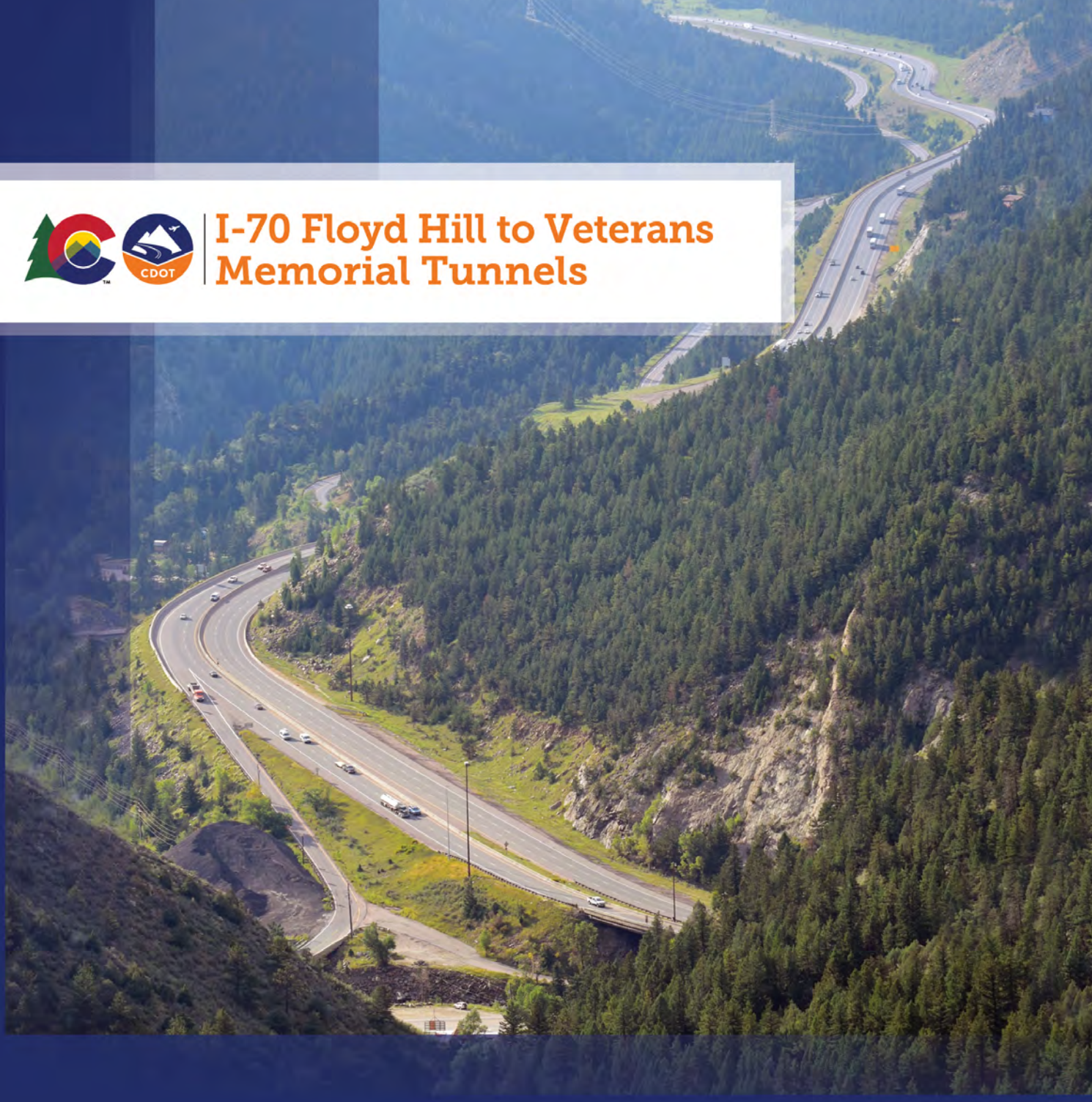


I-70 Floyd Hill to Veterans Memorial Tunnels

Wetlands and Aquatic Resources Technical Report

May 2021

This page intentionally left blank.

Table of Contents

1. Introduction and Purpose of this Report 1

2. Proposed Action and Alternatives 2
   2.1. Description of Proposed Action and Alternatives 2
   2.2. No Action Alternative 5
   2.3. Action Alternatives: East Section 5
   2.4. Action Alternatives: Central Section 5
      2.4.1. I-70 Mainline 6
      2.4.2. Frontage Road 6
   2.5. Action Alternatives: West Section 7
   2.6. Construction of Action Alternatives 8

3. Applicable Laws, Regulations, and Guidance 9

4. Aquatic Resources in the Tier 1 PEIS 11
   4.1. Context 11
   4.2. Analysis in Tier 2 Processes 12
   4.3. Tier 2 Mitigation Strategies 12

5. Affected Environment 14
   5.1. Study Area 14
   5.2. Environmental Conditions 15
      5.2.1. Field Survey Methodology 15
      5.2.2. Desktop Survey Methods 16
      5.2.3. FACWet Methodology 17
   5.3. Vegetation Communities 17
   5.4. Hydrology 18
   5.5. General Soils 18
   5.6. Surface Waters 19
      5.6.1. Beaver Brook and its Tributaries 19
      5.6.2. Clear Creek and its Tributaries 20
      5.6.3. Ponds 20
   5.7. Wetlands 21
      5.7.1. Wetlands Associated with Beaver Brook and its Tributaries 21
      5.7.2. Wetlands Associated with Clear Creek and its Tributaries 22
      5.7.3. Wetlands Associated with Ponds 22
      5.7.4. Isolated Wetlands 23
   5.8. FACWet Assessment 23
      5.8.1. AA-1 24
      5.8.2. AA-2 24
      5.8.3. AA-3 24
      5.8.4. AA-4 24
      5.8.5. AA-5 25
      5.8.6. AA-6 25
      5.8.7. AA-7 25
      5.8.8. AA-8 25

6. Impacts 26

6.1. Methodology 27
6.2. No Action Alternative Impacts 27
6.3. Tunnel Alternative Impacts 28
6.3.1. East Section 28
6.3.2. Central Section 29
6.3.3. West Section 30
6.4. Canyon Viaduct Alternative Impacts 31
6.4.1. East Section 31
6.4.2. Central Section 31
6.4.3. West Section 32
7. Mitigation 33
7.1. Mitigation for Permanent Adverse Impacts 33
7.2. Mitigation for Temporary Impacts 36
8. Agency Coordination 37
9. References 38

List of Appendices

Appendix A. Mapbook of Existing Surface Waters and Wetlands
Appendix B. Photographic Log
Appendix C. Wetland Determination Data Forms
Appendix D. Summary of Surface Waters and Wetlands in the Study Area
Appendix E. FACWet Analysis Mapbook
Appendix F. FACWet Assessment Forms
Appendix G. Impact Mapbook
Appendix H. Stream and Wetland Ecological Enhancement Program Issue Task Force Meeting Notes

List of Exhibits

Exhibit 1. Project Location 3
Exhibit 2. East, Central, and West Project Sections 4
Exhibit 3. Aquatic Resources Study Area 14
Exhibit 4. Soil Types Within the Study Area 18
Exhibit 5. Functional Capacity Indices Descriptions 23
Exhibit 6. Summary of Permanent Impacts to Surface Waters 26
Exhibit 7. Summary of Permanent Impacts to Wetlands 26
Exhibit 8. Recommended Mitigation Measures for Permanent Impacts 34
Exhibit 9. Recommended Mitigation Measures for Temporary Impacts 36

List of Acronyms

AA	Assessment Area
ADA	Americans with Disabilities Act
ALIVE	A Landscape Level Inventory of Valued Ecosystem Components
AOI	Area of Interest
BLM	Bureau of Land Management
BMP	best management practice
CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
CMGC	Construction Manager General Contractor
CPW	Colorado Parks and Wildlife
CR	County Road
CSS	Context Sensitive Solutions
CWA	Clean Water Act
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
EO	Executive Order
FAC	facultative
FACU	facultative upland
FACW	facultative wetland
FACWet	Functional Assessment of Colorado Wetlands
FCI	Functional Capacity Index
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
GPS	global positioning system
I-70	Interstate 70
IP	Individual Permit
ITF	Issue Task Force
MEXL	Mountain Express Lane
MOU	Memorandum of Understanding
MP	milepost
mph	miles per hour
ND	non-delineated
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NRCS	National Resource Conservation Service
NWI	National Wetlands Inventory
OBL	obligate wetland
OHWM	ordinary high-water mark
PAB	palustrine aquatic bed
PEIS	Programmatic Environmental Impact Statement

PEM	palustrine emergent
PFO	palustrine forested
Pinyon	Pinyon Environmental, Inc.
PSS	palustrine scrub-shrub
ROD	Record of Decision
SW	surface water
SWEEP	Stream and Wetland Ecological Enhancement Program
TNW	traditional navigable water
UPL	upland
US 6	U.S. Highway 6
US 40	U.S. Highway 40
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WL	wetland
WUS	waters of the U.S.

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 aquatic resources, which include wetlands and non-wetland waters (i.e., surface waters) in the I-70 Floyd Hill to Veterans Memorial Tunnels Project (Project) Study Area. Areas where aquatic resources were present were delineated through field survey and desktop review, and a functional assessment of identified wetlands was completed in accordance with the Functional Assessment of Colorado Wetlands (FACWet) methodology. Potential impacts to aquatic resources were measured and avoided or minimized as much as possible and permitting and coordination requirements under Section 404 of the Clean Water Act (CWA) were evaluated. This report also includes a description of applicable laws and regulations and a summary of the resource analysis and mitigation framework from the PEIS and ROD.

2. Proposed Action and Alternatives

2.1. Description of Proposed Action and Alternatives

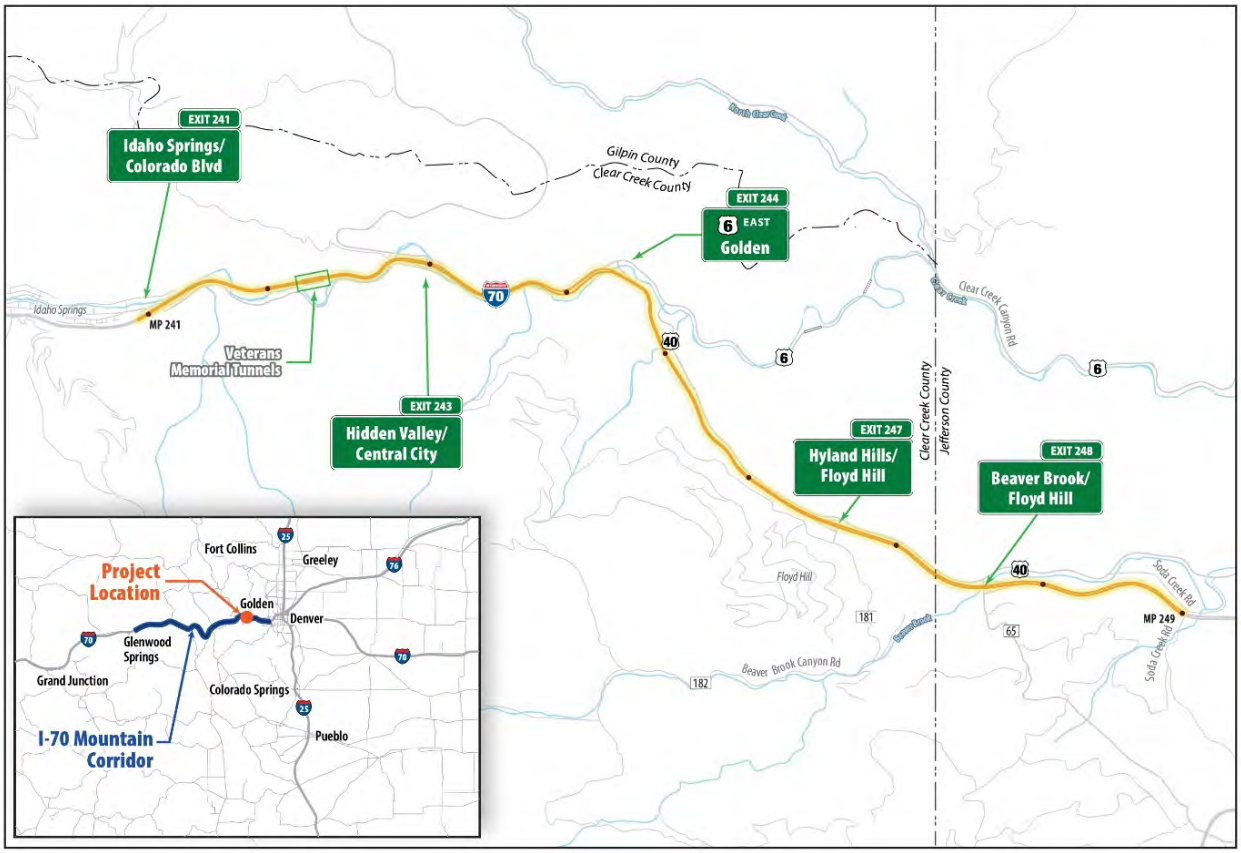
CDOT and FHWA propose improvements along approximately 8 miles of the I-70 Mountain Corridor from the top of Floyd Hill through the Veterans Memorial Tunnels to the eastern edge of Idaho Springs. The purpose of the Project is to improve travel time reliability, safety, and mobility, and address the deficient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

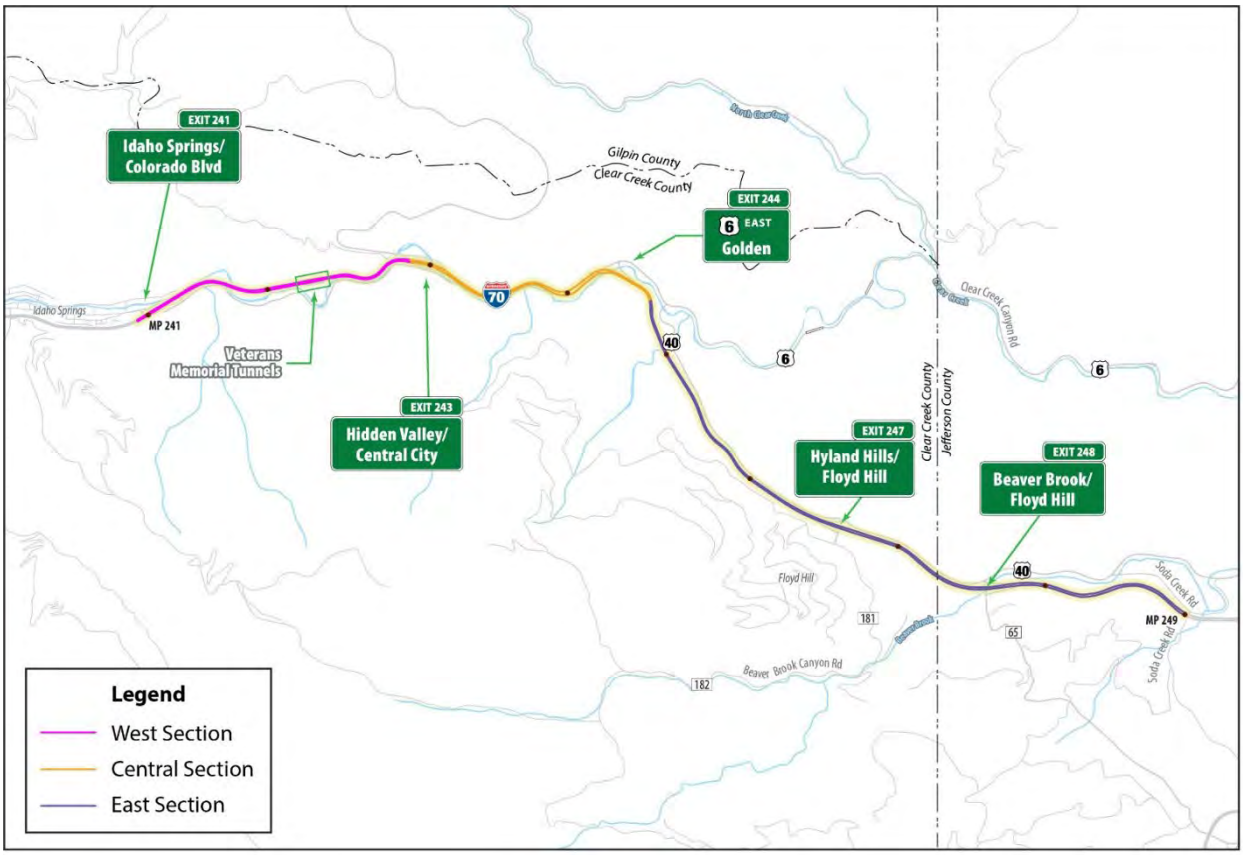
The Project is located on I-70 between MP 249 (east of the Beaver Brook/Floyd Hill interchange) and MP 241 (Idaho Springs/Colorado Boulevard), west of the Veterans Memorial Tunnels. It is located mostly in Clear Creek County, with the eastern end in Jefferson County (see Exhibit 1). The primary roadway 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, 2020a).

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 wildlife-vehicle collisions.

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 faces 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 faces 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 as described below.

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 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 in to 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 (mostly winter and summer weekends and holidays).

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

Waters of the U.S. (WUS), which include wetlands and other waters (e.g., rivers, streams, ponds, and lakes), are governed by federal regulations and policies, such as Section 404 of the CWA and Executive Order (EO) 11990. Wetlands are commonly found along the edges of stream and creek beds, along shorelines of ponds, in depressional areas where moisture accumulates, or where a naturally high groundwater table exists. Wetlands also can be formed by human-made alterations to the landscape and sustained by stormwater runoff. They are important biological resources that perform multiple functions, including groundwater recharge, flood attenuation, erosion control, and water quality improvement. Wetlands also provide habitat for many plants and animals, including threatened and endangered species.

- **Section 404 of the CWA**—The U.S. Army Corps of Engineers (USACE) regulates WUS under the authority of Section 404 of the CWA, which regulates WUS, such as traditional navigable waters (TNWs), their relatively permanent tributaries (i.e., relatively permanent waters), other tributaries that have a "significant nexus" with a TNW, and associated wetlands. On June 22, 2020, the Navigable Waters Protection Rule (33 Code of Federal Regulations [CFR] Part 328), which excludes ephemeral streams from WUS, was approved; however, this rule has not gone into effect in Colorado.

  Wetlands

  "… those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

  Wetlands are "… those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." (Environmental Laboratory, 1987)

  The protection of these areas is critical for maintaining the physical, chemical, and biological integrity of waterways. Impacts to WUS require permitting through the USACE. Only the USACE has the authority to make jurisdictional determinations.

- Section 404 of the CWA is jointly implemented by the USACE and the U.S. Environmental Protection Agency (EPA) (EPA, 1989; EPA, 2019). The EPA's roles and responsibilities for the CWA include:

  - Developing and interpreting policy, guidance, and environmental criteria used in evaluating permit applications
  - Determining scope of geographic jurisdiction and applicability of exemptions
  - Reviewing and commenting on individual permit applications

  EPA also has authority under Section 404 of the CWA to prohibit, deny, or restrict the use of any defined area as a disposal site (Section 404(c)), and it can elevate specific cases (Section 404(q)) and enforce Section 404 provisions.

- **EO 11990**—Non-jurisdictional wetlands are not subject to permitting by the USACE under Section 404; however, all federal agencies are required to avoid and minimize wetland impacts to the greatest extent possible per EO 11990, "Protection of Wetlands" (Federal Register, 1977). The FHWA is responsible for compliance with EO 11990 and provides guidance to avoid and minimize impacts to wetlands in FHWA Technical Advisory T6640.8A.
- **CDOT Policy—**CDOT requires compensatory mitigation of impacts to jurisdictional and non-jurisdictional wetlands. Non-jurisdictional wetlands subject to CDOT mitigation requirements include areas with wetland soils, hydrology, and vegetation.

4. Aquatic Resources in the Tier 1 PEIS

4.1. Context

General locations of aquatic resources within the I-70 Mountain Corridor were identified initially between 2001 and 2004 within a 4,000-foot-wide Study Area along I-70 from Dotsero, Colorado, to C-470 in Golden, Colorado. Although wetland delineations were not performed in the PEIS Corridor, available resources provided the general locations of aquatic resources.

Aquatic resources in the Study Area were identified and mapped using advanced photographic techniques, including geo-referenced, ortho-rectified, false-color infrared aerial photographs. Additional digitized, high-resolution, low-altitude, geo-referenced, ortho-rectified black-and-white or true color aerial photography was used to assist mapping (FHWA, 2011; CDOT, 2011). Fen wetlands were assessed within 200 feet of both sides of I-70, and sites were field-verified in 2009. In 2010, CDOT and FHWA reviewed wetland mapping and identification methodology, which was determined to be valid for the purposes of the impact assessment in the PEIS. Areas of interest were determined by watershed basin (FHWA, 2011; CDOT, 2011). CDOT and FHWA coordinated with the USACE and EPA during the PEIS, and both agencies participated in the Collaborative Effort to identify the Preferred Alternative for the I-70 Mountain Corridor.

The sub-basins discussed in the PEIS included:

- Colorado River Sub-Basin
- Eagle River Sub-Basin—including Eagle River, Gore Creek, and Black Gore Creek
- Blue River Sub-Basin—including West Tenmile Creek, Tenmile Creek, and Straight Creek
- Clear Creek Sub-Basin—including Clear Creek and Mount Vernon Creek

The PEIS focused on three principal wetland categories:

- **General Wetlands**—These included wetland classifications of palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine aquatic bed (PAB), that follow Cowardin et al. (1979). These were analyzed as one category.
- **Fens**—These were distinguished from other wetlands and uplands by thickness of peat, hydrologic regime, and vegetation composition.
- **Other Waters of the U.S.**—These included all "open waters" (i.e., surface waters) such as riverine (year-round flow), intermittent or seasonal tributaries, and water storage features (ponds or lakes). These were analyzed as one category.

The I-70 Floyd Hill to the Veterans Memorial Tunnels Project is located within the Clear Creek Sub-Basin. In this area, the PEIS identified general wetlands and surface waters of the U.S. in areas that overlap this Project's Study Area. No fens were identified in the PEIS within the Study Area.

Potential impacts to general wetlands, fens, and surface waters identified during the Tier 1 PEIS included:

- Direct loss of aquatic resources from construction activities
- Reduced function of wetlands and surface waters
- Changes in surface and sub-surface hydrology and water quality (e.g., inflows, sedimentation, and winter maintenance) that result in loss of either area or function

- Indirect impacts of sedimentation and stormwater runoff on aquatic resources during construction, during road maintenance operation, and post-construction

4.2. Analysis in Tier 2 Processes

The Tier 1 analysis identified the following processes to be performed for all future Tier 2 analyses:

- A delineation of wetlands using the latest approved USACE methodology
- Identification and analysis of impacts to fens for each specific project and in-depth field studies to identify potentially affected fens; in such cases where fens would be potentially affected, project plans will need to be modified to avoid affecting these areas
- Functional assessment of wetlands within the Corridor using the FACWet methodology (currently Version 3 [Johnson, et al., 2013])
- Determination of jurisdictional and non-jurisdictional wetlands for permitting
- A more-detailed analysis of direct and indirect impacts on aquatic resources
- Development of specific and detailed mitigation strategies and measures
- Development of specific best management practices (BMPs) for each project

Subsequent Tier 2 studies have been performed within the PEIS corridor since the ROD. Several of these studies have project areas that overlap portions of the I-70 Floyd Hill to Veterans Memorial Tunnels Study Area. These include:

- I-70 Twin Tunnels EA and Finding of No Significant Impact
- I-70 Frontage Road Improvements Categorical Exclusion
- I-70 Westbound Twin Tunnels Categorical Exclusion and Section 4(f) Evaluation
- I-70 Peak Period Shoulder Lane Categorical Exclusion (Westbound and Eastbound)

These subsequent studies further analyzed the Study Area for aquatic resources, including full delineations following USACE methodology and CDOT FACWet assessments for both the I-70 Twin Tunnels projects and I-70 Frontage Road Improvements Categorical Exclusion, both of which identified aquatic resources, including Clear Creek and wetlands along Clear Creek. Wetlands along Clear Creek were categorized as PEM or PEM/PSS combination wetlands during these studies. FACWet scores for wetlands identified during the Tier 2 studies, recorded as Functional Capacity Indices (FCI), ranged from 77 to 80.

4.3. Tier 2 Mitigation Strategies

The PEIS incorporated avoidance and minimization strategies into the development of the Preferred Alternative but noted that Tier 2 projects likely would result in impacts to wetlands and other aquatic resources. Through the PEIS, CDOT entered into the Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding (MOU), which commits to improving stream and wetland conditions in the I-70 Mountain Corridor. The parties to the MOU include CDOT, FHWA, U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), Bureau of Land Management (BLM), Colorado Parks and Wildlife (CPW), Upper Clear Creek County Watershed Foundation, and Colorado Trout Unlimited. The parties comprise the SWEEP Issues Task Force (ITF), which, per the MOU, is engaged in Tier 2 processes to identify and recommend appropriate mitigation strategies, including design, implementation, and monitoring, to anticipate environmental impacts resulting from implementing the PEIS Preferred Alternative.

CDOT also entered into the A Landscape Level Inventory of Valued Ecosystem Components (ALIVE) MOU with many of the same parties in the SWEEP MOU, including CDOT, FHWA, USFWS, USFS, BLM, and CPW. The ALIVE MOU aims to improve wildlife conditions in the I-70 Mountain Corridor through recommendations from the ALIVE ITF, which consists of biologists from each of the signatory agencies, to increase the permeability of the I-70 Mountain Corridor for terrestrial wildlife and aquatic species to provide and maintain long-term protection and restoration of wildlife linkage areas, improve habitat connectivity, and preserve essential ecosystem components. The SWEEP and ALIVE ITF's coordinate on Tier 2 processes, with joint interests related to ecosystem connectivity for aquatic species and terrestrial wildlife.

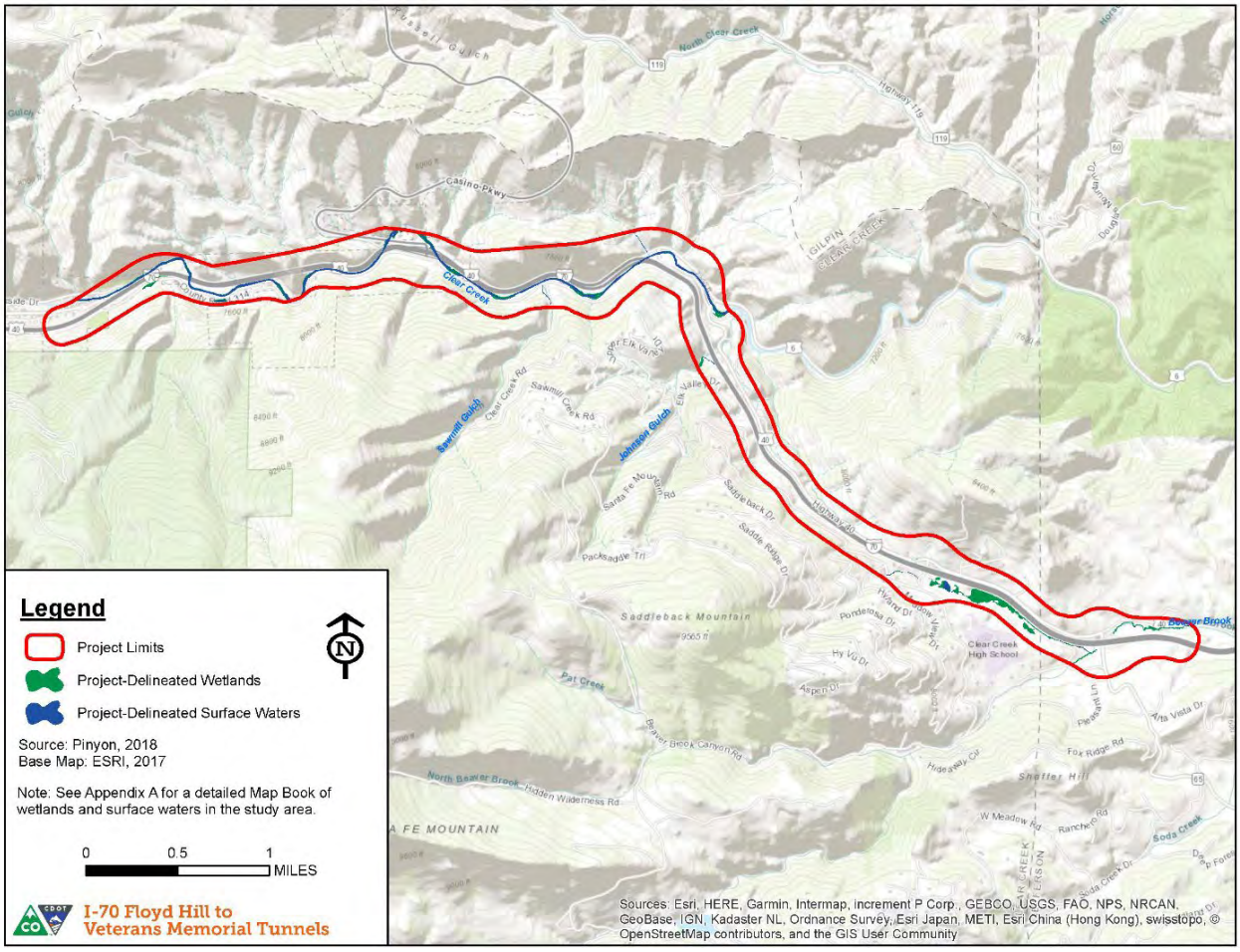
Each Tier 2 process will address impacts to aquatic resources, based on impacts identified in those processes; mitigation will be subject to approval by the USACE. The PEIS also noted CDOT's policy to mitigate all wetland impacts, regardless of whether the wetland is jurisdictional or non-jurisdictional.

5. Affected Environment

5.1. Study Area

The Study Area generally extends 500 feet on either side of the I-70 centerline and 1,000 feet around interchange areas to provide a conservative estimate of the extent of temporary and permanent project-related impacts (Exhibit 3). Most of the Study Area was field surveyed for aquatic resources, but some private properties where access was not granted were delineated using advanced desktop survey methods, as described in Section 5.2. Appendix A contains a detailed mapbook showing aquatic resource locations identified in the Study Area.

Exhibit 3. Aquatic Resources Study Area



The Study Area comprises approximately 1,225 acres of existing CDOT right of way, and public and private properties. Within this area, 27.76 acres of surface waters (includes riverine and ponds) were identified and mapped. Surface waters in the Study Area include Beaver Brook and its tributaries, Clear Creek and its tributaries, and three unnamed ponds. Wetlands were noted along some of these surface waters, and isolated wetlands associated with roadside ditches also were found in the Study Area. In total, 14.13 acres of wetlands were mapped within the Study Area.

Section 5.2 describes the methodologies used to conduct the surveys and delineate aquatic resources. Section 5.3 through Section 5.8 describe the existing conditions for aquatic resources within the Study Area. Additional details about aquatic resources in the Study Area can be found in the following appendices:

- Appendix A is a mapbook illustrating the field- and desktop-identified surface waters and wetland areas in the Study Area
- Appendix B is a photographic log
- Appendix C contains wetland determination data forms
- Appendix D is a table summarizing the identification number, type, and acreages of each identified feature, as well as associated feature acreage totals in the Study Area
- Appendix E is a mapbook supporting the FACWet analysis
- Appendix F contains the FACWet assessment forms

5.2. Environmental Conditions

Both field surveys and desktop data review were performed to delineate wetlands and surface waters in the Study Area. This effort included a review of readily available data sources, as well as the PEIS; SWEEP coordination; a USACE wetland delineation; results from the Colorado State University Soil, Water, and Plant Testing Laboratory; and a CDOT FACWet analysis.

5.2.1. Field Survey Methodology

Biologists from Pinyon Environmental, Inc. (Pinyon), conducted delineations of aquatic resources in those portions of the Study Area where access was acquired. Field visits were completed over 14 days between June 14, 2018, and August 21, 2018. While in the field, aquatic resource boundaries were recorded with sub-meter accurate global positioning system (GPS) units. The GPS data were downloaded and mapped in ArcGIS mapping software. Wetlands were delineated in accordance with the 1987 USACE *Wetland Delineation Manual* (Environmental Laboratory, 1987), and the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (USACE, 2010). Representative photographs were taken to document field conditions (Appendix B), and sampling points were excavated in representative locations to identify wetland boundaries. Wetland determination data forms are included in Appendix C. A general description of wetlands delineated within the Study Area is presented below. Appendix D lists the individual aquatic resource areas by type and acreage—locations of individual aquatic resource areas are noted in Appendix A.

Vegetation was identified and documented within the strata-specific sampling radii recommended by USACE (30 feet for trees, 15 feet for shrubs, 5 feet for herbs, and 15 feet for woody vines) (USACE, 2010). Additional plant species located outside of the sampling point, but within the sampled plant community, were noted on data forms as needed to better describe the nearby vegetation, when applicable. Wetland indicator status for plant species was referenced in the State of Colorado 2016 Wetland Plant List (National Plant List) and/or the U.S. Department of Agriculture (USDA) Plant Database (Lichvar, et al., 2016; USDA, 2019). Species were classified as obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), or upland (UPL). Plant species classified as OBL, FACW, or FAC typically are considered hydrophytic plants, which are characteristic of wetlands. In general, if plant species identified in the field were not listed on the National Plant List or the USDA Plant Database, those plant species were classified as UPL.

Wetlands also were classified using the Cowardin classification system (Cowardin, et al., 1979). Wetlands classified as PSS consist of 30 percent or greater coverage of shrubs and/or saplings. Wetlands classified as PEM are dominated by herbaceous plant species and have less than 30 percent coverage of shrubs and/or saplings.

Hydrology and soil data were collected at the sampling points and recorded on wetland determination data forms (Appendix C). Hydrology indicators may include topographic position, presence of standing water and/or saturated soil profile conditions, drainage patterns, water marks, sediment deposits, and/or oxidized root channels in the upper 12 inches of the soil profile. Wetland soil indicators may include presence of color streaking (mottling), gleying (greyish coloration), reducing conditions, hydrogen sulfide odor, and organic content. If organic soils were noted within the Study Area, soil samples were taken and sent to a soil laboratory (see Section 5.7.1) for further testing of organic components. Reference soil points were dug to confirm the presence or absence of hydric soils. Reference soil point locations were mapped in the field; however, no wetland data forms were completed for the reference soil points, as these points were within passing wetland complexes—wetland delineation data forms already were completed for the complex and reference soil points were used to assist in validating the edge of the wetland(s).

In addition to wetlands, the boundaries of surface waters and the ordinary high-water mark (OHWM) were identified in accordance with USACE guidance on determining the OHWM in the Western Mountains, Valleys, and Coast Region (USACE, 2014). In general, the OHWM was identified based on the presence of bed and bank, a visible impression on the shoreline, a change in substrate type or texture, or a change in vegetation. Surface waters are non-wetland waters located between the OHWM (i.e., from bank to bank) where wetlands are not present. Surface waters noted within the Study Area are described further below, as well as in Appendix D.

Appendix A includes a mapbook of wetland and surface water boundaries. The OHWM delineated within the Study Area is included in the mapbook in Appendix A.

5.2.2. Desktop Survey Methods

Detailed desktop surveys were completed for locations within the Study Area where either right of entry was not granted from private landowners or if an area was unsafe to survey in the field (e.g., steep banks, limited room for access, high stream flows). For this analysis, readily available data were used to digitize potential aquatic resource boundaries in ArcGIS mapping software. Readily available data included:

- Current aerial photography (Google Earth, Bing, etc.) (Google Earth, 2018; ESRI, 2018)
- USFWS National Wetlands Inventory (NWI) data (USFWS, 2018)
- U.S. Geological Survey (USGS) topographic maps (USGS, 1974)
- Streams and hydrology data from the USGS National Hydrography Dataset (NHD) (USGS, 2018)

These data also were supplemented by observations made from public right of way while in the field. Features where desktop surveys (i.e., desktop delineations) were conducted include “ND” in the naming convention (e.g., SW-ND-01; WL-ND-01). The ND stands for “non-delineated.” This information is described further below in this report.

5.2.3. FACWet Methodology

FACWet is a rapid assessment method for evaluating wetland conditions based on interpretation of ecological stressors and their effects on wetland functioning (Johnson, et al., 2013). The methodology was performed for wetlands identified in the Area of Interest (AOI), which includes the Study Area, plus a 25-meter buffer around the Study Area (Appendix E). The AOI encompasses the area that could be directly or indirectly impacted by Project activities. Although the Study Area is conservatively set at this stage of the project, FACWet still requires a 25-meter buffer of the Study Area. Within the AOI, areas of target habitat were defined as Assessment Areas (AAs). Target habitat for this assessment included any wetlands, surface waters, or riparian vegetation. Consistent with the methodology, expectations of the reference standard conditions were developed based on knowledge of the evaluator(s). Observations for each AA were recorded on FACWet data sheets (Appendix F).

5.3. Vegetation Communities

Vegetation communities noted within the Study Area included upland forest, upland shrubland, upland grassland, riparian, wetlands, and mowed/landscaped areas. The following section describes each of these habitat types:

- **Upland Forest**—Upland forest communities generally were present throughout the Study Area. Dominant trees included ponderosa pine (*Pinus ponderosa*; FACU) and Colorado pinyon pine (*Pinus edulis*; UPL). Common understory plants in these areas included smooth brome (*Bromus inermis*; UPL), witchgrass (*Panicum capillare*; FAC), and crested wheatgrass (*Agropyron cristatum*; UPL).
- **Upland Shrubland**—Upland shrubland areas were noted primarily in open landscapes consisting of Gambel oak (*Quercus gambelii*; UPL), Woods' rose (*Rosa woodsii*; FACU), and snowberry (*Symphoricarpos albus*; FACU). Woods' rose and snowberry also were common in unmown areas of the right of way. Rubber rabbitbrush (*Ericameria nauseosa*; UPL) also was noted in drier areas of the right of way.
- **Upland Grassland**—Upland grassland communities were noted in areas of open landscapes, including unmown areas within and near the right of way, as well as areas used for grazing. These areas may have been seeded in the past with desirable pasture grasses. In less-disturbed areas, and in areas of the right of way where it appears that plants have been reseeded, native grasses such as western wheatgrass (*Pascopyrum smithii*; FACU) were common. Most upland grassland habitat was dominated by smooth brome, crested wheatgrass, and western wheatgrass. Other herbaceous species typical of roadsides and upland habitat, such as kochia (*Bassia scoparia*; FAC), common mullein (*Verbascum thapsus*; FACU), Canadian horseweed (*Conyza canadensis*; UPL), ragweed (*Ambrosia spp.*; FACU), prickly lettuce (*Lactuca serriola*; FACU), and common sunflower (*Helianthus annuus*; FACU) were common throughout the upland grassland habitat.
- **Riparian**—Riparian vegetation communities along Clear Creek, Beaver Brook, and their tributaries were characterized by graminoid species, such as Baltic rush (*Juncus balticus*; FACW), creeping bentgrass (*Agrostis stolonifera*; FAC), and smooth horsetail (*Equisetum laevigatum*; FACW); shrubs and saplings, such as coyote willow (*Salix exigua*; FACW) and narrowleaf cottonwood (*Populus angustifolia*; FACW); and mature trees, such as crack willow (*Salix fragilis*; FAC) and narrowleaf cottonwood.

- **Wetland**—Wetland vegetation communities (often adjacent to Clear Creek, Beaver Brook, and their tributaries) were dominated by graminoid species, including Baltic rush, smooth horsetail, variegated horsetail (*Equisetum variegatum*; FACW), common horsetail (*Equisetum arvense*; **FAC), creeping bentgrass, common spikerush (Eleocharis palustris; OBL), needle spikerush** (*Eleocharis acicularis*; OBL), Nebraska sedge (*Carex nebrascensis*; OBL), spearmint (*Mentha spicata*; FACW), broadleaf cattail (*Typha latifolia*; OBL), and narrowleaf cattail (*Typha angustifolia*; OBL). Shrubs and saplings such as park willow (*Salix monticola*; OBL), water birch (*Betula occidentalis*; FACW), and narrowleaf cottonwood also were present.
- **Mown/Landscaped—**Mown/landscaped areas were noted primarily within the right of way. The mown areas consisted of **the** same species as upland grassland habitat, and the mowing maintained the vegetation in these areas to less than one foot in height. Landscaped areas consisted of maintained vegetation, which included few ornamental species.

5.4. Hydrology

The Study Area is within the Upper South Platte River Watershed. Streams within the Study Area include Clear Creek and Beaver Brook and their tributaries (USGS, 2018). Tributaries connecting to either Beaver Brook or Clear Creek include Johnson Gulch and Sawmill Gulch, as well as multiple unnamed, intermittent, and/or ephemeral water features. These water features contribute to the hydrology that supports wetlands within the Study Area.

Beaver Brook is a perennial feature that flows southwest to northeast. Beaver Brook passes under I-70 near the eastern end of the Study Area at approximately MP 248 (Appendix A). Beaver Brook eventually connects to Clear Creek downstream and outside of the Study Area.

Clear Creek is a perennial surface water that flows from west to east and eventually connects to the South Platte River in the Denver metropolitan area. Clear Creek flows parallel to I-70 throughout most of the western half of the Study Area (approximately from MP 241 to MP 244.75 [Appendix A]). Clear Creek crosses underneath I-70 at approximately MP 241.65, MP 242.75, MP 243, and MP 244.3.

Other sources of hydrology noted within the Study Area include ponds, natural springs (exposed groundwater), snow melt, stormwater runoff occurring as sheet flow across roads, and stormwater directed into permanent water quality features. These sources of hydrology also contribute to the formation and support of wetlands noted within the Study Area.

5.5. General Soils

There are 26 soil types identified within the Study Area (Exhibit 4; Natural Resources Conservation Service [NRCS], 2018). The soils in the Study Area's wetlands typically consisted of loam, sandy loam, loamy sand, sand, clay, or silt loam. Of the 26 soil types present in the Study Area, one (Cumulus Cryaquolls) was classified as hydric (NRCS, 2018).

Exhibit 4. Soil Types Within the Study Area

Soil Name[1]
Arents-Dumps, mine complex, 5 to 80 percent slopes
Breece gravelly sandy loam, 3 to 40 percent slopes
Cathedral-Rock outcrop complex, 30 to 70 percent slopes
Cumulus Cryaquolls, 0 to 3 percent slopes
Kataka-Resort-Rock outcrop complex, 30 to 70 percent slopes

Soil Name[1]
Lininger-Resort complex, 5 to 15 percent slopes
Lininger-Trag gravelly sandy loams, 15 to 30 percent slopes
Mammoth-Ohman-Bendemeere complex, 30 to 60 percent slopes
Mammoth-Ohman-Rock outcrop complex 30 to 60 percent slopes
Ohman-Ivywild very gravelly sandy loams, 30 to 60 percent slopes
Ohman-Legault very gravelly sandy loams, 30 to 60 percent slopes
Pettingell-Rogert-Rock outcrop complex, 30 to 80 percent slopes
Resort very gravelly sandy loam, 10 to 30 percent slopes
Resort-Cathedral-Rubble land complex, 30 to 60 percent slopes
Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes
Rock outcrop -Rubble land-Cathedral complex, 40 to 100 percent slopes
Rock outcrop-Tolland complex, 30 to 100 percent slopes
Trag gravelly sandy loam, 3 to 15 percent slopes
Herbman-Sprucedale-Rock outcrop complex, 9 to 15 percent slopes
Herbman-Sprucedale-Rock outcrop complex, 15 to 30 percent slopes
Kittredge-Earcree complex, 9 to 20 percent slopes
Rogert, very stony-Herbman-Rock outcrop complex, 30 to 70 percent slopes
Troutdale gravelly sandy loam, 3 to 9 percent slopes
Troutdale-Kittredge sandy loams, 5 to 5 percent slopes
Troutdale-Rogert-Kittredge complex, 15 to 30 percent slopes
Troutdale-Sprucedale gravelly sandy loams, 3 to 15 percent slopes

[1]NRCS, 2018
Note: soil names represented in bold are considered hydric.

5.6. Surface Waters

The following sub-sections discuss the primary surface water features present within the Study Area. Locations of both field- and desktop-delineated features are illustrated in Appendix A and described in sub-sections below. Appendix B contains photographs of these features, and Appendix D contains additional surface water information, including feature ID, type (e.g., riverine, pond), and acreage.

5.6.1. Beaver Brook and its Tributaries

Beaver Brook (Surface Water [SW]-10) occurs in the eastern half of the Study Area (Exhibit 2; Appendix A). Two unnamed drainages (i.e., tributaries), SW-09 and SW-11, were noted discharging into Beaver Brook within the Study Area. Portions of Beaver Brook and SW-09, described as SW-ND-02 and SW-ND-03, were delineated through desktop surveys. Stream characteristics for SW-ND-02 and SW-03 were noted to be similar to areas mapped and assessed at SW-09 and SW-10 during the site visits. A man-made dam was noted within SW-09, creating a pond feature within the drainage—this pond feature is described further in Section 5.6.3.

Beaver Brook, a tributary to Clear Creek, is a perennial stream that flows southwest to northeast within the Study Area. Beaver Brook flows into Clear Creek outside of the Study Area; therefore, Beaver Brook and its tributaries are presumed to be jurisdictional waters. However, only the USACE has the authority to determine jurisdiction.

At the time of the site visits, Beaver Brook was flowing with a width varying from 2 feet to 10 feet and depth of less than 1 foot to 2 feet deep. Beaver Brook had a predominantly naturally meandering channel and a variable substrate of mud, silt, sand, and cobble.

