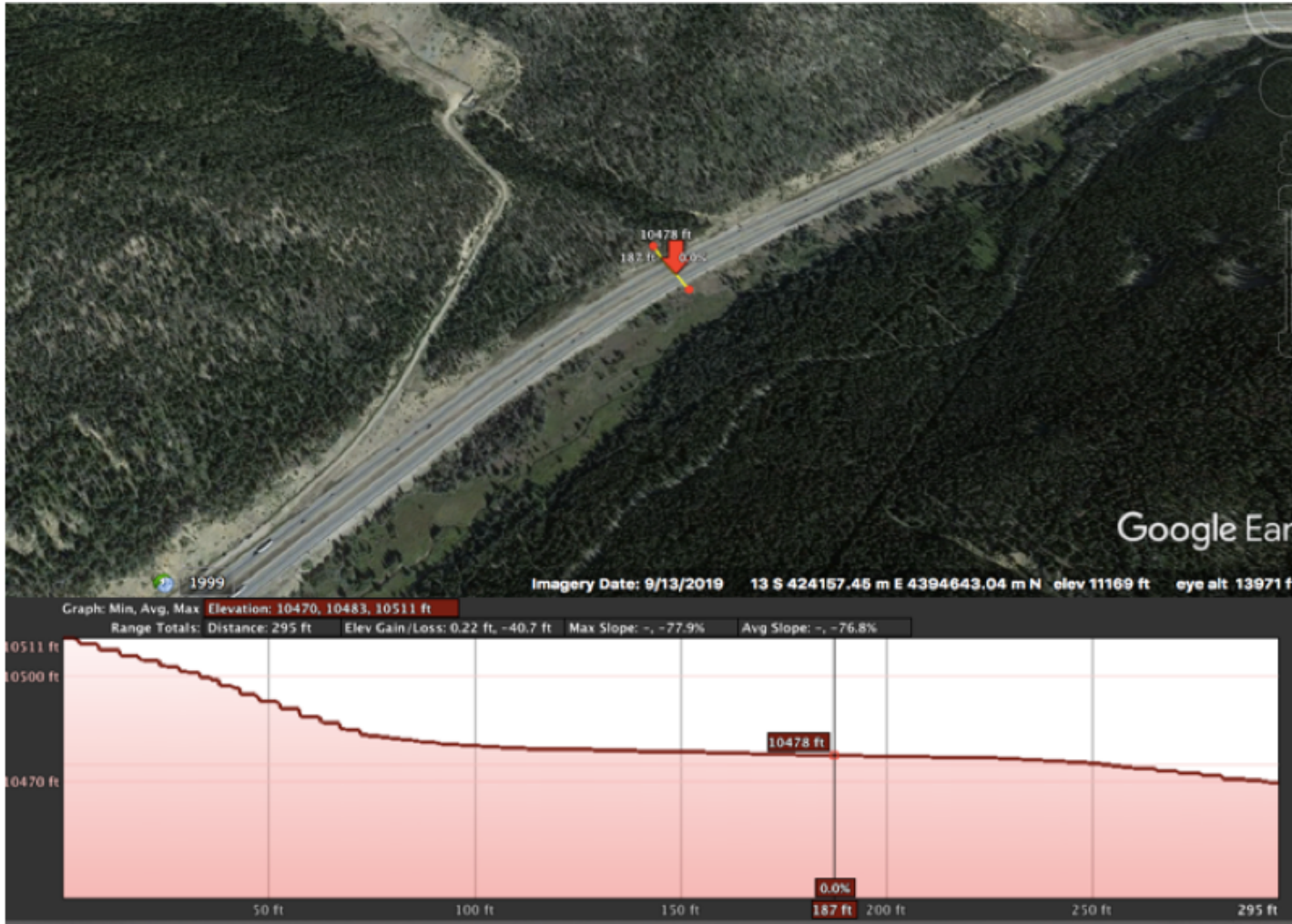


Estimated Cost:
\$13.5-14.5

Wildlife Overpass
200' wide



MP 217.4 – Dry Gulch



Herman Gulch →

EJMT ←



MP 217.4 – Dry Gulch: Wildlife Overpass



Estimated Cost:
\$13.5-14.5

Wildlife Overpass
200' wide



Mitigation Options Ranking

Mitigation Option	Ranking Notes	RANK
Floyd Hill (habitat protection)		
Soda Creek		
Genesee		
Ruby Ranch		
US 40 Empire		
Kearney Gulch		
Dry Gulch		



Next Steps

- Document ALIVE agreements
- Incorporate mitigation commitments into EA mitigation
- Reconvene ALIVE Committee during final design of wildlife crossings once construction funding is identified