5.6.2. Clear Creek and its Tributaries

Clear Creek (SW-01) occurs in the western half of the Study Area and generally flows parallel to I-70 before flowing parallel to US 6 through Clear Creek Canyon toward Golden, Colorado (Exhibit 2; Appendix A). Several tributaries of Clear Creek, including Sawmill Gulch (SW-06) and Johnson Gulch (SW-08), as well as unnamed drainages, including SW-03, SW-04, and SW-07, were noted discharging into Clear Creek within the Study Area (Appendix A). A portion of Johnson Gulch, described as SW-ND-01, was delineated through desktop survey. Stream characteristics at SW-ND-01 were similar to the areas mapped and assessed at SW-08 during the site visits.

Clear Creek is a perennial stream represented as a solid blue line on the USGS Squaw Pass 7.5-minute topographic quadrangle (USGS, 1974). Within the Study Area, Clear Creek flows from west to east. Clear Creek eventually flows into the South Platte River (outside of the Study Area), which is a TNW; therefore, Clear Creek and its tributaries are presumed to be jurisdictional waters. However, only the USACE has the authority to determine jurisdiction.

At the time of the site visits, Clear Creek was flowing with a width varying from 30 feet to 75 feet and depth of approximately 3 feet to 4 feet. Substrate noted within Clear Creek consisted of large boulders with riprap lining the sides of the channel in some locations. Deep pools and riffle runs were noted throughout Clear Creek.

5.6.3. Ponds

Three unnamed ponds were identified and mapped in the Study Area: SW-02, SW-05, and SW-09. Locations of these ponds are illustrated in Appendix A.

- The pond feature associated with SW-09 is located approximately 80 feet south of I-70, near the intersection of Homestead Road and Beaver Brook Canyon Road. The pond was noted to be less than 6 feet deep. SW-09 is an unnamed drainage feature that extends upslope and downslope of the pond and is assumed to be the main source of hydrology for the pond. A drainage outlet (i.e., culvert), which allows water to flow downstream when water levels are high, was noted on the east bank of the pond (which was a dam). SW-09 is likely fed by stormwater and snow melt runoff. Because this pond is associated directly with SW-09, this pond is noted as “Riverine” in Appendix D.
- SW-05 is located along the south bank of Clear Creek, immediately north of the Central City Parkway bridge over Clear Creek. The pond is located approximately 10 feet to 15 feet from Clear Creek and was noted to be approximately 4 feet deep. This pond likely is fed by stormwater runoff; however, there is potential that groundwater seepage and/or flooding from Clear Creek may be contributing to the pond’s water level. A flume was noted on the north bank of the pond, which allows outflow into Clear Creek. This flume likely helps prevent the pond from overbanking when water levels are high.
- SW-02 is located southwest of Veterans Memorial Tunnels near CR 314. This pond is located approximately 70 feet from the south bank of Clear Creek. The depth of the pond is unknown, as the bottom could not be seen during the survey. This pond likely is fed by stormwater and snow melt runoff. Although a visible connection to Clear Creek was not noted during the site

visit, hydrology between the pond and Clear Creek may be connected through groundwater seepage because of their proximity to one another.

The substrate of all three ponds was mud and silt. The ponds contained water at the time of the site visits. Because these three ponds appear to be connected to presumed jurisdictional water features, all three ponds are presumed to be jurisdictional waters. However, only the USACE has the authority to determine jurisdiction.

5.7. Wetlands

The following sub-sections discuss wetlands delineated within the Study Area. Wetlands in the Study Area are associated with streams and their tributaries, as well as ponds and isolated roadside depressions (i.e., roadside ditches). Delineated wetlands are grouped and discussed in context of their associated hydrological source (surface water). Both field- and desktop-delineated features are described in sub-sections below. Appendix A contains a mapbook showing the location of each of the wetland features, and Appendix B contains a log of representative photos. Wetland determination data forms are included in Appendix C. Additional wetland information, including feature ID, type (e.g., PEM, PSS), and acreage, can be found in Appendix D.

5.7.1. Wetlands Associated with Beaver Brook and its Tributaries

Within the Study Area along Beaver Brook, 39 wetlands were delineated (Wetland [WL]-BB-01 through WL-BB-39). In addition, 11 wetlands were delineated along Beaver Brook tributaries (WL-07 through WL-17).

PEM and PSS wetlands were noted along Beaver Brook and its tributaries. The wetland plants present in these wetlands include herbaceous species, such as variegated horsetail, common horsetail, creeping bentgrass, Nebraska sedge, spearmint, narrowleaf cattail, Baltic rush, and common spikerush; shrubs and saplings, such as coyote willow, park willow, and water birch; and mature trees, such as narrowleaf cottonwood. Hydric soil indicators noted in these wetlands included hydrogen sulfide (A4), redox dark surface (F6), sandy redox (S5), and histic epipedon (A2) (USACE, 2010). Common wetland hydrology indicators included surface water (A1), high water table (A2), saturation (A3), and hydrogen sulfide odor (C1) (USACE, 2010). Other hydrology indicators included drainage patterns (B10), FAC-neutral test (D5), and geomorphic position (D2) (USACE, 2010).

As noted above, histic epipedons were observed in wetlands within the Study Area. Histic epipedons contain organic soil material (e.g., muck, mucky peat, peat) (USACE, 2010). Organic soils were noted in two wetlands along drainage SW-09 (WL-13 and WL-15). Due to the amount of organic soils noted at these locations, soil samples were excavated, documented, then sent to Colorado State University's Soil, Water, and Plant Testing Laboratory. The laboratory tested the soils for organic carbon content to determine if the soils would pass as "histosol," which could classify the wetlands as fens. Histosols generally include 16 inches or more of organic material within the upper 32 inches of the soil surface with an organic carbon content (by weight) of 12 percent to 18 percent or more (USACE, 2010). The soils lacked appropriate amounts of organic material to be classified as histosol; therefore, the wetlands do not classify as fens (CSU, 2018).

Wetlands along portions of Beaver Brook described as WL-ND-05 were delineated through desktop surveys. Although soils and hydrology characteristics were not field verified in this area, it is presumed to be a wetland because of similar vegetation and stream characteristics noted along other portions of Beaver Brook (e.g., WL-BB-01 and WL-BB-02).

Beaver Brook and its tributaries are presumed to be jurisdictional; therefore, wetlands associated with these surface waters also are presumed to be jurisdictional. However, only the USACE has the authority to determine jurisdiction.

5.7.2. Wetlands Associated with Clear Creek and its Tributaries

Along Clear Creek and its tributaries, 83 wetlands were delineated (WL-CC-01 through WL-CC-82 and WL-JG-01). PEM and PSS wetlands were noted along these water features. Vegetation present within these wetlands included graminoids, such as Baltic rush, common spikerush, smooth horsetail, Nebraska sedge, broadleaf cattail, and narrowleaf cattail; shrubs and saplings, such as coyote willow, water birch, park willow, crack willow, and narrowleaf cottonwood; and mature trees, such as crack willow and narrowleaf cottonwood. Hydric soil indicators noted in these wetlands included hydrogen sulfide (A4), sandy redox (S5), depleted matrix (F3), redox depression (F8), and redox dark surface (F6) (USACE, 2010). Common wetland hydrology indicators included saturation (A3), high water table (A2), and hydrogen sulfide odor (C1) (USACE, 2010). Other wetland hydrology indicators included oxidized rhizospheres along living roots (C3), geomorphic position (D2), and drainage patterns (B10) (USACE, 2010).

Two presumed wetland areas (WL-ND-02 and WL-ND-03) were noted along Clear Creek from desktop surveys. The presumed wetland areas were noted to have similar characteristics of those wetlands that were field verified along Clear Creek (e.g., hydrophytic vegetation, saturation visible on the bank within the presumed wetland area). Although soils were not assessed at these locations, it is presumed that soils would pass as hydric in these locations because of their geomorphic position along the creek.

Portions of WL-JG-01 (a wetland associated with Johnson Gulch), described as WL-ND-04, was identified through desktop survey. Although soils and hydrology characteristics were not field verified in this area, this area is presumed to be a wetland because of similar vegetation and stream characteristics noted in WL-JG-01.

Clear Creek and its tributaries are presumed to be jurisdictional; therefore, wetlands associated with these surface waters also are presumed to be jurisdictional. However, only the USACE has the authority to determine jurisdiction.

5.7.3. Wetlands Associated with Ponds

Wetland areas associated with ponds were delineated in the Study Area: WL-03, WL-05, and WL-10. PEM and PSS wetlands were noted along the ponds. Wetland plants noted were Baltic rush, narrowleaf cottonwood, and coyote willow. Hydric soil indicators noted were sandy redox (S5), depleted matrix (F3), redox depressions (F8), and redox dark surface (F6) (USACE, 2010). Wetland hydrology indicators noted were saturation (A3) and oxidized rhizospheres along living roots (C3) (USACE, 2010). Other hydrology indicators noted were drainage patterns (B10), geomorphic position (D2), and FAC-neutral test (D5) (USACE, 2010). As noted above, all three ponds are presumed to be jurisdictional features; therefore, wetlands associated with these ponds also are presumed to be jurisdictional. However, only the USACE has the authority to determine jurisdiction.

5.7.4. Isolated Wetlands

Three PEM wetlands were delineated along roadside ditches within the Study Area: WL-01, WL-02, and WL-06.

- WL-06 was delineated along the north ditch of US 40, immediately west of the US 40 and Homestead Road intersection.
- WL-02 was delineated along the south ditch of eastbound I-70, immediately along the Idaho Springs eastbound on-ramp.
- WL-01 was delineated along the south ditch of CR 314. Portions of WL-01, described as WL-ND-01, were delineated through desktop survey. Although soils and hydrology characteristics were not field-verified in this area, it is presumed to be a wetland because of a similar vegetation community and geomorphic position that were present in WL-01.

Common wetland plants noted within these wetlands include graminoids such as Baltic rush and needle spikerush. Hydric soil indicators noted in these wetlands included depleted matrix (F3) and redox dark surface (F6) (USACE, 2010). Wetland hydrology indicators noted were surface water (A1), saturation (A3), oxidized rhizospheres along living roots (C3), drainage patterns (B10), FAC-neutral test (D5), and geomorphic position (D2), (USACE, 2010).

Although the isolated wetlands described herein are likely preamble wetlands (i.e., artificially created with no connection to jurisdictional waters), only the USACE has the authority to determine the jurisdiction of potential aquatic resource features. Therefore, isolated wetlands noted within the Study Area are presumed to be jurisdictional unless the USACE determines otherwise.

5.8. FACWet Assessment

The wetland areas were grouped into AAs to analyze the functional capacity of the wetlands per CDOT's FACWet methodology (Johnson, et al., 2013). Typically, AAs are based on hydrogeomorphic class, wetland type, and location within the AOI. Wetlands along specific water features (e.g., creeks, drainages, ponds, ditches) were assigned to a separate AA based on hydrogeomorphic class, wetland type, and location. Eight AAs were identified in the Study Area, and Pinyon delineated multiple wetlands within eight AAs in the AOI. The AAs are described below.

Appendix E contains a mapbook supporting the FACWet analysis, and Appendix F contains the FACWet assessment forms and recorded FCI scores. FCI score values were interpreted as shown in Exhibit 5. Appendix A through Appendix D contain additional information about the individual wetlands.

Exhibit 5. Functional Capacity Indices Descriptions

FCI Score	Functional Category	Interpretation
1.0 – 0.9	Reference Standard	AA is functioning at or near its Reference Standard capacity.
<0.9 – 0.8	Highly Functioning	AA retains all of its natural functions. While the capacity of some or all have been altered somewhat, the function of the wetland is still fundamentally sound.
<0.8 – 0.7	Functioning	The capacity of some or all of the AA's functions has been markedly altered, but the wetland still provides the types of functions associated with its habitat type.

FCI Score	Functional Category	Interpretation
<0.7 – 0.6	Functioning Impaired	The functioning of the wetland has been severely altered. Certain functions may be nearly extinguished, or they may be grossly altered to be more representative of a different class of wetland (e.g., a fen converted to a depressional system). Despite the profound changes, the AA still supports wetland habitat.
<0.6	Non-Functioning	AA no longer possesses the basic criteria necessary to support wetland conditions.

Source: Johnson, et al., 2013

5.8.1. AA-1

AA-1 includes wetlands WL-CC-1 through WL-CC-82, which are located along Clear Creek (SW-01). The overall FACWet FCI is 0.84, meaning that it is classified as "Highly Functioning"; the wetland functions of this AA are fundamentally sound. Stressors noted within this AA included the surrounding transportation corridors, as well as stormwater and road runoff and how they contribute to Clear Creek's hydrology, and artificial banks (e.g., riprap) along the creek banks. The scores for habitat connectivity, contributing area, geomorphology, and chemical environment variables were lower than AA-1's composite score, while the scores for the water source, water distribution, water outflow, and vegetation structure and complexity were higher than AA-1's composite score.

5.8.2. AA-2

AA-2 includes wetlands WL-1 and WL-2. These wetlands were noted within close proximity along I-70 and CR 314. The overall FACWet FCI is 0.74, meaning that it is classified as "Functioning"; the wetland functions of this AA have been markedly altered. Stressors noted within this AA included the surrounding transportation corridors, contribution of stormwater culverts to hydrology, mowing near the wetland (within the right of way), and lack of tree cover. The score for contributing area and geomorphology variables were lower than AA-2's composite score, while scores for habitat connectivity, water source, water distribution, water outflow, chemical environment, and vegetation structure and complexity were greater than or equal to AA-2's composite score.

5.8.3. AA-3

AA-3 includes wetland WL-3, which is located on the edge of a pond (SW-02). The overall FACWet FCI is 0.78, meaning that it is classified as "Functioning"; the wetland functions of this AA have been markedly altered. Stressors noted within this AA included the surrounding transportation corridors, as well as stormwater and road runoff and how they contribute to SW-02's hydrology. The scores for habitat connectivity and contributing area variables were lower than AA-3's composite score, while scores for water source, water distribution, water outflow, geomorphology, chemical environment, and vegetation structure and complexity were higher than AA-3's composite score.

5.8.4. AA-4

AA-4 includes wetland WL-5, which is located on the edge of a pond (SW-05). The overall FACWet FCI is 0.75, meaning that it is classified as "Functioning"; the wetland functions of this AA have been markedly altered. Stressors noted within this AA included the surrounding transportation corridors, as well as stormwater and road runoff and how they contribute to SW-05's hydrology, and lack of shading.

The scores for contributing area, water source, water distribution, and water outflow variables were lower than AA-4's composite score, while scores for habitat connectivity, geomorphology, chemical environment, and vegetation structure and complexity were higher than AA-4's composite score.

5.8.5. AA-5

AA-5 includes wetlands WL-JG-01 and WL-ND-04, which are located along Johnson Gulch (SW-08 and SW-ND-01). The overall FACWet FCI is 0.82, meaning that it is classified as "Highly Functioning"; the wetland functions of this AA are fundamentally sound. Stressors noted within this AA included the surrounding transportation corridors, as well as stormwater and road runoff and how they contribute to Johnson Gulch's hydrology. The scores for habitat connectivity and water outflow variables were lower than AA-5's composite score, while scores for contributing area, water source, water distribution, geomorphology, chemical environment, and vegetation structure and complexity were higher than AA-5's composite score.

5.8.6. AA-6

AA-6 includes wetland WL-06, which is in a ditch along US 40. The overall FACWet FCI is 0.74, meaning that it is classified as "Functioning"; the wetland functions of this AA have been markedly altered. Stressors noted within this AA included the surrounding transportation corridors and lack of tree cover. The scores for habitat connectivity, contributing area, geomorphology, and vegetation structure and complexity variables were lower than AA-6's composite score, while scores for water source, water distribution, water outflow, and chemical environment were higher than AA-6's composite score.

5.8.7. AA-7

AA-7 includes wetlands WL-7 through WL-17, which are located along an unnamed drainage (SW-09 and SW-ND-02). The overall FACWet FCI is 0.85, meaning that it is classified as "Highly Functioning"; the wetland functions of this AA are fundamentally sound. Stressors noted within this AA included the surrounding transportation corridors, culverts, and stormwater and road runoff and how they contribute to SW-09 and SW-ND-02's hydrology. The scores for contributing area, water distribution, water outflow, and geomorphology variables were lower than AA-7's composite score, while scores for habitat connectivity, water source, chemical environment, and vegetation structure and complexity were greater than or equal to AA-7's composite score.

5.8.8. AA-8

AA-8 includes wetlands WL-BB-01 through WL-BB-39 and WL-ND-05, which are located along Beaver Brook (SW-10 and SW-ND-03). The overall FACWet FCI is 0.83, meaning that it is classified as "Highly Functioning"; the wetland functions of this AA are fundamentally sound. Stressors noted within this AA included the surrounding transportation corridors, culverts, livestock grazing (e.g., bison), and stormwater and road runoff and how they contribute to Beaver Brook's hydrology. The scores for habitat connectivity, contributing area, and geomorphology variables were lower than AA-8's composite score, while scores for water source, water distribution, water outflow, chemical environment, and vegetation structure and complexity were greater than or equal to AA-8's composite score.

6. Impacts

The impacts discussed in the following subsections are based on project design as of July 2020. Permanent impacts would result from the widening and realignment of I-70 and the frontage road, replacement of existing bridges, pier placement for new bridges, and bank stabilization associated with roadway reconfiguration. Exhibit 6 and Exhibit 7 summarize the direct permanent impacts of the action alternatives on surface waters and wetlands, respectively.

Exhibit 6. Summary of Permanent Impacts to Surface Waters

Section	Permanent Impacts (Acres)	Permanent Impacts (Square Feet)	Linear Feet of Impact	Assumed Jurisdictional Status[1]
Tunnel Alternative, North Frontage Road Option				
East	0.010	424	185 (Johnson Gulch)	Jurisdictional
Central	0.001	56	25 (Unnamed Drainage) 7 (Pier in Clear Creek)	Jurisdictional
West	0.897	39,085	1,365 (Clear Creek)	Jurisdictional
Total	*0.908*	*39,565*	*1,582*	*NA*
Tunnel Alternative, South Frontage Road Option				
East	0.009	398	184 (Johnson Gulch)	Jurisdictional
Central	0.006	263	25 (Unnamed Drainage) 78 (Sawmill Gulch)	Jurisdictional Jurisdictional
West	0.897	39,085	1,365 (Clear Creek)	Jurisdictional
Total	*0.912*	*39,746*	*1,652*	*NA*
Canyon Viaduct Alternative				
East	0.006	262	125 (Johnson Gulch)	Jurisdictional
Central	0.001	56	25 (Unnamed Drainage) 7 (Pier in Clear Creek)	Jurisdictional
West	0.897	39,085	1,365 (Clear Creek)	Jurisdictional
Total	*0.904*	*39,403*	*1,522*	*Jurisdictional*

[1]Jurisdictional status assumed based on conditions in the field and review of maps and aerial imagery. Only the USACE has the authority to determine what is jurisdictional.
NA = Not applicable

Exhibit 7. Summary of Permanent Impacts to Wetlands

Section	Permanent Impact (Acres)	Permanent Impacts (Square Feet)	Classification[1]	Associated Waterbody	Assumed Jurisdictional Status[2]
Tunnel Alternative, North Frontage Road Option					
East	0.000	0	NA	NA	NA
Central	<0.001	4	PSS	Clear Creek	Jurisdictional
West	0.001	40	PEM	Clear Creek	Jurisdictional
Total	*0.001*	*44*	*PEM/PSS*	*Clear Creek*	*Jurisdictional*

Section	Permanent Impact (Acres)	Permanent Impacts (Square Feet)	Classification[1]	Associated Waterbody	Assumed Jurisdictional Status[2]
Tunnel Alternative, South Frontage Road Option					
East	0.000	0	NA	NA	NA
Central	0.000	0	NA	NA	NA
West	0.001	40	PEM	Clear Creek	Jurisdictional
Total	*0.001*	*40*	*PEM*	*Clear Creek*	*Jurisdictional*
Canyon Viaduct Alternative					
East	0.000	0	NA	NA	NA
Central	<0.001	4	PSS	Clear Creek	Jurisdictional
West	0.001	40	PEM	Clear Creek	Jurisdictional
Total	*0.001*	*44*	*PEM/PSS*	*Clear Creek*	*Jurisdictional*

[1]Cowardin et al., 1979
[2]Jurisdictional status assumed based on conditions in the field and review of maps and aerial imagery. Only USACE has the authority to determine what is jurisdictional.
Notes:
PEM = palustrine emergent
PSS = palustrine scrub-shrub
NA= Not applicable

Temporary impacts related to construction activities would result from vegetation removal, earthmoving, bridge demolition, grading activities, and staging of equipment. It is anticipated that construction activities would occur within the right of way and that wetlands would be identified on construction plans and avoided. Impacts to waters of the U.S. could occur from vegetation removal, erosion and increased stormwater runoff, or other ground-disturbing activities.

Indirect impacts would result from construction activities, road surface-related activities, demolition and replacement of existing bridges, and installation of new bridge spans over aquatic resources.

6.1. Methodology

Direct impacts to aquatic resources were calculated in Geographic information Systems (GIS). Project alternative limits of disturbance were overlaid on aquatic resources (surface waters and wetlands). Aquatic resources then were clipped to the project footprints and acreages, and square feet of impacts were calculated.

In addition to quantitative analysis, project elements and features were addressed to qualitatively define potential temporary and indirect impacts to aquatic resources from the action alternatives.

6.2. No Action Alternative Impacts

The No Action Alternative includes ongoing highway maintenance and the replacement of the I-70 westbound bridge at the bottom of Floyd Hill. The bridge would be replaced in its current location but would need to be designed to current standards, with improved sight distance and wider shoulders. The bridge spans Clear Creek; therefore, depending on design of the new structure, the No Action Alternative could have the potential to impact Clear Creek directly and indirectly. Direct impacts could occur from placing fill material within the OHWM as part of the new bridge structure. Temporary impacts could occur from the construction activities and demolition of the existing bridge.

No wetlands were identified along Clear Creek in the area of the No Action Alternative; therefore, impacts to wetlands are unlikely.

Indirect impacts to Clear Creek could result from construction activities but are anticipated to be temporary and minor. Surface runoff during construction may temporarily impact Clear Creek. Indirect impacts also include increased runoff from the widened road and increase in impervious surface. That runoff could be of lower water quality since it may contain pollutants. In addition, the widening of existing bridge structures could result in additional shading over Clear Creek, thus affecting potential growth of vegetation underneath.

6.3. Tunnel Alternative Impacts

6.3.1. East Section

Beaver Brook, its tributaries, and Johnson Gulch are the primary aquatic resources located in the East Section of the Tunnel Alternative. Improvements in the East Section include adding a third lane with inside and outside shoulders in the westbound direction, safety improvements, and potential wildlife mitigation. Some water quality features (retention ponds and retention ditches) would be added along the south side of the eastbound lanes.

6.3.1.1. Direct Impacts

Proposed improvements would occur outside of the Beaver Brook aquatic complex; therefore, no direct impacts to aquatic resources (i.e., surface waters or wetlands) associated with Beaver Brook or its tributaries would result.

Widening of I-70 would cause minimal impact to Johnson Gulch (SW-08) in the East Section in the eastbound direction (on the south side of I-70). The toe-of-slope would be moved south of the interstate with a shift to accommodate the third westbound lane and the addition of an eastbound climbing lane, and the existing culvert of the gulch would be lengthened to accommodate the widening. There would be 0.010 acre (424 square feet) of permanent surface water impact to Johnson Gulch associated with the Tunnel Alternative, North Frontage Road Option improvements, and 0.009 acre (398 square feet) of permanent impact to surface water associated with the Tunnel Alternative, South Frontage Road Option (Exhibit 6; Appendix G). Impacts would occur along approximately 185 linear feet of the gulch for both design options.

There would be no impacts to wetlands in the East Section for either Tunnel Alternative design option.

Temporary impacts related to construction activities could result from vegetation removal, earthmoving, grading activities, and staging of equipment.

6.3.1.2. Indirect Impacts

Indirect impacts to surface waters or wetlands could result from construction activities, but they are anticipated to be temporary and minor. Surface runoff during construction may temporarily impact nearby wetlands or surface waters. Construction activities also unavoidably disturb the ground surface, which increases the likelihood of noxious weeds becoming established that may crowd out more desirable native wetland vegetation. Because wetlands in the East Section are distant from ground-disturbing construction activities, impacts to wetlands are unlikely. Indirect impacts also include increased impervious surface and runoff from the widened road. That runoff could be of lower water

quality since it may contain pollutants. A construction Stormwater Management Plan would be implemented to minimize these impacts.

The Project would not alter the local or regional hydrology of the area. The major surface water features, described in Section 5 of this report, would continue to support aquatic habitat within the Project limits and the adjacent areas. The hydrologic connectivity across I-70 would be maintained.

6.3.2. Central Section

Clear Creek, its tributaries and associated wetlands, and Sawmill Gulch are the primary aquatic resources located in the Central Section of the Tunnel Alternative. Improvements that would impact aquatic resources include road widening and realignment of I-70, resurfacing of an existing pedestrian trail, demolition and replacement of existing bridges, and new bridge spans and bridge piers.

6.3.2.1. Direct Impacts

Proposed improvements would occur primarily outside of Clear Creek and its associated wetlands; therefore, direct impacts to aquatic resources (surface waters or wetlands) associated with both Tunnel Alternative design options would be minimal in the Central Section.

North Frontage Road Option

There would be impacts to two surface waters in the Central Section for the Tunnel Alternative, North Frontage Road Option: an unnamed drainage (SW-07) and Clear Creek (SW-01) (Exhibit 6). Impacts to the unnamed drainage (SW-07) would occur as a result of road stabilization activities at US 6. These activities would result in 0.001 acre (39 square feet) of permanent impacts along approximately 25 linear feet of the unnamed drainage (SW-07) (Appendix G).

A new bridge span carrying the eastbound on-ramp over Clear Creek (SW-01) would be constructed as part of the Tunnel Alternative North Frontage Road Option. As such, new bridge spans for the proposed bridge would impact less than 0.001 acre (17 square feet) along approximately 7 linear feet of Clear Creek and less than 0.001 acre (4 square feet) of PSS wetlands (WL-CC-54) adjacent to Clear Creek (Appendix G).

Temporary impacts related to construction activities would result from vegetation removal, earthmoving, grading activities, and staging of equipment. In addition, the demolition of existing bridge structures near the I-70 and US 6 interchange could result in temporary impacts; although specific demolition methods are not known at this time, the contractor will be required to avoid impacts to wetlands and to minimize impacts to surface waters through implementation of a Stormwater Management Plan and other BMPs.

South Frontage Road Option

There would be impacts to two surface waters in the Central Section from the South Frontage Road Option: an unnamed drainage (SW-07) and Sawmill Gulch (SW-06) (Exhibit 6). Impacts to the unnamed drainage (SW-07) would occur as a result of road stabilization activities at US 6. These activities would result in 0.001 acre (39 square feet) of permanent impacts along approximately 25 linear feet of the unnamed drainage (SW-07) (Appendix G).

The construction of the frontage road along the south side of Clear Creek would require placing approximately 78 linear feet of Sawmill Gulch (SW-06) in a culvert where the frontage road is proposed

to cross near MP 243.7 of I-70. This would result in 0.005 acre (224 square feet) of impact to Sawmill Gulch (Appendix G).

There would be no impacts to wetlands in the Central Section from the South Frontage Road Option (Exhibit 7).

Temporary impacts related to construction activities would result from vegetation removal, earthmoving, grading activities, and staging of equipment; however, some details of design have not yet been finalized and quantities of temporary impacts have not been calculated at this time. In addition, the demolition of existing bridge structures near the I-70 and US 6 interchange could result in temporary impacts; although specific demolition methods are not known at this time, the contractor will be required to avoid impacts to wetlands and to minimize impacts to surface waters through implementation of a Stormwater Management Plan and other BMPs.

6.3.2.2. Indirect Impacts

Indirect impacts to surface waters or wetlands for both Tunnel Alternative design options in the Central Section could result from construction activities, but they are anticipated to be temporary and minor. Surface runoff during construction may temporarily impact nearby wetlands or surface waters. Construction activities also unavoidably disturb the ground surface, which increases the likelihood of noxious weeds becoming established that may crowd out more desirable native wetland vegetation. Indirect impacts also include increased runoff from the widened road. That runoff could be of lower water quality since it may contain pollutants. A construction Stormwater Management Plan would be implemented to minimize these impacts.

The Project would not alter the local or regional hydrology of the area. The major surface water features, described in Section 5 of this report, would continue to support aquatic habitat within the Project limits and the adjacent areas. The hydrologic connectivity across I-70 would be maintained. However, new bridge spans and replacement and widening of existing bridge structures could result in additional shading over Clear Creek, thus affecting establishment and growth of wetland vegetation underneath.

6.3.3. West Section

Clear Creek and its associated wetlands are the primary aquatic resource located in the West Section of the Tunnel Alternative. Improvements that would impact aquatic resources include road widening and realignment of I-70, the frontage road, and CR 314; resurfacing of a pedestrian/bicycle trail; and demolition and replacement of existing bridges. The realignment of the roadways also requires realignment of approximately 1,400 feet of Clear Creek.

6.3.3.1. Direct Impacts

The West Section would widen the interstate to add a third westbound travel lane and flatten the S-curve in this location. The curve modifications require realigning both the I-70 mainline and frontage road through this section. Much of CR 314 would be realigned south between the Doghouse Rail Bridge over Clear Creek near the Veterans Memorial Tunnels east portal and Hidden Valley.

The alignment shifts associated with widening I-70, the frontage road and CR 314 would result in the relocation of 0.897 acre (39,085 square feet) along 1,365 linear feet of Clear Creek (SW-01) to the south, between I-70 and CR 314, near MP 242.5 (Exhibit 6; Appendix G). In addition, 0.001 acre (40 square feet) of PEM wetlands (WL-CC-41) associated with Clear Creek would be impacted (Exhibit 7;

Appendix G). Impacts would be the same for the Tunnel Alternative under both the North and South Frontage Road Options.

Temporary impacts related to construction activities would result from vegetation removal, earthmoving, grading activities, and staging of equipment. In addition, the replacement of existing bridge structures (MP 242.8) just east of the Hidden Valley/I-70 interchange could result in temporary impacts; although specific demolition methods are not known at this time, the contractor will be required to avoid impacts to wetlands and to minimize impacts to surface waters through implementation of a Stormwater Management Plan and other BMPs.

6.3.3.2. Indirect Impacts

Indirect impacts to surface waters or wetlands could result from construction activities, but they are anticipated to be temporary and minor. Surface runoff during construction may temporarily impact nearby wetlands or surface waters. Construction activities also unavoidably disturb the ground surface, which increases the likelihood of noxious weeds becoming established that may crowd out more desirable native wetland vegetation. Indirect impacts also include increased runoff from the widened road. That runoff could be of lower water quality since it may contain pollutants. A construction Stormwater Management Plan would be implemented to minimize these impacts.

The Project would not alter the local or regional hydrology of the area. The major surface water features, described in Section 5 of this report, would continue to support aquatic habitat within the Project limits and the adjacent areas. The hydrologic connectivity across I-70 would be maintained. However, the replacement and widening of existing bridge structures could result in additional shading over Clear Creek, thus affecting establishment and growth of wetland vegetation underneath.

6.4. Canyon Viaduct Alternative Impacts

6.4.1. East Section

The impact area in the East Section is similar to the Tunnel Alternative; therefore, impacts would be similar. Widening of I-70 would cause 0.006 acre (262 square feet) of permanent surface water impact along 125 linear feet of Johnson Gulch (SW-08) (Exhibit 6; Appendix G).

There would be no impacts to wetlands in the East Section of the Canyon Viaduct Alternative.

Temporary and indirect impacts would be the same as the Tunnel Alternative (see Section 6.3.1).

6.4.2. Central Section

The Canyon Viaduct Alternative would realign both westbound and eastbound I-70 lanes on viaduct structures approximately 400 feet south of the existing I-70 alignment on the south side of Clear Creek Canyon. The viaduct would cross above Clear Creek twice.

6.4.2.1. Direct Impacts

There would be impacts to two surface waters in the Central Section for the Canyon Viaduct Alternative: an unnamed drainage (SW-07) and Clear Creek (SW-01) (Exhibit 6). Impacts to the unnamed drainage (SW-07) would occur as a result of road stabilization activities at US 6. These activities would result in 0.001 acre (39 square feet) of permanent impacts along approximately 25 linear feet of the unnamed drainage (SW-07) (Appendix G).

The frontage road would cross Clear Creek after the Hidden Valley/Central City interchange to be on the north side of Clear Creek (SW-01), and a new bridge span would be constructed as part of the Canyon Viaduct Alternative. As such, bridge piers would impact less than 0.001 acre (17 square feet) along approximately 7 linear feet of Clear Creek and less than 0.001 acre (4 square feet) of PSS wetlands (WL-CC-54) adjacent to Clear Creek (Appendix G).

Temporary impacts related to construction activities would result from vegetation removal, earthmoving, grading activities, and staging of equipment. In addition, the demolition of existing bridge structures near the I-70 and US 6 interchange could result in temporary impacts; although specific demolition methods are not known at this time, the contractor will be required to avoid impacts to wetlands and to minimize impacts to surface waters through implementation of a Stormwater Management Plan and other BMPs.

6.4.2.2. Indirect Impacts

Indirect impacts to surface waters or wetlands could result from construction activities, but they are anticipated to be temporary and minor. Surface runoff during construction may temporarily impact nearby wetlands or surface waters. Construction activities also unavoidably disturb the ground surface, which increases the likelihood of noxious weeds becoming established that may crowd out more desirable native wetland vegetation. Indirect impacts also include increased runoff from the widened road. That runoff could be of lower water quality since it may contain pollutants.

The Project would not alter the local or regional hydrology of the area. The major surface water features described in Section 5 of this report would continue to support aquatic habitat within the Project limits and the adjacent areas. The hydrologic connectivity across I-70 would be maintained. However, the creation of new bridge structures could result in additional shading over Clear Creek, thus affecting establishment and growth of wetland vegetation underneath.

6.4.3. West Section

Proposed improvements in the West Section are the same as the Tunnel Alternative; therefore, direct permanent and temporary impacts and indirect impacts would be the same as for the Tunnel Alternative (see Section 6.3.3).

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. Mitigation for Permanent Adverse Impacts

Per Section 404 of the CWA, impacts to surface waters and wetlands under the jurisdiction of the USACE must be avoided, minimized, or mitigated, in that order of preference. A Section 404 permit will be required for this Project. It is anticipated that a single Individual Permit (IP) will be obtained for the Project.

CDOT policy requires all wetland impacts to be mitigated, regardless of jurisdiction or magnitude. Temporary impacts would be mitigated by revegetation activities, as will be outlined in the Project Stormwater Management Plan. Revegetation typically includes reseeding temporarily impacted wetlands with a native wetland seed mix or planting willow stakes or some combination of methods intended to revegetate the area.

Enhancements to riparian and aquatic habitat, which are supported by the SWEEP Issue Task Force (ITF), would be appropriate for Section 404 compensatory mitigation for surface water impacts if the Project shows a functional lift to Clear Creek based on the functional value of the area of stream relocation impact. It is anticipated that areas downstream of the relocation but within the Project limits are appropriate for this type of enhancement, and the Project team conducted a site review with CPW in May 2020 to review site conditions and areas for aquatic habitat enhancements.

The Study Area also was evaluated for the potential for onsite mitigation for permanent impacts to wetlands. Construction would occur within a confined canyon, and space for creating wetlands within that footprint is extremely limited. Establishing appropriate hydrology within this small space is not feasible. Although downstream enhancement areas may provide suitable areas to restore vegetation and establish wetlands, because the impacted wetland area is so small under all action alternatives and establishment of on-site wetlands requires substantial monitoring, an offsite mitigation site will likely be the preferred form of CDOT-required wetland mitigation for this Project.

It is anticipated that the selected mitigation site would be from the Clear Creek Ecological Restoration property. Wetland mitigation details will be determined at a later date.

Exhibit 8 summarizes the direct and indirect impacts of the alternatives.

Exhibit 8. Recommended Mitigation Measures for Permanent Impacts

Activity	Location	Impact	Mitigation
General construction activities (*All alternatives*)	Within Project limits	Direct and/or indirect impacts to surface waters and wetlands	Construction limit fencing will be installed around all delineated and mapped wetlands in the Project area to protect wetlands that are not directly impacted by the Project. CDOT will maintain temporary erosion controls and plantings to stabilize temporarily disturbed wetland areas. Fertilizers and/or hydro mulching will not be allowed within 50 feet of wetlands.
Construction activities near Beaver Brook, Johnson Gulch, Sawmill Gulch, Clear Creek, and adjacent mapped wetland areas (*All alternatives*)	Within and adjacent to all mapped wetlands and surface waters	Direct and/or indirect impacts to surface waters and wetlands	Ensure BMPs and containment structures are in place for work conducted within and adjacent to the OHWM and mapped wetlands to prevent concrete washout and other potential pollutants from reaching creeks and wetlands.
Construction activities resulting in a permanent loss of wetlands (*All alternatives*)	Within identified and permitted wetland areas. *Tunnel Alternative: North Frontage Road Option*: 0.001 acre (44 square feet) *Tunnel Alternative: South Frontage Road Option*: 0.001 acre (40 square feet) *Canyon Viaduct Alternative*: 0.001 acre (44 square feet)	Direct impacts to wetlands	The Project will mitigate wetland losses at a ratio of 1:1, likely at an offsite location within the watershed.
Clear Creek realignment, resulting in a permanent loss of surface waters	Clear Creek, West Section of Project	Direct impacts to Clear Creek surface waters	A Section 404 Individual Permit will be obtained. Impacts will be verified, and any additional encroachment within the OHWM will be identified prior to submitting 404 Permit application. A stream functional assessment will be conducted to determine the functional length of the creek that needs to be mitigated. A mitigation plan that identifies at least a 1:1 linear area of functional stream length impacted

Activity	Location	Impact	Mitigation
			will be developed and implemented. CDOT will coordinate with the SWEEP ITF, CPW, US Army Corps of Engineers, EPA, and rafting groups to develop the mitigation plan before submitting the Section 404 permit application.
Construction activities resulting in a permanent loss of surface waters, including demolition of existing bridges over Clear Creek	Within identified and permitted surface water areas.	Direct impacts to surface waters	Construction work will be closely monitored to ensure that additional fill is not placed within the OHWM.
Runoff from construction (*All alternatives*)	Throughout the Project area	Water resources and water quality contamination and degradation	See *I-70 Floyd Hill to Veterans Memorial Tunnels Drainage and Water Quality Report* (CDOT, 2020b).
Long-term erosion impacts from soil disturbance that occurred during construction (*All alternatives*)	Throughout the Project area	Erosion and increased sedimentation to adjacent water resources	See *I-70 Floyd Hill to Veterans Memorial Tunnels Drainage and Water Quality Report* (CDOT, 2020b)
Runoff from operation of the Proposed Action Alternative (*All alternatives*)	Within established CDOT, municipal, and county Municipal Separate Storm Sewer System areas	Increased impervious surface	Water quality control measures will be created along the corridor. See *I-70 Floyd Hill to Veterans Memorial Tunnels Drainage and Water Quality Report* (CDOT, 2020b).

7.2. Mitigation for Temporary Impacts

Exhibit 9 summarizes the temporary impacts that are anticipated during construction.

Exhibit 9. Recommended Mitigation Measures for Temporary Impacts

Activity	Location	Impact	Mitigation
Construction staging and storage activities (*All alternatives*)	Construction staging areas within the project area (currently unknown)	Temporary impacts to wetlands and surface waters	Construction staging and materials stockpiling will be located greater than 50 feet from the edge of wetlands or creeks, when possible. No staging will be allowed in wetlands. Specific staging locations will be determined during construction ,to verify this buffer is achievable considering the narrowness of the corridor and limited areas available. If this buffer is not achievable, CDOT will consider the placement of materials closer to the edge of wetlands or the edge of water and identify appropriate additional BMPs that would be required to minimize disturbance of vegetation and prevent pollutant discharges into sensitive habitats. BMPs will be determined on a site-by-site basis and any modifications will require CDOT environmental staff's approval.
Construction activities at wetland and riparian areas (*All alternatives*)	Within mapped wetland and riparian areas	Temporary impacts to wetlands	Timber mats or geotextile/straw will be used to minimize temporary impacts to wetlands from construction equipment traversing wetlands areas.
Construction of new bridges at Clear Creek crossings (*All alternatives*)	Clear Creek crossings where an OHWM has been identified	Temporary impacts to surface waters	Construction equipment will be prohibited from entering the OHWM except where identified on design plans.

8. Agency Coordination

Agency coordination has been conducted primarily with the SWEEP ITF, as directed by the SWEEP MOU, which has met separately three times since the start of the Project (Appendix H). SWEEP ITF members involved in the Project include representatives from CPW, USFWS, USFS, BLM, Upper Clear Creek Watershed Association, Trout Unlimited, and local agencies. Many of the ITF members also are part of the Project Technical Team, which has met more than 20 times during the Project development.

As noted, a Section 404 IP is anticipated to be required for this Project, and through the SWEEP ITF, CDOT and FHWA have coordinated with USACE regarding appropriate permitting strategies and mitigation. Although the Project did not follow a formal Section 404 Merger process, the USACE has reviewed the Project purpose and need and impacts associated with the Clear Creek relocation, and it has advised on permitting approaches. Additionally, CPW, which has jurisdictional responsibilities for riparian wildlife habitat under Senate Bill 40, has advised on these requirements and provided expertise on fish habitat enhancements in the Project area, which is one of the categories of functional lift that also will apply to the Section 404 permit requirements.

In addition to SWEEP ITF meetings, a site visit was held on May 20, 2020, with Paul Winkle (CPW Fish Biologist), Joseph Walter (CPW District Wildlife Manager), and the Project Team to identify locations where in-stream BMPs, areas of increased sinuosity, or other stream enhancements could be located to improve fish habitat.

9. References

Colorado Department of Transportation (CDOT). 2011. *I-70 Mountain Corridor PEIS Wetlands and Other Waters of the U.S. Technical Report*. August 2010; Reissued March 2011.

CDOT. 2020a. *I-70 Floyd Hill to Veterans Memorial Tunnels Alternatives Analysis Technical Report.* Denver, CO: CDOT.

CDOT. 2020b. *I-70 Floyd Hill to Veterans Memorial Tunnels Drainage and Water Quality Report*. Denver, CO: CDOT.

Colorado State University. 2018. Colorado State University Soil, Water, and Plant Testing Laboratory. I-70 Floyd Hill Soil Sample Results—available upon request. Results received August 2018.

Cowardin, L.M., V. Carter V., F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. United States Fish and Wildlife Service Report No. FWS/OBS/-79/31.Washington, D.C.: USFWS.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1. Vicksburg, MS: United States Army Engineer Waterways Experiment Station.

Environmental Systems Research Institute (ESRI). 2018. World Topographic Map—Base Layer. Sources: Service Layer Credit Sources: ESRI, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community. Data Accessed August 2018.

Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT). 2011. *I-70 Mountain Corridor Final Programmatic Environmental Impact Statement*. Denver, CO: FHWA and CDOT.

Federal Register. 1977. *The Provisions of Executive Order 11990 (Protection of Wetlands)*, 42 FR 26961, 3 CFR, 1977, page 121. The Federal Register, May 24, 1977.

Google Earth. 2018. Aerial Imagery. Available at: http://www.earth.google.com. Accessed August 2018.

Johnson, Brad, Mark Beardsley, and Jessica Doran. 2013. *Colorado Department of Transportation's Functional Assessment of Colorado Wetlands Method Version 3.0.* Denver, CO: CDOT.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. "State of Colorado 2016 Wetland Plant List: The National Wetland Plant List: 2016 wetland ratings." *Phytoneuron* 2016-30: 1-17. April 28, 2016.

Natural Resources Conservation Service (NRCS). 2018. Web Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/. Accessed September 2018.

U.S. Army Corps of Engineers (USACE). 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USACE. 2014. *A Guide to Ordinary High-Water Mark Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the U.S.* Technical Report 14-13. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Department of Agriculture (USDA). 2019. Plants Database. Available at: https://plants.sc.egov.usda.gov/java/. Last modified June 3, 2019.

U.S. Environmental Protection Agency (EPA). 1989. *Federal Enforcement for the Section 404 Program of the Clean Water Act; Memorandum Between the Department of the Army and the Environmental Protection Agency*. Available at: https://www.epa.gov/cwa-404/federal-enforcement-section-404-program-clean-water-act. Accessed May 2019.

EPA. 2019. CWA Compliance Monitoring; CWA Section 404. Available at: https://www.epa.gov/compliance/clean-water-act-cwa-compliance-monitoring#wetlands. Accessed May 2019.

U.S. Fish and Wildlife Service (USFWS). 2018. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Available at: http://www.fws.gov/wetlands/. Accessed August 2018.

U.S. Geological Survey (USGS). 2018. National Hydrography Dataset. Available at: http://nhd.usgs.gov/. Accessed August 2018.

USGS. 1974. 7.5-Minute Topographic Map, Squaw Pass, Colorado, U.S. Geological Survey, 1957, revised 1974.