1 **Attachment B: Land Use Analysis, Top of Floyd Hill**

2



Technical Memorandum

To: Colorado Department of Transportation (CDOT)

From: Keith Hidalgo, Carol Zhou

Subject: Floyd Hill Wildlife Crossings Land Use Analysis

Date: January 25, 2019

Introduction

Previously, as part of the I-70 Mountain Corridor Programmatic Environmental Impact Statement (PEIS) and the *A Landscape Level Inventory of Valued Ecosystem Components (ALIVE)* Committee, studies were conducted to identify areas where wildlife-vehicle conflicts were occurring at high rates through the I-70 PEIS corridor. As part of the *A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor* analysis, these previous studies (CDOT, 2004; CDOT, 2011) identified Linkage Interference Zones (LIZs) where higher rates of wildlife-vehicle conflicts occurred; these areas were identified from the I-70 PEIS for future mitigation efforts.

Refer to Sections 4.2.1.2, 5.4.1, and 5.4.2 in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial and Aquatic Species Existing Conditions Technical Report* (Atkins, 2019) for more detailed information on wildlife movement and the need for wildlife mitigation in the Floyd Hill Project Area.

The segment of Interstate 70 (I-70) from Floyd Hill to the Veterans Memorial Tunnels (milepost 240 to milepost 248) is located within two distinct LIZs (Beaver Brook and Clear Creek Junction). Colorado Parks and Wildlife (CPW) has identified and mapped several resident and migratory populations of big game and carnivore wildlife species that inhabit the study area and are at risk when attempting to cross the interstate to access habitat to the north and south or are attracted to vegetation and salts along the interstate. Within the Beaver Brook LIZ area at the top of Floyd Hill, Elk (*Cervus elaphus*) is the primary target species, along with Mule Deer (*Odocoileus hemionus*) as the meadows and wetlands adjacent to I-70 are areas that are regularly used for foraging by both species.

As part of the I-70 Floyd Hill to Veterans Memorial Tunnels Project and as part of the ALIVE Committee process, several locations for wildlife mitigation (overpasses, underpasses, enhancements, etc.) have been identified in the Beaver Brook LIZ and the Clear Creek Junction LIZ to improve connectivity across I-70.



Purpose

The purpose of this technical memorandum is to document the existing and expected future land uses surrounding the potential wildlife crossing locations identified on I-70 as part of the I-70 Floyd Hill to Veterans Memorial Tunnels Project. The memorandum was prepared to identify land use and property constraints that may affect the construction or use of wildlife crossings and as a reference for discussions with landowners.

This memorandum also will help ensure that all communications between the Colorado Department of Transportation (CDOT) and representatives of Clear Creek County, Jefferson County, and private landowners are conducted to comply with and protect the legal rights of impacted property owners pursuant to: (1) 49 Code of Federal Regulations (CFR) Part 24, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act); (2) applicable state statutes, and (c) CDOT policies and procedures set forth in its *Right of Way Manual*.

Methodology

The project team has conducted a preliminary screening of potential crossing locations. This land use analysis focuses on locations that are in the Beaver Brook Meadows area near County Road (CR) 65 and at the I-70/U.S. Highway 6 (US 6) Interchange near milepost 244.5. The crossings near the top of Floyd Hill (near mileposts 247 and 248) are in unincorporated Clear Creek County, just west of the county line with Jefferson County. The crossings at the US 6 junction also are within Clear Creek County. Locations are illustrated in Appendix A.

The existing land uses on surrounding properties were obtained from the county assessor's data. Information about planned land uses and zoning came from the *Comprehensive Plan* of Clear Creek County and Jefferson County, zoning ordinances, and online mapping applications. The *Floyd Hill Gateway Sub-Regional Master Plan* also was reviewed. Preliminary information about proposed development located southeast of the Beaver Brook/Floyd Hill Interchange at Exit 247 (south of I-70 and north of Clear Creek High School) was provided by Clear Creek County. The future development discussion is based on information contained in the resource documents noted above and from coordination with Clear Creek County staff.

Study Area

This report evaluates existing land use, zoning, and future land uses, including a one-mile section of I-70 from approximately west of Exit 247 to east of Exit 248 and adjacent lands covering approximately one mile south to one mile north of the examined crossing locations. The analysis area was determined through consultation with the project team. Property ownership and valuation information was obtained for a total of 11 parcels immediately adjacent to the assessed locations, provided in Appendix B.

The analysis included a review of CPW Species Activity Mapping (SAM) data to identify wildlife populations in the area that would be affected by additional development near I-70 and the ability for these wildlife populations to access wildlife crossing structures. Construction of crossing structures would be less effective for wildlife movement and human safety in locations where future development creates a new barrier for wildlife, potentially forcing wildlife to cross I-70 (at-grade) in different locations.

Existing Zoning

Current zoning and permitted uses of parcels within the study area was reviewed to assess land use compatibility and estimate development type and intensity at the locations of potential crossings.

Clear Creek County Zoning

A review of Clear Creek County zoning codes was conducted. Following are summaries of the existing zoning districts that are found within the analysis area of the wildlife overpass locations.

- In the Clear Creek County Mountain Residential/Single-Family Unit (MR-1) district, one single-family dwelling unit is allowed per parcel, and development of the parcel must meet the development standards specified in Section 10 of district regulations and other applicable Clear Creek County Zoning Regulations. Newly created parcels must comprise at least two acres of land zoned MR-1 (CCC, 2011).
- The Clear Creek County Commercial One (C-1) district, which is an obsolete district for new zoning, allows uses such as restaurants, food services, retail trade, light manufacturing, offices, and emergency services buildings. Density of these parcels may not exceed 50 percent of the total square footage of the parcel. Residential uses also may be developed in conjunction with a significant commercial principal use when more than 21 dwelling units are proposed (CCC, 2011).
- The Clear Creek County Planned Development (PD) designation is a zoning district that allows an owner to develop a tract of land under a specific plan. A PD concept usually will contain a mix of uses or specific uses not allowed in other zoning districts while providing a continuum of design and development through total integration of project planning. Minimum acreage and number of units must be specified for the overall site in the approved Official Development Plan (ODP) with respect to those limitations established for similar uses (CCC, 2011).

Jefferson County Zoning

A review of Jefferson County zoning codes was conducted. Following are summaries of the existing zoning districts that are found within the analysis area of the wildlife overpass locations.

- Pursuant to Section 25 of the Jefferson County Zoning Regulations, the minimum lot area for any use permitted in an Agricultural-One (A-1) district must be at least five acres. The permitted principal uses include single-family dwellings, general farming, forestry farming, public parks, cemeteries, and water supply facilities. The A-1 district is intended to provide for limited farming, ranching, and agriculturally related uses while protecting the surrounding land from any harmful effects (Jefferson County, 2018).
- Jefferson County's PD zoning district may include uses of any nature (residential, commercial, conservation, mining, industrial, public or quasi-public, etc.). Minimum parking, height, setback, and area regulations need to be specified for the overall site with respect to those limitations established on similar uses in other Jefferson County zoning districts and with respect to compatibility with surrounding development. The permitted uses and standards for a particular PD zoning district are those which were approved by the Board of County Commissioners through the Planned Development zoning case and included in the ODP (Jefferson County, 2018).

General Land Use

Clear Creek County Land Use

Most land in the analysis area at the wildlife overpass locations within Clear Creek County is designated low-density residential. Residential land use designations in the area of I-70 include Large Rural Residential and Residential Large Lot. There is some commercial development designated near the Hyland Hills/Floyd Hill Interchange along I-70.



Site No. 1, Parcel No. 1963-122-00-201

On the north side of the two potential crossing locations is a self-storage facility. This parcel, which is noted as Site No. 1 in Appendix A and shown on the map to the left, is designated as Regional Commercial under existing land use and is zoned as PD under the Clear Creek County zoning ordinances. It has a future land use designation of Residential Large Lot in the County's Online Maps and a "Multiple Use-1" designation in the *Clear Creek County Comprehensive Plan*, both of which indicate the County's desire to maintain the existing low-density development pattern on this land. The remaining land north of I-70 in the study area is zoned as MR-1 or PD.

The entire Beaver Brook Meadows Subdivision has been designated as "Multiple-Use 1" in the *Clear Creek County Community Master Plan (CCC, 2017)*. The plan identified Multiple Use-1 as areas that, "... allow for multiple uses with the intention of maintaining the level and intensity of current land uses or future uses specified by an approved subarea plan." Only a very small percentage of the County is designated as this land use type, mostly near Floyd Hill,

where the appropriate level of development intensity needs to be examined further at the subarea level. The permitted uses may include residential, commercial, parks, and open space. The plan also indicated that "site-specific considerations in these areas such as scenic vistas, sensitive natural and cultural resources, natural hazards, availability of services/ infrastructure, and existing and/or future limitations on access, water, or sewer may limit or shape development."