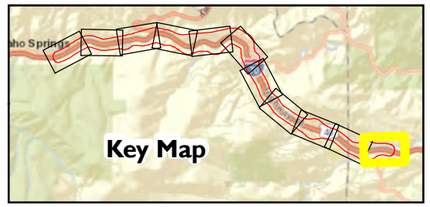
Appendix A Mapbook of Existing Surface Waters and Wetlands

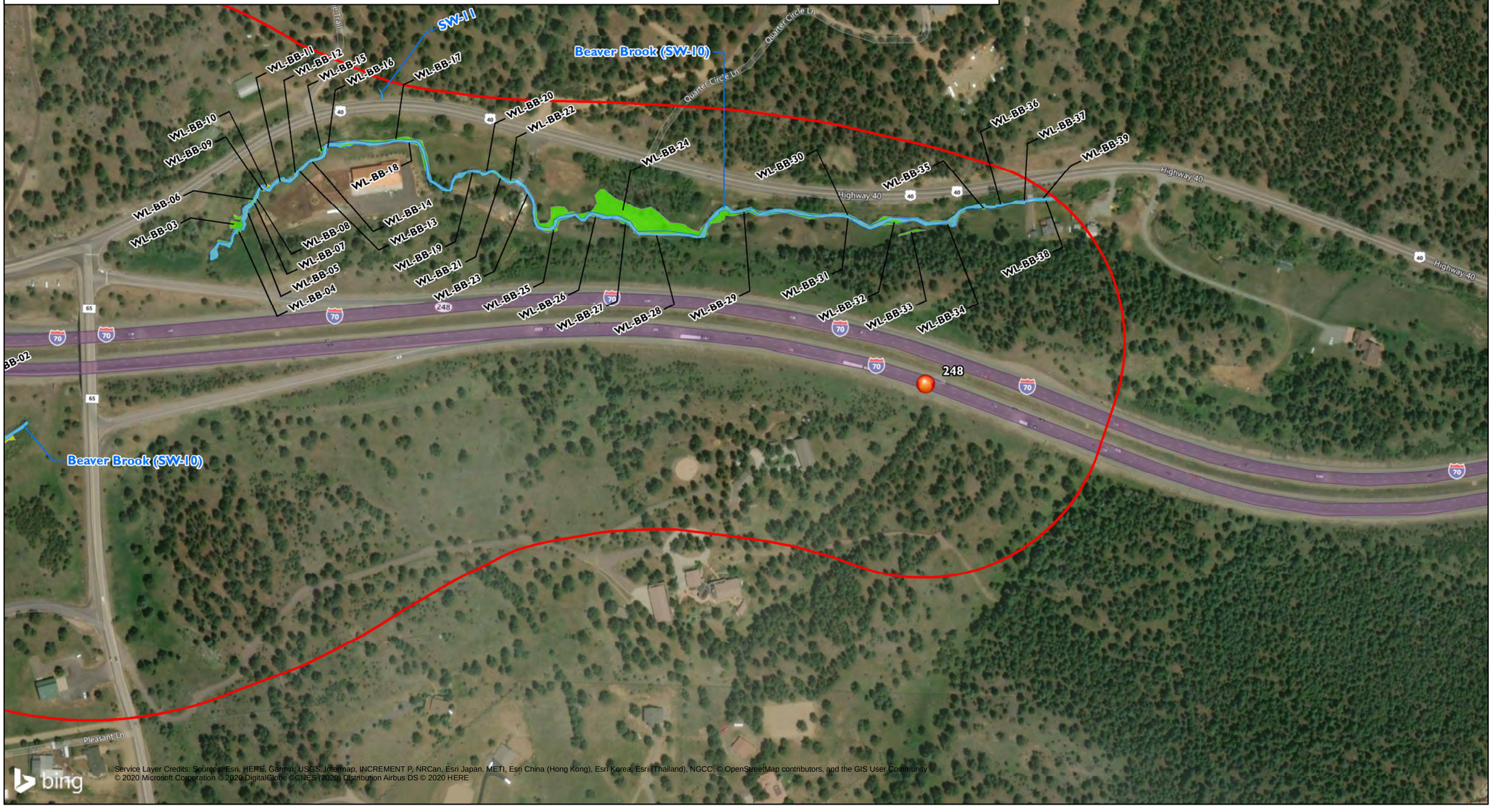
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





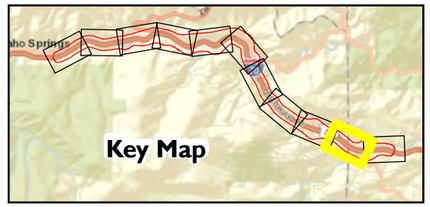
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet



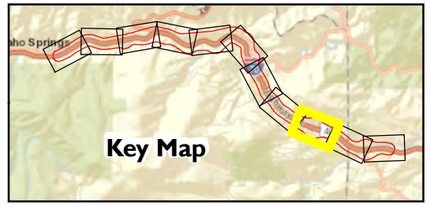
Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet



WL-06
WL-07
WL-08
WL-09
WL-10
WL-11
WL-12
WL-13
SW-09
County Road 182
Floyd Hill Rd
Sleeping Bear Ln
Homestead Rd
Saddleback Dr
County Road 181
Hyland Dr
Beaver Brook Canyon Rd
Meadow View Dr
Evergreen Park
70
40
241

Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

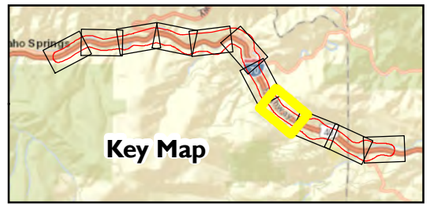
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

Legend

Study Area
Surface Waters
OHWM
PEM Wetland
PSS Wetland
Mile Post
Surface Waters - Desktop Delineated
Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet



246

Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

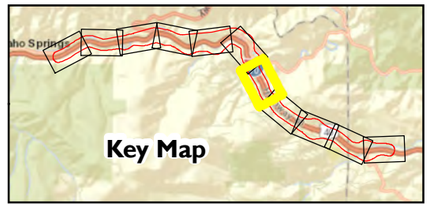
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet



245

Johnson Gulch (SW-08)

Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

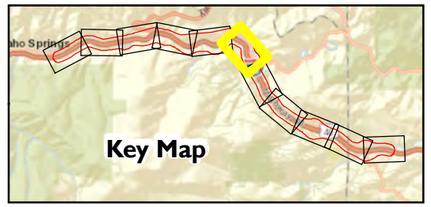
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

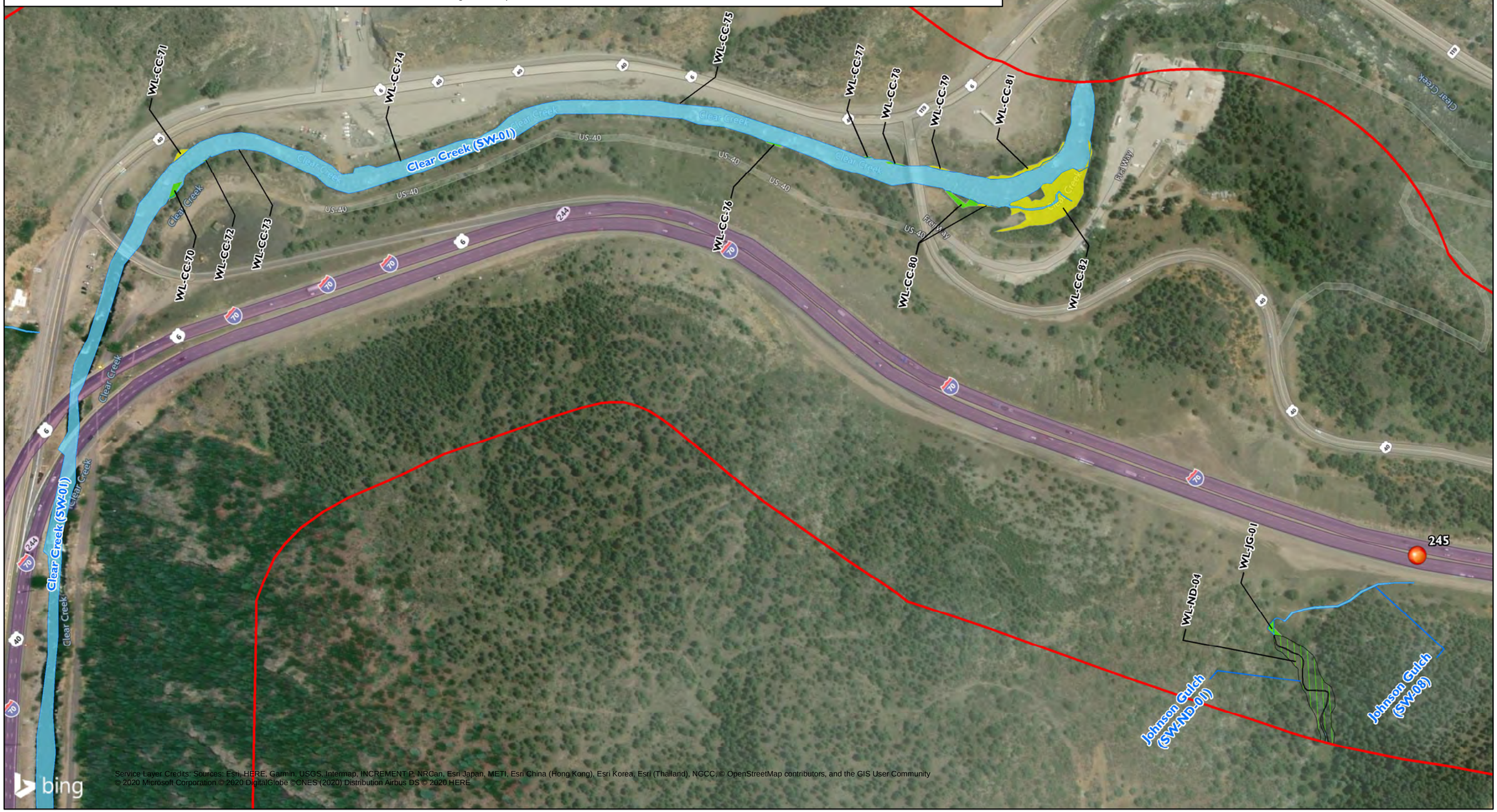
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





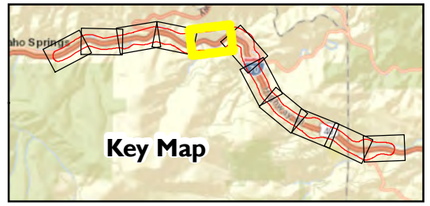
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

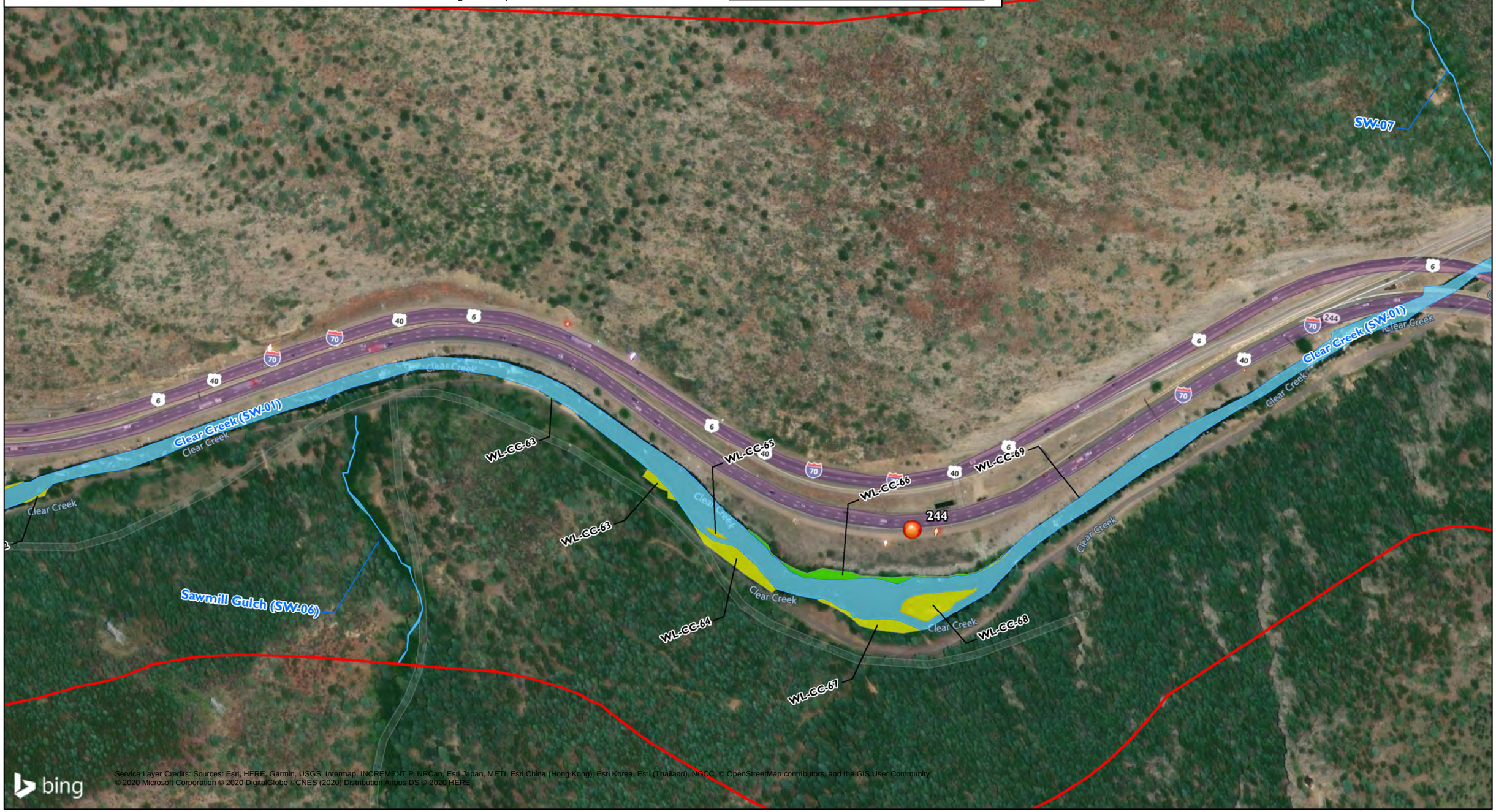
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





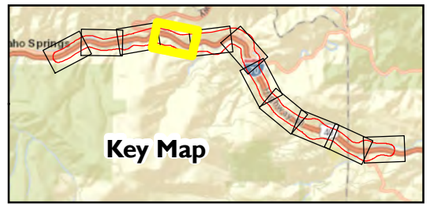
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

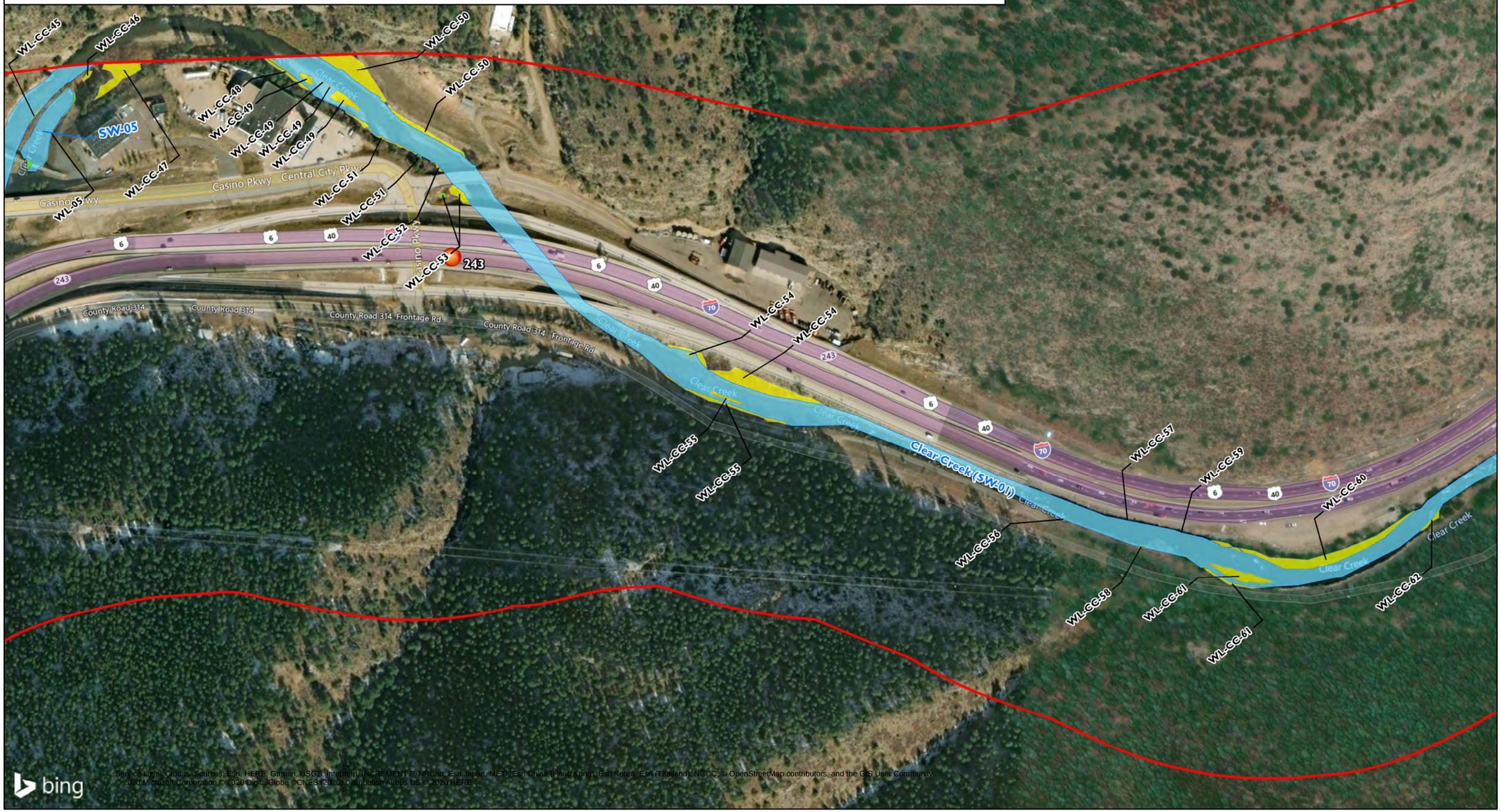
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





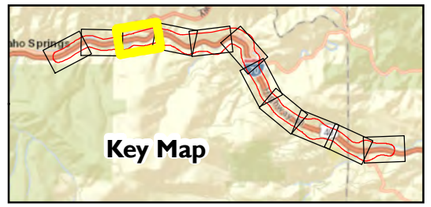
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

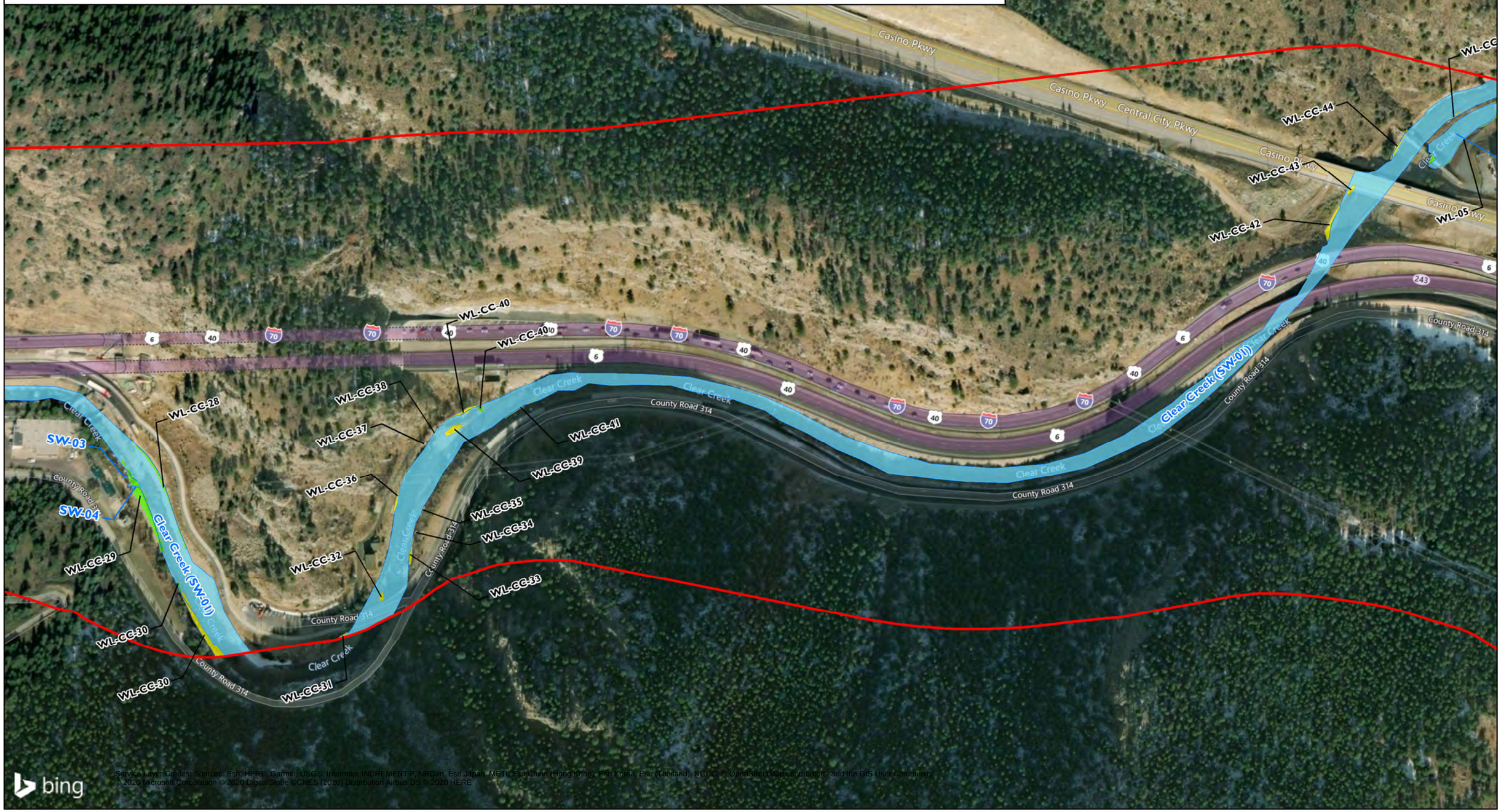
Legend

Study Area
Surface Waters
OHWM
PEM Wetland
PSS Wetland
Mile Post
Surface Waters - Desktop Delineated
Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

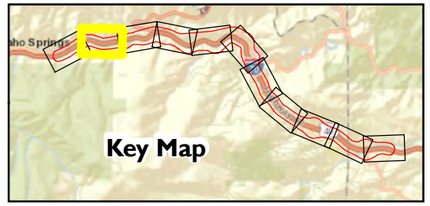
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

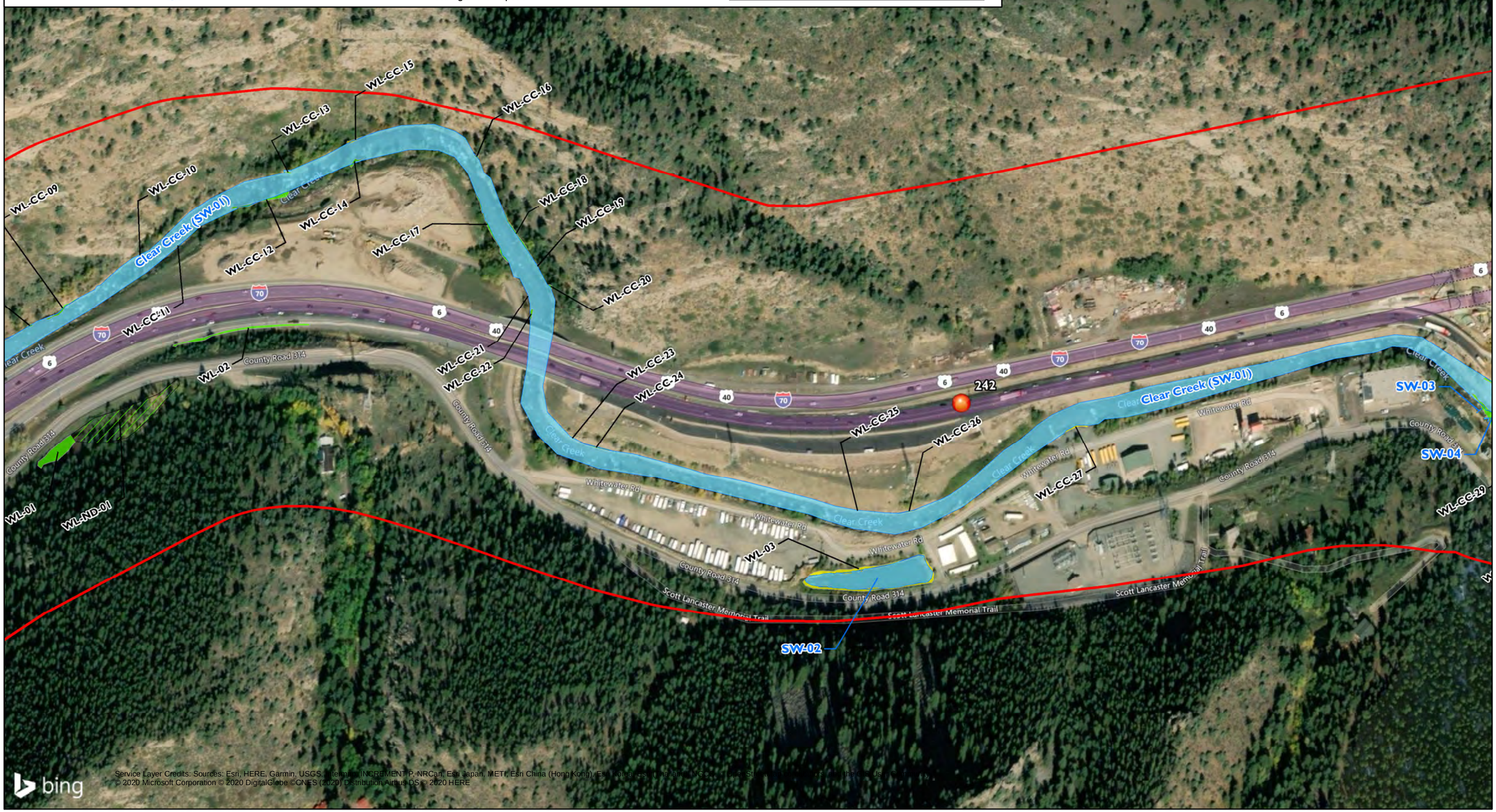
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

Note: OHWM is included but may not be visible due to the scaling of the mapbook.

0 125 250 Feet





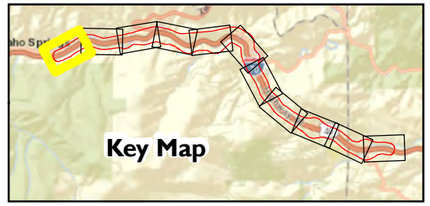
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

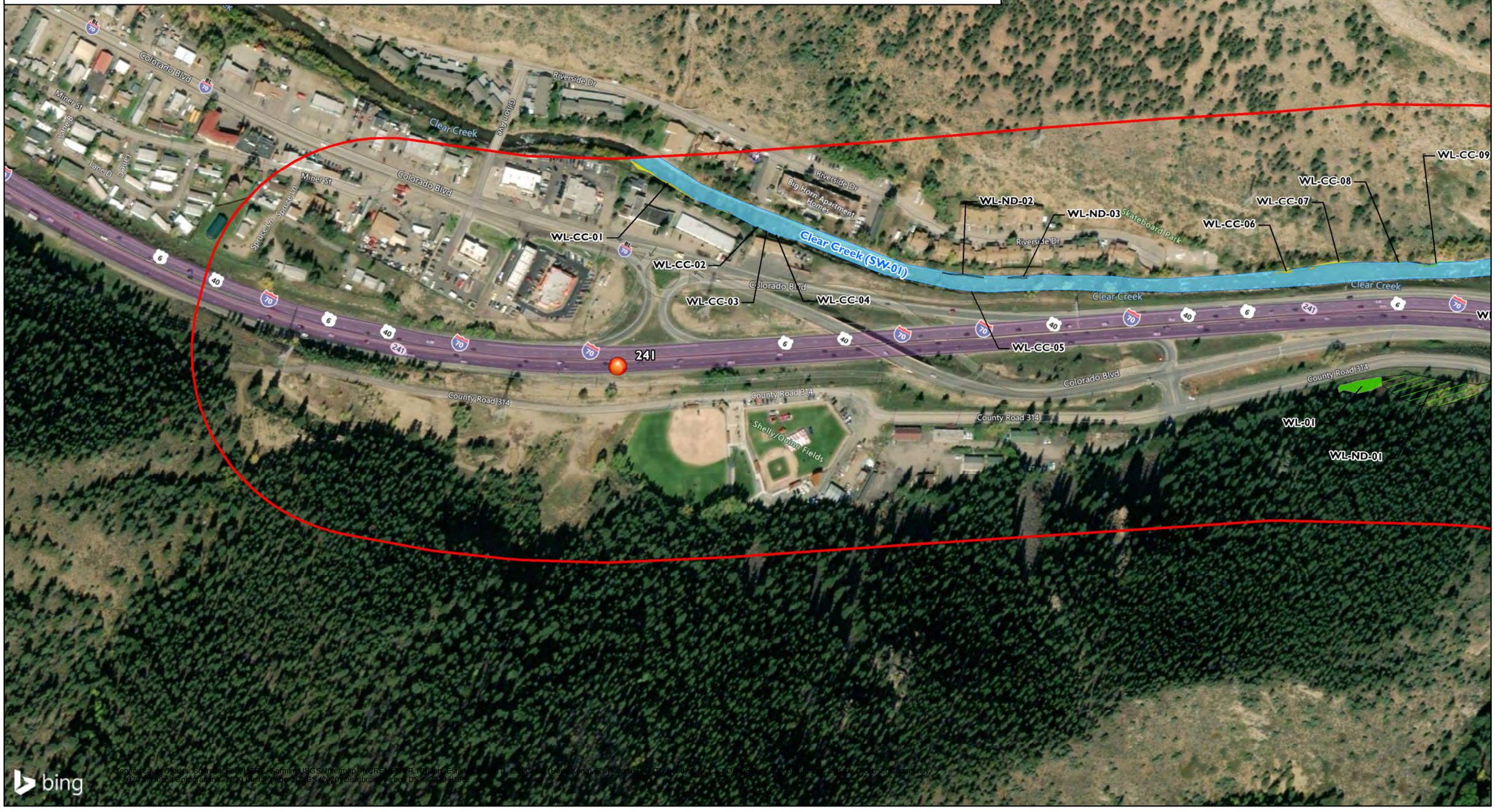
Legend

- Study Area
- Surface Waters
- OHWM
- PEM Wetland
- PSS Wetland
- Mile Post
- Surface Waters - Desktop Delineated
- Wetlands - Desktop Delineated

0 125 250 Feet

Note: OHWM is included but may not be visible due to the scaling of the mapbook.





Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_MapBook.mxd

Appendix B Photographic Log

Photo 1.
Clear Creek.

Sampling Point (SP)–9 is associated with wetland WL-CC-13, a Palustrine Emergent (PEM) wetland along Clear Creek Surface Water (SW)-01. WL-CC-13 is one of many representations of PEM wetlands along Clear Creek. Vegetation communities in PEM wetlands may differ along various portions of Clear Creek.

Photo 2.
Clear Creek.

SP-9 soil profile. Depleted Matrix noted. Other PEM wetlands along Clear Creek may show different indicators of hydric soils.

Photo 3.
Clear Creek.

SP-15 is associated with WL-CC-27, a Palustrine Scrub Shrub (PSS) wetland along Clear Creek. Area dominated by *Salix exigua*, a hydrophytic shrub. WL-CC-27 is one of many different representations of PSS wetlands along Clear Creek. PSS wetlands may differ by shrub species present along various portions of Clear Creek.

Photo 4.
Clear Creek.

SP-15 soil profile. Sandy Redox noted. Other PSS wetlands along Clear Creek may show different indicators of hydric soils.

Photo 5.
Clear Creek.

View of the creek to the east, from north bank.

Photo 6.
Clear Creek.

View of the creek to the south, from north bank. I-70 bridge structure in background.

Photo 7.
Clear Creek.

View to the south.

Photo 8.
Clear Creek.

PEM and PSS wetlands present along both banks. View to the north.

Photo 9.
Clear Creek.

I-70 bridge structure. Riprap present on both banks. View to the south.

Photo 10.
Clear Creek.

PEM wetland fringe on north bank. View to the east.

Photo 11.
Clear Creek.

Pedestrian bridge crossing south of I-70 and Veterans Memorial Tunnels. View to the southeast.

Photo 12.
Clear Creek.

View to the northwest. PEM fringe wetlands on both sides of creek. Pedestrian bridge in the background.

Photo 13.
Clear Creek.

SW-04, an inlet (i.e., tributary) located on the west bank of Clear Creek, view to the east. PEM fringe wetlands (WL-CC-29) on both sides of SW-04.

Photo 14.
Clear Creek.

PEM fringe wetland (WL-CC-29) on west bank of creek, view to the northwest.

Photo 15.
Clear Creek.

View to the southeast, south of Veterans Memorial Tunnels.

Photo 16.
Clear Creek.

PSS fringe wetland (WL-CC-36) on west bank of creek, view to the south. Concrete bridge structure in background.

Photo 17.
Clear Creek.

PEM wetland island (WL-CC-40) and PSS wetland island (WL-CC-39) in Clear Creek. View to the southwest.

Photo 18.
Clear Creek.

PSS wetland Island (WL-CC-39) in Clear Creek, view to the northwest. I-70 and Veterans Memorial Tunnels in the background.

Photo 19.
Clear Creek.

PEM fringe wetlands (WL-CC-41) and PSS wetland island (WL-CC-39) in Clear Creek, view to the southwest.

Photo 20.
Clear Creek.

View to the northwest. Clear Creek paralleling I-70 (I-70 on left side of photo). Clear Creek is frequently used for recreation.

Photo 21.
Clear Creek.

View to the south. Multiple bridge structures over Clear Creek. PSS fringe wetland (WL-CC-42) on west bank between structures.

Photo 22.
Clear Creek.

PSS wetland (WL-CC-47) associated with Clear Creek. View to the southwest.

Photo 23.
Clear Creek.

I-70 bridge structures over Clear Creek, view to the southeast. Large riprap on both sides of creek.

Photo 24.
Clear Creek.

PSS fringe wetlands (WL-CC-55 and WL-CC-54) on both banks. View to the southeast.

Photo 25.
Clear Creek.

PSS wetlands (WL-CC-60 and WL-CC-61) on both banks and a large PSS wetland island. View to the east.

Photo 26.
Clear Creek.

Bridge structures near I-70 and U.S Highway 6. View to the northeast.

Photo 27.
Clear Creek.

View to the northwest. PEM fringe wetland. Scattered hydrophytic shrubs noted outside of wetland boundary.

Photo 28.
Unnamed Drainage (SW-09).

Unnamed Drainage (SW-09) is a linear drainage that parallels I-70. View to the east.

PEM and PSS wetlands are associated with this drainage.

Photo 29. Unnamed Drainage (SW-09).

PEM wetland associated with the drainage, view to the north. I-70 is in the background.

Photo 30. Unnamed Drainage (SW-09).

PEM wetland associated with the drainage. Scattered trees and shrubs in wetland. View to the northeast.

Photo 31. Unnamed Drainage (SW-09).

PEM wetland in foreground and PSS wetland in background associated with the drainage. View to the west.

Photo 32. Unnamed Drainage (SW-09).

PEM wetland on both banks of the drainage. View to the east.

Photo 33. Unnamed Drainage (SW-09).

SP-33 in a PEM wetland (WL-13) associated with the drainage. Area is dominated by *Carex nebrascensis*. View to the east.

Photo 34. Unnamed Drainage (SW-09).

SP-34 soil profile. Area is in an upland dominated by *Cirsium arvense*.

Photo 35. Unnamed Drainage (SW-09).

The drainage flows from west to east, parallel to I-70.

Photo 36. Unnamed Drainage (SW-09).

PEM wetland (WL-14) present in the drainage on the south side of I-70.

Photo 37. Unnamed Drainage (SW-09).

PEM wetland (WL-15). Wetland dominated by *Carex nebrascensis*. View to the east.

Photo 38. Unnamed Drainage (SW-09).

SP-27 is located in WL-15. Area is dominated by *Carex nebrascensis*. View to the southwest.

Photo 39. Unnamed Drainage (SW-09).

SP-28 is located just outside of WL-15. Area is dominated by *Menthe spicata*. View is to the west.

Photo 40. Unnamed Drainage (SW-09).

PEM wetland, view to the north. I-70 in the background.

Photo 41.
Beaver Brook.

PSS wetlands (WL-BB-01, WL-BB-02, and WL-ND-05) present on both banks, view to the southwest. Beaver Brook (SW-10 and SW-ND-03) in photo. Beaver Brook crosses under I-70 to the north near the east end of the study area.

Photo 42.
Beaver Brook.

PEM fringe wetland (WL-BB-03) located on both banks of Beaver Brook. View to the southwest. Beaver Brook continues north of I-70 and flows to the east.

Photo 43.
Beaver Brook.

SP-03 is located in a PEM wetland (WL-BB-08) and is dominated by *Eleocharis palustris*. View to the northeast.

Photo 44.
Beaver Brook.

SP-04 is located in an upland and is dominated by *Dactylis glomerata*. View to the south.

Photo 45.
Beaver Brook.

PEM fringe wetlands are present on both banks. Scattered trees and shrubs noted along the brook. View to the east.

Photo 46.
Beaver Brook.

PEM fringe wetlands present on both banks in foreground and PSS wetland present in background. View to the east.

Photo 47.
Beaver Brook.

PEM fringe wetlands on both banks of the brook. View to the north. Small island wetlands also present.

Photo 48.
Beaver Brook.

PEM fringe wetlands on both banks. Private concrete drive over the brook. View to the east.

Photo 49.
Beaver Brook.

PEM fringe wetlands on both banks.

Photo 50.
Beaver Brook.

Small pool located on the brook towards the eastern end of study area. View to the east.

Photo 51.
Ponds.

Pond (SW-02) is south of Clear Creek and south of I-70, view to the east.

A PSS fringe wetland (WL-03) surrounds the pond's perimeter.

Photo 52.
Ponds.

Pond (SW-05) is east of Clear Creek and north of U.S. Highway 6, view to the north.

A PEM fringe wetland (WL-05) surrounds the pond's perimeter.

Photo 53. Isolated Wetlands (Roadside).

PEM wetland (WL-01) located on the south edge of East Idaho Springs Road (County Road 314). View to the east.

Photo 54. Isolated Wetlands (Roadside).

PEM wetland (WL-02) located on the south edge of I-70. View to the northeast.

Appendix C Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/13/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-1

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744092° Long: -105.490914° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: R5UBH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-1 located on stream bank (Clear Creek). Sandy redox and saturation noted in soils.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	25	Y	FACU
2. Populus angustifolia	10	Y	FACW
3.			
4.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix fragilis	20	Y	FAC
2. Betula occidentalis	10	Y	FACW
3.			
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Juncus balticus	30	Y	FACW
2. Dactylis glomerata	10	Y	FACU
3. Equisetum arvense	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 50

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Stream bank dominated by hydrophytic vegetation.

SOIL

Sampling Point: SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 4/2	80	7.5YR 3/4	20	C	M	Loamy sand	Distinct redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 9

Hydric Soil Present? Yes ✓ No ___

Remarks:

Distinct redox throughout soil profile. Sandy soils. Soil on top of rock, along river bank.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology source is Clear Creek, primary wetland hydrology indicator A3 and secondary wetland hydrology indicator D2 noted. FAC-Neutral test passes.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/13/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-2

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): None Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744119° Long: -105.490895° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-2 is approximately 2 feet uphill, north of SP-1. Vegetation passes as hydrophytic; secondary hydrology indicators noted; soils do not pass as hydric. SP-2 is on the edge of Clear Creek.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	30	Y	FACU
2. Populus angustifolia	10	Y	FACW
3.			
4.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix fragilis	20	Y	FAC
2. Betula occidentalis	10	Y	FACW
3.			
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Juncus balticus	25	Y	FACW
2. Dactylis glomerata	10	Y	FACU
3. Equisetum arvense	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	45	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 55

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes as hydrophytic. Dominance test >50%.

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/3	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 9

Hydric Soil Present? Yes ____ No ✓

Remarks:

No hydric soil indicators noted. Large restrictive rock layer at 9 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No primary wetland hydrology indicators noted. Secondary indicators noted include Fac-Neutral Test. SP-2 located within a flood zone along creek bank.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Jefferson Sampling Date: 6/15/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-3

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): None Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716632° Long: -105.390089° Datum: WGS84

Soil Map Unit Name: Kittredge-Earcree complex, 3 to 9 percent slopes NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-3 is located on a bench along stream (Beaver Brook). Area dominated by hydrophytic vegetation. Soils and hydrology pass as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	30	Y	FACW
2.			
3.			
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Rosa woodsii	5	Y	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Eleocharis palustris	80	Y	OBL
2. Agrostis stolonifera	10	N	FAC
3. Equisetum arvense	5	N	FAC
4. Lactuca serriola	5	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by hydrophytic vegetation.

SOIL

Sampling Point: SP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	2.5Y 3/2	90	10YR 3/6	10	C	M	Sandy loam	Prominent redox noted
7-16	Gley 1 2.5/N	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicators A4 and F6 noted. Did not excavate pit to 20 inches due to high water table.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ✓ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 5

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology is from Beaver Brook. Hydrology indicators noted include A2, A3 and C1. Secondary indicators D2 and D5 also noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Jefferson Sampling Date: 6/15/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-4

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): >3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716628° Long: -105.390070° Datum: WGS84

Soil Map Unit Name: Kittredge-Earcree complex, 3 to 9 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-4 is located upslope from SP-3 (wetland). Area dominated by upland vegetation. Vegetation, soils, and hydrology do not pass as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	25	Y	FACW
2.			
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Rosa woodsii	5	Y	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Dactylus glomerata	55	Y	FACU
2. Bromus inermis	25	Y	UPL
3. Lactuca serriola	10	N	FACU
4. Cirsium arvense	5	N	FAC
5. Thlaspi arvense	5	N	UPL
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	5	x 3 =	15
FACU species	70	x 4 =	280
UPL species	30	x 5 =	150
Column Totals:	130 (A)		495 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Area dominated by upland vegetation.

SOIL

Sampling Point: SP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/2	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Jefferson Sampling Date: 6/15/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-5

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace/Bench Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716838° Long: -105.389723° Datum: WGS84

Soil Map Unit Name: Kittredge-Earcree complex, 3 to 9 percent slopes NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area located on stream bank (Beaver Brook). Area dominated by shrub and emergent vegetation. Vegetation, soils, and hydrology pass as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	30	Y	FACW
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix monticola	50	Y	OBL
2. Betula occidentalis	10	N	FACW
3. Populus angustifolia	5	N	FACW
4.			
5.			
	65 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Equisetum arvense	65	Y	FAC
2. Agrostis stolonifera	30	Y	FAC
3. Equisetum variegatum	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

PSS wetland with emergent vegetation below.

SOIL

Sampling Point: SP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	90	7.5YR 3/4	10	C	M	Loamy sand	Distinct redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 8

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted. Dark loamy sand; unable to form ribbon.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 2

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicator A3 noted and secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Jefferson Sampling Date: 6/15/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-6

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716844° Long: -105.389736° Datum: WGS84

Soil Map Unit Name: Kittredge-Earcree complex, 3 to 9 percent slopes NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-6 located upslope of SP-5 (wetland). Area dominated by wetland shrub/tree habitat, but on the edge of the emergent habitat boundary (wetland vs. upland). Soils and hydrology do not pass as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	30	Y	FACW
2.			
3.			
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix monticola	50	Y	OBL
2. Betula occidentalis	10	N	FACW
3. Populus angustifolia	5	N	FACW
4.			
5.			
	65	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Equisetum arvense	50	Y	FAC
2. Bromus inermis	40	Y	UPL
3. Agrostis stolonifera	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by wetland shrubs/trees with under-story on the edge of emergent upland habitat.

SOIL

Sampling Point: SP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/2	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 16

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted. Rock layer at 16 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-7

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Fringe/Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744684° Long: -105.489611° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area dominated by Equisetum laevigatum. Soils and hydrology pass as hydric. Fringe wetland along north bank of stream (Clear Creek).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	5	Y	FACW
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Equisetum laevigatum	70	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Continuous fringe/bench along Clear Creek with Equisteum laevigatum dominant.

SOIL

Sampling Point: SP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 4/2	80	7.5YR 3/4	20	C	M	Loamy sand	Distinct redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted. Heavy redox.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 9

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A2 and A3 noted and secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-8

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): >3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744696° Long: -105.489637° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-8 located upslope from SP-7 (wetland). Steep bank with 25% cover Equisetum laevigatum. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	10	Y	FACW
2.			
3.			
4.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Populus angustifolia	2	Y	FACW
2.			
3.			
4.			
5.			
	2	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Equisetum laevigatum	25	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 75

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Steep bank with Equisetum laevigatum.

SOIL

Sampling Point: SP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/3	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-9

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Fringe Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.745651° Long: -105.487402° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Wetland fringe along creek (Clear Creek). Area dominated by Juncus balticus. Soils and hyrdology pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	15	Y	FACU
2. Populus angustifolia	10	Y	FACW
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Populus angustifolia	5	Y	FACW
2. Betula occidentalis	5	Y	FACW
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Juncus balticus	73	Y	FACW
2. Agrostis stolonifera	2	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by Juncus balticus.

SOIL

Sampling Point: SP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	90	7.5YR 3/4	10	C	M/PL	Sandy loam	Distinct redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bed rock

Depth (inches): 10

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator F3 noted. Redox noted throughout soil profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A2 and A3 noted and secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-10

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Bench Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.745673° Long: -105.487429° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-10 upslope from SP-9 (wetland). Vegetation passes as hydric; however, soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	15	Y	FACU
2. Populus angustifolia	10	Y	FACW
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Populus angustifolia	5	Y	FACW
2. Betula occidentalis	5	Y	FACW
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Bromus inermis	10	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 90

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area rocky with some scouring. Vegetation passes as hydrophytic.

SOIL

Sampling Point: SP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/3	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bed rock

Depth (inches): 12

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-11

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.745866° Long: -105.486832° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-11 is located in a wetland. Area dominated by Salix exigua and Puccinellia distans. Soils and hydrology pass as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	50	Y	FACW
2. Betula occidentalis	5	N	FACW
3.			
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Puccinellia distans	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Location is dominated with FACW vegetation.