Both of the crossings on the south side in the Beaver Brook Meadows area are located on the Beaver Brook Meadows Subdivision Lot 4 parcel. It is noted as Site No. 2 in Appendix A and shown on the map to the right. This long parcel is adjacent to CDOT right of way and has a Clear Creek County General Plan land use designation of Rural Residential with split zoning. According to the subdivision regulations, "For Lot 4, which is split-zoned as a MR-1 zoned section and a C-RO zoned section, development cannot concurrently exist on both the MR-1 and C-RO sections... if the C-RO section has been developed and uses/structures exist on that portion of property, the MR-1 portion of property cannot be developed unless all development and uses/structures are decommissioned and removed from the C-RO section of land, and that land is reclaimed to its natural states." The Lot 4 parcel currently is developed for commercial use as a show home owned by Floyd Hill Investment LLC.



Site No. 2, Parcel No. 1963-122-03-004



Site No. 3, Parcel No. 1963-122-03-001



Site No. 4, Parcel No. 1963-122-03-003

The other two lots in the Beaver Brook Meadows subdivision (noted as Site No. 3 and No. 4 in Appendix A and shown on the maps to the left and below) are adjacent to the one long parcel described above. They are zoned as Mountain Residential/Single-Family Units (MR-1) and have a Rural Residential existing land use designation. The land in the two parcels is largely undeveloped except for at the Beaver Brook Cellular Telecommunications Facility on a portion of Site No. 3. This facility is divided by a property line and exists on two different parcels, one owned by the School District, the other owned by ESRI Properties. This vacant area provides valuable habitat and an important movement corridor for several wildlife species.

Based on conversations with Clear Creek County staff (personal communication with Adam Springer), Site No. 3 is in the early process of planned development. Current estimates have identified a minimum development of 188 units. The planned development includes high-density apartments, commercial development, and surface parking.

However, the development plan is preliminary and may change. When an ODP is finalized, the plan will be available on Clear Creek County's website, similar to the other information that was collected for this report.

The Hyland Hills parcel just west of Beaver Brook Meadows (noted as Site No. 5 on the map to the right) is zoned for commercial use and designed as Multiple Use-1 for future land use. It is currently undeveloped. Although this parcel does not directly affect the crossing location, commercial development could affect the wildlife activity in the vicinity, which could negate the effectiveness of the crossing. CDOT could consider buying an appropriate area either in fee or via a conservation easement to preserve wildlife access to the crossing.

Jefferson County Land Use

Much of the study area in Jefferson County primarily consists of rural residential, farmlands, and grazing lands. Residential development mostly is scattered and low density. According to the County's Online Zoning Map, most of the land within the analysis area is zoned as agriculture. A few parcels south of I-70 within the analysis area are zoned as PD.

Jefferson County does not have an existing land use map layer on the County's Online Map. The County Assessor's data include a land use type that is associated with the land use value model. That information was used to indicate the current land use of parcels. One of the geographic information systems (GIS) layers on the County's Online Zoning Map is called Land Use Summary. This layer was a field the planning staff had to create because the *Comprehensive Master Plan* was a merging of multiple stand-alone community and area plans. That field was used to create a general summary of the recommended land use from area to area across multiple plans.



Site No. 5, Parcel No. 1963-111-01-209



The surrounding parcels (which are noted as Site No. 6 and No. 7 in Appendix A and shown in the maps below) are recommended primarily as Residential with one dwelling unit per acre, indicating a low-density development pattern.



Site No. 6, Parcel No. 42-122-00-001



Site No. 7, Parcel No. 42-121-00-013

A few adjacent parcels south of I-70 (which are noted as Site No. 8 and No. 9 in Appendix A and shown on maps below) have a land use recommendation as “Area of Stability—Commercial.” Areas of stability typically are residential in nature. The *Evergreen Subarea Plan* (Jefferson County, 2013) specifies, “... any new development or redevelopment in these areas should be consistent with the character, scale, uses and typical lot sizes of the properties in the general vicinity of the proposed development. Lot sizes should remain the same or increase in size. Future zonings to decrease the minimum lot sizes should be discouraged.”



Site No. 8, Parcel No. 42-124-00-026



Site No. 9, Parcel No. 42-121-00-019

Future Development

Site-specific constraints, such as steep slopes, wetlands, and inadequate access to water and sewer, limit the development potential at the reviewed properties. Both counties' *Comprehensive Plans* envision low-density rural residential development and protecting surrounding agricultural land and open space. In the Clear Creek County 2017 *Community Master Plan*, the crossing analysis area is designated primarily for Multiple Use-1, i.e., "... areas allow for multiple uses with the intention of maintaining the level and intensity of current land uses or future uses specified by an approved subarea plan." The *Floyd Hill Gateway Sub-Regional Master Plan* also indicates that the existing public facilities infrastructure, such as water/sewer and limited highway interchange access, will restrict Floyd Hill's ability to accommodate medium to high densities until improvements are implemented in a planned, phased manner.