SOIL

Sampling Point: SP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	95	10YR 3/6	5	C	PL	Loamy sand	Prominent redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bed rock

Depth (inches): 12

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 4

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicator A3 noted, secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-12

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): >3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.745869° Long: -105.486813° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-12 located upslope from SP-11 (wetland). Vegetation passes as hydric. Soils and hydrology do not pass for wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	30	Y	FACW
2.			
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Puccinellia distans	30	Y	FACW
2. Bromus tectorum	5	N	UPL
3. Centaurea stoebe	5	N	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes as hydric.

SOIL

Sampling Point: SP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-13

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 32, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Bench Local relief (concave, convex, none): Convex Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743247° Long: -105.475612° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-13 is located on a bench along a creek (Clear Creek). Vegetation, soils, and hydrology pass as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	10	Y	FACW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Poa palustris	90	Y	FAC
2. Elymus trachycaulus	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes Dominance Test.

SOIL

Sampling Point: SP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	95	10YR 3/6	5	C	PL	Loamy sand	Prominent redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bed rock

Depth (inches): 8

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicator A3 noted, secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/27/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-14

Investigator(s): Pinyon - KJM, KKM Section, Township, Range: Section 32, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): >3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743222° Long: -105.475633° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Cathedral-Resort complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-14 is located upslope from SP-13 (wetland). Vegetation, soils, and hydrology do not pass as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	5	Y	FACU
2.			
3.			
4.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	5	Y	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus tectorum	15	Y	UPL
2. Artemesia ludoviciana	15	Y	FACU
3. Bromus inermis	5	N	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 65

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	20	x 4 =	80
UPL species	20	x 5 =	100
Column Totals:	45 (A)		190 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Area dominated by upland species.

SOIL

Sampling Point: SP-14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/3	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 16

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/29/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-15

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743656° Long: -105.479863° Datum: WGS84

Soil Map Unit Name: Arents-Dumps, mine complex, 5 to 80 percent slopes NWI classification: R5UBH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-15 is located in a PSS wetland on a shelf just above the creek (Clear Creek). Vegetation, soils, and hydrology indicators pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	60	Y	FACW
2.			
3.			
4.			
5.			
	60 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Poa palustris	50	Y	FAC
2. Juncus balticus	50	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by hydrophytic vegetation.

SOIL

Sampling Point: SP-15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	95	7.5YR 3/4	5	C	M	Loamy sand	Prominent redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bedrock

Depth (inches): 8

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted. Prominent redox noted throughout top 8 inches of soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicator A3 noted, secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/29/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-16

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743646° Long: -105.479871° Datum: WGS84

Soil Map Unit Name: Arents-Dumps, mine complex, 5 to 80 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-16 located on man-made shelf/terrace above SP-15 (wetland). Vegetation passes as hydrophytic. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	20	Y	FACW
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Puccinellia distans	60	Y	FACW
2. Lactuca serriola	5	N	FACU
3. Verbascum thapsus	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes the Rapid Test for Hydrophytic Vegetation and Dominance Test.

SOIL

Sampling Point: SP-16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 6

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted. Edge of man-made driveway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/29/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-17

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Fringe Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.742564° Long: -105.496654° Datum: WGS84

Soil Map Unit Name: Lone Rock-Breece gravelly sandy loams, 2 to 9 percent slopes NWI classification: R5UBH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-17 located along creek fringe (Clear Creek). Area dominated by shrub vegetation; PSS wetland. Vegetation, soils, and hydrology pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	5	Y	FACW
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix monticola	60	Y	OBL
2. Populus angustifolia	10	N	FACW
3.			
4.			
5.			
	70	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Equisetum arvense	30	Y	FAC
2. Bromus inermis	5	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 65

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Fringe area dominated by Salix monticola. Moss growing on ground, considered in bare ground percentage.

SOIL

Sampling Point: SP-17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	95	10YR 3/6	5	C	M	Loamy sand	Prominent redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Bedrock

Depth (inches): 8

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicator A3 and secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 6/29/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-18

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.742548° Long: -105.496659° Datum: WGS84

Soil Map Unit Name: Lone Rock-Breece gravelly sandy loams, 2 to 9 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-18 is located upslope from SP-17 (wetland). Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	5	Y	FACW
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix monticola	40	Y	OBL
2. Populus angustifolia	10	Y	FACW
3.			
4.			
5.			
	50	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Bromus inermis	90	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Herb stratum dominated by upland plants; however, vegetation passes due to the Dominance Test.

SOIL

Sampling Point: SP-18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/4	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock/Boulders

Depth (inches): 12

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/2/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-19

Investigator(s): Pinyon - KJM, MRF Section, Township, Range: Section 32, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.748101° Long: -105.46356° Datum: WGS84

Soil Map Unit Name: Cathedral-Rock outcrop complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Depression near creek (Clear Creek) and pond. Area contiguous vegetation as noted along creek/pond. Area passes as PSS wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	30	Y	FACW
2. Salix monticola	15	Y	OBL
3.			
4.			
5.			
	45 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Typha angustifolia	30	Y	OBL
2. Eleocharis palustris	30	Y	OBL
3. Schoenoplectus tabernaemontani	5	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	65 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 35

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by FACW and OBL vegetation.

SOIL

Sampling Point: SP-19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 4/2	90	5YR 3/4	10	C	PL	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicators F3 and F8 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 4

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A3 and C3 noted, secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/2/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-20

Investigator(s): Pinyon - KJM, MRF Section, Township, Range: Section 33, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.748101° Long: -105.463558° Datum: WGS84

Soil Map Unit Name: Cathedral-Rock outcrop complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-20 upslope of SP-19 (wetland). Vegetation passes as hydric. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pinus ponderosa	5	Y	FACU
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	20	Y	FACW
2. Salix monticola	10	Y	OBL
3.			
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Eleocharis palustris	30	Y	OBL
2. Equisetum arvense	30	Y	FAC
3. Melilotus officionalis	10	N	FACU
4. Puccinellia distans	10	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	80	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes the Dominance Test.

SOIL

Sampling Point: SP-20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	99	10YR 3/6	1	C	M	Loamy sand	Distinct redox noted
4-18	10YR 4/3	100					Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted. Slight redox noted in the upper 4 inches, but only 1%.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-21

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.720219° Long: -105.409116° Datum: WGS84

Soil Map Unit Name: Lininger-Trag gravelly sandy loams, 15 to 30 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area dominated by wetland plant species (PSS wetland). Soils and hydrology pass as wetland. Area is a depressional slope with a pond downslope.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	20	Y	FACW
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Carex nebrascensis	80	Y	OBL
2. Rumex densiflorus	10	N	FACW
3. Agrostis stolonifera	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Although shrub stratum only notes 20% shrub cover, wetland area is dominated by Salix exigua with Carex nebrascensis and Agrostis stolonifera understory. Area considered PSS wetland.

SOIL

Sampling Point: SP-21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/1	90	7.5YR 3/4	10	C	M	Sandy clay	Prominent redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator F6 noted. Redox becomes more prominent as you move downslope.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 2

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A2 and A3 noted and secondary wetland hydrology indicators D2 and D5 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-22

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.720271° Long: -105.409214° Datum: WGS84

Soil Map Unit Name: Lininger-Trag gravelly sandy loams, 15 to 30 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-22 located upslope from SP-21 (wetland). Area located outside edge of wetland boundary at toe of slope of man-made terrace/hill. Area does not pass as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 35)			
1. Poa palustris	35	Y	FAC
2. Bromus inermis	35	Y	UPL
3. Cirsium arvense	15	N	FAC
4. Carex utriculata	15	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	35	x 5 =	175
Column Totals:	100 (A)		340 (B)

Prevalence Index = B/A = 3.4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Vegetation does not pass as hydrophytic.

SOIL

Sampling Point: SP-22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/1	100					Sandy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-23

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Fringe/Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.719802° Long: -105.407927° Datum: WGS84

Soil Map Unit Name: Lininger-Trag gravelly sandy loams, 15 to 30 percent slopes NWI classification: PUBG

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

SP-23 located on the edge of a pond (SW-02). PSS wetland runs down to pond then transitions to PEM wetland around pond, with some scattered shrubs. SP-23 located on the edge of PEM and PSS wetland transition. Depression is a man-made pond.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	20	Y	FACW
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 35)			
1. Juncus balticus	85	Y	FACW
2. Cirsium arvense	15	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Fringe wetland around pond dominated by Juncus balticus. Typha sp. and Phalaris sp. also noted around fringe, but outside of SP-23 sampling radius.

SOIL

Sampling Point: SP-23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/1	95	10YR 3/6	5	C	M	Sandy clay	Prominent redox noted; some in pore linings

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicators F6 and F8 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A3 and C3 noted and secondary wetland hydrology indicators B10, D2, and D5 noted. Ponding due to depression.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-24

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.719777° Long: -105.407898° Datum: WGS84

Soil Map Unit Name: Lininger-Trag gravelly sandy loams, 15 to 30 percent slopes NWI classification: PUBG

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-24 located upslope from SP-23 (wetland). Obvious vegetation line depicting wetland, below SP-24. Vegetation passes as hydrophytic. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	10	Y	FACW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus inermis	50	Y	UPL
2. Juncus balticus	35	Y	FACW
3. Cisium arvense	15	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes the Dominance test.

SOIL

Sampling Point: SP-24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100					Sandy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: 16 inches

Depth (inches): Compacted Layer

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

One secondary hydrology indicator noted, D5.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-25

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 2, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): <2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.722087° Long: -105.410701° Datum: WGS84

Soil Map Unit Name: Trag gravelly sandy loam, 3 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-25 located in a vegetated roadside ditch. Dominated by PEM vegetation. Soils and hydrology pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus balticus	80	Y	FACW
2. Poa palustris	15	N	FAC
3. Hordeum jubatum	5	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes Rapid Test for Hydrophytic Vegetation and Dominance test. Typha sp. also located in ditch but outside of 5 foot radius.

SOIL

Sampling Point: SP-25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	95	10YR 3/6	5	C	PL	Sandy clay	Distinct redox noted

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock/gravel

Depth (inches): 6

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator F3 noted. Soils hard and compact. Restrictive rock/gravel layer at 6 inches. Distinct redox noted throughout.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 1

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary wetland hydrology indicators A1, A3, and C3 noted and secondary primary indicators B10, D2, and D5 noted. Recent rain event; surface water likely from run-off and not high water table. Culvert noted upslope of SP-25.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/12/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-26

Investigator(s): Pinyon - CAT, KJM Section, Township, Range: Section 2, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): >3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.722094° Long: -105.410700° Datum: WGS84

Soil Map Unit Name: Trag gravelly sandy loam, 3 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-26 located on hillslope above SP-25 (wetland). Vegetation, soils, and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus inermis	40	Y	UPL
2. Verbascum thapsus	10	N	FACU
3. Cirsium arvense	10	N	FAC
4. Juncus balticus	10	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	10	x 3 =	30
FACU species	10	x 4 =	40
UPL species	40	x 5 =	200
Column Totals:	70 (A)		290 (B)

Prevalence Index = B/A = 4.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Area dominated by upland plants. Dominance Test and Prevalence Index do not pass.

SOIL

Sampling Point: SP-26

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	100					Sandy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock/gravel

Depth (inches): 8

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted. Unable to dig past 8 inches because of hard, compacted soils. Restrictive rock/gravel layer at 8 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/23/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-27

Investigator(s): Pinyon - KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): < 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716573° Long: -105.399025° Datum: WGS84

Soil Map Unit Name: Cumulic Cryaquolls, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area very saturated with small drainage-like features throughout. Hydrology likely from spring and run-off; pond upslope as well. High water table noted. Area passes as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Carex nebrascensis	90	Y	OBL
2. Juncus balticus	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Other hydrophytic vegetation noted in wetland include: Typha, Salix, Mentha, and other species of Carex.

SOIL

Sampling Point: SP-27

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 2/1	100					Peat	Fibric
9-18	10YR 2/1	100					SiCL	Hemic/Mucky Peat
18-32	Gley 1 2.5/N	100					SaCL	Sapric/Muck - minimal sand-like grains noted; not present after/during ru

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ✓ Histic Epipedon (A2)
- ✓ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Fibric layer (0-9"): Carex and pine cone noted decomposing; sample fully intact after squeezing (fibrous); more clear water extracts when squeezed.
Hemic layer (9-18"): greasy soil texture; some of sample squeezes out when squeezed (peat in soil stayed intact); turbid water extracts when squeezed.
Sapric layer (below 18"): Sand noted in muck layer; however, sand not present after rubbing 10x.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 2

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): <1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Area very saturated. Surface water present in area but not noted in immediate vicinity of sampling point. Hydrogen sulfide odor noted below 16". Approximately 8" of soil/surface shakes/bounces when stomped/hit.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/23/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-28

Investigator(s): Pinyon - KJM Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): < 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.716616° Long: -105.398995° Datum: WGS84

Soil Map Unit Name: Cumulic Cryaquolls, 0 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-28 is just outside the edge of wetland (SP-27). Vegetation passes as hydrophytic. No hydric soil or hydrology indicators noted.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus balticus	50	Y	FACW
2. Mentha spicata	50	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by FACW plants.

SOIL

Sampling Point: SP-28

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/1	100					SaCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/25/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-29

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): toe of slope; drainage Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.721127° Long: -105.412663° Datum: WGS84

Soil Map Unit Name: Trag gravelly sandy loam, 3 to 15 percent slopes NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-29 located at the toe of slope of an unnamed drainage. Drainage dominated by FAC plants. Soils and hydrology pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Agrostis stolonifera	60	Y	FAC
2. Trifolium repens	20	Y	FAC
3. Cirsium arvense	10	N	FAC
4. Phleum pratense	10	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Hydrophytic vegetation present.

SOIL

Sampling Point: SP-29

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	80	5YR 3/4	20	C	M	Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock layer

Depth (inches): 8

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted. Heavy redox noted throughout soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary hydrology indicator A3 noted and secondary hydrology indicators B10 and D2 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/25/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-30

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 11, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Terrace above drainage Local relief (concave, convex, none): None Slope (%): <1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.721132° Long: -105.412602° Datum: WGS84

Soil Map Unit Name: Trag gravelly sandy loam, 3 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-30 located at the top (3-5 ft higher in elevation from SP-29) of an incised drainage. Hydrophytic vegetation noted but soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus inermis	30	Y	UPL
2. Elymus repens	20	Y	FAC
3. Agrostis stolonifera	20	Y	FAC
4. Cirsium arvense	20	Y	FAC
5. Achillea millefolium	10	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area passes for Dominance Test. Just outside of the 5 ft radius Smooth Brome is dominant.

SOIL

Sampling Point: SP-30

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100					Loamy sand	
9-20	10YR 2/1	95	7.5YR 4/6	5	C	M	Sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

Soils do not pass for Sandy Redox because redox starts below 6 inches (must be within top 6 inches for Sandy Redox). Does not pass for Redox Dark Surface because only 3 inches of redox occurs within the top 12 inches (must have 4 inches of redox within the top 12 inches for Redox Dark Surface).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/26/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-31

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Bench/terrace Local relief (concave, convex, none): Convex Slope (%): <2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.742666° Long: -105.481377° Datum: WGS84

Soil Map Unit Name: Arents-Dumps, mine complex, 5 to 80 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

PSS Wetland. SP-31 is located on the fringe of a man-made pond (SW-02). Area dominated by wetland vegetation. Soils and hydrology pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Populus angustifolia	20	Y	FACW
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus balticus	80	Y	FACW
2. Agrostis stolonifera	10	N	FAC
3. Typha latifolia	10	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Although only 20% shrub cover was noted in SP-31, the wetland boundary around the pond is considered a PSS wetland as the wetland fringe has greater than 30% shrub cover throughout.

SOIL

Sampling Point: SP-31

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 4/1	90	10YR 3/6	10	C	M	Loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 9

Hydric Soil Present? Yes ✓ No ___

Remarks:

Hydric soil indicator S5 noted. Restrictive rock layer at 9 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary hydrology indicator A3 noted, secondary hydrology indicators D2 and D5 noted. Saturation present throughout soil profile below one inch.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/26/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-32

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Bench/terrace Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.742650° Long: -105.481357° Datum: WGS84

Soil Map Unit Name: Arents-Dumps, mine complex, 5 to 80 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-32 higher in elevation (1-2 ft) than SP-31 (wetland). Vegetation passes as hydric. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	10	Y	FACW
2. Pinus ponderosa	5	N	FACU
3.			
4.			
	15	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Populus angustifolia	50	Y	FACW
2.			
3.			
4.			
5.			
	50	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Amorpha fruticosa	60	Y	FACW
2. Juncus balticus	20	Y	FACW
3. Bromus inermis	10	N	UPL
4. Melilotus officinalis	10	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation passes for Dominance Test.

SOIL

Sampling Point: SP-32

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/2	100					Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No hydric soil indicators noted. Soil hard and compacted, could not excavate deeper then 14 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/26/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-33

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope/Wet Meadow Local relief (concave, convex, none): Concave Slope (%): < 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.718976° Long: -105.404562° Datum: WGS84

Soil Map Unit Name: Cumulic Cryaquolls, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area highly saturated with organic soils; earth bounces when stomped/hit. Groundwater and surface water (small channel-like features) noted throughout the area. Soils consist of Peat in upper 12". Mucky peat from 12" - 20". Gravel with mixed peat below 20".

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Carex nebrascensis	100	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Wetland contains other hydrophytic vegetation including other species of Carex, Typha, and Mentha. Scattered patches of Salix were also noted throughout the wetland area.

SOIL

Sampling Point: SP-33

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Peat	Fibrous
12-20	10YR 2/1	100					SiCL	Fibrous mix
20+	10YR 2/1	100					SaCL	Little fibrous

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ✓ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Peat layer: 0"-12", clear water when squeezed. Mucky peat: 12"-20", turbid water when squeezed and some sample squeezed out (not half, ~1/4)
20" and below: gravel dominant layer with a little peat intermixed below 20"
Slight hydrogen sulfide odor noted at mucky peat layer below 12" line, hint of carbon-like smell.
Soils samples sent to CSU lab for further investigation. Soil considered Histic Epipedon.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 1

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrogen sulfide odor just below 12" line. Surface water noted in areas throughout wetland (small channel-like features) but not in immediate vicinity of SP-33. Soils saturated to the surface. Wetland likely fed by ground water (natural spring), as well as run-off. Further, an unnamed drainage feature flows within the wetland area (SW-09). SW-09 eventually connects to Beaver Brook, downstream.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Clear Creek Sampling Date: 7/26/2018

Applicant/Owner: CDOT State: CO Sampling Point: SP-34

Investigator(s): Pinyon - KJM, BCA Section, Township, Range: Section 12, Township 4 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope/Meadow Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.719178° Long: -105.405064° Datum: WGS84

Soil Map Unit Name: Cumulic Cryaquolls, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-34 located on an elevated hill slope, upslope of SP-33 (wetland). Vegetation passes as hydrophytic. Soils and hydrology do not pass for wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix amygdaloides	5	Y	FACW
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Cirsium arvense	70	Y	FAC
2. Juncus balticus	20	Y	FACW
3. Carex nebracensis	5	N	OBL
4. Mentha spicata	5	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 15)			
1. N/A			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by hydrophytic vegetation.

SOIL

Sampling Point: SP-34

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/1	100					Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators noted. Soil not peat like noted in SP-33.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-35

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 3, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.738132 Long: -105.432457 Datum: WGS 84

Soil Map Unit Name: Cathedral-Rock outcrop complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

SP-35 within drainage on edge of vertical wall at toe of slope. Typha, salix exigua, and phalaris along drainage. Hydrogen sulfide odor noted.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix exigua	40	Y	FACW
2.			
3.			
4.			
5.			
	40 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha latifolia	95	Y	OBL
2. Phalaris arundinacea	5	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

PEM wetland, dominated by wetland vegetation. Although 40% shrub cover noted above, shrubs were noted just on edge of wetland boundary and do not represent the entire wetland feature.

SOIL

Sampling Point: SP-35

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 3/2	95	10 YR 3/6	5	C	M/PL	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 16

Hydric Soil Present? Yes ✓ No ___

Remarks:

F6 and A4 noted. Redox noted in matrix and pore linings.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ✓ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A3 and C1 noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-36

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 3, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.738133 Long: -105.432419 Datum: WGS84

Soil Map Unit Name: Cathedral-Rock outcrop complex, 30 to 70 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-36 upslope from SP-35 (wetland). Hydrophytic vegetation but no hydric soils or hydrology.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	10	Y	FACW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Phalaris arundinacea	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Hydrophytic vegetation present.

SOIL

Sampling Point: SP-36

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10 YR 3/1	100					SaL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-37

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743597° Long: -105.489776° Datum: WGS84

Soil Map Unit Name: Lone Rock-Breece gravelly sandy loams, 2 to 9 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ✓ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

PEM SP-37 in roadside ditch (depression). Area dominated by hydrophytic vegetation. Soils and hydrology pass as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	10	Y	FACW
2.			
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Eleocharis acicularis	90	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Carex spp. also noted in area, but outside of 5 ft. plot. Are dominated by wetland vegetation.

SOIL

Sampling Point: SP-37

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 3/1	90	7.5 YR 3/4	10	C	M/PL	SaCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 12

Hydric Soil Present? Yes ✓ No ___

Remarks:

Redox noted in matrix and pore linings throughout soil profile. Rock layer at 12 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A3, B8, and C3 noted in pit.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-38

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.743612 Long: -105.48978 Datum: WGS84

Soil Map Unit Name: Lone Rock-Breece gravelly sandy loams, 2 to 9 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-38 on a concave sloped hill above SP-37 (wetland). Area does not pass as a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix exigua	5	Y	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus inermis	95	Y	UPL
2. Melilotus officinalis	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	_____	x 1 =	_____
FACW species	5	x 2 =	10
FAC species	_____	x 3 =	_____
FACU species	5	x 4 =	20
UPL species	95	x 5 =	475
Column Totals:	105 (A)		505 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Area dominated by upland vegetation. Carex noted at wetland/upland line.

SOIL

Sampling Point: SP-38

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 3/1	100					SaCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

No indicators noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators noted.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-39

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744403° Long: -105.488480° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Tolland complex, 30 to 100 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Roadside ditch dominated by hydric vegetation. Soils and hydrology noted as hydric.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus balticus	90	Y	FACW
2. Phleum pratense	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Area dominated by wetland vegetation.

SOIL

Sampling Point: SP-39

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10 YR 3/1	90	10 YR 3/6	10	C	M	SaCL	
8-16	10 YR 3/2	90	10 YR 3/6	10	C	M	LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 16

Hydric Soil Present? Yes ✓ No ___

Remarks:

F6 noted.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 5

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology indicators noted are A3.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: I-70 Floyd Hill to VMT City/County: Idaho Springs/Clear Creek Sampling Date: 7/27/18

Applicant/Owner: CDOT State: CO Sampling Point: SP-40

Investigator(s): Pinyon - KJM, CAT Section, Township, Range: Section 31, Township 3 South, Range 72 West

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): LRR E - Rocky Mountain Forests and Rangeland Lat: 39.744410° Long: -105.488436° Datum: WGS84

Soil Map Unit Name: Rock outcrop-Tolland complex, 30 to 100 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

SP-40 located just upslope of SP-39 (wetland). Area does not pass as wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. Bromus inermis	85	Y	UPL
2. Phleum pratense	5	N	FAC
3. Juncus balticus	5	N	FACW
4. Agrostis stolonifera	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 15)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species 5	x 2 = 10
FAC species 10	x 3 = 30
FACU species _____	x 4 = _____
UPL species 85	x 5 = 425
Column Totals: 100 (A)	465 (B)

Prevalence Index = B/A = 4.65

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Upland vegetation is dominant.

SOIL

Sampling Point: SP-40

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10 YR 2/1	100					SaCL	
4-14	10 YR 3/2	100					LSa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Rock

Depth (inches): 14

Hydric Soil Present? Yes _____ No ✓

Remarks:

No indicators noted. Rock layer present at 14 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators noted.

Appendix D Summary of Surface Waters and Wetlands in the Study Area

I-70 Floyd Hill Aquatic Resources Master Table

Feature ID	Type	Acres	Assumed USACE Jurisdictional
Beaver Brook and its Tributaries			
SW-09	Riverine	1.22	JD
SW-10 (Beaver Brook)	Riverine	0.47	JD
SW-11	Riverine	0.00	JD
SW-ND-02	Riverine	0.03	JD
SW-ND-03 (Beaver Brook)	Riverine	0.15	JD
WL-BB-01	PSS	0.01	JD
WL-BB-02	PSS	0.01	JD
WL-BB-03	PEM	0.03	JD
WL-BB-04	PEM	0.00	JD
WL-BB-05	PEM	0.00	JD
WL-BB-06	PEM	0.00	JD
WL-BB-07	PEM	0.00	JD
WL-BB-08	PEM	0.00	JD
WL-BB-09	PSS	0.00	JD
WL-BB-10	PSS	0.00	JD
WL-BB-11	PSS	0.00	JD
WL-BB-12	PSS	0.00	JD
WL-BB-13	PEM	0.00	JD
WL-BB-14	PEM	0.00	JD
WL-BB-15	PEM	0.01	JD
WL-BB-16	PEM	0.00	JD
WL-BB-17	PEM	0.04	JD
WL-BB-18	PEM	0.02	JD
WL-BB-19	PEM	0.00	JD
WL-BB-20	PEM	0.00	JD
WL-BB-21	PEM	0.00	JD
WL-BB-22	PEM	0.00	JD
WL-BB-23	PEM	0.00	JD
WL-BB-24	PEM	0.37	JD
WL-BB-25	PEM	0.01	JD
WL-BB-26	PEM	0.00	JD
WL-BB-27	PEM	0.01	JD
WL-BB-28	PEM	0.00	JD
WL-BB-29	PEM	0.05	JD
WL-BB-30	PEM	0.04	JD
WL-BB-31	PEM	0.00	JD
WL-BB-32	PEM	0.01	JD
WL-BB-33	PEM	0.01	JD
WL-BB-34	PEM	0.01	JD
WL-BB-35	PEM	0.00	JD
WL-BB-36	PEM	0.00	JD

I-70 Floyd Hill Aquatic Resources Master Table

WL-BB-37	PSS	0.00	JD
WL-BB-38	PEM	0.00	JD
WL-BB-39	PEM	0.00	JD
WL-05	PEM	0.02	JD
WL-07	PEM	0.03	JD
WL-08	PSS	0.45	JD
WL-09	PSS	0.18	JD
WL-10	PSS	0.09	JD
WL-10	PSS	0.18	JD
WL-10	PEM	0.10	JD
WL-11	PSS	0.06	JD
WL-12	PEM	0.34	JD
WL-13	PEM	6.65	JD
WL-14	PEM	0.30	JD
WL-15	PEM	0.89	JD
WL-16	PEM	0.01	JD
WL-17	PSS	0.07	JD
WL-ND-05	PSS	0.11	JD
Totals	Riverine	1.87	JD
	PEM	8.98	JD
	PSS	1.17	JD
Clear Creek and its Tributaries			
SW-01 (Clear Creek)	Riverine	25.05	JD
SW-02	Pond	0.39	JD
SW-03	Riverine	0.00	JD
SW-04	Riverine	0.00	JD
SW-05	Pond	0.25	JD
SW-06 (Sawmill Gulch)	Riverine	0.07	JD
SW-07	Riverine	0.06	JD
SW-08 (Johnson Gulch)	Riverine	0.05	JD
SW-ND-01 (Johnson Gulch)	Riverine	0.02	JD
WL-CC-01	PSS	0.04	JD
WL-CC-02	PSS	0.00	JD
WL-CC-03	PSS	0.00	JD
WL-CC-04	PEM	0.00	JD
WL-CC-05	PEM	0.00	JD
WL-CC-06	PSS	0.01	JD
WL-CC-07	PSS	0.02	JD
WL-CC-08	PEM	0.00	JD
WL-CC-09	PEM	0.01	JD
WL-CC-10	PEM	0.00	JD
WL-CC-11	PEM	0.00	JD
WL-CC-12	PEM	0.02	JD
WL-CC-13	PEM	0.00	JD
WL-CC-14	PEM	0.00	JD
WL-CC-15	PSS	0.01	JD

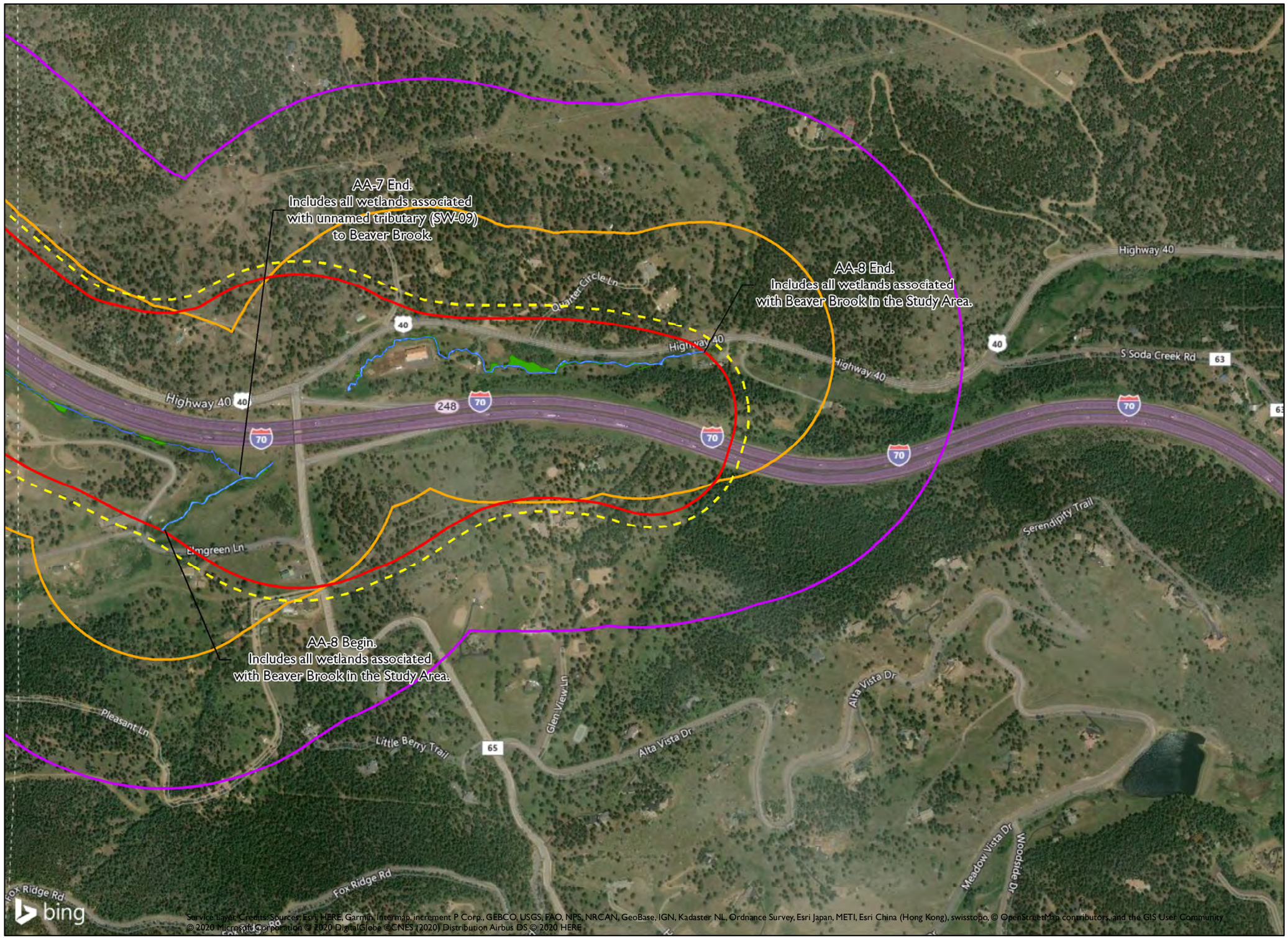
I-70 Floyd Hill Aquatic Resources Master Table

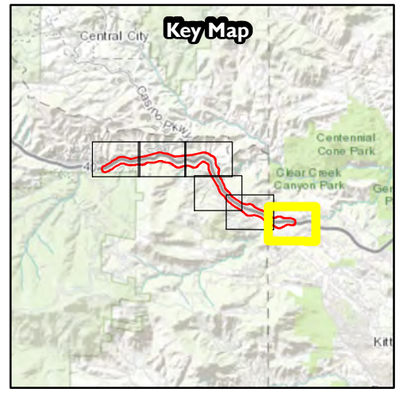
WL-CC-16	PEM	0.00	JD
WL-CC-17	PEM	0.02	JD
WL-CC-18	PEM	0.01	JD
WL-CC-19	PEM	0.00	JD
WL-CC-20	PEM	0.00	JD
WL-CC-21	PEM	0.00	JD
WL-CC-22	PEM	0.00	JD
WL-CC-23	PEM	0.00	JD
WL-CC-24	PEM	0.01	JD
WL-CC-25	PEM	0.00	JD
WL-CC-26	PEM	0.00	JD
WL-CC-27	PSS	0.01	JD
WL-CC-28	PEM	0.04	JD
WL-CC-29	PEM	0.09	JD
WL-CC-30	PEM	0.01	JD
WL-CC-30	PSS	0.06	JD
WL-CC-31	PSS	0.00	JD
WL-CC-32	PSS	0.01	JD
WL-CC-33	PSS	0.01	JD
WL-CC-34	PEM	0.00	JD
WL-CC-35	PSS	0.00	JD
WL-CC-36	PSS	0.01	JD
WL-CC-37	PSS	0.00	JD
WL-CC-38	PSS	0.00	JD
WL-CC-39	PSS	0.02	JD
WL-CC-40	PSS	0.01	JD
WL-CC-40	PEM	0.00	JD
WL-CC-41	PEM	0.01	JD
WL-CC-42	PSS	0.02	JD
WL-CC-43	PSS	0.01	JD
WL-CC-44	PSS	0.01	JD
WL-CC-45	PSS	0.00	JD
WL-CC-46	PSS	0.01	JD
WL-CC-47	PSS	0.11	JD
WL-CC-48	PSS	0.03	JD
WL-CC-49	PSS	0.05	JD
WL-CC-50	PSS	0.22	JD
WL-CC-51	PSS	0.03	JD
WL-CC-51	PEM	0.00	JD
WL-CC-52	PSS	0.01	JD
WL-CC-53	PSS	0.03	JD
WL-CC-53	PEM	0.00	JD
WL-CC-54	PSS	0.21	JD
WL-CC-55	PSS	0.07	JD
WL-CC-56	PEM	0.00	JD
WL-CC-57	PEM	0.00	JD
WL-CC-58	PEM	0.00	JD

I-70 Floyd Hill Aquatic Resources Master Table

WL-CC-59	PEM	0.00	JD
WL-CC-60	PSS	0.25	JD
WL-CC-61	PSS	0.10	JD
WL-CC-62	PSS	0.01	JD
WL-CC-63	PEM	0.00	JD
WL-CC-63	PSS	0.04	JD
WL-CC-64	PSS	0.19	JD
WL-CC-65	PSS	0.02	JD
WL-CC-66	PSS	0.19	JD
WL-CC-67	PSS	0.13	JD
WL-CC-68	PSS	0.22	JD
WL-CC-69	PEM	0.00	JD
WL-CC-70	PEM	0.02	JD
WL-CC-71	PSS	0.01	JD
WL-CC-72	PEM	0.00	JD
WL-CC-73	PEM	0.00	JD
WL-CC-74	PEM	0.00	JD
WL-CC-75	PEM	0.00	JD
WL-CC-76	PEM	0.01	JD
WL-CC-77	PEM	0.00	JD
WL-CC-78	PEM	0.01	JD
WL-CC-79	PSS	0.01	JD
WL-CC-80	PSS	0.01	JD
WL-CC-80	PEM	0.03	JD
WL-CC-81	PSS	0.06	JD
WL-CC-82	PSS	0.41	JD
WL-JG-01	PEM	0.01	JD
WL-03	PSS	0.10	JD
WL-ND-02	PEM	0.01	JD
WL-ND-03	PEM	0.00	JD
WL-ND-04	PEM	0.36	JD
Totals	Riverine	25.25	JD
	Pond	0.64	JD
	PEM	0.70	JD
	PSS	2.77	JD
Isolated Wetlands			
WL-01	PEM	0.07	JD
WL-02	PEM	0.06	JD
WL-06	PEM	0.01	JD
WL-ND-01	PEM	0.38	JD
Totals	PEM	0.52	JD

Appendix E FACWet Analysis Mapbook





Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

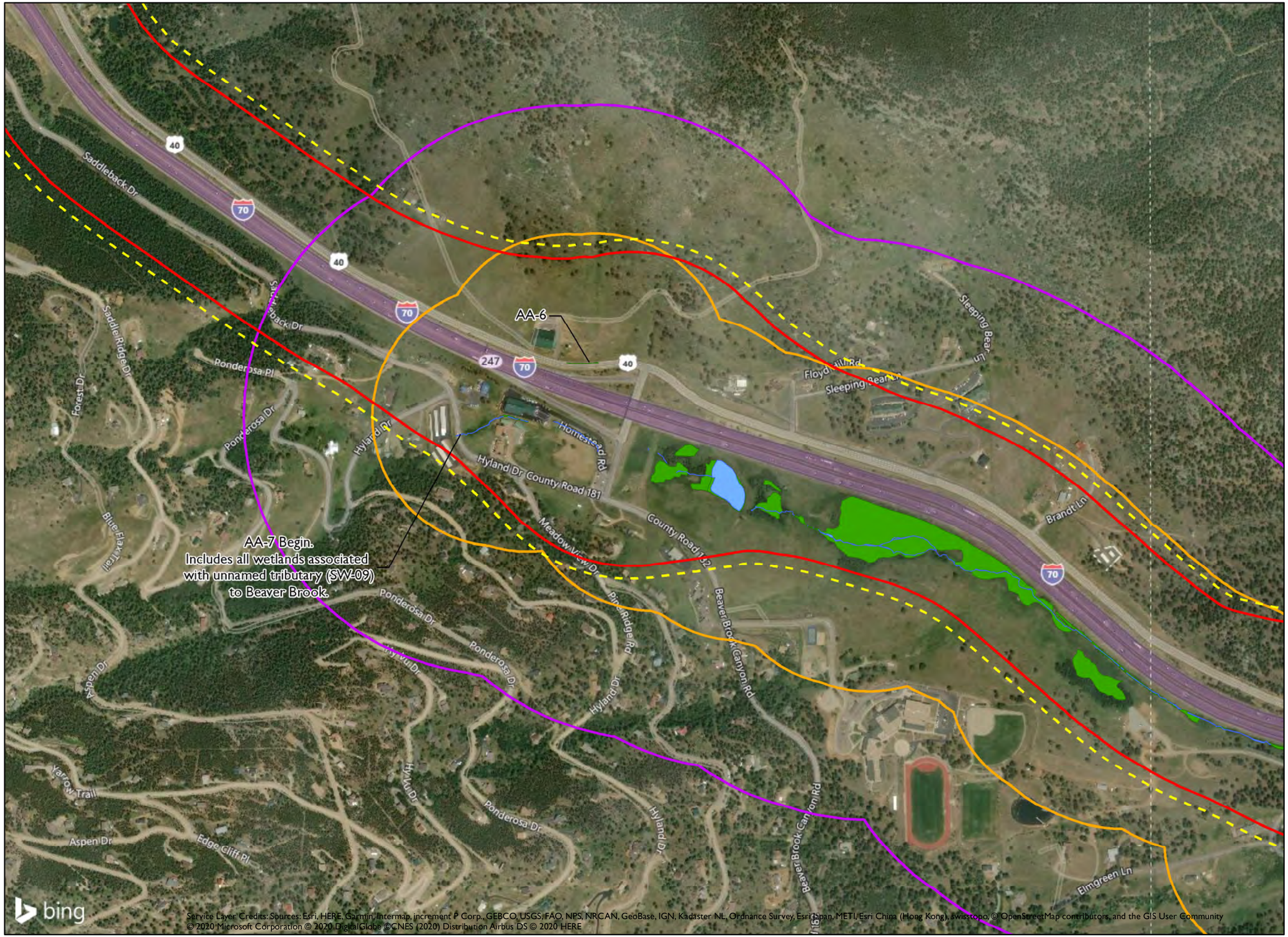
I-70 Floyd Hill to Veterans Memorial Tunnels

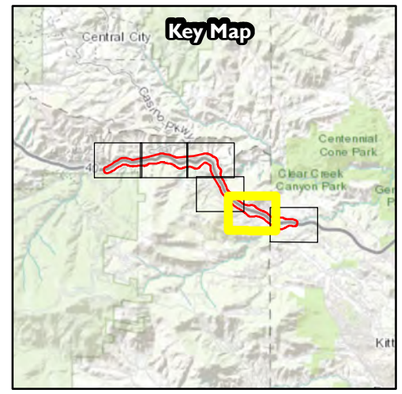
FACWet ANALYSIS

I-70 Floyd Hill to
Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 1 of 6
Pinyon Project Number: 1/17-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\1779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd





Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

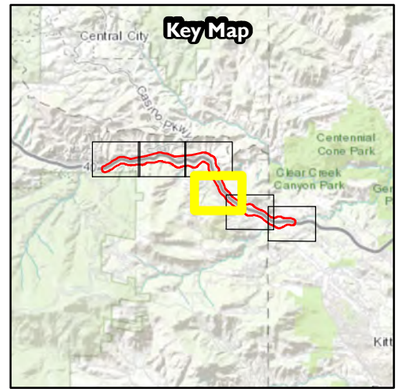
I-70 Floyd Hill to Veterans Memorial Tunnels

FACWet ANALYSIS

I-70 Floyd Hill to
Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 2 of 6
Pinyon Project Number: 1/17-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\1779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd



Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

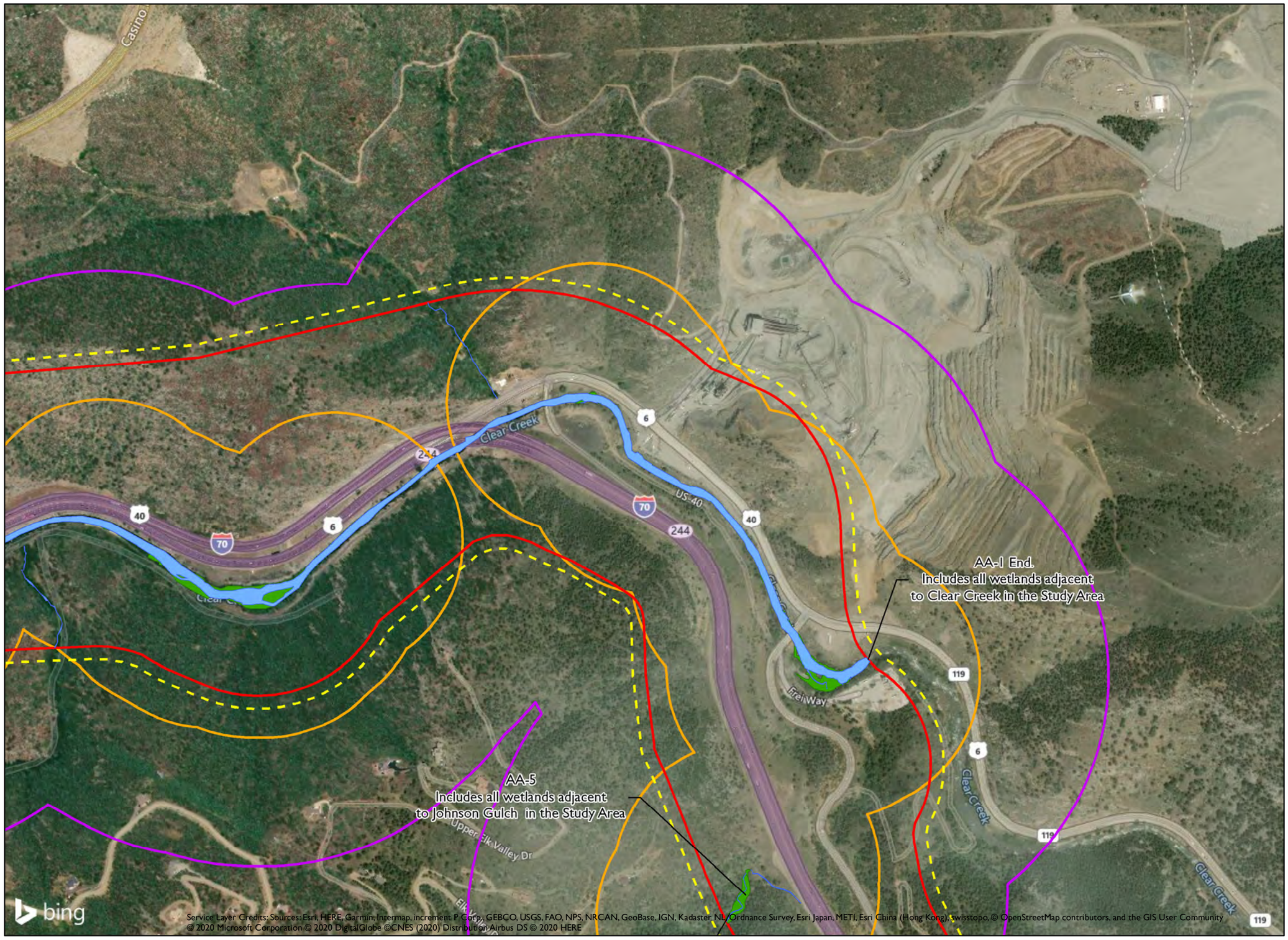
I-70 Floyd Hill to Veterans Memorial Tunnels

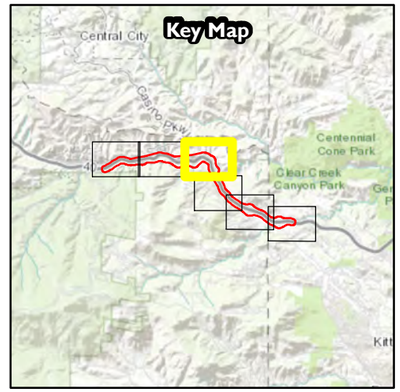
FACWet ANALYSIS

I-70 Floyd Hill to
Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 3 of 6
Pinyon Project Number: 1/17-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\1779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd





Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

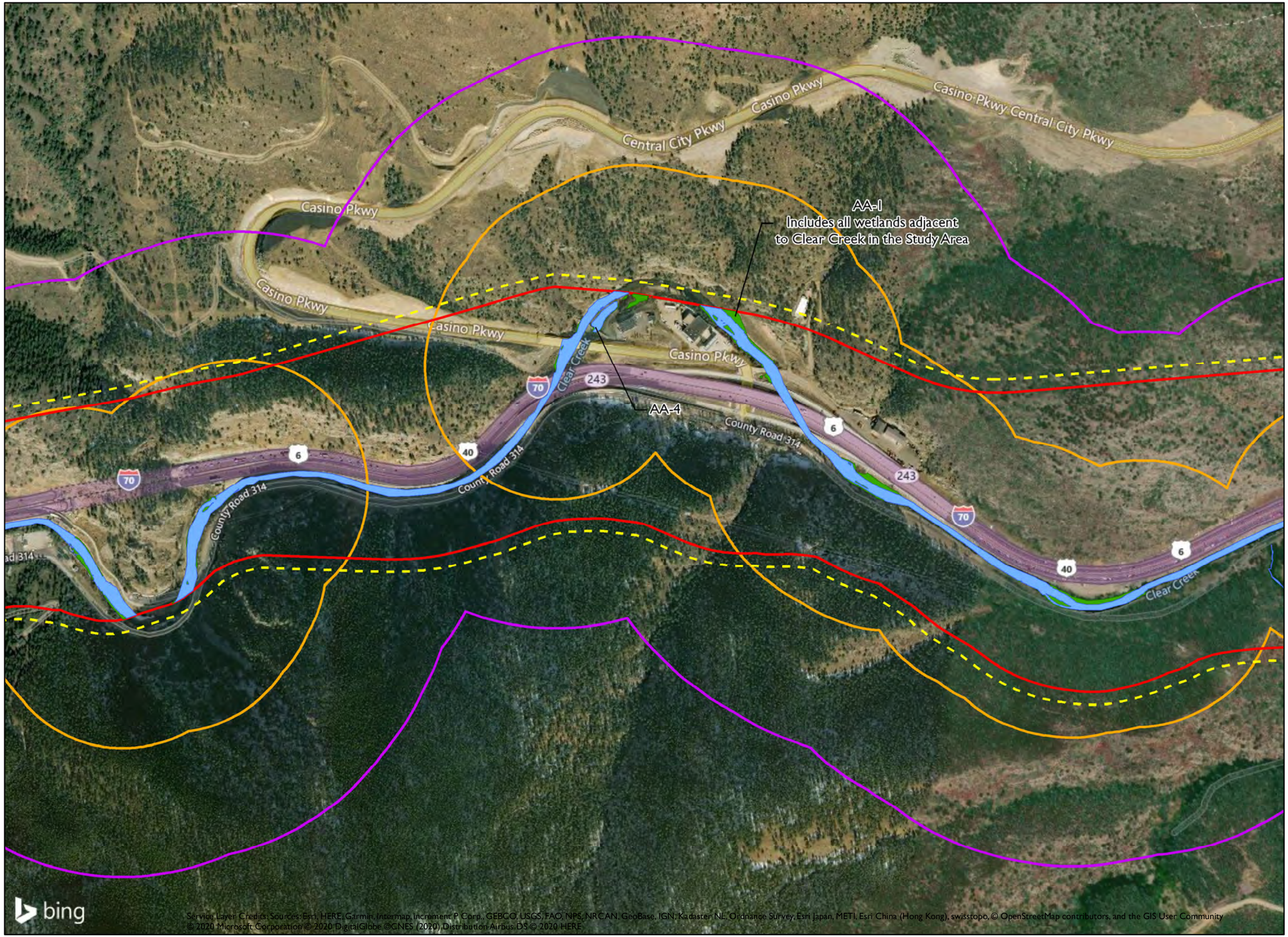
I-70 Floyd Hill to Veterans Memorial Tunnels

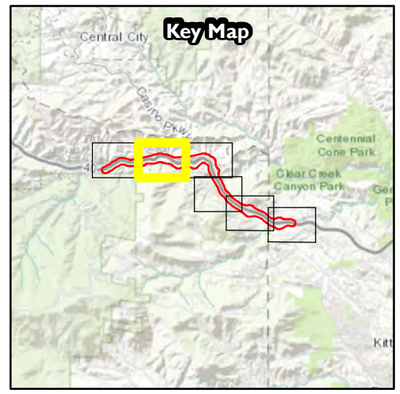
FACWet ANALYSIS

I-70 Floyd Hill to
Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 4 of 6
Pinyon Project Number: 1/17-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\1779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd





Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

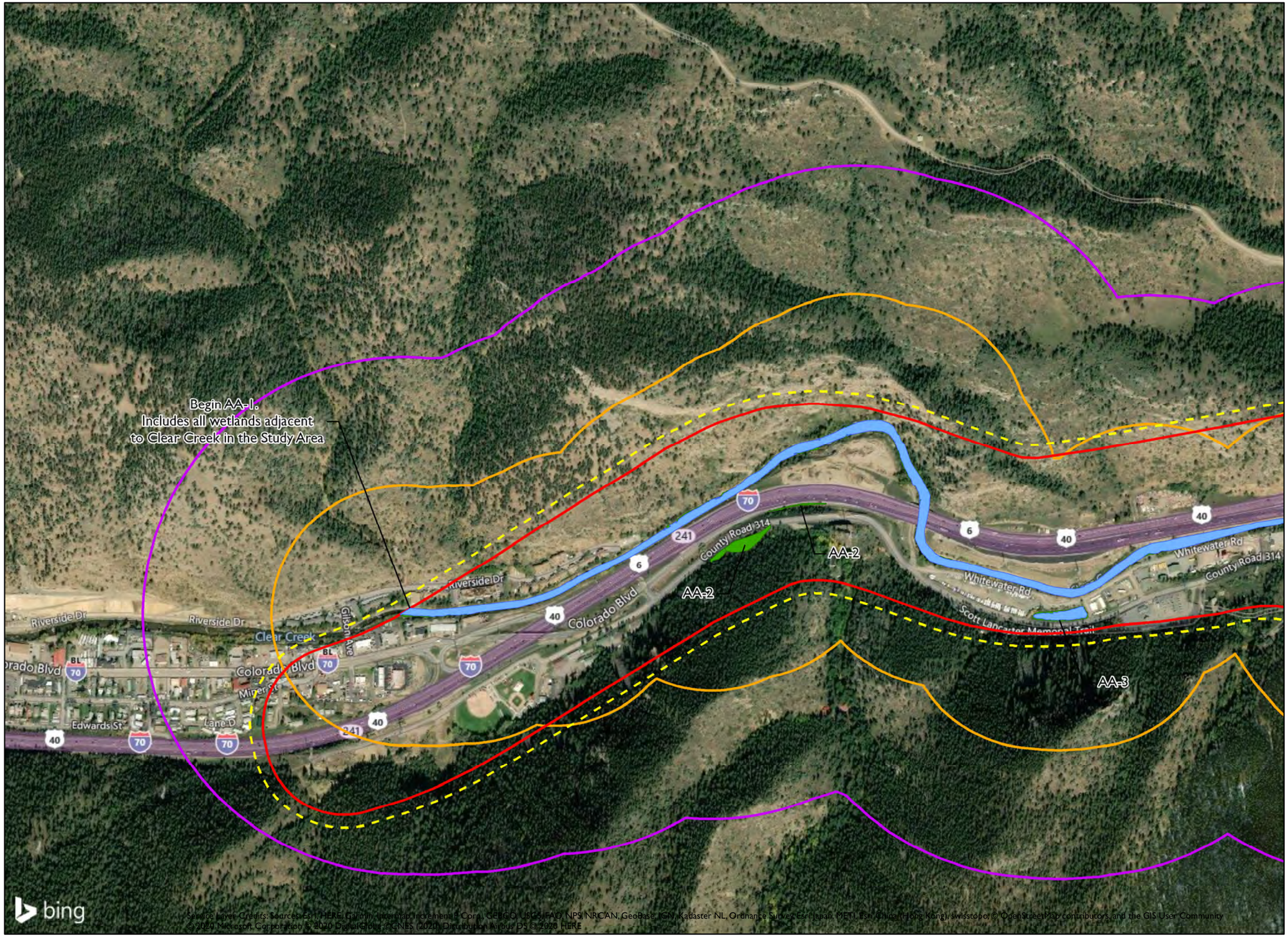
I-70 Floyd Hill to Veterans Memorial Tunnels

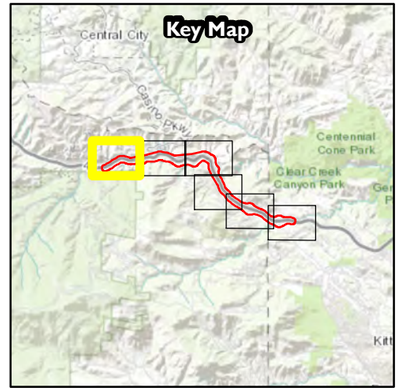
FACWet ANALYSIS

I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 5 of 6
Pinyon Project Number: 1/17-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\1779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd





Legend

- Study Area
- Non-Wetland Waters
- Wetlands/Assessment Area (AA)
- Area of Interest (AOI) (25 meters)
- Contributing Area (500 meters)
- Habitat Connectivity Envelope (HCE) (500 meters)

1 inch = 600 feet

0 300 600 Feet

I-70 Floyd Hill to Veterans Memorial Tunnels

FACWet ANALYSIS

I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Page 6 of 6
Pinyon Project Number: 117-790-01; CDOT Project Number: XXXXXX	Reviewed By: KJM	Date: 5/21/2020

Document Path: Z:\PROJECTS\2017\117790 01 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_FACWet.mxd

Appendix F FACWet Assessment Forms

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	6/14/2018
Site Name or ID:	Clear Creek (AA-1)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc.

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.742591°, -105.496870° to 39.741779°, -105.429806°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,480 - 7,195'
Location Information:	Wetlands along creek bank		
Associated stream/water body name:	Clear Creek	Stream Order:	6
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT right-of-way; private

Project Information:			
This evaluation is being performed at: (Check applicable box)	[x] *Project Wetland*	Purpose of Evaluation (check all applicable):	[x] *Potentially Impacted Wetlands*
	[ ] *Mitigation Site*		[ ] *Mitigation; Pre-construction*
			[ ] *Mitigation; Post-construction*
			[ ] *Monitoring*
			[ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	2.989 ac.	[X]	Measured		
		[ ]	Estimated		
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	2.989 ac.	[X]	Measured	PEM wetlands	PSS wetlands
		[ ]	Estimated	0.498 ac.	2.491 ac.

Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted along Clear Creek segment of study area.
Notes:	Multiple PEM and PSS wetlands were noted within the study area. This assessment (form) represents wetlands along Clear Creek. Wetland characteristics were noted to be similar throughout Clear Creek, within the study area.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.

- [x] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx, Mexican Spotted Owl

- [x] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [x] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [ ] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow)	Groundwater	(Precipitation)	Unknown		
Hydrodynamics	(Unidirectional)	Vertical	Bi-directional			
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%		
# Surface Inlets	(Over-bank)	0	1	2	3	(>3)
# Surface Outlets		0	(1)	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Wetlands along Clear Creek. Steep banks with rip-rap/large boulder banks throughout majority of creek - channelized. National Wetland Inventory (NWI) mapped Clear Creek as R5UBH.					
HGM class	(Riverine)	Slope	Depressional	Lacustrine		

Historical Conditions

Previous wetland typology

Water source	(Surface flow)	Groundwater	(Precipitation)	Unknown
Hydrodynamics	(Unidirectional)	Vertical		
Geomorphic Setting (Narrative Description)	Noted as R5UBH on the National Wetlands Inventory mapper.Wetlands along Clear Creek. Steep banks with rip-rap/large boulder banks throughout majority of creek - channelized.			
Previous HGM Class	(Riverine)	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Riverine	Palustrine	Emergent	Rooted Vascular	E	0	20
Riverine	Palustrine	Scrub-Shrub	Rooted Vascular	E	0	80

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Areas of access (e.g., boat launches) to creek have been developed for recreational use in areas along Clear Creek. These areas are small; however, wetlands may have been present in these areas prior to development. Rip-rap (i.e., channel reinforcment) along banks may have decreased historic wetlands over the years.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers

✓	Stressors	Comments/description
✓	Major Highway	I-70
✓	Secondary Highway	US-6; east end of Clear Creek within study area
✓	Tertiary Roadway	Frontage roads along I-70
	Railroad	
✓	Bike Path	Trail system along portions of Clear Creek.
✓	Urban Development	Idaho Springs
	Agricultural Development	
✓	Artificial Water Body	Stormwater retention and/or detention ponds along I-70
✓	Fence	Chain fencing along residential areas
	Ditch or Aqueduct	
	Aquatic Organism Barriers	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.80
SV 1.2 Score	0.70

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.75

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.8 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

80 Percent of AA with Buffer

0.80 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	*12*	*23*	*250*	*19*	*30*	*51*	*13*	*250*	81
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.78 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.8 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
✓	Industrial/commercial	Gravel mine, Clear Creek Rafting Co
✓	Urban	Idaho Springs
✓	Residential	Houses
✓	Rural	Houses
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70, US-6, US-40
✓	Urban Parklands	Idaho Springs Skate Park
✓	Dams/impoundments	Stormwater retention/detention ponds
	Artificial Water body	
✓	Physical Resource Extraction	Gravel mine
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

Buffer Score (Lowest score)		**Surrounding Land Use**				
(0.78	+	0.8	) ÷	2	= **Variable 2 Score**	0.79

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
✓	Ditches or Drains (tile, etc.)	Roadside ditches and mountain side drainages.
✓	Dams	Dam/flume near Georgetown (upslope).
	Diversions	
	Groundwater pumping	
	Draw-downs	
✓	Culverts or Constrictions	Round and box culverts.
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.87

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
✓	Ditches	Roadside ditches
	Ponding/Impoundment	
✓	Culverts	Round and box culverts in drainages
	Road Grades	
✓	Channel Incision/Entrenchment	Steep grade along majority of creek banks.
	Hardened/Engineered Channel	
	Enlarged Channel	
✓	Artificial Banks/Shoreline	Rip-rap lined along majority of creek.
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.85

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
✓	Road Grades	I-70 and frontage roads built up; windy roads in areas.
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
✓	Confined Bridge Openings	Creek narrows slightly at eastern I-70 bridge crossing (US 6 and I-70 Junction).

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.88

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.
2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
		Fill, including dikes, road grades, etc.	
		Grading	
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
✓		Channelization	Channel incised with rip-rap lined bank.
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.8

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.85
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion	✓	Minor erosion along creek banks.	0.75
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity	✓	Turbity after rain events	
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.70
	Nearby Industrial Sites	✓	Mining operations - low impact	
	Road Drainage/Runoff	✓	Stormwater run-off	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	Run-off	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS	✓	Run-off from cities/towns	
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.85
	Lack of Shading		Segments with good shading (trees, e	
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.87
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.85	+	0.75	+	0.70	+	0.85	+	0.87	=	4.02

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.81

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	5	40	80	15	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	5	+ 40	+ 80	+ 10	=	135	
	x	x	x	x			
Veg. Layer Sub-variable Score	0.8	0.9	0.9	0.9		÷	**See sub-variable scoring guidelines on following page**
	=	=	=	=			
Weighted Sub-variable Score	4.00	+ 36.00	+ 72.00	+ 9.00	=	121	

Variable 8 Score 0.90

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.75
	Variable 2:	**Contributing Area (CA)**	0.79
Hydrology	**Variable 3:**	**Water Source (Source)**	0.87
	Variable 4:	**Water Distribution (Dist)**	0.85
	Variable 5:	**Water Outflow (Outflow)**	0.88
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.80
	Variable 7:	**Chemical Environment (Chem)**	0.81
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.90

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.75	+	0.79	+	1.79	+		+		=	3.33	÷ 4	= 0.83

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+				
2.61	+	1.70	+	1.76	+	0.80	+	0.81	+		=	7.68	÷ 9 = 0.85

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.79	+	1.74	+	1.70	+	1.76	+	0.80	+	0.90	=	7.69	÷ 9 = 0.85

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.87	+	1.70	+	1.76	+	0.80	+		+		=	5.13	÷ 6 = 0.86

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.58	+	1.70	+	0.80	+	0.81	+		+		=	4.89	÷ 6 = 0.82

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$									
0.79	+	1.60	+	1.79	+		+		+		=	4.18	÷ 5 = 0.84

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$					
0.75	+	1.76	+	0.80	+	0.81	+	1.79	+		=	5.91	÷ 7 = 0.84

Sum of Individual FCI Scores 5.89

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.84

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/26/2018
Site Name or ID:	WL-01 & WL-02 (AA-2)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc.

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.743599°, -105.489746°; 39.744437°, -105.488321°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,470 feet
Location Information:	Ditch's along I-70 and County Road 314 (west end of study area); County Road 314 splits wetlands.		
Associated stream/water body name:	Roadside ditch/depression	Stream Order:	NA
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT

Project Information:

This evaluation is being performed at: *(Check applicable box)*
- [x] *Project Wetland*
- [ ] *Mitigation Site*

Purpose of Evaluation (check all applicable):
- [x] *Potentially Impacted Wetlands*
- [ ] *Mitigation; Pre-construction*
- [ ] *Mitigation; Post-construction*
- [ ] *Monitoring*
- [ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.13 ac.	[x]	Measured		
		[ ]	Estimated		
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.13 ac.	[x]	Measured	PEM wetland (WL-01)	PEM wetland (WL-02)
		[ ]	Estimated	0.07 ac.	0.06 ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted along ditches in the west portion of study area. Two ditch wetlands had similar vegetation, water source (runoff), and geomorphology. Two wetlands are located less than 100' away from one another and split by County Road 314.				

Notes:	Ditch wetlands were noted along I-70 and CR 314, within the study area. This assessment (form) represents those wetlands.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.
- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx,
  Mexican Spotted Owl,
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [ ] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [X] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	Surface flow	Groundwater	(Precipitation)	Unknown	
Hydrodynamics	Unidirectional	(Vertical)	Bi-directional		
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%	
# Surface Inlets	Over-bank	0	1	(2)	3	>3
# Surface Outlets		0	(1)	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Roadside/ditch wetalnds getting water from stormwater run-off (upslope in either direction). Gradient of ditch allows for water to exit in one direction (downslope).				
HGM class	Riverine	Slope	(Depressional)	Lacustrine	

Historical Conditions

Previous wetland typology

Water source	Surface flow	Groundwater	Precipitation	Unknown
Hydrodynamics	Unidirectional	Vertical		
Geomorphic Setting (Narrative Description)	Same as above.			
Previous HGM Class	Riverine	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): Man made depressional features along roadways.

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

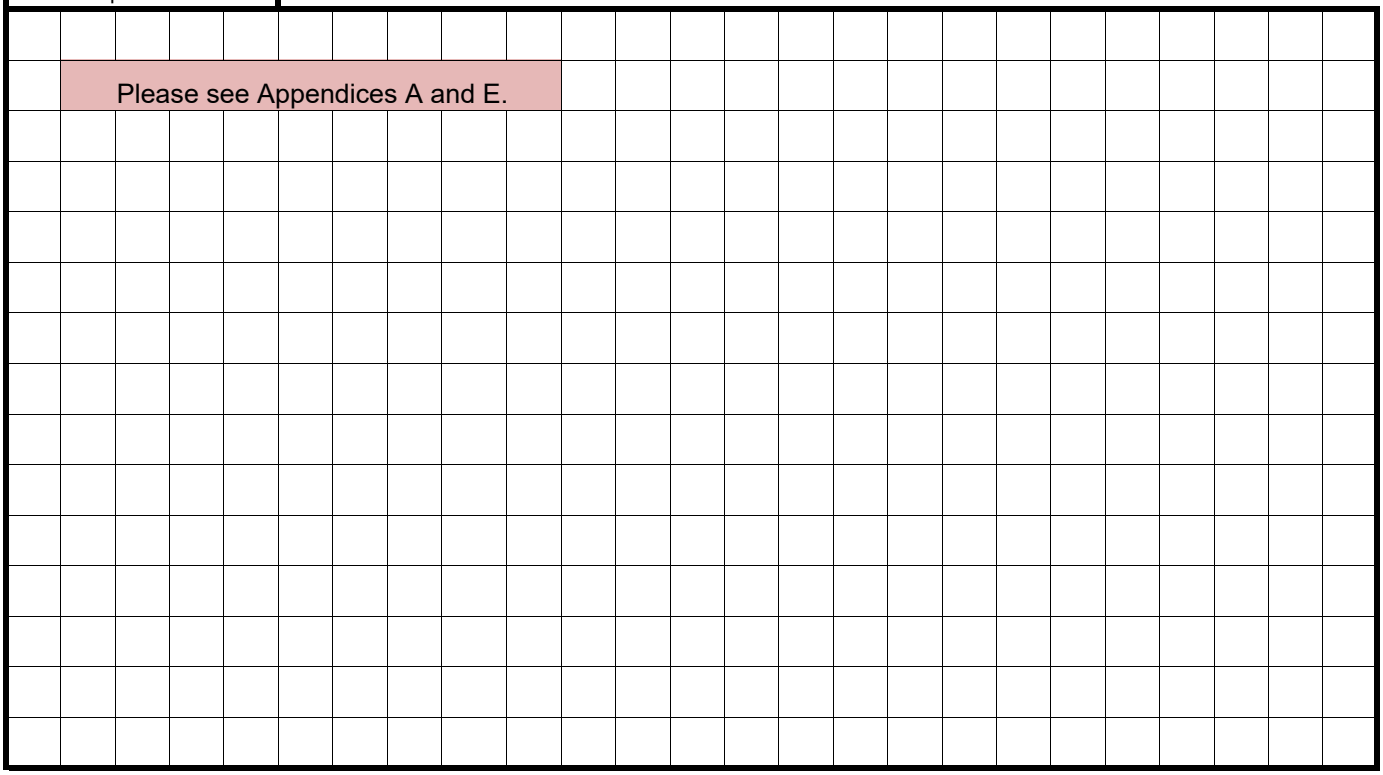
US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Palustrine	Palustrine	Emergent	Rooted Vascular	E	D, 0	100
Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.



Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Ditch wetlands being assessed were man-made. Other wetlands within HCE are naturally occurring. Wetlands along Clear Creek, within the HCE, may have been impacted due to rip-rap placement and/or building boat launch areas.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70
		Secondary Highway	
	✓	Tertiary Roadway	County Road 314
		Railroad	
		Bike Path	
		Urban Development	
		Agricultural Development	
		Artificial Water Body	
	✓	Fence	Wire fence
		Ditch or Aqueduct	
		Aquatic Organism Barriers	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.85
SV 1.2 Score	0.65

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.75

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.74 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

65 Percent of AA with Buffer

0.78 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	5	5	144	19	16	15	5	5	27
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.68

SV 2.3 - Average Buffer Width Score

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.7

SV 2.4 - Surrounding Land Use Score

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
	Industrial/commercial	
	Urban	
	Residential	
✓	Rural	House to the southeast of wetlands.
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70 and CR 314
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.68	**+**	0.7	**) ÷**	2	= **Variable 2 Score**	0.69

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
✓	Culverts or Constrictions	Circular culvert in drainage.
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.8

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
	Culverts	
✓	Road Grades	CR 314 and I-70 roadside wetlands are split by CR 314.
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.79

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
✓	Ditches	Roadside ditches that don't allow for horizontal water flow.
	Dikes/Levees	
✓	Road Grades	Built up road grade that confines water to ditches.
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.79

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
✓	General	Fill, including dikes, road grades, etc.	Road grade/fill along roads have altered geomorphology.
✓	General	Grading	Road grade/fill along roads have altered geomorphology.
	General	Compaction	
	General	Plowing/Disking	
	General	Excessive Sedimentation	
	General	Dumping	
	General	Hoof Shear/Pugging	
	General	Aggregate or Mineral Mining	
	General	Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
	Channels Only	Excessive Bank Erosion	
	Channels Only	Channelization	
	Channels Only	Reconfigured Stream Channels	
	Channels Only	Artificial Banks/Shoreline	
	Channels Only	Beaver Dam Removal	
	Channels Only	Substrate Embeddedness	
	Channels Only	Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.65

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
 -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.85
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.85
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.70
	Nearby Industrial Sites			
	Road Drainage/Runoff	✓	I-70 and CR 314 runoff.	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	Slope runoff and road runoff.	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.75
	Lack of Shading	✓	Ditches lack mature trees/shade.	
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.70
	Mechanical Soil Disturbance			
	Dumping/introduced Soil	✓	Fill from road construction; sand/gravel from winter road mitigation.	
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.85	+	0.85	+	0.70	+	0.75	+	0.70	=	3.85

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.78

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	0	10	85	5	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying			x		Mowing within right-of-way.
Noxious Weeds			x		Mowing/weed management in right-of-way.
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	5	+	10	+	80	+	5	=	100
	x		x		x		x		
Veg. Layer Sub-variable Score	0.65		0.75		0.75		0.7	÷	**See sub-variable scoring guidelines on following page**
	=		=		=		=		
Weighted Sub-variable Score	3.25	+	7.50	+	60.00	+	3.50	=	74.25

Variable 8 Score 0.74

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.75
	Variable 2:	**Contributing Area (CA)**	0.69
Hydrology	**Variable 3:**	**Water Source (Source)**	0.80
	Variable 4:	**Water Distribution (Dist)**	0.79
	Variable 5:	**Water Outflow (Outflow)**	0.79
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.65
	Variable 7:	**Chemical Environment (Chem)**	0.78
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.74

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.75	+	0.69	+	1.49	+		+		=	2.93	÷ 4 =	0.73

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$					
2.40	+	1.58	+	1.58	+	0.65	+	0.78	+		=	6.99	÷ 9 =	0.78

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.69	+	1.60	+	1.58	+	1.58	+	0.65	+	0.74	=	6.84	÷ 9 =	0.76

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.80	+	1.58	+	1.58	+	0.65	+		+		=	4.61	÷ 6 =	0.77

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.38	+	1.58	+	0.65	+	0.78	+		+		=	4.39	÷ 6 =	0.73

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$									
0.69	+	1.30	+	1.49	+		+		+		=	3.48	÷ 5 =	0.70

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$						
0.75	+	1.58	+	0.65	+	0.78	+	1.49	+		=	5.25	÷ 7 =	0.75

Sum of Individual FCI Scores 5.21

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.74

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/26/2018
Site Name or ID:	WL-3 (AA-3)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc.

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.742672°, -105.481389°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,410'
Location Information:	Fringe wetland around pond. Pond located between East Idaho Springs Road and Clear Creek, west of Clear Creek Rafting Company.		
Associated stream/water body name:	Pond near Clear Creek	Stream Order:	NA: Pond
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 (circled) 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	Private

Project Information:			
This evaluation is being performed at: (Check applicable box)	[x] *Project Wetland* [ ] *Mitigation Site*	Purpose of Evaluation (check all applicable):	[x] *Potentially Impacted Wetlands* [ ] *Mitigation; Pre-construction* [ ] *Mitigation; Post-construction* [ ] *Monitoring* [ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.104 ac.	[X] Measured [ ] Estimated					
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.104 ac.	[X] Measured	ac.	ac.	ac.	ac.
		[ ] Estimated	ac.	ac.	ac.	ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted around pond, immediately south of Clear Creek on the western half of the study area.						

Notes:	PSS wetland noted within the study area. This assessment (form) represents wetlands surrounding a pond near Clear Creek.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.

- [x] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx,
  Mexican Spotted Owl
- [x] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [ ] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [x] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	Surface flow	(Groundwater)	(Precipitation)	Unknown		
Hydrodynamics	Unidirectional	(Vertical)	Bi-directional	Unknown		
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%		
# Surface Inlets	(Over-bank)	0	1	2	3	>3
# Surface Outlets		(0)	1	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Pond located just south of Clear Creek. Assumed that pond hydrology is fed by stormwater runoff, as well as potential groundwater seepage from Clear Creek (close proximity).					
HGM class	Riverine	Slope	(Depressional)	Lacustrine		

Historical Conditions

Previous wetland typology

Water source	Surface flow	Groundwater	Precipitation	Unknown
Hydrodynamics	Unidirectional	Vertical		
Geomorphic Setting (Narrative Description)	Pond located just south of Clear Creek. Assumed that pond hydrology is fed b stormwater runoff, as well as potential groundwater seepage from Clear Creek (close proximity)			
Previous HGM Class	Riverine	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Palustrine	Palustrine	SS	Rooted vascular	B	0	100

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Wetlands along Clear Creek are within the HCE.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70 in area.
		Secondary Highway	
	✓	Tertiary Roadway	Whitewater Road; County Road 314
		Railroad	
		Bike Path	
	✓	Urban Development	Storage facility; more-so rural development
		Agricultural Development	
		Artificial Water Body	
		Fence	
		Ditch or Aqueduct	
	✓	Aquatic Organism Barriers	Roads, development between pond wetland and Clear Creek

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.75
SV 1.2 Score	0.62

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.69

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.6 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

60 Percent of AA with Buffer

0.75 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	5	4	4	5	7	30	7	9	9
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.61 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.62 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

	Stressors	Comments/description
✓	Industrial/commercial	Clear Creek Rafting Company immediately east, along with other facil
	Urban	
	Residential	
✓	Rural	Rural area - county roads, etc.
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	County roads in corridor. I-70 to the north.
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.6	+	0.62	) ÷	2	= **Variable 2 Score**	0.61

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
	Culverts or Constrictions	
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
✓	Storm Drain/Urban Runoff	May impact aquatic species in the pond.
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.79

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
	Culverts	
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.79

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
	Road Grades	
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.79

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
		Fill, including dikes, road grades, etc.	
✓		Grading	Roads and storage facilities in area - compaction of soils; altered soils.
✓		Compaction	Roads in area; soil compaction may impact sub-surface water flows.
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.8

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.85
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.85
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.72
	Nearby Industrial Sites			
	Road Drainage/Runoff	✓	County Roads/side roads	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	Up-slope run-off; mountain south	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.85
	Lack of Shading			
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.70
	Mechanical Soil Disturbance	✓	Road maintenance	
	Dumping/introduced Soil	✓	Road maintenance	
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.85	+	0.85	+	0.72	+	0.85	+	0.70	=	3.97

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.79

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	20	50	80	10	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	25	+	30	+	80	+	20	= 155
	x		x		x		x	
Veg. Layer Sub-variable Score	0.85		0.9		0.9		0.85	÷
	=		=		=		=	
Weighted Sub-variable Score	21.25	+	27.00	+	72.00	+	17.00	= 137.25

See sub-variable scoring guidelines on following page

Variable 8 Score 0.89

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.69
	Variable 2:	**Contributing Area (CA)**	0.61
Hydrology	**Variable 3:**	**Water Source (Source)**	0.79
	Variable 4:	**Water Distribution (Dist)**	0.79
	Variable 5:	**Water Outflow (Outflow)**	0.79
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.80
	Variable 7:	**Chemical Environment (Chem)**	0.79
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.89

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.69	+	0.61	+	1.77	+		+		=	3.07	÷ 4	= 0.77

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$						
2.37	+	1.58	+	1.58	+	0.80	+	0.79	+		=	7.12	÷ 9	= 0.79

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.61	+	1.58	+	1.58	+	1.58	+	0.80	+	0.89	=	7.04	÷ 9	= 0.78

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.79	+	1.58	+	1.58	+	0.80	+		+		=	4.75	÷ 6	= 0.79

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.22	+	1.58	+	0.80	+	0.79	+		+		=	4.39	÷ 6	= 0.73

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$									
0.61	+	1.60	+	1.77	+		+		+		=	3.98	÷ 5	= 0.80

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$						
0.69	+	1.58	+	0.80	+	0.79	+	1.77	+		=	5.63	÷ 7	= 0.80

Sum of Individual FCI Scores 5.46

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.78

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/5/2018
Site Name or ID:	Pond (AA-4)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.747879, -105.463955	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,325'
Location Information:	Pond on east bank of Clear Creek, immediately north of Central City Parkway.		
Associated stream/water body name:	Pond along Clear Creek	Stream Order:	NA: Pond
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	Private; City of Blackhawk

Project Information:

This evaluation is being performed at: *(Check applicable box)*
- [X] *Project Wetland*
- [ ] *Mitigation Site*

Purpose of Evaluation (check all applicable):
- [X] *Potentially Impacted Wetlands*
- [ ] *Mitigation; Pre-construction*
- [ ] *Mitigation; Post-construction*
- [ ] *Monitoring*
- [ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.022 ac.	[X]	Measured				
		[ ]	Estimated				
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.022 ac.	[X]	Measured	ac.	ac.	ac.	ac.
		[ ]	Estimated	ac.	ac.	ac.	ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted around pond, immediately east of Clear Creek on the western half of the study area.						

Notes:	PEM wetland noted within the study area. This assessment (form) represents wetlands surrounding a po near Clear Creek.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.
- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx, Mexican Spotted Owl
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [ ] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification

  If the above is checked, please describe the original wetland type if discernable using the table below.
- [X] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow)	(Groundwater)	(Precipitation)	Unknown		
Hydrodynamics	Unidirectional	Vertical	(Bi-directional)			
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%		
# Surface Inlets	(Over-bank)	0	1	2	3	>3
# Surface Outlets		(0)	(1)	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Pond located just east of Clear Creek. Assumed that pond hydrology is fed by stormwater runoff, potential groundwater seepage, and at times, overtopping of Clear Creek (close proximity).					
HGM class	Riverine	Slope	(Depressional)	Lacustrine		

Historical Conditions

Previous wetland typology

Water source	Surface flow	Groundwater	Precipitation	Unknown
Hydrodynamics	Unidirectional	Vertical		
Geomorphic Setting (Narrative Description)	Same as above.			
Previous HGM Class	Riverine	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Palustrine	Palustrine	Emergent	Rooted vascular	B	0	100

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Per Google Earth imagery, the pond was created between 2003-2005. Wetland vegetation likely existed along Clear Creek; however, additional wetlands may have been created post pond installation.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70 in area
	✓	Secondary Highway	Central City Parkway
	✓	Tertiary Roadway	Driveways (City of Black Hawk property)
		Railroad	
		Bike Path	
	✓	Urban Development	Gas station; City of Black Hawk building
		Agricultural Development	
		Artificial Water Body	
		Fence	
		Ditch or Aqueduct	
		Aquatic Organism Barriers	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.80
SV 1.2 Score	0.80

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.80

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.8 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

55 Percent of AA with Buffer

0.71 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	*4*	*6*	*6*	*3*	*32*	*50*	*36*	*15*	19
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.67 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.73 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
✓	Industrial/commercial	City of Blackhawk building east of pond - owners of pond; gas station e
	Urban	
	Residential	
✓	Rural	Non-residential or urban area. Open area with a few buildings near por
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70, Central City Parkway
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.67	+	0.73	) ÷	2	= **Variable 2 Score**	0.70

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
	Culverts or Constrictions	
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
✓	Storm Drain/Urban Runoff	May impact aquatic species in pond.
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
✓	Actively Managed Hydrology	Hydrology may be managed in pond - City of Blackhawk; pond may be
		stocked - trout noted in pond.

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.7

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
	Culverts	
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.7

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
	Road Grades	
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
✓	Hardened/Engineered Channel	Flume outfall on north end of pond; releases water into Clear Creek when water level is too high.
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.7

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
✓		Fill, including dikes, road grades, etc.	Man-made pond.
✓		Grading	Material brought in area for pond.
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.83

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✔	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.86
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.89
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.72
	Nearby Industrial Sites	✔	City of Blackhawk site.	
	Road Drainage/Runoff	✔	Run-off from Central City	
	Livestock		Parkway and potential	
	Agricultural Runoff		contaminants from I-70 upstream	
	Storm Water Runoff	✔	General runoff.	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.80
	Lack of Shading	✔	Pond lacks tall shrubs and trees.	
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.82
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.86	+	0.89	+	0.72	+	0.80	+	0.82	=	4.09

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.81

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	0	10	90	20	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	20	+	30	+	85	+	20	= 155
	x		x		x		x	
Veg. Layer Sub-variable Score	0.6		0.72		0.83		0.85	÷
	=		=		=		=	
Weighted Sub-variable Score	12.00	+	21.60	+	70.55	+	17.00	= 121.15

See sub-variable scoring guidelines on following page

Variable 8 Score 0.78

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.80
	Variable 2:	**Contributing Area (CA)**	0.70
Hydrology	**Variable 3:**	**Water Source (Source)**	0.70
	Variable 4:	**Water Distribution (Dist)**	0.70
	Variable 5:	**Water Outflow (Outflow)**	0.70
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.83
	Variable 7:	**Chemical Environment (Chem)**	0.81
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.78

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.80	+	0.70	+	1.56	+		+		=	3.06	÷ 4	= 0.77

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$					
2.10	+	1.40	+	1.40	+	0.83	+	0.81	+		=	6.54	÷ 9 = 0.73

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.70	+	1.40	+	1.40	+	1.40	+	0.83	+	0.78	=	6.51	÷ 9 = 0.72

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.70	+	1.40	+	1.40	+	0.83	+		+		=	4.33	÷ 6 = 0.72

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.40	+	1.40	+	0.83	+	0.81	+		+		=	4.44	÷ 6 = 0.74

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$								
0.70	+	1.66	+	1.56	+		+		=	3.92	÷ 5	= 0.78

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$					
0.80	+	1.40	+	0.83	+	0.81	+	1.56	+		=	5.40	÷ 7 = 0.77

Sum of Individual FCI Scores 5.23

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.75

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/27/2018
Site Name or ID:	Johnson Gulch (AA-5)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.738114°, -105.432525°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,420'
Location Information:	Wetlands along Johnson Gulch, a tributary to Clear Creek. Gulch and wetlands extend outside of CDOT right-of-way (ROW).		
Associated stream/water body name:	Johnson Gulch	Stream Order:	1
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT right-of-way; private

Project Information:			
This evaluation is being performed at: (Check applicable box)	[X] *Project Wetland* [ ] *Mitigation Site*	Purpose of Evaluation (check all applicable):	[X] *Potentially Impacted Wetlands* [ ] *Mitigation; Pre-construction* [ ] *Mitigation; Post-construction* [ ] *Monitoring* [ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.37	[X] Measured [ ] Estimated			
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.37	[X] Measured [ ] Estimated		WL-JG-01 (PEM wetland) 0.01 ac.	WL-ND-04 (PEM wetland) 0.36 ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted along Johnson Gulch segment of study area.				

Notes:	Emergent (PEM) wetland vegetation dominated wetlands noted within the study area - edge of wetand had a little overlap of riparian/wetland shrubs (willow). This assessment (form) represents wetlands along Johnson Gulch. Wetland characteristics were noted to be similar throughout Johnson Gulch, within the study area, as well as outside of the study area.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.
- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx,
  Mexican Spotted Owl
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [X] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [ ] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow) Groundwater (Precipitation) Unknown
Hydrodynamics	(Unidirectional) Vertical Bi-directional
Wetland Gradient	(0 - 2%) 2-4% 4-10% >10%
# Surface Inlets	Over-bank 0 1 (2) 3 >3
# Surface Outlets	0 (1) 2 3 >3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Noted as R5UBH on the National Wetlands Inventory mapper. Area dominated by emergent vegetation with some shrubs on the edge of the wetland. Narrow draina feeding through the mountains.
HGM class	(Riverine) Slope Depressional Lacustrine

Historical Conditions

Previous wetland typology

Water source	(Surface flow) Groundwater (Precipitation) Unknown
Hydrodynamics	(Unidirectional) (Vertical)
Geomorphic Setting (Narrative Description)	Noted as R5UBH on the National Wetlands Inventory mapper. Area dominated b emergent vegetation with some shrubs on the edge of the wetland. Narrow draina feeding through the mountains
Previous HGM Class	(Riverine) Slope Depressional Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Riverine	Palustrine	Emergent	Rooted Vascular	E	0	100

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: I-70 buitl up (steep embankment) and crossing over Johnson Gulch. Gulch now drains through culvert to pass under I-70. Historically, the gulch likely had continuous wetlands to Clear Creek.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70
		Secondary Highway	
		Tertiary Roadway	
		Railroad	
		Bike Path	
		Urban Development	
		Agricultural Development	
		Artificial Water Body	
		Fence	
		Ditch or Aqueduct	
	✓	Aquatic Organism Barriers	Culvert-like structure; I-70

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.78
SV 1.2 Score	0.70

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.74

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.85 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

100 Percent of AA with Buffer

1.00 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	73	59	72	195	183	130	140	120	122
Line #	1	2	3	4	5	6	7	8	Avg. Buffer Width (m)

0.83 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.83 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
	Industrial/commercial	
	Urban	
✓	Residential	Few houses south and west of AA.
✓	Rural	Forest surrounding AA
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.83	+	0.83	) ÷	2	= **Variable 2 Score**	0.83

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
✓	Culverts or Constrictions	Culvert for Johnson Gulch to move east under I-70.
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.84

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
✓	Culverts	Culvert for flow to go under I-70 - flows east.
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.83

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
✓	Road Grades	I-70 built up above gulch. Flows have to go through small culvert/drain.
✓	Culverts	I-70 built up above gulch. Flows have to go through small culvert/drain.
	Diversions	
✓	Constrictions	I-70 built up above gulch. Flows have to go through small culvert/drain.
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.73

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
		Fill, including dikes, road grades, etc.	
✓		Grading	Grading on northeast end of AA has been raised for I-70.
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.82

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.88
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.88
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.80
	Nearby Industrial Sites			
	Road Drainage/Runoff	✓	I-70 (east); county roads (south a	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	Slopes surrounding AA.	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.90
	Lack of Shading			
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.88
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.88	+	0.88	+	0.80	+	0.90	+	0.88	=	4.34

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.86

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	5	15	95	60	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	10	+ 25	+ 90	+ 40	=	165	
	x	x	x	x			
Veg. Layer Sub-variable Score	0.8	0.85	0.95	0.95	÷		**See sub-variable scoring guidelines on following page**
	=	=	=	=			
Weighted Sub-variable Score	8.00	+ 21.25	+ 85.50	+ 38.00	=	152.75	

Variable 8 Score 0.90

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.74
	Variable 2:	**Contributing Area (CA)**	0.83
Hydrology	**Variable 3:**	**Water Source (Source)**	0.84
	Variable 4:	**Water Distribution (Dist)**	0.83
	Variable 5:	**Water Outflow (Outflow)**	0.73
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.82
	Variable 7:	**Chemical Environment (Chem)**	0.86
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.90

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$	+		+		+		=	Total Functional Points	÷ 4	=	FCI
0.74	+	0.83	+	1.80	+		+		+		=	3.37	÷ 4	=	0.84

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+		=				
2.52	+	1.66	+	1.46	+	0.82	+	0.86	+		=	7.32	÷ 9	=	0.81

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$	=				
0.83	+	1.68	+	1.66	+	1.46	+	0.82	+	0.90	=	7.35	÷ 9	=	0.82

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+		+		=				
0.84	+	1.66	+	1.46	+	0.82	+		+		=	4.78	÷ 6	=	0.80

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$	+		+		=				
1.66	+	1.66	+	0.82	+	0.86	+		+		=	5.00	÷ 6	=	0.83

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$	+		+		+		=				
0.83	+	1.64	+	1.80	+		+		+		=	4.27	÷ 5	=	0.85

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$	+		=				
0.74	+	1.46	+	0.82	+	0.86	+	1.80	+		=	5.68	÷ 7	=	0.81

Sum of Individual FCI Scores 5.77

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.82

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/12/2018
Site Name or ID:	US 40 Ditch Wetland (AA-6)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist, Pinyon Environmental, Inc

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.722080°, -105.410748°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,910
Location Information:	Wetland along US 40 ditch.		
Associated stream/water body name:	Roadside ditch/depression	Stream Order:	NA
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT right-of-way

Project Information:			
This evaluation is being performed at: (Check applicable box)	[X] *Project Wetland*	Purpose of Evaluation (check all applicable):	[X] *Potentially Impacted Wetlands*
	[ ] *Mitigation Site*		[ ] *Mitigation; Pre-construction*
			[ ] *Mitigation; Post-construction*
			[ ] *Monitoring*
			[ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* [ ] Restoration [ ] Enhancement [ ] Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.01 ac.	[X]	Measured				
		[ ]	Estimated				
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.01 ac.	[X]	Measured	ac.	ac.	ac.	ac.
		[ ]	Estimated	ac.	ac.	ac.	ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted in ditch along US 40.						