Currently, no land use cases under review exist on the surrounding parcels. According to local news (Westeman, 2018), a developer based in Evergreen has started the pre-application with Clear Creek County for a new residential development in Floyd Hill. The project proposes rezoning on Floyd Hill near Clear Creek County High School and construction of a residential development resulting in future creation of 400 townhomes, condominiums, and single-family houses. The Hyland Hills parcel (Homestead) at the southeastern corner of the I-70/Homestead Road interchange currently is zoned as C-1 and approved for apartments with a small retail component. However, the MR-1 designation of the Beaver Brook Meadows Lot 1 parcel (Snowy Ridge) requires that rezoning be requested to change the current zoning to high-density residential to allow for the proposed condominium units. During community meetings supporting the pre-application process, residents were concerned about increased traffic and unsustainable water use, with some residents completely opposing the proposed development. The County has not yet received a formal application for the proposed rezoning.

Options for Wildlife Corridor Preservation

The conceptual design suggests that the potential wildlife crossing structure could extend beyond the public right of way, which will be required to comply with local comprehensive plans and local zoning regulations. CDOT should begin to identify which private parcels could be impacted to support this facility. To the extent that any of the identified properties would be directly impacted by an acquisition in fee or via a conservation easement, the property owner(s) from whom the property would be acquired would be entitled to receive just compensation and the negotiation and transaction would be conducted in compliance with the Uniform Act, applicable state statutes, and the *CDOT Right of Way Manual*.

- Due to the configuration of Site No. 2 and the fact that improvements have been made on part of the property, it would be a favorable approach for CDOT to contact the property owner and preliminarily discuss in a general way a possible purchase of the fee interest in the property, or, alternatively, the procurement of a conservation easement.
- Site No. 3, 4, and 5 provide valuable habitat and an important movement corridor for several wildlife species in the area. To make the potential wildlife crossing effective, it would be beneficial for CDOT to preliminarily explore conservation options with the landowners. Given that improvements have been made to Site No. 1, it would be beneficial to consider adjusting the alignment of the structure in the final design to minimize any impacts to the property and work with the landowners to explore options to support the wildlife crossing.
- Site No.6, adjacent to Site No. 1, is currently undeveloped and is zoned as agriculture. This current land use and zoning designation allows more flexibility for CDOT to work with the landowners to explore conservation options on the property.

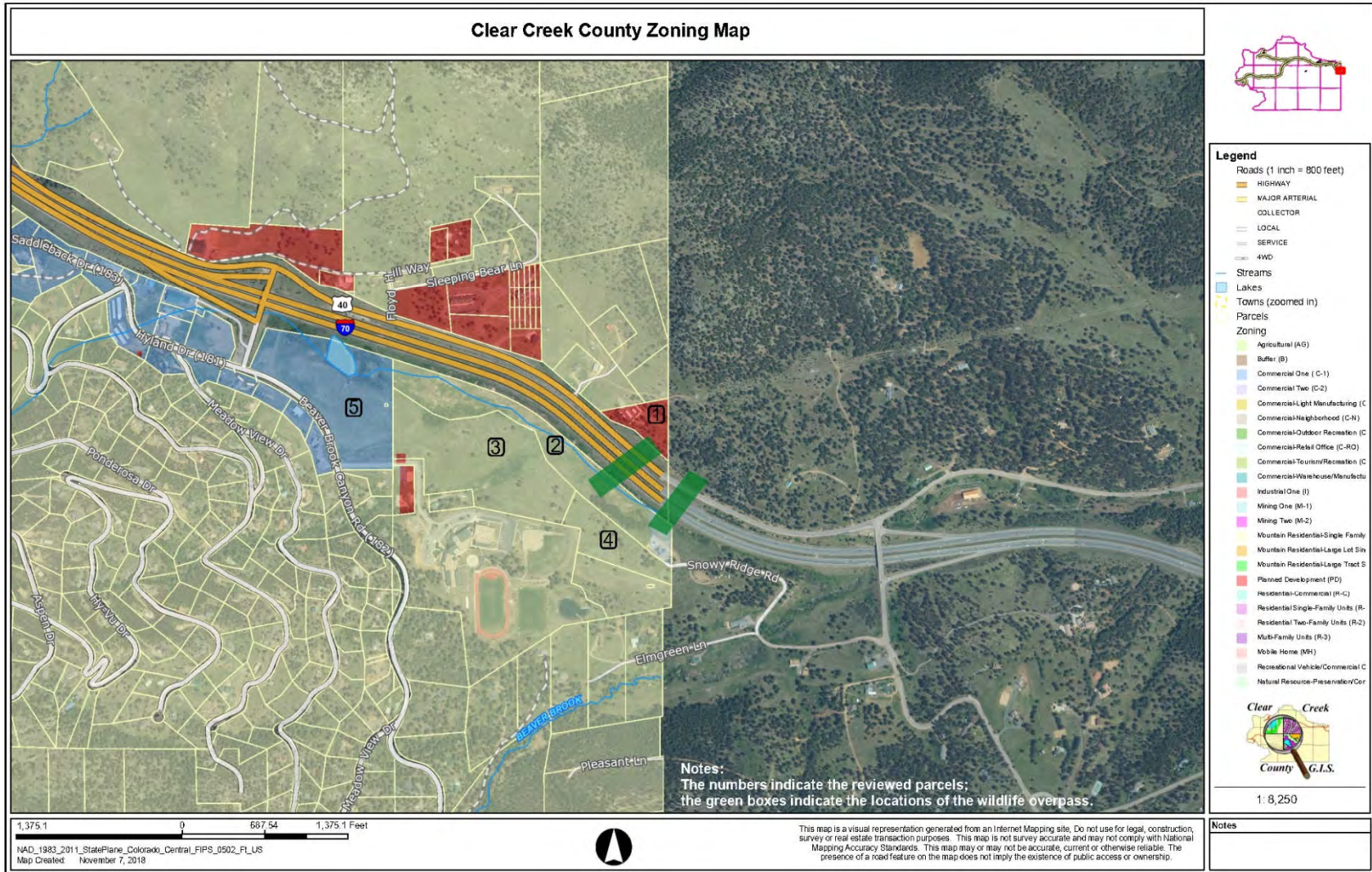


References

- Colorado Department of Transportation (CDOT), Federal Highway Administration (FHWA), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture Forest Service (USFS), U.S. Bureau of Land Management (BLM), and Colorado Parks & Wildlife (CPW) (formerly Colorado Division of Wildlife). 2008. *ALIVE Memorandum of Understanding*. April 11, 2008.
- Clear Creek County (CCC). (2009). *Floyd Hill Gateway Development Master Plan*. Adopted November 18, 2009. Retrieved from <https://www.co.clear-creek.co.us/DocumentView.aspx?DID=993>.
- CCC. (2011). Clear Creek County Zoning Regulations. Adopted August 29, 2011. Retrieved from <https://www.co.clear-creek.co.us/DocumentView.aspx?DID=927>.
- CCC. (2017a). *Clear Creek County 2017 Community Master Plan*. Adopted January 18, 2017. Retrieved from <http://www.co.clear-creek.co.us/DocumentCenter/View/7626>.
- CCC. (2017b). Clear Creek County Interactive Maps. Retrieved from <https://map.co.clear-creek.co.us/HTML5Viewer/?viewer=clearmap>.
- Jefferson County. (2013). *Jefferson County Comprehensive Master Plan*. Adopted October 9, 2013. Retrieved from <https://www.jeffco.us/DocumentCenter/View/9914>.
- Jefferson County. (2017). Jefferson County Interactive Map. Retrieved from <http://maps.jeffco.us/>.
- Jefferson County. (2018). Jefferson County Zoning Resolution. Updated July 2018. Retrieved from <https://www.jeffco.us/2460/Zoning-Resolution>.
- Westeman, Corinne. (2018). "400 homes proposed in meadow on Floyd Hill." *Canyon Courier*. February 7, 2018. Retrieved from <https://www.canyoncourier.com/content/400-homes-proposed-meadow-floyd-hill>.