Notes:	
	PEM wetland noted in ditch within study area. This assessment (form) represents wetlands noted within the ditch along US 40. Ditch - water intake from runnoff. Depressional wetland in ditch. Water likely comes from road runoff and runnoff from up slope.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.
- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx,
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [ ] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification

  If the above is checked, please describe the original wetland type if discernable using the table below.
- [X] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow)	Groundwater	(Precipitation)	Unknown	
Hydrodynamics	(Unidirectional)	Vertical	Bi-directional		
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%	
# Surface Inlets	Over-bank	0	1	(2)	3	>3
# Surface Outlets		0	(1)	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Ditch - water intake from runnoff. Depressional wetland in ditch. Water likely comes from road runoff and runnoff from up slope. Wetland likely created due to road work - created from an upland setting.				
HGM class	Riverine	Slope	(Depressional)	Lacustrine	

Historical Conditions

Previous wetland typology

Water source	Surface flow	Groundwater	Precipitation	Unknown
Hydrodynamics	Unidirectional	Vertical		
Geomorphic Setting (Narrative Description)				
Previous HGM Class	Riverine	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Riverine	Palustrine	Emergent	Rooted vascular	E	D, 0	100

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Ditch wetland likely created from an upland setting. Wetlands noted within HCE downslope in drainage, on south side of I-70. Geopmorphic positioning of AA-6 suggests that wetlands were created after roadwork occurred.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70
	✓	Secondary Highway	US 40
	✓	Tertiary Roadway	Driveways off of US 40.
		Railroad	
		Bike Path	
		Urban Development	
		Agricultural Development	
		Artificial Water Body	
		Fence	
		Ditch or Aqueduct	
	✓	Aquatic Organism Barriers	Roads and upland habitat

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.85
SV 1.2 Score	0.60

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.73

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.72 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

50 Percent of AA with Buffer

0.69 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	*1*	*1*	*2*	*1*	*12*	*27*	*36*	*33*	14
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.65 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.65 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
	Industrial/commercial	
	Urban	
✓	Residential	A coupel of houses in area.
✓	Rural	Country-like area along I-70 and US 40
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70 and US 40
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

Buffer Score (Lowest score)		**Surrounding Land Use**				
(0.65	+	0.65	) ÷	2	=	**Variable 2 Score** 0.65

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
	Culverts or Constrictions	
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.8

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
	Culverts	
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.8

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
✓	Ditches	Roadside ditches that don't allow for horizontal water flow - too much horizontal movement may im
	Dikes/Levees	
✓	Road Grades	Built up road grade that confines water to ditches - helps create wetland.
	Culverts	
	Diversions	
	Constrictions	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.8

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.
2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
✓		Fill, including dikes, road grades, etc.	Road grade/fill along roads have altered geomorphology. So far, alteration
✓		Grading	Road grade/fill along roads have altered geomorphology. So far, alteration
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.65

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.85
	Agricultural Runoff			
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.85
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.70
	Nearby Industrial Sites			
	Road Drainage/Runoff	✓	US 40 runoff.	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	Slope runoff and road runoff.	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.65
	Lack of Shading	✓	Ditch lacks mature trees/shade.	
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.70
	Mechanical Soil Disturbance			
	Dumping/introduced Soil	✓	Fill from road construction;	
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.85	+	0.85	+	0.70	+	0.65	+	0.70	=	3.75

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.75

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	0	0	80	0	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying			x		Mowing within right-of-way.
Noxious Weeds			x		Mowing/weed management in right-of-way.
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	5	+	10	+	100	+	0	=	115
	x		x		x		x		
Veg. Layer Sub-variable Score	0.6		0.6		0.75		0.6	÷	**See sub-variable scoring guidelines on following page**
	=		=		=		=		
Weighted Sub-variable Score	3.00	+	6.00	+	75.00	+	0.00	=	84

Variable 8 Score 0.73

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.73
	Variable 2:	**Contributing Area (CA)**	0.65
Hydrology	**Variable 3:**	**Water Source (Source)**	0.80
	Variable 4:	**Water Distribution (Dist)**	0.80
	Variable 5:	**Water Outflow (Outflow)**	0.80
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.65
	Variable 7:	**Chemical Environment (Chem)**	0.75
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.73

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.73	+	0.65	+	1.46	+		+		=	2.84	÷ 4	= 0.71

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+				
2.40	+	1.60	+	1.60	+	0.65	+	0.75	+		=	7.00	÷ 9 = 0.78

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.65	+	1.60	+	1.60	+	1.60	+	0.65	+	0.73	=	6.83	÷ 9 = 0.76

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.80	+	1.60	+	1.60	+	0.65	+		+		=	4.65	÷ 6 = 0.78

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.30	+	1.60	+	0.65	+	0.75	+		+		=	4.30	÷ 6 = 0.72

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$								
0.65	+	1.30	+	1.46	+		+		=	3.41	÷ 5	= 0.68

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$					
0.73	+	1.60	+	0.65	+	0.75	+	1.46	+		=	5.19	÷ 7 = 0.74

Sum of Individual FCI Scores 5.16

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.74

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	7/12/2018
Site Name or ID:	Unnamed Drainage (SW-09)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:	Wetlands (AA-7)	Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist, Pinyon Environmental, Inc

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.720806°, -105.413712° to 39.714677°, -105.392922°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,925-7,565'
Location Information:	Wetlands along unnamed drainage associated with Beaver Brook (south side of I-70).		
Associated stream/water body name:	Unnamed Drainage associated with Beaver B	Stream Order:	1
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT right-of-way; private

Project Information:

This evaluation is being performed at: *(Check applicable box)*
- [X] *Project Wetland*
- [ ] *Mitigation Site*

Purpose of Evaluation (check all applicable):
- [X] *Potentially Impacted Wetlands*
- [ ] *Mitigation; Pre-construction*
- [ ] *Mitigation; Post-construction*
- [ ] *Monitoring*
- [ ] *Other (Describe)*

Intent of Project: *(Check all applicable)* ☐ Restoration ☐ Enhancement ☐ Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	9.33 ac.	[ ]	Measured		
		[ ]	Estimated		
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	9.33 ac.	[X]	Measured	PEM wetlands	PSS wetlands
		[ ]	Estimated	8.31 ac.	1.02 ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted along unnamed drainage (SW-09) associated with Beaver Brook segment of study area.				

Notes:	Multiple PEM and PSS wetlands were noted within the study area. This assessment (form) represents wetlands along SW-09. Wetland characteristics were noted to be similar throughout SW-09, within the study area.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [X] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [X] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.
- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx, Mexican Spotted Owl, Colorado Butterfly Plant, Ute Ladies'-tresses
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [X] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [ ] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow)	(Groundwater)	(Precipitation)	Unknown		
Hydrodynamics	(Unidirectional)	(Vertical)	(Bi-directional)			
Wetland Gradient	(0 - 2%)	(2-4%)	4-10%	>10%		
# Surface Inlets	(Over-bank)	(0)	(1)	2	3	>3
# Surface Outlets		(0)	(1)	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Wetlands along SW-09. SW-09 classified as R4SBC on the National Wetlands Inventory (NWI) Map. SW-09 along the south side of I-70.					
HGM class	(Riverine)	Slope	Depressional	Lacustrine		

Historical Conditions

Previous wetland typology

Water source	(Surface flow)	(Groundwater)	(Precipitation)	Unknown
Hydrodynamics	(Unidirectional)	(Vertical)		
Geomorphic Setting (Narrative Description)	Due to organic soils, geomorphic setting is likely similar present day as historically.			
Previous HGM Class	(Riverine)	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None; organic soils noted. Sent soil samples to Colorado State University (CSU) as wetland had qualities of a fen - soils did not pass as fen.

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Riverine	Intermittent; Palustrine	EM	Rooted vascular/Organic	C	0, g	50
Riverine	Intermittent; Palustrine	SS	Rooted vascular/Organic	C	0, g	50
Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Road and other development in area. Historic wetlands may be absent due to development and/or roads.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70
		Secondary Highway	
	✓	Tertiary Roadway	Homestead Road, County Roads 181, 182, 183, etc.
		Railroad	
		Bike Path	
	✓	Urban Development	Housing, school, business/buildings, etc. in area.
		Agricultural Development	
		Artificial Water Body	
	✓	Fence	Wired fences, etc.
		Ditch or Aqueduct	
	✓	Aquatic Organism Barriers	Fences, roads, etc.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.88
SV 1.2 Score	0.85

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.87

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.85 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

90 Percent of AA with Buffer

0.90 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	*1*	*3*	*58*	*110*	*36*	*10*	*229*	*60*	63
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.75 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.85 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✓	Stressors	Comments/description
✓	Industrial/commercial	Few office buildings; school
	Urban	
✓	Residential	Few houses in area
✓	Rural	Not a metropolitan; open county in most of area.
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
	Livestock Grazing	
✓	Transportation Corridor	I-70 and other 2-lane roads in area.
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.75	+	0.8	) ÷	2	= **Variable 2 Score**	0.78

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
✓	Culverts or Constrictions	Circular culverts along drainage (e.g.,culvert outlet at pond and
	Point Source (urban, ind., ag.)	under roads).
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.85

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
✓	Ponding/Impoundment	Pond located near the west end (upslope) of AA.
✓	Culverts	Few circular culverts noted on the upslope half of the drainage; some water in AA from springs
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.84

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
	Road Grades	
✓	Culverts	Few culverts within drainage.
	Diversions	
✓	Constrictions	I-70 encroaching on north end of drainage; may have impacted flows in area.
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.84

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
✓		Fill, including dikes, road grades, etc.	I-70 and county roads built up in area, as well as buildings.
✓		Grading	I-70 and county roads built up in area, as well as buildings.
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.8

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock			0.89
	Agricultural Runoff			
	Septic/Sewage	✓	Houses nearby likely have septic.	
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.89
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff			
	Excessive Turbidity	✓	Some turbidity may occur after ra	
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.85
	Nearby Industrial Sites			
	Road Drainage/Runoff	✓	I-70, etc.	
	Livestock			
	Agricultural Runoff			
	Storm Water Runoff	✓	General runoff	
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.87
	Lack of Shading	✓	Few areas in AA lack shade.	
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.90
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.89	+	0.89	+	0.85	+	0.87	+	0.90	=	4.40

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.88

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	5	40	100	10	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal					
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing					
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	5	+	30	+	80	+	10	= 125
	x		x		x		x	
Veg. Layer Sub-variable Score	0.9		0.9		0.95		0.9	÷
	=		=		=		=	
Weighted Sub-variable Score	4.50	+	27.00	+	76.00	+	9.00	= 116.5

See sub-variable scoring guidelines on following page

Variable 8 Score 0.93

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.87
	Variable 2:	**Contributing Area (CA)**	0.78
Hydrology	**Variable 3:**	**Water Source (Source)**	0.85
	Variable 4:	**Water Distribution (Dist)**	0.84
	Variable 5:	**Water Outflow (Outflow)**	0.84
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.80
	Variable 7:	**Chemical Environment (Chem)**	0.88
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.93

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.87	+	0.78	+	1.86	+		+		=	3.50	÷ 4	= 0.88

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$					
2.55	+	1.68	+	1.68	+	0.80	+	0.88	+		=	7.59	÷ 9 = 0.84

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.78	+	1.70	+	1.68	+	1.68	+	0.80	+	0.93	=	7.57	÷ 9 = 0.84

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.85	+	1.68	+	1.68	+	0.80	+		+		=	5.01	÷ 6 = 0.84

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.55	+	1.68	+	0.80	+	0.88	+		+		=	4.91	÷ 6 = 0.82

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$									
0.78	+	1.60	+	1.86	+		+		+		=	4.24	÷ 5 = 0.85

Function 7 -- Production Export/Food Chain Support

$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$					
0.87	+	1.68	+	0.80	+	0.88	+	1.86	+		=	6.09	÷ 7 = 0.87

Sum of Individual FCI Scores 5.93

Divide by the Number of Functions Scored ÷ 7

Composite FCI Score 0.85

ADMINISTRATIVE CHARACTERIZATION

General Information			
		Date of Evaluation:	6/14/2018
Site Name or ID:	Beaver Brook (AA-8)	Project Name:	I-70 Floyd Hill to VMT
404 or Other Permit Application #:		Applicant Name:	Colorado Department of Transportation (CDOT)
Evaluator Name(s):	Korby Mintken	Evaluator's professional position and organization:	Biologist; Pinyon Environmental, Inc.

Location Information:			
Site Coordinates (Decimal Degrees, e.g., 38.85, -104.96):	39.713738°, -105.394735° to 39.716846°, -105.382461°	Geographic Datum Used (NAD 83):	WGS84
		Elevation	7,520 - 7,410 feet
Location Information:	Wetlands along Beaver Brook.		
Associated stream/water body name:	Beaver Brook	Stream Order:	2
USGS Quadrangle Map:	Squaw Pass	Map Scale: (Circle one)	1:24,000 1:100,000 Other 1:
Sub basin Name (8 digit HUC):	10190004	Wetland Ownership:	CDOT right-of-way; private

Project Information:			
This evaluation is being performed at: (Check applicable box)	[X] *Project Wetland*	Purpose of Evaluation (check all applicable):	[X] *Potentially Impacted Wetlands*
	[ ] *Mitigation Site*		[ ] *Mitigation; Pre-construction*
			[ ] *Mitigation; Post-construction*
			[ ] *Monitoring*
			[ ] *Other (Describe)*
Intent of Project: *(Check all applicable)*	[ ] Restoration	[ ] Enhancement	[ ] Creation

Total Size of Wetland Involved: (Record Area, Check and Describe Measurement Method Used)	0.685 ac.	[X]	Measured		
		[ ]	Estimated		
Assessment Area (AA) Size (Record Area, check appropriate box. Additional spaces are used to record acreage when more than one AA is included in a single assessment)	0.685 ac.	[X]	Measured	PSS wetlands	PEM wetlands
		[ ]	Estimated	0.038 ac.	0.647 ac.
Characteristics or Method used for AA boundary determination:	Project study area provided by project team. Wetlands noted along Beaver Brook segment of study area.				

Notes:	Multiple PEM and PSS wetlands were noted within the study area. This assessment (form) represents wetlands along Beaver Brook. Wetland characteristics were noted to be similar throughout Beaver Brook, within the study area.

ECOLOGICAL DESCRIPTION 1

Special Concerns

Check all that apply

- [ ] Organic soils including Histosols or Histic Epipedons are present in the AA (i.e., AA includes core fen habitat).
- [ ] Project will directly impact organic soil portions of the AA including areas possessing either Histosol soils or histic epipedons.
- [ ] Organic soils are known to occur anywhere within the contiguous wetland of which the AA is part.
- [ ] The wetland is a habitat oasis in an otherwise dry or urbanized landscape?
- [ ] Federally threatened or endangered species are **KNOWN** to occur in the AA? List Below.

- [X] Federally threatened or endangered species are **SUSPECTED** to possibly occur in the AA?

  Canada Lynx, Preble's Meadow Jumping Mouse
  Mexican Spotted Owl,
  Colorado Butterfly Plant, Ute Ladies'-tresses
- [X] Species of concern according to the Colorado Natural Heritage (CNHP) are known to occur in the AA?
- [ ] Other special concerns (please describe)
- [ ] Other special concerns (please describe)

HYDROGEOMORPHIC SETTING

- [X] AA wetland maintains its fundamental natural hydrogeomorphic characteristics
- [ ] AA wetland has been subject to change in HGM classes as a result of anthropogenic modification
  If the above is checked, please describe the original wetland type if discernable using the table below.
- [ ] AA wetland was created from an upland setting.

Current Conditions

Describe the hydrogeomorphic setting of the wetland by circling all conditions that apply.

HGM Setting

Water source	(Surface flow)	Groundwater	(Precipitation)	Unknown		
Hydrodynamics	(Unidirectional)	Vertical	Bi-directional			
Wetland Gradient	(0 - 2%)	2-4%	4-10%	>10%		
# Surface Inlets	(Over-bank)	0	(1)	2	3	>3
# Surface Outlets		0	1	2	3	>3
Geomorphic Setting (Narrative Description. Include approx. stream order for riverine)	Wetlands along Beaver Brook. Cut-banks throughout majority of creek. Per the National Wetland Inventory (NWI), Beaver Brook is mapped as R5UBH (riverine).					
HGM class	(Riverine)	Slope	Depressional	Lacustrine		

Historical Conditions

Previous wetland typology

Water source	(Surface flow)	Groundwater	Precipitation	Unknown
Hydrodynamics	(Unidirectional)	Vertical		
Geomorphic Setting (Narrative Description)	Wetlands along Beaver Brook. Cut-banks throughout majority of creek. NWI mapped wetlands as PSSC and PEM1C.			
Previous HGM Class	(Riverine)	Slope	Depressional	Lacustrine

Notes (include information on the AA's HGM subclass and regional subclass): None.

ECOLOGICAL DESCRIPTION 2

Vegetation Habitat Description

US FWS habitat classification according as reported in Cowardin et al. (1979).

System	Subsystem	Class	Subclass	Water Regime	Other Modifiers	% AA
Riverine	Palustrine	Emergent	Rooted Vascular	C	0	80
Riverine	Palustrine	Scrub-Shrub	Rooted Vascular	C	0	20

Lacustrine	Littoral; Limnoral	Rock Bot. (RB) Uncon Bottom(UB) Aquatic Bed(AB) Rocky Shore(RS) Uncon Shore(US) Emergent(EM) Shrub-scrub(SS) Forested (FO)	Floating vascular; Rooted vascular; Algal; Persistent; Non-Persistent; Broad-leaved deciduous; Needle-leaved evergreen; Cobble - gravel; Sand; Mud; Organic	**Examples** Temporarily flooded(A); Saturated(B); Seasonally flooded(C); Seas.-flood./sat.(E); Semi-Perm. flooded(F); Intermittently exposed(G); Artificially flooded(K); Sat./semiperm./Seas. (Y); Int. exposed/permenant(Z)	Hypersaline(7) ; Eusaline(8); Mixosaline(9); Fresh(0); Acid(a); Circumneutral(c); Alkaline/calcareous(i); Organic(g); Mineral(n); Beaver(b); Partially Drained/ditched(d); Farmed(f); Diked/impounded(h); Artificial Substrate(r); Spoil(s); Excavated(x)	
Palustrine	Palustrine					
Riverine	Lower perennial; Upper perennial; Intermittent					

Site Map

Scale: 1 sq. =

Draw a sketch map of the site including relevant portions of the wetland, AA boundary, structures, habitat classes, and other significant features.

Please see Appendices A and E.

Variable 1: Habitat Connectivity

The Habitat Connectivity Variable is described by two sub-variables – Neighboring Wetland and Riparian Habitat Loss and Barriers to Migration and Dispersal. These sub-variables were treated as independent variables in FACWet Version 2.0. The merging of these variables makes their structure more consistent with that of other composite variables in FACWet. The new variable configuration also makes this landscape variable more accurately reflect the interactions amongst aquatic habitats in Colorado's agricultural and urbanized landscapes, which have a naturally low density of wetlands. The two Habitat Connectivity Sub-variables are scored in exactly the same manner as their FACWet 2.0 counterparts, as described below. The Habitat Connectivity Variable score is simply the arithmetic average of the two sub-variable scores which is entered on the second page of the Variable 1 data form. If there is little or no wetland or riparian habitat in the Habitat Connectivity Envelope (defined below), then Sub-variable 1.1 is not scored.

SV 1.1 - Neighboring Wetland and Riparian Habitat Loss

(Do not score if few or no wetlands naturally exist in the HCE)

This sub-variable is a measure of how isolated from other naturally-occurring wetlands or riparian habitat the AA has become as the result of habitat destruction. To score this sub-variable, estimate the percent of naturally-occurring wetland/riparian habitat that has been lost (by filling, draining, development, or whatever means) within the 500-meter-wide belt surrounding the AA. This zone is called the Habitat Connectivity Envelope (HCE). In most cases the evaluator must use best professional judgment to estimate the amount of natural wetland loss. Historical photographs, National Wetland Inventory (NWI) maps, hydric soil maps can be helpful in making these determinations. Floodplain maps are especially valuable in river-dominated regions, such as the Front Range urban corridor. Evaluation of landforms and habitat patterns in the context of perceivable land use change is used to steer estimates of the amount of wetland loss within the HCE.

Rules for Scoring:

1. On the aerial photo, create a 500 m perimeter around the AA.
2. The area within this perimeter is the **Habitat Connectivity Envelope (HCE)**.
3. Within the HCE, outline the current extent of naturally occurring wetland and riparian habitat. Do not include habitats such as excavated ponds or reservoir induced fringe wetlands.
4. Outline the historical extent of wetland and riparian habitats (i.e., existing natural wetlands plus those that have been destroyed).

- Use your knowledge of the history of the area and evident land use change to identify where habitat losses have occurred. Additional research can be utilized to increase the accuracy of this estimate including consideration of floodplain maps, historical aerial photographs, soil maps, etc.

5. Calculate the area of existing and historical wetlands. Divide the area of existing wetland by the total amount of existing and historical wetland and riparian habitat, and determine the variable score using the guidelines below. Enter sub-variable score at the bottom of p.2 of the Habitat Connectivity data form.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Wetland losses are absent or negligible or there is no evidence to suggest the native landscape within the HCE historically contained other wetland habitats
<0.9 - 0.8	***B*** *Highly Functioning*	More than 80% of historical wetland habitat area within the HCE is still present (less than 20% of habitat area lost).
<0.8 - 0.7	***C*** *Functioning*	80 to 60% of historical wetland habitat area within the HCE is still present (20% to 40% of habitat area lost).
<0.7 - 0.6	***D*** *Functioning Impaired*	Less than 60 to 25% of historical wetland habitat area within the HCE is still present (more than 40 to 75% of habitat area lost).
<0.6	***F*** *Non-functioning*	Less than 25% of the historical wetland habitat area within the HCE still in existence (more than 70% of habitat lost).

Notes: Wetlands noted with HCE.

Variable 1: Habitat Connectivity p. 2

SV 1.2: Migration/Dispersal Barriers

This sub-variable is intended to rate the degree to which the AA has become isolated from existing neighboring wetland and riparian habitat by artificial barriers that inhibit migration or dispersal of organisms. On the aerial photograph, identify the man-made barriers within the HCE that intercede between the AA and surrounding wetlands and riparian areas, and identify them by type on the stressor list. Score this variable based on the barriers' impermeability to migration and dispersal and the amount of surrounding wetland/riparian habitat they affect.

Rules for Scoring:

1. On the aerial photo, outline **all** existing wetland and riparian habitat areas within the HCE. This includes naturally occurring habitats, as well as those purposefully created or induced by land use change.

2. Identify artificial barriers to dispersal and migration of organisms within the HCE that intercede between the AA and surrounding habitats. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

3. Considering the composite effect of all of identified barriers to migration and dispersal (i.e., stressors), assign an overall variable score using the scoring guidelines.

Stressors = artificial barriers	✓	Stressors	Comments/description
	✓	Major Highway	I-70
	✓	Secondary Highway	US 40
		Tertiary Roadway	
		Railroad	
		Bike Path	
		Urban Development	
	✓	Agricultural Development	Livestock (Bison) yard.
		Artificial Water Body	
	✓	Fence	Wired fence along poperty lines.
		Ditch or Aqueduct	
	✓	Aquatic Organism Barriers	Long culvert under I-70 - fish unable to pass.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable barriers exist between the AA and other wetland and riparian habitats in the HCE; or there are no other wetland and riparian areas in the HCE.
<0.9 - 0.8	***B*** *Highly Functioning*	Barriers impeding migration/dispersal between the AA and up to 33% of surrounding wetland/riparian habitat highly permeable and easily passed by most organisms. Examples could include gravel roads, minor levees, ditches or barbed-wire fences. More significant barriers (see "functioning category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.8 - 0.7	***C*** *Functioning*	Barriers to migration and dispersal retard the ability of many organisms/propagules to pass between the AA and up to 66% of wetland/riparian habitat. Passage of organisms and propagules through such barriers is still possible, but it may be constrained to certain times of day, be slow, dangerous or require additional travel. Busy two-lane roads, culverted areas, small to medium artificial water bodies or small earthen dams would commonly rate a score in this range. More significant barriers (see "functioning impaired" category below) could affect migration to up to 10% of surrounding wetland/riparian habitat.
<0.7 - 0.6	***D*** *Functioning Impaired*	Barriers to migration and dispersal preclude the passage of some types of organisms/propagules between the AA and up to 66% of surrounding wetland/riparian habitat. Travel of those animals which can potential negotiate the barrier are strongly restricted and may include a high chance of mortality. Up to 33% of surrounding wetland/riparian habitat could be functionally isolated from the AA.
<0.6	***F*** *Non-functioning*	AA is essentially isolated from surrounding wetland/riparian habitat by impermeable migration and dispersal barriers. An interstate highway or concrete-lined water conveyance canal are examples of barriers which would generally create functional isolation between the AA and wetland/riparian habitat in the HCE.

SV 1.1 Score	0.80
SV 1.2 Score	0.65

Add SV 1.1 and 1.2 scores and divide by two to calculate variable score

Variable 1 Score 0.73

Variable 2: Contributing Area

The AA's Contributing Area is defined as the 250-meter-wide zone surrounding the perimeter of the AA. This variable is a measure of the capacity of that area to support characteristic functions of high quality wetland habitat. Depending on its condition, the contributing area can help maintain wetland condition or it can degrade it. Contributing Area condition is evaluated by considering the AA's Buffer and its Surrounding Land Use. Buffers are strips or patches of more-or-less natural upland and/or wetland habitat more than 5m wide. Buffers are contiguous with the AA boundary and they intercede between it and more intensively used lands. The AA Buffer is characterized with three sub-variables: Buffer Condition, Buffer Extent, and Average Buffer Width. The Surrounding Land Use Sub-variable considers changes within the Contributing Area that limit its capacity to support characteristic wetland functions. Many of the acute, on-site effects of land use change in the Contributing Area are specifically captured by Variables 3 - 8.

Rules for Scoring:

1. Delimit the Contributing Area on an aerial photograph as the zone within 250 meters of the outer boundary of the AA.
2. Evaluate and then rate the Buffer Condition sub-variable using the scoring guidelines. Record the score in the cell provided on the datasheet.
3. Indicate on the aerial photograph zones surrounding the AA which have ≥5m of buffer vegetation and those which do not.
4. Calculate the percentage of the AA which has a Buffer and record the value where indicated on the data sheet.
5. Rate the *Buffer Extent* Sub-variable using the scoring guidelines.
6. Determine the average Buffer width by drawing a line perpendicularly from the AA boundary to the outer extent of the buffer habitat. Measure line length and record its value on the data sheet. Repeat this process until a total of 8 lines have been sampled.
7. Calculate the average buffer width and record value on the data form. Then determine the sub-variable score using the scoring guidelines.
8. Score the Surrounding Land Use sub-variable by recording land use changes on the stressor list that affect the capacity of the landscape to support characteristic wetland functioning.
9. Enter the **lowest** of the three Buffer sub-variable scores along with the Surrounding Land Use Sub-variable score in the Contributing Area Variable scoring formula at the bottom of p. 2 of the data form. The Contributing Area Variable is the aver of the two sub-variable scores.

SV 2.1 - Buffer Condition

0.83 ***SV 2.1 - Buffer Condition Score***

Subvariable Score	Condition Grade	Buffer Condition Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Buffer vegetation is predominately native vegetation, human-caused disturbance of the substrate is not evident, and human visitation is minimal. Common examples: Wilderness areas, undeveloped forest and range lands.
<0.9 - 0.8	*Highly Functioning*	Buffer vegetation may have a mixed native-nonnative composition, but characteristic structure and complexity remain. Soils are mostly undisturbed or have recovered from past human disturbance. Little or only low-impact human visitation. Buffers with higher levels of substrate disturbance may be included here if the buffer is still able to maintain predominately native vegetation. Common examples: Dispursed camping areas in national forests, common in wildland parks (e.g. State Parks) and open spaces.
<0.8 - 0.7	*Functioning*	Buffer vegetation is substantially composed of non-native species. Vegetation structure may be somewhat altered, such as by brush clearing. Moderate substrate distrbance and compaction occurs, and small pockets of greater disturbance may exist. Common examples: City natural areas, mountain hay meadows.
<0.7 - 0.6	*Functioning Impaired*	Buffer vegetation is substantially composed of non-native species and vegetation structure has been strongly altered by the complete removal of one or more strata. Soil disturbance and the intensity of human visitation are generally high. Common examples: Open lands around resource extraction sites (e.g., gravel mines), clear cut logging areas, ski slopes.
<0.6	*Non-functioning*	Buffer is nearly or entirely absent.

SV 2.2 - Buffer Extent

80 Percent of AA with Buffer

0.85 ***SV 2.2 - Buffer Extent***

Subvariable Score	Condition Class	% Buffer Scoring Guidelines
1.0 - 0.9	*Reference Standard*	90 - 100% of AA with Buffer
<0.9 - 0.8	*Highly Functioning*	70-90% of AA with Buffer
<0.8 - 0.7	*Functioning*	51-69% of AA with Buffer
<0.7 - 0.6	*Functioning Impaired*	26-50% of AA with Buffer
<0.6	*Non-functioning*	0-25% of AA with Buffer

Variable 2: Contributing Area (p. 2)

SV 2.3 - Average Buffer Width

Record measured buffer widths in the spaces below and average.

Buffer Width (m)	*63*	*47*	*42*	*23*	*11*	*44*	*56*	*8*	37
Line #	1	2	3	4	5	6	7	8	**Avg. Buffer Width (m)**

0.71 ***SV 2.3 - Average Buffer Width Score***

Subvariable Score	Condition Grade	Buffer Width Scoring Guidelines
1.0 - 0.9	*Reference Standard*	Average Buffer width is 190-250m
<0.9 - 0.8	*Highly Functioning*	Average Buffer width is 101-189m
<0.8 - 0.7	*Functioning*	Average Buffer width is 31-100m
<0.7 - 0.6	*Functioning Impaired*	Average Buffer width is 6-30m
<0.6	*Non-functioning*	Average Buffer width is 0-5m

SV 2.4 - Surrounding Land Use

0.83 ***SV 2.4 - Surrounding Land Use Score***

Catalog and characterize land use changes in the surrounding landscape and score.

Stressors = Land Use Changes

✔	Stressors	Comments/description
	Industrial/commercial	Bison yard present but wouldn't consider as commercial (smaller).
	Urban	
	Residential	
	Rural	
	Dryland Farming	
	Intensive Agriculture	
	Orchards or Nurseries	
✔	Livestock Grazing	Bison grazing yards -small operation (40 head or so)
✔	Transportation Corridor	I-70 and US 40
	Urban Parklands	
	Dams/impoundments	
	Artificial Water body	
	Physical Resource Extraction	
	Biological Resource Extraction	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	No appreciable land use change has been imposed Surrounding Landscape.
<0.9 - 0.8	***B*** *Highly Functioning*	Some land use change has occurred in the Surrounding Landscape, but changes have minimal effect on the the landscape's capacity to support characteristic aquatic functioning, either because land use is not intensive, for example haying, light grazing, or low intensity silviculture, or more substantial changes occur in approximately less than 10% of the area.
<0.8 - 0.7	***C*** *Functioning*	Surrounding Landscape has been subjected to a marked shift in land use, however, the land retains much of its capacity to support natural wetland function and it is not an overt source of pollutants or sediment. Moderate-intensity land uses such as dry-land farming, urban "green" corridors, or moderate cattle grazing would commonly be placed within this scoring range.
<0.7 - 0.6	***D*** *Functioning Impaired*	Land use changes within the Surrounding Landscape has been substantial including the a moderate to high coverage (up to 50%) of impermeable surfaces, bare soil, or other artificial surfaces; considerable in-flow urban runoff or fertilizer-rich waters common. Supportive capacity of the land has been greatly diminished but not totally extinguished. Intensively logged areas, low-density urban developments, some urban parklands and many cropping situations would commonly rate a score within this range.
<0.6	***F*** *Non-functioning*	The Surrounding Landscape is essentially comletely developed or is otherwise a cause of severe ecological stress on wetland habitats. Commercial developments or highly urban landscapes generally rate a score of less than 0.6.

	Buffer Score (Lowest score)		**Surrounding Land Use**				
(	0.71	+	0.83	) ÷	2	= **Variable 2 Score**	0.77

Variable 3: Water Source

*This variable is concerned with **up-gradient** hydrologic connectivity. It is a measure of impacts to the AA's water source, including the quantity and timing of water delivery, and the ability of source water to perform work such as sediment transport, erosion, soil pore flushing, etc. To score this variable, identify stressors that alter the source of water to the AA, and record their presence on the stressor list. Stressors can impact water source by depletion, augmentation, or alteration of inflow timing or hydrodynamics. This variable is designed to assess water quantity, power and timing, not water quality. Water quality will be evaluated in Variable 7.*

Scoring rules:

1. Use the stressor list and knowledge of the watershed to catalog type-specific impairments of the AA's water source. Mark the stressors present with a check in the first column and describe the general nature, severity and extent of each. List additional stressors in empty rows at the bottom of the table and explain.

2. Considering the composite effect of stressors on the water source, rate the condition of this variable with the aid of the scoring guidelines.

✓	Stressors	Comments/description
	Ditches or Drains (tile, etc.)	
	Dams	
	Diversions	
	Groundwater pumping	
	Draw-downs	
✓	Culverts or Constrictions	Culvert(s) along creek.
	Point Source (urban, ind., ag.)	
	Non-point Source	
	Increased Drainage Area	
	Storm Drain/Urban Runoff	
	Impermeable Surface Runoff	
	Irrigation Return Flows	
	Mining/Natural Gas Extraction	
	Transbasin Diversion	
	Actively Managed Hydrology	

Variable Score	Condition Grade	Depletion	Augmentation
1.0 - 0.9	***A*** *Reference Standard*	Unnatural drawdown events minor, rare or non-existent, very slight uniform depletion, or trivial alteration of hydrodynamics.	Unnatural high-water events minor, rare or non-existent, slight uniform increase in amount of inflow, or trivial alteration of hydrodynamics.
<0.9 - 0.8	***B*** *Highly Functioning*	Unnatural drawdown events occasional, short duration and/or mild; or uniform depletion up to 20%; or mild to moderate reduction of peak flows or capacity of water to perform work.	Occasional unnatural high-water events, short in duration and/or mild in intensity; or uniform augmentation up to 20%; or mild to moderate increase of peak flows or capacity of water to perform work.
<0.8 - 0.7	***C*** *Functioning*	Unnatural drawdown events common and of mild to moderate intensity and/or duration; or uniform depletion up to 50%; or moderate to substantial reduction of peak flows or capacity of water to perform work.	Common occurrence of unnatural high-water events, of a mild to moderate intensity and/or duration; or uniform augmentation up to 50%; or moderate to substantial increase of peak flows or capacity of water to perform work.
<0.7 - 0.6	***D*** *Functioning Impaired*	Unnatural drawdown events occur frequently with a moderate to high intensity and/or duration; or uniform depletion up to 75%; or substantial reduction of peak flows or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**	Common occurrence of unnatural high-water events, some of which may be severe in nature or exist for a substantial portion of the growing season; or uniform augmentation more than 50% or capacity of water to perform work. **Wetlands with actively managed or wholly artificial hydrology will usually score in this range or lower.**
<0.6	***F*** *Non-functioning*	Water source diminished enough to threaten or extinguish wetland hydrology in the AA.	Frequency, duration or magnitude of unnaturally high-water great enough to change the fundamental characteristics of the wetland.

Variable 3 Score 0.85

Variable 4: Water Distribution

This variable is concerned with hydrologic connectivity ***within*** *the AA. It is a measure of alteration to the spatial distribution of surface and groundwater within the AA. These alterations are manifested as local changes to the hydrograph and generally result from geomorphic modifications within the AA. To score this variable, identify stressors within the AA that alter flow patterns and impact the hydrograph of the AA, including localized increases or decreases to the depth or duration of the water table or surface water.*

Because the wetland's ability to distribute water in a characteristic fashion is fundamentally dependent on the condition of its water source, ***in most cases the Water Source variable score will define the upper limit Water Distribution score****. For example, if the Water Source variable is rated at 0.85, the Water Distribution score will usually have the potential to attain a maximum score of 0.85. Additional stressors within or outside the lower end of the AA effecting water distribution (e.g., ditches and levees) will reduce the score from the maximum value.*

Scoring rules:

1. Identify impacts to the natural distribution of water throughout the AA and catalog them in the stressor table.

2. Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. In most cases, the Water Source variable score will set the upper limit for the Water Distribution score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Ponding/Impoundment	
✓	Culverts	Culvert(s) along creek.
	Road Grades	
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Enlarged Channel	
	Artificial Banks/Shoreline	
	Weirs	
	Dikes/Levees/Berms	
	Diversions	
	Sediment/Fill Accumulation	

Variable Score	Condition Grade	Non-riverine	Riverine
1.0 - 0.9	***A*** *Reference Standard*	Little or no alteration has been made to the way in which water is distributed throughout the wetland. AA maintains a natural hydrologic regime.	Natural active floodplain areas flood on a normal recurrence interval. No evidence of alteration of flooding and subirrigation duration and intensity.
<0.9 - 0.8	***B*** *Highly Functioning*	Less than 10% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in less than a 2 in. (5 cm) change in mean growing season water table elevation.	Channel-adjacent areas have occasional unnatural periods of drying or flooding; or uniform shift in the hydrograph less than typical root depth.
<0.8 - 0.7	***C*** *Functioning*	Between 10 and 33% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 4 in. (5 cm) or less change in mean growing season water table elevation.	In channel-adjacent area, periods of drying or flooding are common; or uniform shift in the hydrograph near root depth.
<0.7 - 0.6	***D*** *Functioning Impaired*	33 to 66% of the AA is affected by *in situ* hydrologic alteration; or more widespread impacts result in a 6 in. (15 cm) or less change in mean growing season water table elevation. Water table behavior must still meet jurisdictional criteria to merit this rating.	Adjacent to the channel, unnatural periods of drying or flooding are the norm; or uniform shift in the hydrograph greater than root depth.
<0.6	***F*** *Non-functioning*	More than 66% of the AA is affected by hydrologic alteration which changes the fundamental functioning of the wetland system, generally exhibited as a conversion to upland or deep water habitat.	Historical active floodplain areas are almost never wetted from overbank flooding, and/or groundwater infiltration is effectively cut off.

Variable 4 Score 0.85

Variable 5: Water Outflow

This variable is concerned with ***down-gradient*** *hydrologic connectivity and the flow of water and water-borne materials and energy out of the AA. In particular it illustrates the degree to which the AA can support the functioning of down-gradient habitats. It is a measure of impacts that affect the hydrologic outflow of water including the passage of water through its normal low- and high-flow surface outlets, infiltration/groundwater recharge, and the energetic characteristics of water delivered to dependent habitats. In some cases, alteration of evapotranspiration rates may be significant enough of a factor to consider in scoring. Score this variable by identifying stressors that impact the means by which water is exported from the AA. To evaluate this variable focus on how water, energy and associated materials are exported out of the AA and their ability it support down-gradient habitats in a manner consistent with their HGM (regional) subclass.*

Because the wetland's ability to export water and materials in a characteristic fashion is to a very large degree dependent the condition of its water source, as with the Water Distribution variable, ***in most cases the Water Source variable score will define the upper limit Water Outflow score****.*

Scoring rules:

1. Identify impacts to the natural outflow of water from the AA and catalog them in the stressor table.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines. Take in to account the cumulative effect of stressors on the wetland's ability to export water and water-borne materials. In most cases the Water Source variable will set the upper limit for the Water Outflow score.

✓	Stressors	Comments/description
	Alteration of Water Source	
	Ditches	
	Dikes/Levees	
	Road Grades	
✓	Culverts	Culvert(s) along creek.
	Diversions	
✓	Constrictions	Culvert(s) along creek.
	Channel Incision/Entrenchment	
	Hardened/Engineered Channel	
	Artificial Stream Banks	
	Weirs	
	Confined Bridge Openings	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors have little to no effect on the magnitude, timing or hydrodynamics of the AA water outflow regime.
<0.9 - 0.8	***B*** *Highly Functioning*	High- or low-water outflows are mildly to moderately affected, but at intermediate ("normal") levels flow continues essentially unaltered in quantity or character.
<0.8 - 0.7	***C*** *Functioning*	High- or low-water outflows are moderately affected, mild alteration of intermediate level outflow occurs; or hydrodynamics moderately affected.
<0.7 - 0.6	***D*** *Functioning Impaired*	Outflow at all stages is moderately to highly impaired resulting in persistent flooding of portions of the AA or unnatural drainage; or outflow hydrodynamics severely disrupted.
<0.6	***F*** *Non-functioning*	The natural outflow regime is profoundly impaired. Down-gradient hydrologic connection severed or nearly so. Alterations may cause widespread unnatural persistent flooding or dewatering of the wetland system.

Variable 5 Score 0.85

Variable 6: Geomorphology

This variable is a measure of the degree to which the geomorphic setting has been altered within the AA. Changes to the surface configuration and natural topography constitute stressors. Such stressors may be observed in the form of fill, excavation, dikes, sedimentation due to absence of flushing floods, etc. In riverine systems, geomorphic changes to the stream channel should be considered if the channel is within the AA (i.e, small is size). Alterations may involve the bed and bank (substrate embeddedness or morphological changes), stream instability, and stream channel reconfiguration. Geomorphic changes are usually ultimately manifested as changes to wetland surface hydrology and water relations with vegetation. Geomorphic alterations can also directly affect soil properties, such as near-surface texture, and the wetland chemical environment such as the redox state or nutrient composition in the rooting zone. In rating this variable, ***do not*** *include these resultant effects of geomorphic change; rather focus on the physical impacts* ***within the footprint*** *of the alteration* ***within the AA*** *– For example, the width and depth of a ditch or the size of a levee* ***within the AA*** *would describe the extent of the stressors. The secondary effects of geomorphic change are addressed by other variables. All alterations to geomorphology should be evaluated including small-scale impacts such as pugging, hoof sheer, and sedimentation which can be significant but not immediately obvious.*

Scoring Rules:

1. Identify impacts to geomorphological setting and topography within the AA and record them on the stressor checklist.

2.Considering all of the stressors identified, assign an overall variable score using the scoring guidelines.

✓		Stressors	Comments
	General	Dredging/Excavation/Mining	
✓		Fill, including dikes, road grades, etc.	Fill along portion of Bison ranch (to add building, road, etc.).
✓		Grading	Same as above.
		Compaction	
		Plowing/Disking	
		Excessive Sedimentation	
		Dumping	
		Hoof Shear/Pugging	
		Aggregate or Mineral Mining	
		Sand Accumulation	
	Channels Only	Channel Instability/Over Widening	
		Excessive Bank Erosion	
		Channelization	
		Reconfigured Stream Channels	
		Artificial Banks/Shoreline	
		Beaver Dam Removal	
		Substrate Embeddedness	
		Lack or Excess of Woody Debris	

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Topography essentially unaltered from the natural state, or alterations appear to have a minimal effect on wetland functioning and condition. Patch or microtopographic complexity may be slightly altered, but native plant communities are still supported.
<0.9 - 0.8	***B*** *Highly Functioning*	Alterations to topography result in small but detectable changes to habitat conditions in some or all of the AA; or more severe impacts exist but affect less than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Changes to AA topography may be pervasive but generally mild to moderate in severity. May include patches of more significant habitat alteration; or more severe alterations affect up to 20 % of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	At least one important surface type or landform has been eliminated or created; microtopography has been strongly impacted throughout most or all of the AA; or more severe alterations affect up to 50% of the AA. Evidence that widespread diminishment or alteration of native plant community exist due to physical habitat alterations. Most incidentally created wetland habitat such as that created by roadside ditches and the like would score in this range or lower.
<0.6	***F*** *Non-functioning*	Pervasive geomorphic alterations have caused a fundamental change in site character and functioning, commonly resulting in a conversion to upland or deepwater habitat.

Variable 6 Score 0.82

Variable 7: Water and Soil Chemical Environment

This variable concerns the chemical environment of the soil and water media within the AA, including pollutants, water and soil characteristics. The origin of pollutants may be within or outside the AA. Score this variable by listing indicators of chemical stress in the AA. Consider point source and non-point sources of pollution, as well as mechanical or hydrologic changes that alter the chemical environment. Because water quality frequently cannot be inferred directly, the presence of stressors is often identified by the presence of indirect indicators. Five sub-variables are used to describe the Water and Soil Chemical Environment: Nutrient Enrichment/Eutrophication/Oxygen; Sedimentation/Turbidity; Toxic Contamination/pH; Temperature; and Soil Chemistry and Redox Potential. Utilization of web-based data mining tools is highly recommended to help inform and support variable scores.

Scoring rules:

1. Stressors are grouped into sub-variables which have a similar signature or set of causes.
2. Use the indicator list to identify each stressor impacting the chemical environment of the AA.
3. For each sub-variable, determine its score using the scoring guideline table provided on the second page of the scoring sheet. Scoring sub-variables is carried out in exactly the same way as normal variable scoring.
   -If the AA is part of a water body that is recognized as impaired or recommended for TMDL development for one of the factors, then score that sub-variable 0.65 or lower.
4. Transcribe sub-variable scores to the following variable scoring page and compute the sum.
5. The lowest sub-variable score sets the letter grade range. The composite of sub-variables influences the score within that range.

Sub-variable	Stressor Indicator	✓	Comments	Sub-variable Score
SV 7.1 Nutrient Enrichment/ Eutrophication/ Oxygen (D.O.)	Livestock	✓	Bison ranch; grazing/trampling vegetation	0.80
	Agricultural Runoff	✓	Potential bison waste entering creek.	
	Septic/Sewage			
	Excessive Algae or Aquatic Veg.			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.2 Sedimentation/ Turbidity	Excessive Erosion			0.80
	Excessive Deposition			
	Fine Sediment Plumes			
	Agricultural Runoff	✓	Didn't note excessive turbidity due to bison ranch but may occur after rain events.	
	Excessive Turbidity			
	Nearby Construction Site			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.3 Toxic contamination/ pH	Recent Chemical Spills			0.80
	Nearby Industrial Sites			
	Road Drainage/Runoff			
	Livestock	✓	Potential bison waste entering creek.	
	Agricultural Runoff	✓	Potential bison waste entering creek.	
	Storm Water Runoff			
	Fish/Wildlife Impacts			
	Vegetation Impacts			
	Cumulative Watershed NPS			
	Acid Mine Drainage			
	Point Source Discharge			
	CDPHE Impairment/TMDL List			
	Metal staining on rocks and veg.			
SV 7.4 Temperature	Excessive Temperature Regime			0.90
	Lack of Shading			
	Reservoir/Power Plant Discharge			
	Industrial Discharge			
	Cumulative Watershed NPS			
	CDPHE Impairment/TMDL List			
SV 7.5 Soil chemistry/ Redox potential	Unnatural Saturation/Desaturation			0.88
	Mechanical Soil Disturbance			
	Dumping/introduced Soil			
	CDPHE Impairment/TMDL List			

Variable 7: Water and Soil Chemical Environment p.2

Sub-variable Scoring Guidelines

Variable Score	Condition Class	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stress indicators not present or trivial.
<0.9 - 0.8	***B*** *Highly Functioning*	Stress indicators scarcely present and mild, or otherwise not occurring in more than 10% of the AA.
<0.8 - 0.7	***C*** *Functioning*	Stress indicators present at mild to moderate levels, or otherwise not occurring in more than 33% of the AA.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stress indicators present at moderate to high levels, or otherwise not occurring in more than 66% of the AA
<0.6	***F*** *Non-functioning*	Stress indicators strongly evident throughout the AA at levels which apparently alter the fundamental chemical environment of the wetland system

Input each sub-variable score from p. 1 of the V7 data form and calculate the sum.