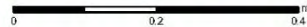
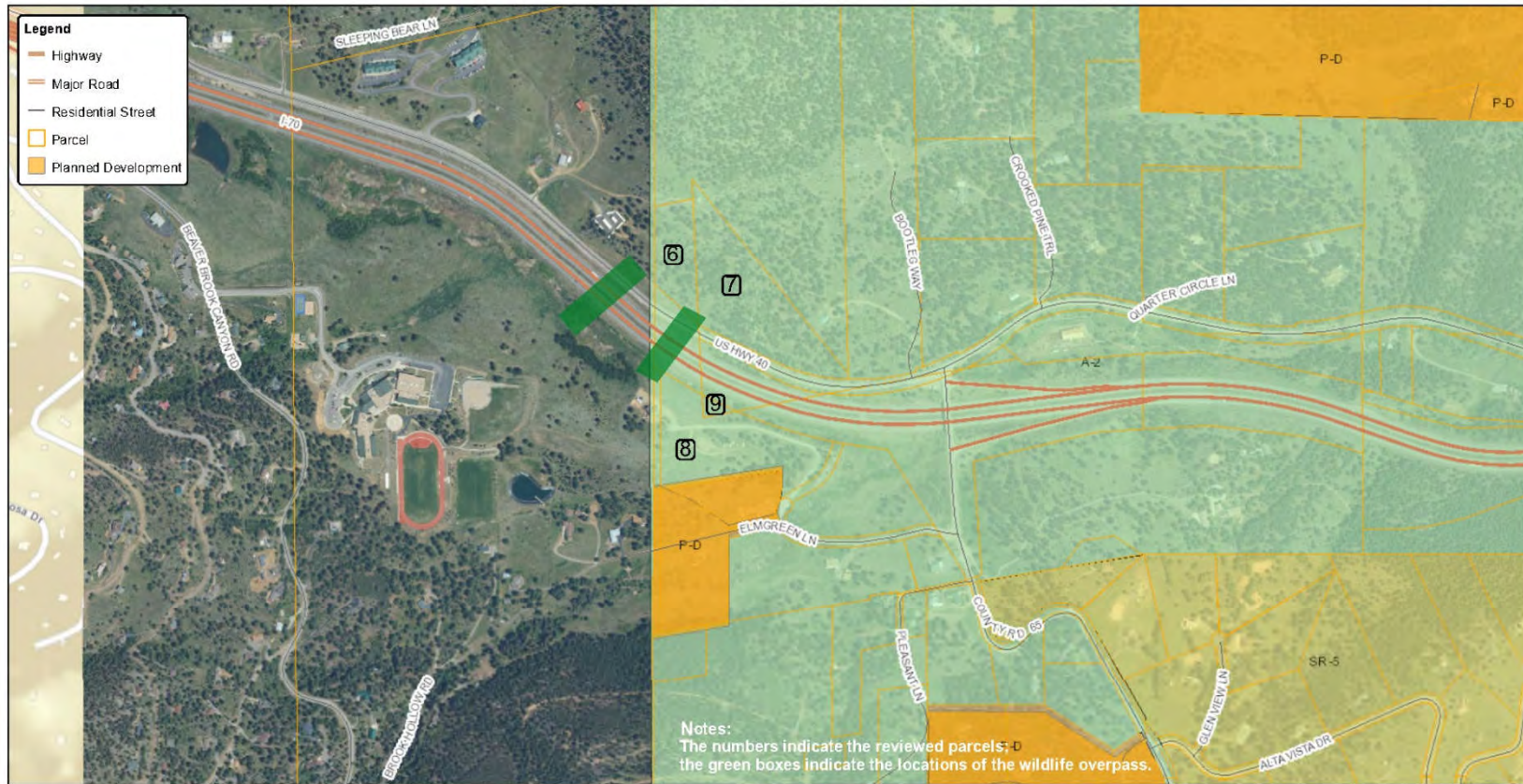


Appendix A. Wildlife Crossing Locations and Adjacent Parcels





Jefferson County Zoning Map



Jefferson County offers this service for informational purposes only for the convenience of the user and assumes no liability whatsoever associated with the use or misuse of this data. This data is provided "as is" and Jefferson County disclaims all representations and warranties expressed or implied, including without limitation all representations and warranties as to the completeness, accuracy, correctness, merchantability and fitness for a particular purpose of any data and any and all warranties of title related thereto.

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community
Jefferson County Colorado



JEFFERSON
COUNTY COLORADO
Author:
Date: 11/7/2018

Appendix B. Summary of Land Use and Land Ownership

Table B-1. Clear Creek County Land Use and Land Ownership



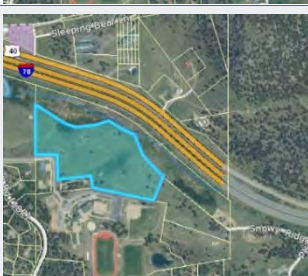
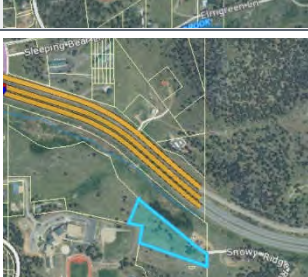