Nutrient enrichment/ Eutrophication/ Oxygen (D.O.)		Sedimentation/ Turbidity		Toxic contamination/ pH		Temperature		Soil chemistry/ Redox potential		Sum of Sub-variable Scores
0.80	+	0.80	+	0.80	+	0.90	+	0.88	=	4.18

Use the table to score the Chemical Environment Variable circling the applicable scoring rules.

Variable Score	Condition Grade	Scoring Rules		
		Single Factor		**Composite Score**
1.0 - 0.9	***A*** *Reference Standard*	No single factor scores < 0.9		The factor scores sum > 4.5
<0.9 - 0.8	***B*** *Highly Functioning*	Any single factor scores ≥ 0.8 but < 0.9		The factor scores sum >4.0 but ≤4.5
<0.8 - 0.7	***C*** *Functioning*	Any single factor scores ≥ 7.0 but < 0.8		The factor scores sum >3.5 but ≤ 4.0
<0.7 - 0.6	***D*** *Functioning Impaired*	Any single factor scores ≥ 0.6 but <0.7		The factor scores sum >3.0 but ≤3.5
< 0.6	***F*** *Non-functioning*	Any single factor scores < 0.6		The factor scores sum < 3.0

Variable 7 Score 0.83

Variable 8: Vegetation Structure and Complexity

This variable is a measure of the condition of the wetland's vegetation relative to its native state. It particularly focuses on the wetland's ability to perform higher-order functions such as support of wildlife populations, and influence primary functions such as flood-flow attenuation, channel stabilization and sediment retention. Score this variable by listing stressors that have affected the structure, diversity, composition and cover of each vegetation stratum that would normally be present in the HGM (regional) subclass being assessed. For this variable, stressor severity is a measure of how much each vegetation stratum differs functionally from its natural condition or from the natural range of variability exhibited the HGM subclass or regional subclass. This variable has four sub-variables, each corresponding to a stratum of vegetation: Tree Canopy; Shrub Layer; Herbaceous Layer; and Aquatics.

Rules for Scoring:

1. Determine the number and types of vegetation layers present within the AA. Make a judgment as to whether additional layers were historically present using direct evidence such as stumps, root wads or historical photographs. Indirect evidence such as local knowledge and expert opinion can also be used in this determination.

2. Do not score vegetation layers that would not normally be present in the wetland type being assessed.

3. Estimate and record the current coverage of each vegetation layer at the top of the table.

4. Record the Reference Standard or expected percent coverage of each vegetation layer to create the sub-variable weigh factor. The condition of predominant vegetation layers has a greater influence on the variable score than do minor components.

5. Enter the percent cover values as decimals in the row of the stressor table labeled " Reference/expected Percent Cover of Layer". Note, percentages will often sum to more than 100% (1.0).

6. Determine the severity of stressors acting on each individual canopy layers, indicating their presence with checks in the appropriate boxes of the stressor table. The difference between the expected and observed stratum coverages is one measure of stratum alteration.

7. Determine the sub-variable score for each valid vegetation layer using the scoring guidelines on the second page of the scoring sheet. Enter each sub-variable score in the appropriate cell of the row labeled "Veg. Layer Sub-variable Score". If a stratum has been wholly removed score it as 0.5.

8. Multiply each layer's *Reference Percent Cover of Layer* score by its Veg. Layer Sub-variable scores and enter the products in the labled cells. These are the weighted sub-variable scores. Individually sum the *Reference Percent Cover of Layer* and *Weighted Sub-variables scores.*

9. Divide the sum of "Veg. Layer Sub-variable Scores" by the total coverage of all layers scored. This product is the Variable 8 score. Enter this number in the labeled box at the bottom of this page.

	Vegetation Layers				
Current % Coverage of Layer	5	30	85	10	
Stressor	**Tree**	**Shrub**	**Herb**	**Aquatic**	**Comments**
Brush Cutting/Shrub Removal		X			Little shrub removal likely around bison ranch building
Dewatering					
Excessive Herbivory					
Exotic/Invasive spp.					
Herbicide					
Livestock Grazing			X		Some livestock grazing - bison ranch (grazing shifts noted so vegetation doesn't get too impacted.
Loss of Zonation/Homogenization					
Mowing/Haying					
Noxious Weeds					
Over Saturation					
Tree Harvest					
DIFFERENCE BETWEEN CURRENT COVERAGE AND REFERENCE/EXPECTED					

Reference/Expected % Cover of Layer	10	+	30	+	85	+	10	=	135
	x		x		x		x		
Veg. Layer Sub-variable Score	0.8		0.85		0.9		0.9	÷	**See sub-variable scoring guidelines on following page**
	=		=		=		=		
Weighted Sub-variable Score	8.00	+	25.50	+	76.50	+	9.00	=	119

Variable 8 Score	0.88

Variable 8: Vegetation Structure and Complexity p. 2

Sub-variable 8 Scoring Guidelines:

Based on the list of stressors identified above, rate the severity of their cumulative effect on vegetation structure and complexity for each vegetation layer.

Variable Score	Condition Grade	Scoring Guidelines
1.0 - 0.9	***A*** *Reference Standard*	Stressors not present or with an intensity low enough as to not detectably affect the structure, diversity or composition of the vegetation layer.
<0.9 - 0.8	***B*** *Highly Functioning*	Stressors present at intensity levels sufficient to cause detectable, but minor, changes in layer composition. Stress related change should generally be less than 10% for any given attribute (e.g., 10% cover of invasive, 10% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as high as 33% for a given attribute if stressors are confined to patches comprising less than 10% of the wetland.
<0.8 - 0.7	***C*** *Functioning*	Stressors present with enough intensity to cause significant changes in the character of vegetation, including alteration of layer coverage, structural complexity and species composition. The vegetation layer retains its essential character though. AA's with a high proportion of non-native grasses will commonly fall in this class. Stress related change should generally be less than 33% for any given attribute (e.g., 33% cover of invasive, 33% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 66% for a given attribute if stressors are confined to patches comprising less than 25% of the wetland.
<0.7 - 0.6	***D*** *Functioning Impaired*	Stressor intensity severe enough to cause profound changes to the fundamental character of the vegetation layer. Stress-related change should generally be less than 66% for any given attribute (e.g., 66% cover of invasive, 66% reduction in richness or cover) if the stressor is evenly distributed throughout the wetland. Stress related change could be as much as 80% of a given attribute if stressors are confined to patches comprising less than 50% of the wetland.
<0.6	***F*** *Non-functioning*	Vegetation layer has been completely removed or altered to the extent that is no longer comparable to the natural structure, diversity and composition.

FACWet Score Card

Scoring Procedure:

1. Transcribe variable scores from each variable data sheet to the corresponding cell in the variable score table.
2. In each Functional Capacity Index (FCI) equation, enter the corresponding variable scores in the equation cells. Do not enter values in the crossed cells lacking labels.
3. Add the variable scores to calculate the total functional points achieved for each function.
4. Divide the total functional points achieved by the functional points possible. The typical number of total points possible is provided, however, if a variable is added or subtracted to FCI equation the total possible points must be adjusted.
5. Calculate the Composite FCI, by adding the FCI scores and dividing by the total number of functions scored (usually 7).
6. If scoring is done directly in the Excel spreadsheet, all values will be transferred and calculated automatically.

VARIABLE SCORE TABLE

Buffer & Landscape Context	**Variable 1:**	**Habitat Connectivity (Connect)**	0.73
	Variable 2:	**Contributing Area (CA)**	0.77
Hydrology	**Variable 3:**	**Water Source (Source)**	0.85
	Variable 4:	**Water Distribution (Dist)**	0.85
	Variable 5:	**Water Outflow (Outflow)**	0.85
Abiotic and Biotic Habitat	**Variable 6:**	**Geomorphology (Geom)**	0.82
	Variable 7:	**Chemical Environment (Chem)**	0.83
	Variable 8:	**Vegetation Structure and Complexity (Veg)**	0.88

Functional Capacity Indices

Function 1 -- Support of Characteristic Wildlife Habitat

$V1_{connect}$	+	$V2_{CA}$	+	$(2 \times V8_{veg})$						Total Functional Points		FCI
0.73	+	0.77	+	1.76	+		+		=	3.26	÷ 4 =	0.81

Function 2 -- Support of Characteristic Fish/aquatic Habitat

$(3 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$					
2.55	+	1.70	+	1.70	+	0.82	+	0.83	+		=	7.60	÷ 9 =	0.84

Function 3 -- Flood Attenuation

$V2_{CA}$	+	$(2 \times V3_{source})$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V8_{veg}$			
0.77	+	1.70	+	1.70	+	1.70	+	0.82	+	0.88	=	7.57	÷ 9 =	0.84

Function 4 -- Short- and Long-term Water Storage

$V3_{source}$	+	$(2 \times V4_{dist})$	+	$(2 \times V5_{outflow})$		$V6_{geom}$							
0.85	+	1.70	+	1.70	+	0.82	+		+		=	5.07	÷ 6 =	0.85

Function 5 -- Nutrient/Toxicant Removal

$(2 \times V2_{CA})$	+	$(2 \times V4_{dist})$	+	$V6_{geom}$		$V7_{chem}$							
1.54	+	1.70	+	0.82	+	0.83	+		+		=	4.89	÷ 6 =	0.82

Function 6 -- Sediment Retention/Shoreline Stabilization

$V2_{CA}$	+	$(2 \times V6_{geom})$	+	$(2 \times V8_{veg})$									
0.77	+	1.64	+	1.76	+		+		+		=	4.17	÷ 5 =	0.83

Function 7 -- Production Export/Food Chain Support

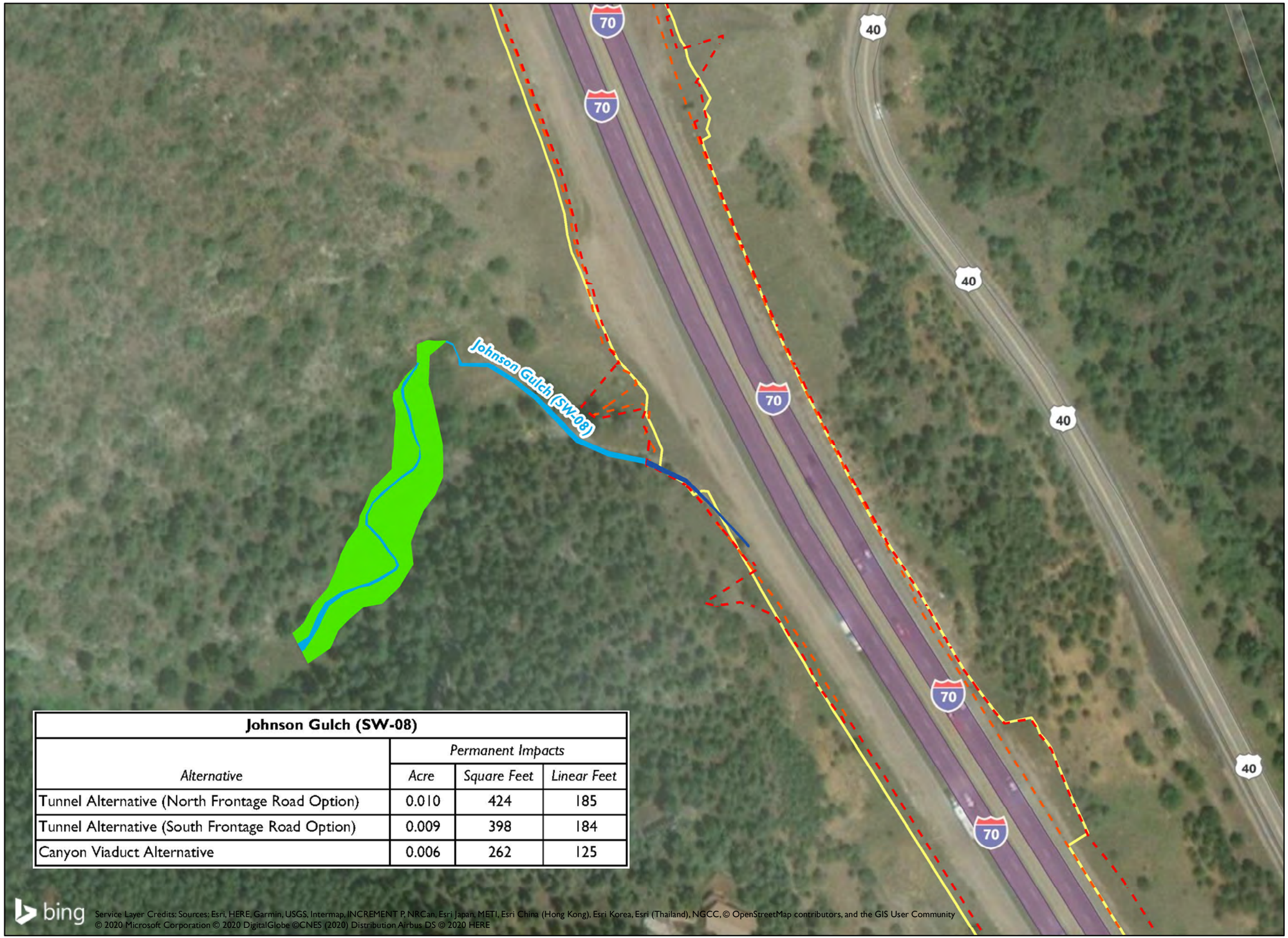
$V1_{connect}$	+	$(2 \times V5_{outflow})$	+	$V6_{geom}$	+	$V7_{chem}$	+	$(2 \times V8_{veg})$					
0.73	+	1.70	+	0.82	+	0.83	+	1.76	+		=	5.84	÷ 7 =	0.83

Sum of Individual FCI Scores 5.83

Divide by the Number of Functions Scored ÷ 7

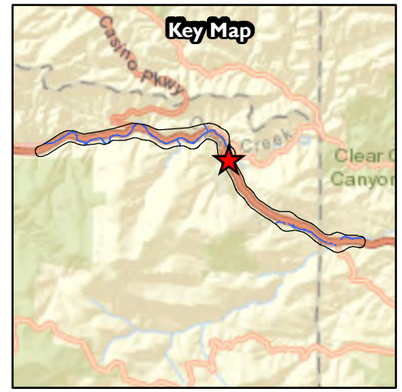
Composite FCI Score 0.83

Appendix G Impact Mapbook



Johnson Gulch (SW-08)			
Alternative	*Permanent Impacts*		
	Acre	*Square Feet*	*Linear Feet*
Tunnel Alternative (North Frontage Road Option)	0.010	424	185
Tunnel Alternative (South Frontage Road Option)	0.009	398	184
Canyon Viaduct Alternative	0.006	262	125

bing
Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE



Legend

- Limits of Disturbance Tunnel Alternative (North Frontage Road Option)
- Limits of Disturbance Tunnel Alternative (South Frontage Road Option)
- Limits of Disturbance Canyon Alternative
- Delineated Wetland
- Delineated Suface Water
- Impacted Surface Water

1 inch = 100 feet

0 50 100 Feet

I-70 Floyd Hill to Veterans Memorial Tunnels

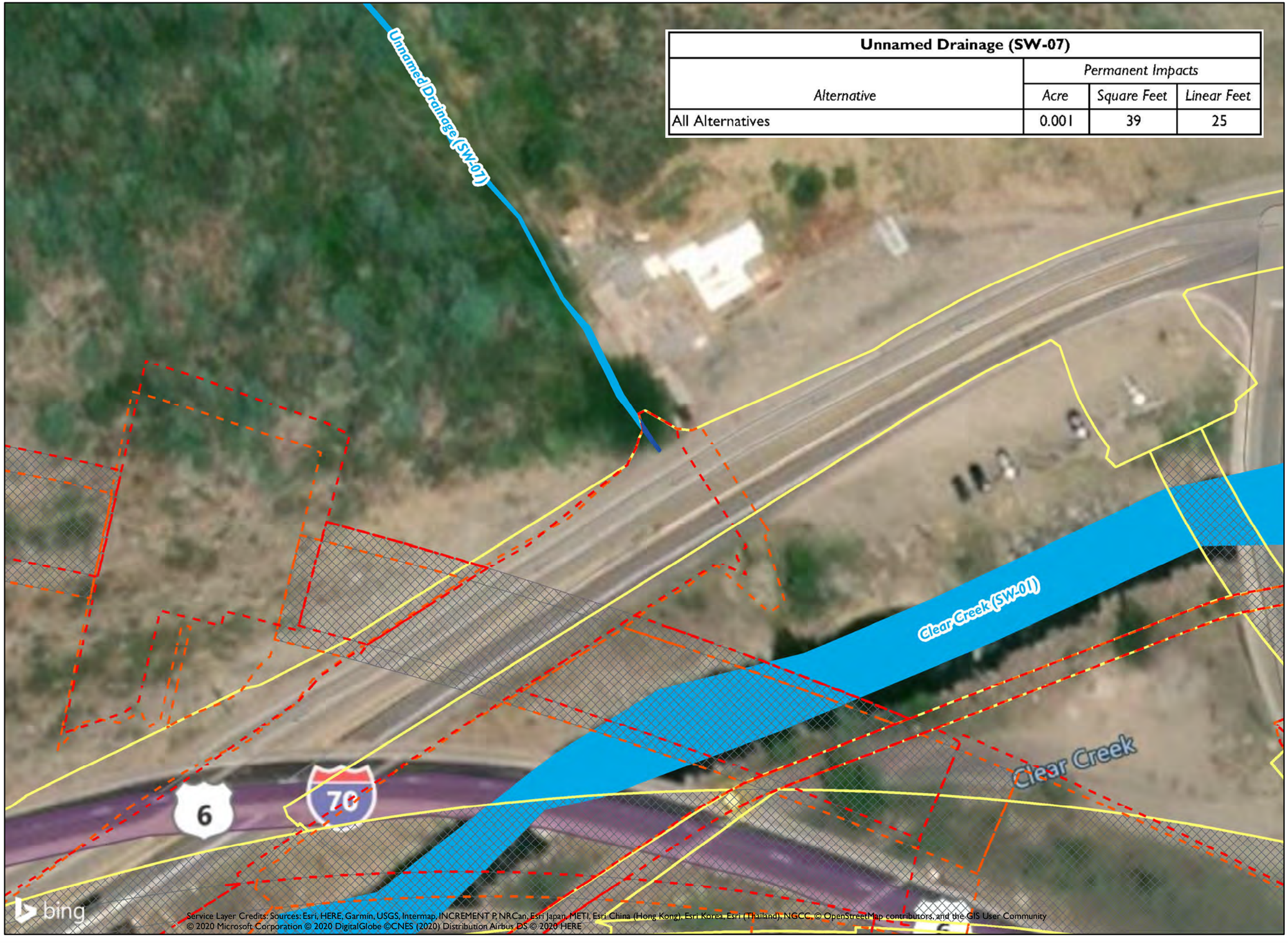
WATERS OF THE US - IMPACTS

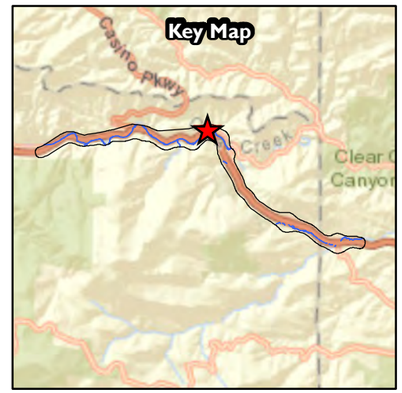
I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County, Colorado	Drawn By: MJS	Johnsons Gulch
Pinyon Project Number: 1/17-790-01	Reviewed By: CAT	Date: 5/15/2020

Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_Impacts_JG.mxd

Unnamed Drainage (SW-07)			
Alternative	*Permanent Impacts*		
	Acre	*Square Feet*	*Linear Feet*
All Alternatives	0.001	39	25





Legend

- Limits of Disturbance Tunnel Alternative (North Frontage Road Option)
- Limits of Disturbance Tunnel Alternative (South Frontage Road Option)
- Limits of Disturbance Canyon Alternative
- Proposed Structure/Bridge
- Delineated Surface Water
- Impacted Surface Water

1 inch = 50 feet

0 25 50 Feet

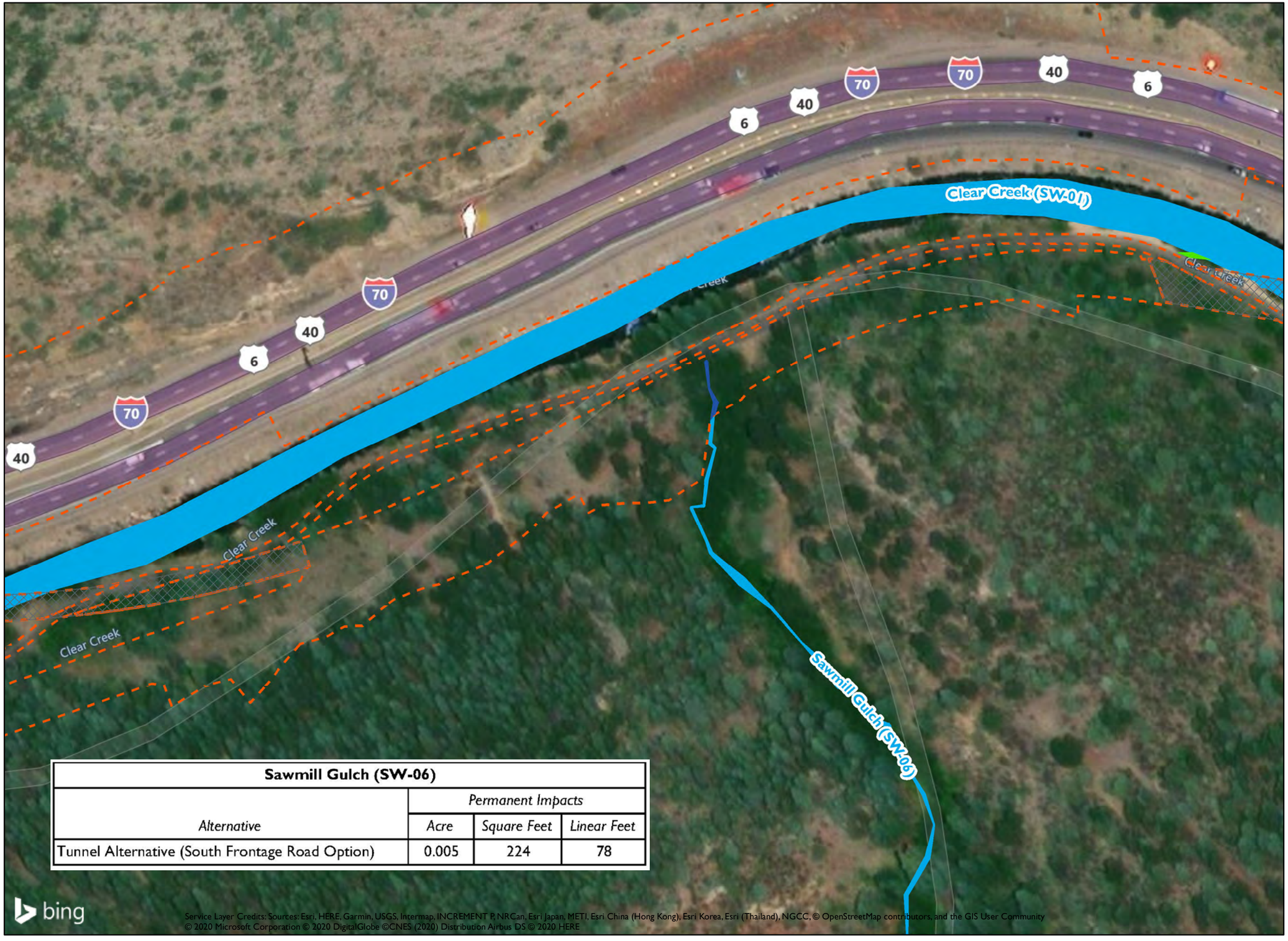
I-70 Floyd Hill to Veterans Memorial Tunnels

WATERS OF THE US - IMPACTS

I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Unnamed Drainage
Pinyon Project Number: 1/17-790-01	Reviewed By: CAT	Date: 5/15/2020

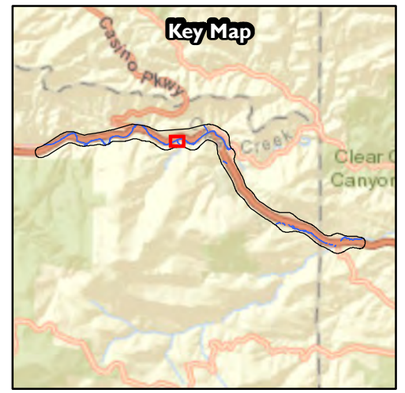
Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_Impacts_UnnamedDrainage.mxd



Sawmill Gulch (SW-06)			
	Permanent Impacts		
Alternative	Acre	Square Feet	Linear Feet
Tunnel Alternative (South Frontage Road Option)	0.005	224	78

bing

Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE



Legend

- Limits of Disturbance Tunnel Alternative (South Frontage Road Option)
- Proposed Structure/Bridge
- Delineated Wetland
- Delineated Surface Water
- Impacted Surface Water

1 inch = 100 feet

0 50 100 Feet

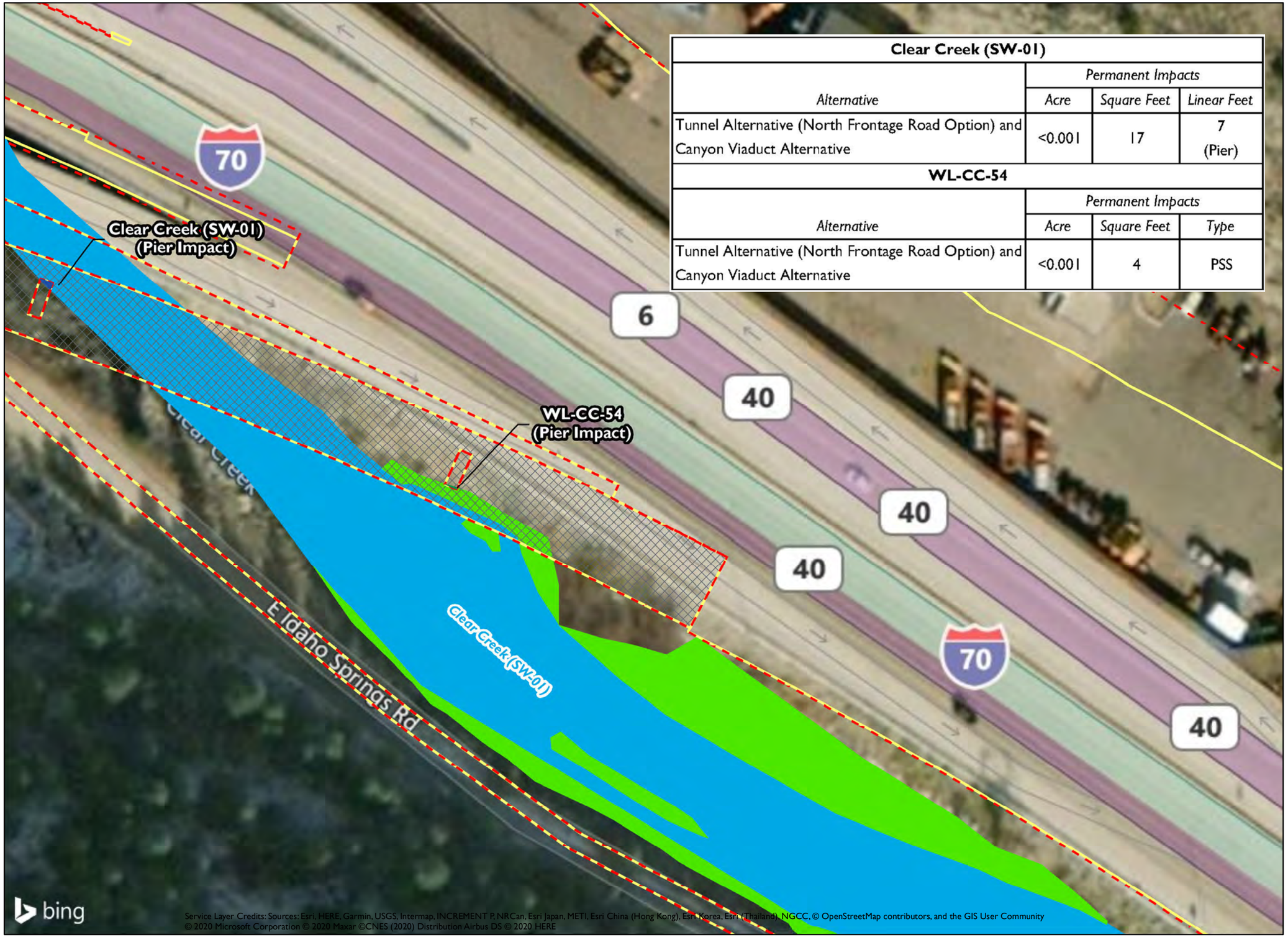
I-70 Floyd Hill to Veterans Memorial Tunnels

WATERS OF THE US - IMPACTS

I-70 Floyd Hill to
Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Sawmill Gulch
Pinyon Project Number: 1/17-790-01	Reviewed By: CAT	Date: 5/15/2020

Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_Impacts_SG_South.mxd



Clear Creek (SW-01)			
	Permanent Impacts		
Alternative	Acre	Square Feet	Linear Feet
Tunnel Alternative (North Frontage Road Option) and Canyon Viaduct Alternative	<0.001	17	7 (Pier)

WL-CC-54			
	Permanent Impacts		
Alternative	Acre	Square Feet	Type
Tunnel Alternative (North Frontage Road Option) and Canyon Viaduct Alternative	<0.001	4	PSS

Legend

- Limits of Disturbance Canyon Alternative
- Limits of Disturbance Tunnel Alternative (North Frontage Road Option)
- Proposed Structure/Bridge
- Delineated Wetland
- Delineated Surface Water
- Impacted Surface Water
- Impacted Wetland

1 inch = 50 feet

0 25 50 Feet

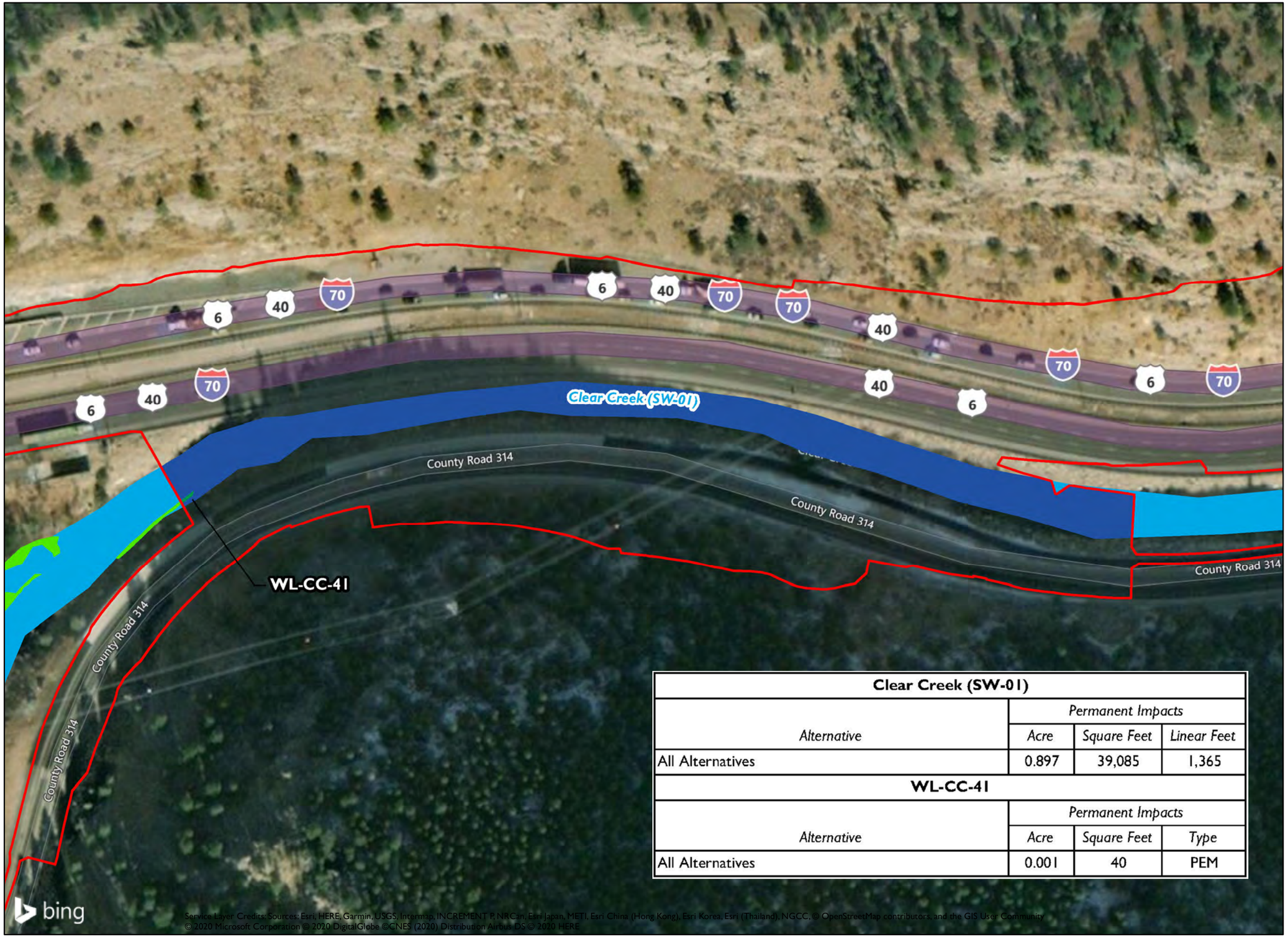
I-70 Floyd Hill to Veterans Memorial Tunnels

WATERS OF THE US - IMPACTS

I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	WL-CC-54/Clear Creek
Pinyon Project Number: 1/17-790-01	Reviewed By: CAT	Date: 7/23/2020

Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_Impacts_Bridge.mxd



Service Layer Credits: 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
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

Clear Creek (SW-01)			
	Permanent Impacts		
Alternative	*Acre*	*Square Feet*	*Linear Feet*
All Alternatives	0.897	39,085	1,365

WL-CC-41			
	Permanent Impacts		
Alternative	*Acre*	*Square Feet*	*Type*
All Alternatives	0.001	40	PEM

Legend

- Limits of Disturbance All Alternatives
- Delineated Wetland
- Delineated Surface Water
- Impacted Wetland
- Impacted Surface Water

1 inch = 100 feet

0 50 100 Feet

I-70 Floyd Hill to Veterans Memorial Tunnels

WATERS OF THE US - IMPACTS

I-70 Floyd Hill to Veterans Memorial Tunnels Project
Clear Creek and Jefferson Counties, Colorado

Site Location: Clear Creek County and Jefferson County, Colorado	Drawn By: MJS	Clear Creek
Pinyon Project Number: 1/17-790-01	Reviewed By: CAT	Date: 5/15/2020

Document Path: Z:\PROJECTS\2017\11779001 I-70 Floyd Hill to VMT\Figures\ArcMap\MXDs\WUS\FloydHill_WUS_Impacts_CCRelocation.mxd

Appendix H Stream and Wetland Ecological Enhancement Program Issue Task Force Meeting Notes

COLORADO
Department of Transportation
Region 1

Region 1 West Program
425 A Corporate Circle
Golden, CO 80401

Floyd Hill – SWEEP Committee Meeting #3

Meeting Summary

May 14, 2020, 1:00 PM to 4:00 PM

Virtual Meeting – Google Hangouts

1. Welcome and Agenda Review

Vanessa Henderson, CDOT, welcomed the group, explained some basics of the online format and Google Hangouts platform, and did a roll call of participants:

- Amy Saxton, Clear Creek County
- Anthony Pisano, Atkins
- Billy Bunch, Environmental Protection Agency (EPA)
- Carol Coates, Atkins
- Chase Taylor, Pinyon Environmental
- Gary Frey, Trout Unlimited
- Holly Huyck, Upper Clear Creek Watershed Association
- Jim Ford, Black Hawk
- Jordan Falzetti, Atkins
- Joe Walter, Colorado Parks and Wildlife (CPW)
- Josh Giovannetti, CDOT
- Keith Hidalgo, Atkins
- Kevin Shanks, THK
- Kristin Salamack, US Fish and Wildlife Service (CDOT liaison)
- Mandy Whorton, Peak Consulting Group
- Matt Hubner, EPA
- Matt Montgomery, US Army Corps of Engineers (USACE)
- Melinda Urban, Federal Highway Administration (FHWA)
- Neil Ogden, CDOT
- Paul Winkle, CPW
- Becky Pierce, CDOT
- Scott Garncarz, Colorado Department of Public Health and Environment, Water Quality Control Division
- Stephanie Gibson, FHWA
- Tammy Eggers, Atkins
- Tom Matthews, US Forest Service
- Valerie Thompson-Van Ryzin, US Forest Service

Vanessa reviewed the agenda and thanked everyone for the robust participation. The presentation from the meeting is attached to these notes for reference.

2. Project Status and Alternatives

Vanessa reviewed project updates since the SWEEP Committee met in October 2018 ahead of the 109/110 ballot initiatives. After the failure of those initiatives, CDOT reassessed and regrouped in 2019, completing existing conditions surveys and reports and continuing to pursue Project funding. CDOT also developed a new alternative, the Canyon Viaduct Alternative. The new CDOT Administration also conducted a 10-year project planning effort to identify a 10-year pipeline of priority projects for the state. The Floyd Hill Project was validated as a priority through this process, and in late 2019, CDOT obtained funding to complete the EA including both the Tunnel and Canyon Viaduct Alternatives. The EA is expected to be released in Fall 2020 with a public hearing in late Fall 2020/early Winter 2021. A decision document would be released in Spring 2021 if construction funding for the Project is identified.

Vanessa reviewed the Project alternatives. She explained that the major Project elements are the same in both alternatives but differ in how they are implemented between US 6 and Hidden Valley interchanges (referred to as the central section of the Project).

Gary Frey asked about the current thinking on the tunnel design length. Vanessa said it was about 2,200 feet.

3. Water Quality and Aquatic Conditions

Mandy Whorton reviewed the existing conditions in the Project area and reviewed the SWEEP framework and issues raised in the previous 2017 and 2018 meetings. Clear Creek, Beaver Brook, Sawmill Gulch, and Johnson Gulch are all located within the Project Area, and Clear Creek is located adjacent to I-70 throughout the western portion of the project from US 6 to the Veterans Memorial Tunnels. Clear Creek through the Project area is highly valued for rafting, fishing, and recreation. While there are some areas with wetlands and riparian habitat, much of the creek is channelized and constrained. Beaver Brook crosses I-70 in the eastern portion of the project and, within the project area, supports high-quality wetland and riparian habitat, including potential Preble's Meadow Jumping Mouse habitat. Both Clear Creek and Beaver Brook have regulated floodplains and fall under Section 404 jurisdiction and Senate Bill 40 (SB 40) certification. Sawmill Gulch and Johnson Gulch flow to Clear Creek and are under Section 404 jurisdiction. Neither has a regulated floodplain, and Sawmill Gulch lacks riparian habitat under SB 40 certification requirements.

The SWEEP MOU and Implementation Matrix considerations for project development nearly all apply to the Project. Issues raised at previous SWEEP meetings include water quality, including coordination of best management practices (BMPs) with maintenance practices; wetlands; and issues associated with realigning Clear Creek.

Question: In the stream relocation area will you be reducing the width of the creek?

Answer: No, the width won't change. But the stream channel takes up most of the space so there isn't a lot of room to widen the channel or do any bank mitigation in this area. Tammy Eggers confirmed that the flow would be the same and that to meet peak flows, the channel could not narrow.

Question: What is planned for the wetlands around Black Hawk intake? Are you planning to construct additional wetlands in this area?

Answer: This is identified as an area where there is potential for mitigation to occur, but the team is aware that any work in the area cannot affect Black Hawk's water intake.

4. Water Quality

Stochastic Empirical Loading and Dilution Model (SELDM) Modeling

Jordan Falzetti provided an overview of the SELDM model and its use for the Project to inform the design and water quality approach.

Question: How were the differences between the alternatives analyzed with respect to the proposed scenario?

Answer: The Project was not analyzed separately for the different alternatives because the model is not detailed enough for that. The existing conditions were compared to the results for the Project (both alternatives).

Josh Giovannetti explained that CDOT hasn't had a lot of experience using SELDM modeling and for this project, it is being used primarily as a guideline to look at treatment effectiveness.

Holly Huyck said she is very familiar with the model based on her previous experience at CDOT in helping to develop and implement it. She suggested that the differences for the total impervious surface for each alternative should be calculated, and if it is more than 10 percent, additional analysis/modeling may be appropriate. She offered that an offline discussion might be beneficial. Josh said he would work with Vanessa to set up a meeting to discuss the details offline. (Subsequent to the meeting, Atkins provided impervious surface numbers. The existing is 68 acres, the Tunnel Alternative is 90 acres, and the Canyon Viaduct Alternative is 89 acres.)

BMP Selection

Jordan reviewed the Project's pollutant-focused, tiered approach to water quality. The approach incorporates formal water quality BMPs, such as detention basins, to mitigate the majority of roadway runoff and informal water quality BMPs, such as vegetated ditches, to mitigate roadway runoff with site constraints. He noted that, as discussed at the last SWEEP meeting in October 2018, the Sediment Control Action Plan (SCAP)-recommended BMPs focused on traction sand treatment and numerous, small facilities that were difficult for CDOT maintenance to access and maintain. The proposed BMPs reflect the new approach and have been updated to reflect changes in Project alternatives.

Jordan reviewed the water quality needs and proposed BMPs by Project section. In the east section (Floyd Hill), the main issue is chlorides, and because of the steep grade at Floyd Hill, this area receives both high and frequent application of de-icers. The primary treatment is through vegetated shoulders and engineered ditches. Constructed wetlands are also being considered in the area where de-icing agents concentrate; if they are successfully established, they can be very effective with uptake of chlorides.

In the central and west sections (Clear Creek), sediments, including metals, and chlorides need to be treated. In this area, larger basins could be included and are proposed under both the Tunnel and Canyon Viaduct Alternatives. The Tunnel Alternative has opportunities for larger basins in comparison to the Canyon Viaduct Alternative.

Question: What was the percentage of chloride reduction assumed for the BMPs in the model?

Answer: Between 1 and 10 percent for ponds and between 10 and 20 percent for swales

Question: How will the swales be maintained?

Answer: CDOT maintenance would maintain swales. Because pollutants would flow over natural vegetation on the way to swales to help removal (vegetation uptake), so even if swales are not well maintained, the system would still reduce pollutants and concentration of chloride. Josh stated that these are initial recommendations that will be refined in the next level of design.

Question: Is there evidence of arsenic in the area that would make it a concern? It was an issue on the Superfund site upstream.

Answer: Josh reviewed the Twin Tunnels Monitoring Report and noted that arsenic was not monitored, and after double checking the list of pollutants, said arsenic is listed on the MS4 Permit. Holly said the Colorado Water Quality Control Commission (CWQCC) is holding off on standards for arsenic because it is naturally occurring and found in almost every watershed in the state. Further, if arsenic was being treated, the same recommendations would apply as to other metals that are being captured in sediment ponds.

Holly expressed support for including larger detention facilities in the design because they are easier and more efficient for CDOT maintenance to clear out, which makes them more effective.

(Subsequent to the meeting, Atkins provided criteria in how pollutants were selected as project area in not in CDOT's municipal separate storm sewer system (MS4) Permit area. Pollutant selection was based on the EPA's 2016 Waterbody Report, with this section of Clear Creek having a 303(d) listed impairment for cadmium, lead, temperature, and zinc. Upon further review, stakeholder coordination recommended additional pollutants to review which finalize the pollutants of concern as cadmium, chloride, copper, lead, sediment (total suspended solids), and zinc.

Question: Did you consider the potential for airborne chlorides? University of Northern Colorado (UNC) did a study on Straight Creek in 2007 that indicated that airborne chlorides

disturbed from vehicles driving on dry roads were aerosolizing and damaging the pine forest up to 100 yards away.

Answer: This would be similar to other re-entrained particles that CDOT has BMPs, like street sweeping, to mitigate. Holly explained that CDOT has sponsored at least three different studies, and they don't all agree with each other. A common conclusion is that avoiding overspray in the application is one of the most effective ways to reduce chlorides in roadside vegetation. Also, it appears mag chloride affects riparian and aspens less than the evergreen trees, probably because it is applied during winter when plants and trees are dormant.

5. Wetlands and Waters of the US

Chase Taylor reviewed preliminary Project direct impacts for wetlands and open waters. The Tunnel and Canyon Viaduct Alternatives have slightly different impacts, as do the North and South frontage road options for the Tunnel Alternative. The largest Project impact is from relocation of Clear Creek at the west end of the Project, which is common to the alternatives and both design options.

Small impacts, less than an acre total, to many of the delineated waters would occur under all Project alternatives and design options. Wetland impacts are less than one-thousandth of an acre under all alternatives (40 to 44 square feet).

The proposed relocation of Clear Creek under both Project alternatives and design options represents the majority of Project impacts and is the focus of further discussion in this meeting regarding mitigation and enhancement opportunities.

Question: The numbers in the tables are hard to read. Is information presented in linear feet for the streams? That is usually how impacts are presented.