No.	Parcel	Land Use and Zoning	Owner(s) Contact	Property Address	Actual Value (2018) and Type	Map
1	1963-122-00-201	<ul style="list-style-type: none"> Existing land use is Regional Commercial Zoning is Planned Development (PD) Future land use is Residential Large Lot 	RSJ Storage LLC, et al. Ronald S Jones PO Box 400 Tabernash, CO 80478	18 Brandt Ln Evergreen, CO 80439	<ul style="list-style-type: none"> Total—\$173,100 Improvements—\$106,200 Commercial 	
2	1963-122-03-004	<ul style="list-style-type: none"> Existing land use is a show home, which is Commercial; the rest of the property is undeveloped Dual zoning (Commercial and Residential) that are mutually exclusive Future land use is Multiple Use-1 	Floyd Hill Investments LLC Nathaniel Peterson 30150 Troutdale Scenic Dr Evergreen, CO 80439	264 Snowy Ridge Road Evergreen, CO 80439 Phone: 303-968-7183	<ul style="list-style-type: none"> Total—\$480,640 Improvements—\$370,440 Commercial 	
3	1963-122-03-001	<ul style="list-style-type: none"> Existing land use is Rural Residential Zoning is Mountain Residential—Single-Family Units (MR-1) Future land use is Multiple Use-1 	ESRE Properties II, Inc. PO Box 4 Evergreen, CO 80437	Vacant	<ul style="list-style-type: none"> Total—\$165,200 Improvements—\$0 Vacant Land and Commercial 	
4	1963-122-03-003	<ul style="list-style-type: none"> Existing land use is Rural Residential Zoning is Mountain Residential—Single-Family Units (MR-1) Future land use is Multiple Use-1 	Sergey Khlop & Olga Marinkina 287 Snowy Ridge Rd Evergreen, CO 80439	Vacant	<ul style="list-style-type: none"> Total—\$92,600 Improvements—\$0 Vacant Land 	
5	1963-111-01-209	<ul style="list-style-type: none"> Existing land use is Regional Commercial Zoning is Commercial One (C-1) Future land use is Multiple Use-1 	Snow Mountain LLC 820 S Monaco Pkwy #102 Denver, CO 80224	Vacant	<ul style="list-style-type: none"> Total—\$198,180 Improvements—\$0 Vacant Land 	

Table B-2. Jefferson County Land Use and Land Ownership






No.	Parcel	Land Use and Zoning	Owner(s) Contact	Property Address	Actual Value (2018) and Type	Map
6	42-122-00-001	<ul style="list-style-type: none"> Existing land use is Residential Zoning is Agriculture Recommended land use is Residential—1 dwelling unit/10 acres 	RSJ Storage LLC Audrey J Hansen Unified Credit Trust 26-6 PO Box 400 Tabernash, CO 80478	Vacant	<ul style="list-style-type: none"> Total—\$36,550 Improvements—\$0 Vacant Land 	
7	42-121-00-013	<ul style="list-style-type: none"> Existing land use is Agriculture Zoning is Agriculture Recommended land use is Residential—1 dwelling unit/10 acres 	Charles P. Brandt 23 Brandt Ln Evergreen, CO 80439	Vacant	<ul style="list-style-type: none"> Total—\$676 Improvements—\$0 Agriculture 	
8	42-124-00-026	<ul style="list-style-type: none"> Existing land use is Agriculture Zoning is Agriculture Recommended land use is Commercial—Area of Stability 	Spirit & Hope LLC 5060 Hwy 73 Evergreen, CO 80439	Vacant	<ul style="list-style-type: none"> Total—\$648 Improvements—\$0 Agriculture 	
9	42-121-00-019	<ul style="list-style-type: none"> Existing land use is Residential Zoning is Agriculture Recommended land use is Commercial—Area of Stability 	Cynthia Lee Westrich Personal Rep 23 Brandt Ln Evergreen, CO 80439	Vacant	<ul style="list-style-type: none"> Total—\$7,863 Improvements—\$0 Vacant Land 	

Table B-3. Clear Creek County Land Use and Land Ownership near US 6 Bridge Crossing

No.	Parcel	Land Use and Zoning	Owner(s) Contact	Property Address	Actual Value (2018) and Type	Map
10	1833-343-01-002	<ul style="list-style-type: none"> Existing land use is Rural Residential Zoning is Mountain Residential—Large-Tract Single-Family Future land use is Rural Residential 	Stanford & Kristine L Watanabe 423 Upper Elk Valley Dr Evergreen, CO 80439	423 Upper Elk Valley Dr Evergreen, CO 80439	<ul style="list-style-type: none"> Total—\$963,060 Improvements—\$ 731,670 Residential 	
11	1833-343-00-955	<ul style="list-style-type: none"> Existing land use is Public Lands Zoning is Natural Resource—Preservation/Conservation Future land use is Parks, Open Space, Recreation 	Clear Creek County PO Box 2000	Vacant	<ul style="list-style-type: none"> Total—\$3,080 Exempt properties 	