Answer: Matt said that the USACE likes to see acres and square feet as well, particularly in comparing alternatives. Chase confirmed the impacts are presented with all three metrics.

Question: Billy Bunch asked if the relocation of Clear Creek was considered a permanent or temporary impact, and is a full loss of those stream segments expected? Would mitigation be proposed?

Answer: These are considered permanent impacts because the creek would be relocated but the volume of water and width of the channel are not changing. The team is planning to mitigate for this as permanent impact but unlikely to be able to include much mitigation in the direct impact area.

Question: Is FACWet being performed for adjacent wetlands to inform the indirect impacts?

Answer: FACWet was performed for all delineated wetlands, not just those affected so that information is available. Indirect impacts associated with ground disturbance would be avoided with CDOT standard specifications for keeping a distance from known wetlands.

Section 404 Permitting

Becky Pierce reviewed Section 404 permitting.

The relocation of Clear Creek does not appear to fall under any Nationwide permit, and CDOT is planning for an Individual Permit. Matt confirmed that an Individual Permit would be needed.

Matt and Vanessa discussed permitting in preparation for the SWEEP meeting, and USACE recommended an informal Section 404/NEPA Merger process be followed. Vanessa provided the draft purpose and need and other background materials to Matt, and he indicated that he thought the documentation would be sufficient for the informal Merger process and would be able to be used by USACE in its permitting. Becky said since this is an EA, it is the choice of CDOT and the USACE to determine whether to follow the Merger process, and CDOT agrees that an informal process makes sense.

Other impacts of the Project meet Nationwide permit conditions, but Matt clarified that if any of the single crossings for a linear project result in a need for an Individual Permit, USACE expects all impacts would be permitted under that Individual Permit.

Becky mentioned that the Colorado Stream Quantification Tool (CSQT) may be applicable since impacts are primarily to open waters. Billy and Matt both said that the CQST may be helpful in determining the amount of mitigation required. Depending on the scores for the CSQT, it is unlikely that the linear feet of impact would result in a 1:1 mitigation requirement because it is unlikely that all would be considered "functional feet" units in the assessment.

Both USACE and EPA expressed interest and availability to be involved in the early Project planning to advise on permitting.

Scott Gancarz noted that if an Individual Permit is required, a Section 401 water quality certification will also be needed, and CDOT will need to work with the Water Quality Control Division to obtain that. Becky said this was an oversight not to mention; CDOT does very few Individual Permits, usually 1 to 2 per year, and thanked him for the reminder.

6. Relocation of Clear Creek

Mandy provided an overview of the relocation area, and Antony Pisano described the design reasons for the relocation. The team looked at a number of options but due to the design speeds of the existing curves, stopping sight distance around the curves, location of the Veterans Memorial Tunnels, and the canyon constraints and large required rock cuts, there are no feasible avoidance alternatives that can meet purpose and need and highway design and safety criteria.

Mandy showed a simulation of the creek relocation, which mostly affects the north bank of the creek, which is a steep riprap embankment. Downstream, there are several areas with wider existing riparian areas that present opportunities for enhancements. Paul Winkle provided an overview of his work monitoring trout populations in the Project area over the past 5 years. He said that this stretch of Clear Creek supports a wild brown trout population and that CPW stocks rainbow trout in the area, but they have not taken hold, which is common in areas where brown trout are dominant. The number of fish has continued to increase as the habitat has improved, which has been a result of habitat enhancement and improvements in water quality. Although the numbers are up, the trout are not large

compared to those downstream of reservoirs; large trout in Clear Creek might be 12 to 14 inches. In 2014, Paul conducted a redd survey, and identified almost 50 redds in the stretch of Clear Creek between US 6 and Veterans Memorial Tunnels; he plans to do another survey in the fall, which could also inform enhancement opportunities.

Additionally, areas where the I-70 footprint is smaller present opportunities to lay back slopes and open up the floodplain. Kevin Shanks stated that the Canyon Viaduct Alternative presented the most opportunities for creek enhancements because there was less highway infrastructure next to the creek. Holly asked for clarification about the potential differences in terms of percentage. Kevin said he had not calculated percentages, but estimated it was substantial – maybe 50 percent more. Billy noted that the CSQT could help quantify and compare options. Mandy showed the area in Google Earth, and Kevin reviewed specific locations of potential for enhancements, particularly at the bends. Kevin described the Twin Tunnels mitigation and working with CPW. Unlike the Project relocation area, one of the issues with the Twin Tunnels section was that it was too wide to provide pool-riffle-run sequences. Paul explained that the pools are particularly important for winter habitat. Holly asked how deep the pools were and if they had filled in. The deepest pools in that section are six feet deep or so, and they have not filled in with material. The spring runoff seems to flush them out. Kevin explained that the CPW biologist had carefully considered rock placement and direction to flow to ensure that they flushed naturally. Paul noted that the willow plantings had not survived but otherwise, the design was holding up well.

Kevin described several of the mitigation details from the Twin Tunnels project that were being reviewed for application on downstream Floyd Hill improvements.

Matt and Billy both stated that enhancements to riparian and aquatic habitat would be appropriate for Section 404 compensatory mitigation. The Project will need to show a functional lift for the stream, not necessarily a 1:1 linear foot of improvements. For instance, for the 1,200 feet of affected creek, perhaps the functional units may be 700 feet, which would establish the mitigation target. Billy asked to be included in 404 mitigation discussions.

Question: Gary asked about shading and if there were opportunities to develop riparian habitat that would have less sun exposure.

Answer: Right now, the north side of bank doesn't have much vegetation; if a bench could be added where willows, cottonwoods, and other plants could establish, this would create shading. Kevin said that although the Twin Tunnels project willow plantings failed, maybe there were lessons in including more diverse plantings and selecting willows that are better suited to higher elevations. The willows at the Black Hawk Sanitation District may be better, and Jim can help coordinate. Becky said the willows came from the mitigation site, which is just 300 feet higher in elevation, so she did not think this was an issue.

Question: If improved, would this stretch qualify for a re-stocking program?

Answer: CPW currently stocks rainbow trout in the Project area. While it is difficult for other species to compete with a strong brown trout population, creek enhancements might help the stocked rainbows establish.

7. Wrap-Up and Action Items

Mandy asked the group if there were any additional comments or thoughts. Gary and Holly said that they liked what was presented and thought things were on the right track. No one voiced any concerns.

Mandy summarized the next steps. Next week, there will be a site visit led by CPW to look at some of the mitigation opportunities. The mitigation plan will be developed further, and the team will continue to coordinate with the USACE and EPA on Section 4040 permitting and with CPW for SB 40 certification. It is anticipated that the planned enhancements can serve multiple mitigation commitments as well as the intention of the SWEEP MOU to improve aquatic and water quality conditions when possible. By mid-summer, the team should have a good handle on impacts and mitigation, which will be discussed with the Technical Team before completing the EA.

Action Items

- Hold an offline meeting to discuss SELDM (Josh, Vanessa, Holly, Jordan, and others)
- Conduct initial site visit to review mitigation opportunities (Paul, Kevin, and others)
- Conduct redd survey in fall 2020 (Paul)
- Prepare CSQT to inform mitigation requirements and effectiveness (timing and responsibility TBD)

COLORADO
Department of Transportation

I-70 Floyd Hill
SWEEP Meeting #3

May 14, 2020

Agenda

- Project Updates and Status
- Overview of Project Alternatives
- Existing Conditions and SWEEP Issues
- Water Quality
- Wetlands and Waters of the US
- Clear Creek Relocation
- Next Steps and Action Items

COLORADO
Department of Transportation

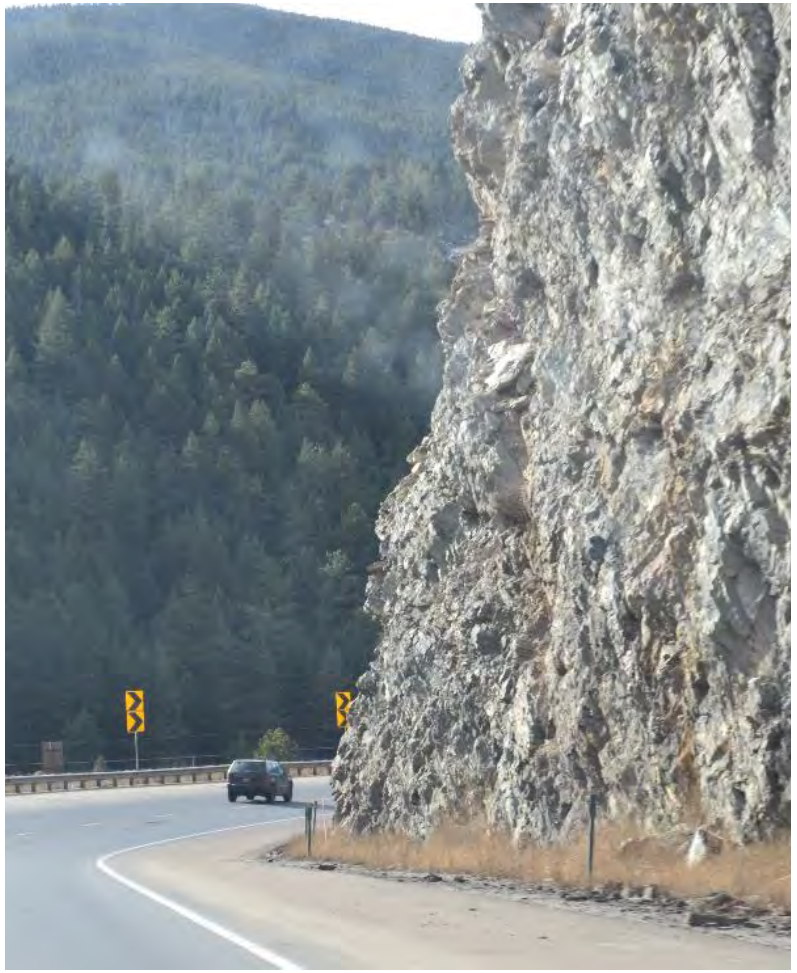
Project Updates

Project Updates

- Environmental Assessment initiated in summer 2017
- Developed Tunnel Alternative in 2018 as proposed action for ballot initiates 109/110
  - SWEEP meetings in April and October 2018
- Reassessed and regrouped in 2019
  - Completed existing conditions surveys and reports
  - Developed Canyon Viaduct Alternative as additional alternative
  - Confirmed project priority in 10-year plan through statewide planning effort with new CDOT administration
  - Continued to pursue funding; HPTE initiated financial study
- EA funded and resumed in late 2019/early 2020
  - Public Meeting #2 – February 2020
  - Environmental Assessment – Fall 2020
  - Public Hearing – Late Fall 2020/early Winter 2021
  - Decision document – Spring 2021 (if construction funding is identified)

Alternatives Overview: Major Project Elements

- Add third westbound I-70 travel lane from top of Floyd Hill through the Veterans Memorial Tunnels
- New frontage road connection between US 6 and Hidden Valley interchanges
- Improve traffic operations at interchanges and intersections within the project limits
- Enhance safety by flattening curves to improve design speeds and stopping sight distance
- Improve the Clear Creek Greenway
- Reduce animal-vehicle conflicts and improve wildlife connectivity



Environmental Assessment Alternatives

- No Action Alternative
  - Replace westbound I-70 bridge in its current location, and continue regular highway maintenance
- Tunnel Alternative
  - Major elements
  - New tunnel for westbound I-70 near US 6 interchange
  - Realign eastbound I-70 on the current highway footprint
  - Construct a frontage road between US 6 and Hidden Valley, either north or south of Clear Creek
- Canyon Viaduct Alternative
  - Major elements of the Proposed Action
  - Realign both eastbound and westbound I-70 between US 6 and Hidden Valley on a viaduct
  - Construct the frontage road on the current I-70 alignment

East Section: Floyd Hill to US 6

Central Section: US 6 to Hidden Valley
TUNNEL ALTERNATIVE

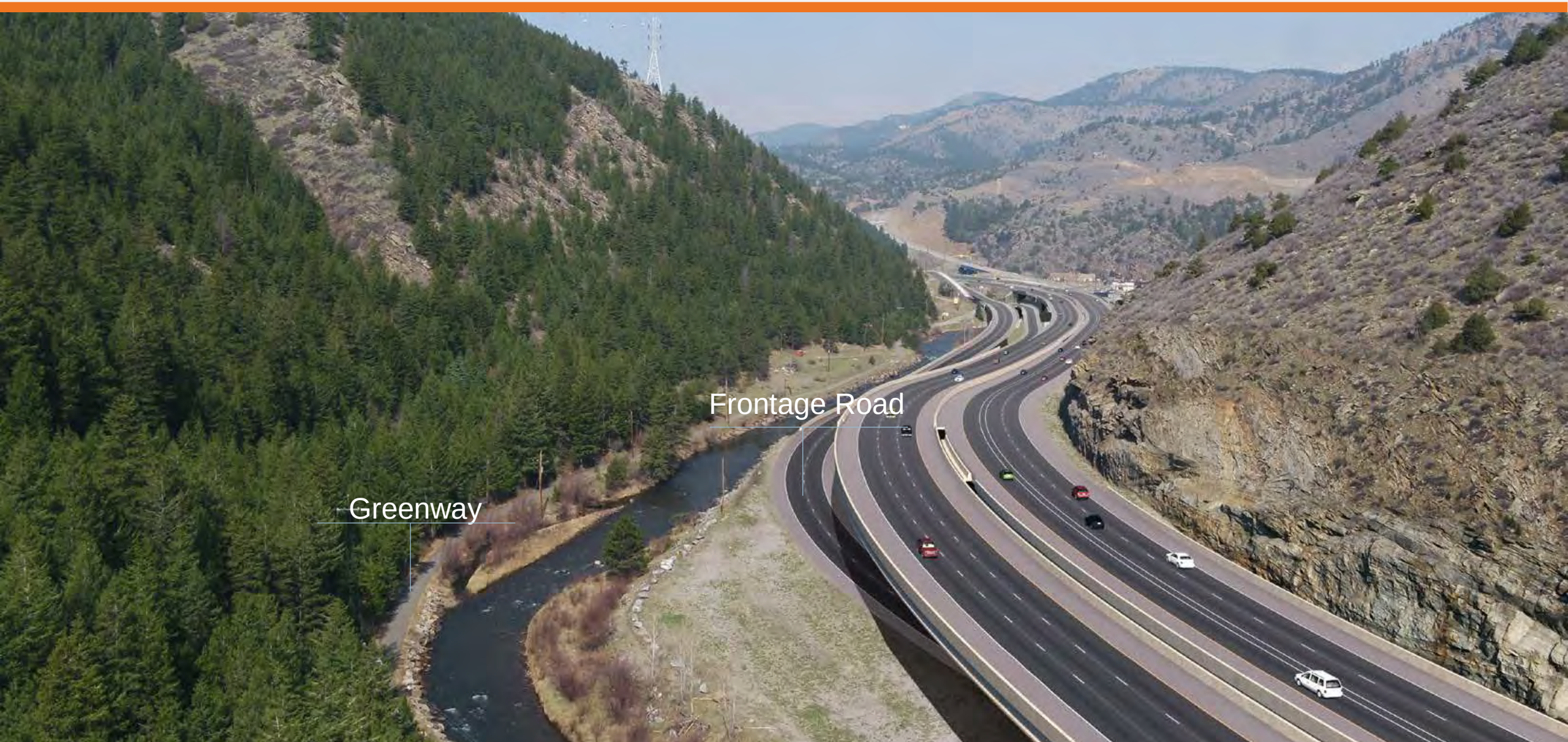
Central Section: US 6 to Hidden Valley
TUNNEL ALTERNATIVE, North Frontage Road

Central Section: US 6 to Hidden Valley
TUNNEL ALTERNATIVE, South Frontage Road

Central Section: US 6 to Hidden Valley
CANYON VIADUCT ALTERNATIVE

Central Section: US 6 to Hidden Valley
CANYON VIADUCT ALTERNATIVE

Central Section: US 6 to Hidden Valley
CANYON VIADUCT ALTERNATIVE



West Section: Hidden Valley to Veterans Memorial Tunnels

COLORADO
Department of Transportation

Water Quality and Aquatic Conditions

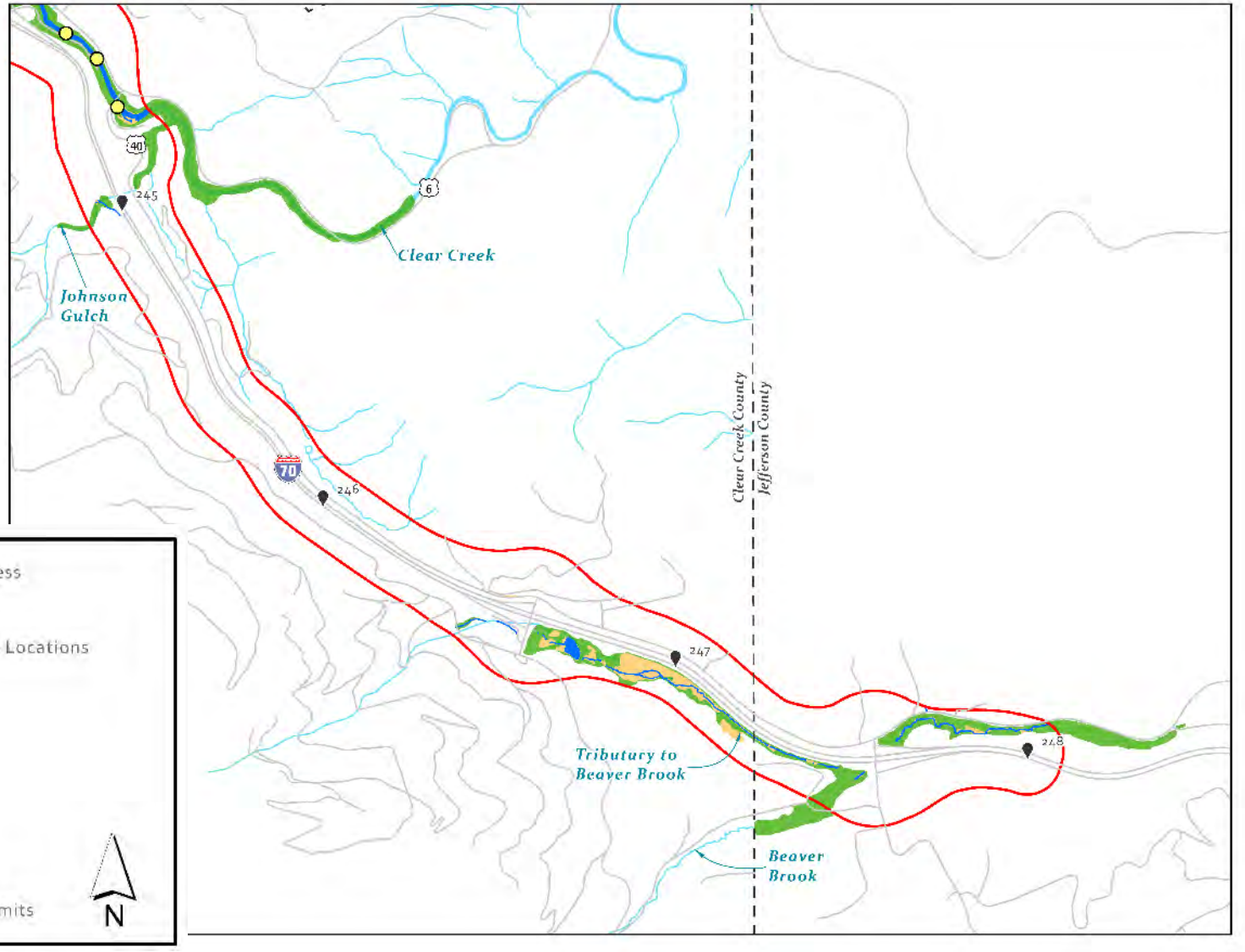
Water Quality and Aquatic Conditions

- Clear Creek water quality
  - Impaired for metals from mining and naturally occurring metals in soils/mineralized rock
  - Black Hawk drinking water intake
  - Decreasing use of traction sand and increased use of deicers
  - SCAP BMPs implemented for projects upstream; one existing WQ pond in Project area (near Black Hawk water intake)
- Clear Creek condition
  - Areas of significant channelization throughout
  - Wider floodplain areas support riparian habitat/wetlands
  - Regulated floodplain
- Clear Creek fishery
  - Clear Creek is a high value fishery
  - Brown trout spawning upstream; increasing density
  - Aquatic connectivity is not an issue

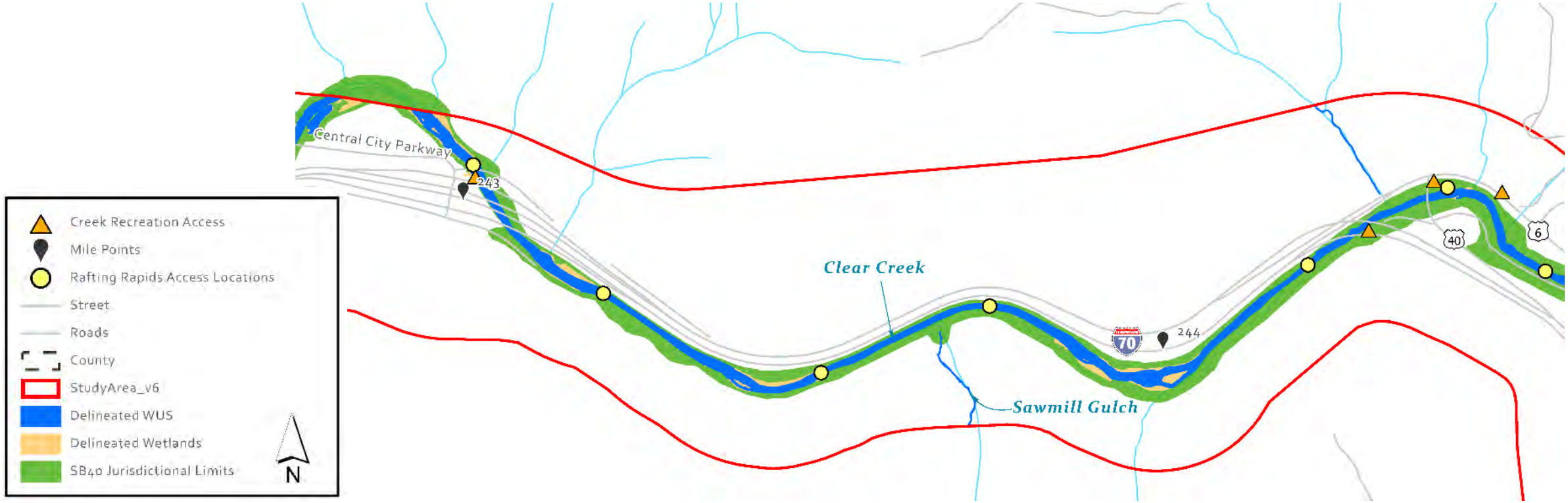
- Other streams and gulches
  - Johnson Gulch, Sawmill Gulch, Beaver Brook also impaired for metals
  - Sawmill Gulch lacks riparian vegetation for SB 40
  - Beaver Brook
    - Brook trout spawning 1-mile upstream of Project
    - Regulated Floodplain

Existing Conditions: East Section

- Wetland complex at Beaver Brook (elk meadows)
  - Fen testing in Aug 2018 (negative)
- Johnson Gulch in culvert under I-70



Existing Conditions: Central Section



- Numerous recreational points, including rafting rapids and fishing accesses
- Greatest potential for creek enhancement in the Project area
- Areas near Black Hawk intake and Sawmill Gulch are wider and support wetlands

Existing Conditions: West Section

- Previous Creek Restoration project upstream (Twin Tunnels)
- Highly constrained and channelized
- Area of Clear Creek realignment

SWEEP Commitments and Considerations

SWEEP MOU and Implementation Matrix considerations in project development

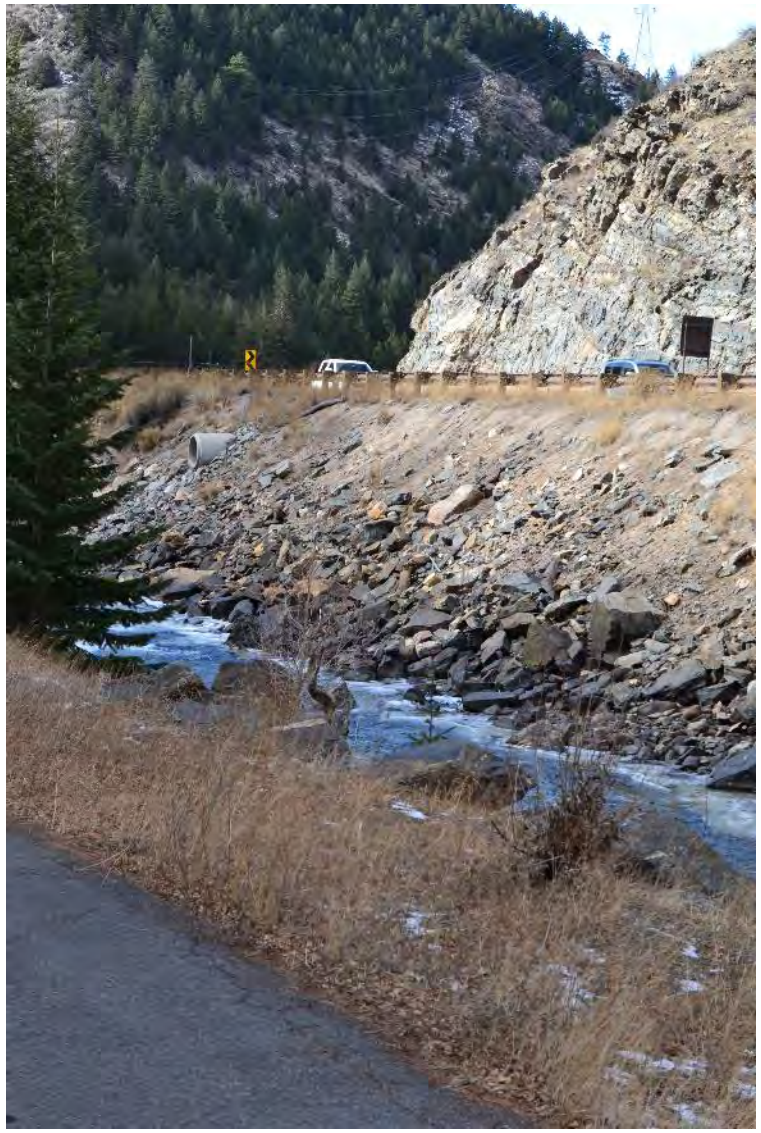
- Sediment management
- Section 303(d) impaired waters
- Mining wastes and mineralized rock
- Wetlands protection
- Special status species
- Aquatic species as recreational resource
- Information and research needs

PEIS Commitments for Tier 2 Projects

- Delineate wetlands using the latest approved USACE methodology
- Identify and analyze impacts to fens if applicable
- Functional Assessment of wetlands using FACWet
- Determine jurisdictional and non-jurisdictional wetlands
- More detailed analysis of direct and indirect impacts on aquatic resources
- Develop specific and detailed mitigation strategies and measures
- Develop specific best management practices

Issues Raised at Previous SWEEP Meetings

- Water quality
  - Chlorides and effects on water quality and vegetation
  - Increased sedimentation / contaminants from frontage road maintenance, rock cut areas, snow plowing over the creek
  - Potential for truck overturning and hazmat spills
- Coordination with maintenance
  - BMP design, location, and maintenance
  - Winter maintenance practices
- Wetlands
  - Complex at Beaver Brook (elk meadows)
  - Wetland functional assessment
- Realigning Clear Creek
  - Creek geology
  - Sediment and turbidity



COLORADO
Department of Transportation

Water Quality

I-70 Floyd Hill to Veterans Memorial Tunnel

SELDM Model Factsheet

The Stochastic Empirical Loading and Dilution Model (SELDM) is a stochastic model that uses Monte Carlo methods to determine the effect of runoff on receiving waters. It is primarily used as a screening mechanism for projects' environmental impacts.

Four Scenarios:

- Existing Conditions
- Proposed Conditions, using no BMPs
- **Proposed Conditions, using extended detention basins (EDB)**
- **Proposed Conditions, using vegetated swales.**

Highway site inputs

- Drainage area = Combined area of I-70, US 6, Central City Parkway, and CR314.
- Drainage length = Veteran's Memorial Tunnel to the top of Floyd Hill
- Basin Development Factor = Proposed improvements cause an increase in peak runoff potential on a scale of 0 to 12.

Scenario	Drainage Area (ac)	Drainage Length (ft)	Basin Development Factor
Existing	105.18	28875.74	2
Proposed	124.77	28875.74	5

Preliminary Results:

Constituent	Existing vs Proposed No BMP (%)	Existing vs Proposed with Ponds (%)	Existing vs Proposed with Swales (%)
TSS	+18.62	-68.91	-66.67
Chloride	+18.65	+0.95	-20.19
Cadmium*	+18.64	-47.86	-80.90
Copper*	+18.65	-61.61	-68.9
Lead	+18.65	-9.44	-25.97
Zinc*	+18.64	-36.83	-37.73

*Used regional pollutant loading data

Loading Concentration Data:

- CDOT report Interstate 70 Mountain Corridor Storm Event/Snowmelt Water Quality Monitoring.

Data on the efficiency of applicable BMPs:

- USGS Statistical Study for SELDM Inputs

Data on the efficiency of BMPs on chlorides.

- Transportation Research Board *Synthesis 449: Strategies to Mitigate the Impacts of Chloride*.

Water Quality Approach:

- **Application of SCAP recommendations is no longer applicable**
- **No MS4 Permit.**
- **Focus on addressing specific pollutants of concern.**

Water Quality: SELDM

- Modeling Goals
- Inputs
- Results inform design
  - Define WQ Approach
  - SCAP
  - No MS4

Water Quality: BMP Selection

Pollutant Focused, Tiered Approach to Water Quality

- Formal WQ BMPs proposed to mitigate the majority of the Roadway Runoff
  - Extended Detention Basins: Highly effective for sediment and metal removal
  - Constructed Wetlands: Highly effective for treatment of de-icing agents as it dilutes Chlorides and maximizes uptake

Extended Detention Basin – Sediment and Metals

Constructed Wetlands – Deicing Agents / Chlorides via Dilution and Uptake)

Water Quality : BMP Selection

Pollutant Focused, Tiered Approach to Water Quality

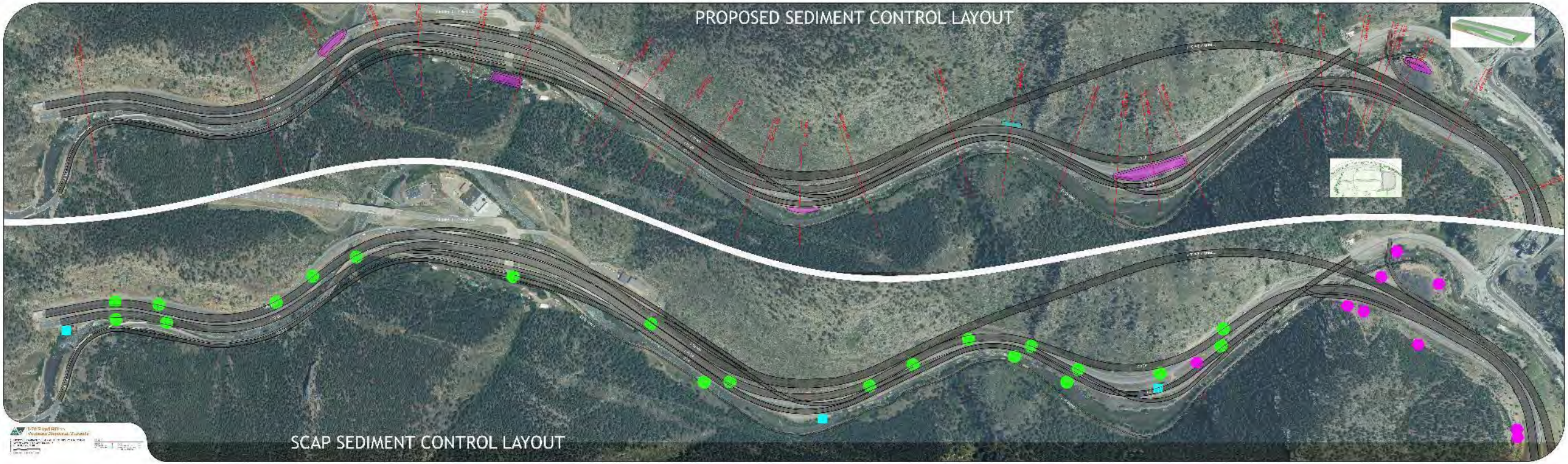
- Informal WQ BMPs proposed to mitigate roadway runoff with site constraints
  - Vegetated ditches
  - Stilling Basins
  - Engineered ditches with check dams
- Effective removal for sediment and metals and diluting chlorides

Vegetated Ditch w/ Stilling Basins (Bridge Sections) - Sediments and Metals

Engineered Ditch with check dams – Deicing agents

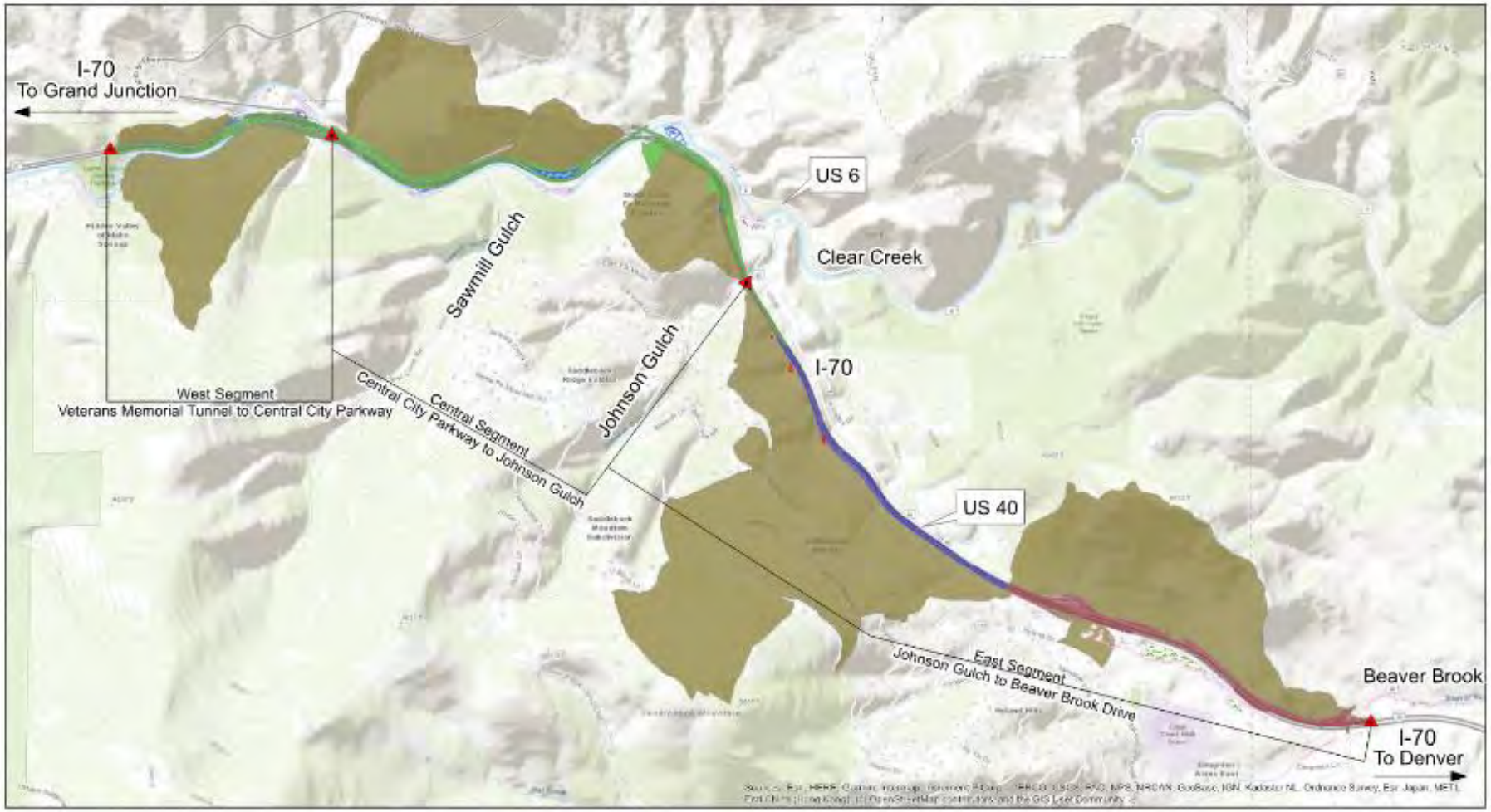
Water Quality : BMP Selection

- SWEEP Meeting No. 2 (October 25, 2018): Review of materials presented
  - CDOT transitioned to using de-icing agents in lieu of traction sand
  - SCAP-recommended BMPs focused on traction sand and present maintenance challenges
- Proposed BMPs have been updated to reflect changes in Design Options



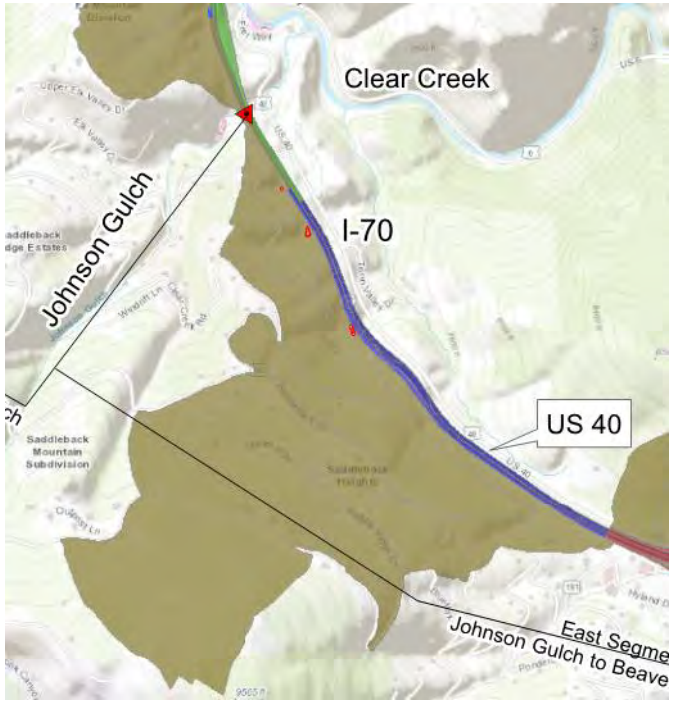
Water Quality : BMP Selection

- Project Section
  - East
  - Central
  - West
- WQ Watersheds
  - Floyd Hill
  - Clear Creek
    - Tunnel
    - Canyon



Water Quality: East Section (Floyd Hill)

- Chlorides and Sediment
- Vegetated shoulders/slopes provide natural treatment over flowpaths
- Engineered Ditches provide dilution and uptake
- Constructed Wetlands provide dilution and uptake



Vegetated Shoulders/slopes

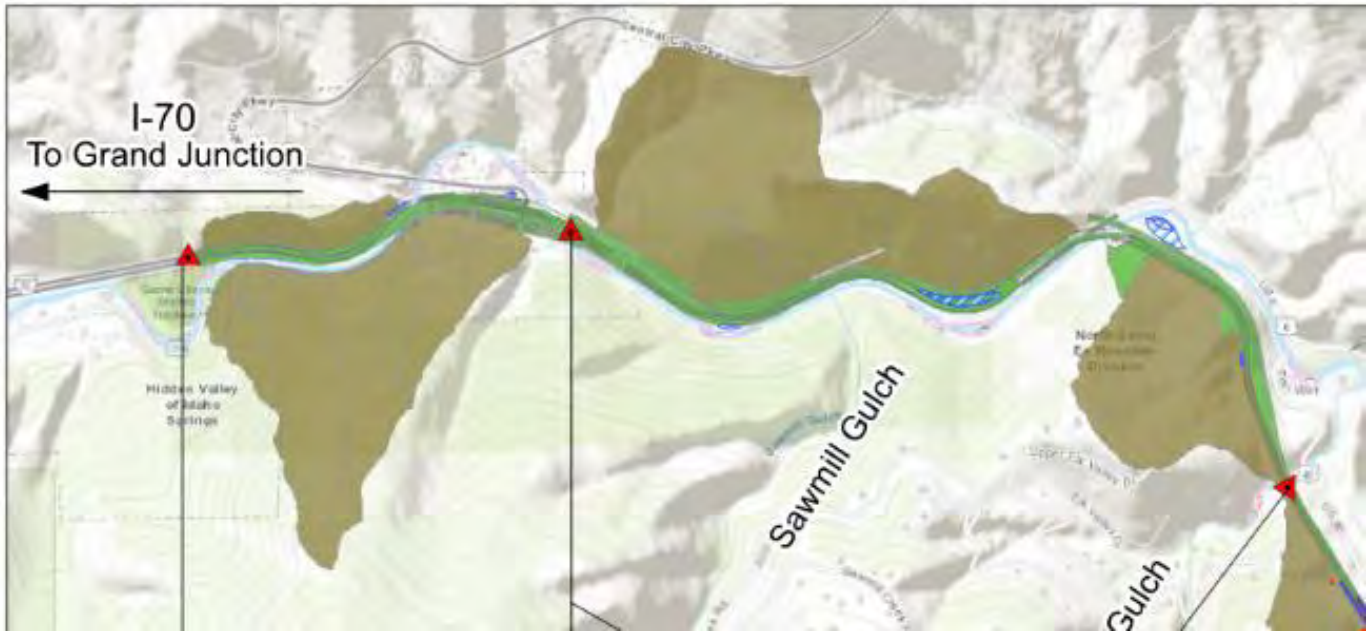
Constructed Wetlands and Engineered Ditches

Water Quality: East Section (Floyd Hill)

User: FALZ7683 Date: 5/1/2020 S:\Tranproj\100056334 - I-70 Floyd Hill to VMT\21912\Hydraulics\07_GIS\Figures\Figure_SWEEP WQ Floyd Hill.mxd

Water Quality: Central and West Sections (Clear Creek)

- Sediment, Metals, Chlorides
- Extended Detention Basins captures sediments and treats metals
- Sediment Basins captures sediment
- Vegetated ditches provide natural treatment over flowpaths
- Engineered Ditches provide dilution and uptake



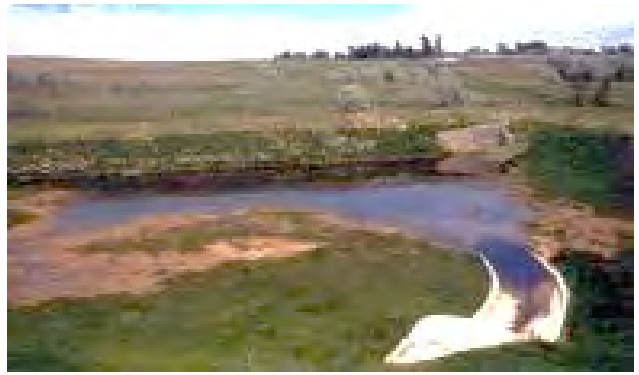
Extended Detention Basins

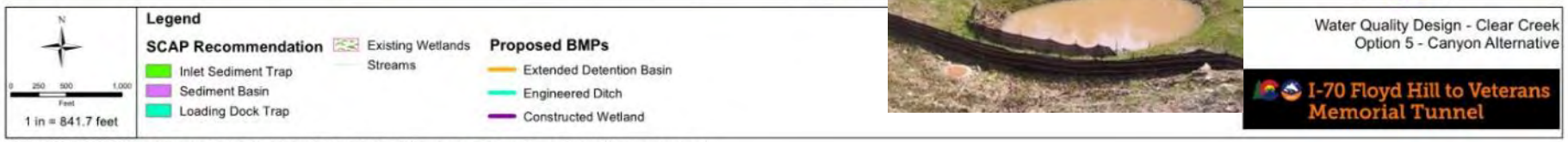
Sediment Basins

Water Quality: BMP Locations, Clear Creek: Tunnel Alternative

User: FALZ7683 Date: 5/1/2020 S:\Tranproj\100056334 - I-70 Floyd Hill to VMT\21912\Hydraulics\07_GIS\Figures\Figure_SWEEP WQ Opt1 Tunnel.mxd

Water Quality: BMP Locations, Clear Creek: Canyon Alternative





COLORADO
Department of Transportation

Wetlands and Waters of the US

Wetlands and Waters of the US

Permanent Impacts

- Impacts based on project design as of May 5, 2020.
- Permanent impacts would result from the widening and realignment of I-70 and Frontage Road, replacement of existing bridges, installation of bridge piers, and bank stabilization associated with roadway reconfiguration.

Alternative	Permanent Impact (Acres)	Permanent Impacts (Square Feet)	Linear Feet of Impact	Assumed Jurisdictional Status[1]
Tunnel Alternative (North Frontage Road Option)	0.908	39,565	1,575	Jurisdictional
Tunnel Alternative (South Frontage Road Option)	0.912	39,746	1,652	Jurisdictional
Canyon Viaduct Alternative	0.929	40,458	1,835	Jurisdictional

[1]Jurisdictional status assumed based on conditions in the field and review of maps and aerial imagery. Only the U.S. Army Corps of Engineers (USACE) has the authority to determine what is jurisdictional.

Wetlands

Alternative	Permanent Impact (Acres)	Permanent Impacts (Square Feet)	Classification[1]	Assumed Jurisdictional Status[2]
Tunnel Alternative (North Frontage Road Option)	0.001	44	PEM and PSS	NA
Tunnel Alternative (South Frontage Road Option)	0.001	40	PEM	NA
Canyon Viaduct Alternative	0.001	44	PEM and PSS	NA

[1]Cowardin et al., 1979

[2]Jurisdictional status assumed based on conditions in the field and review of maps and aerial imagery. Only USACE has the authority to determine what is jurisdictional.

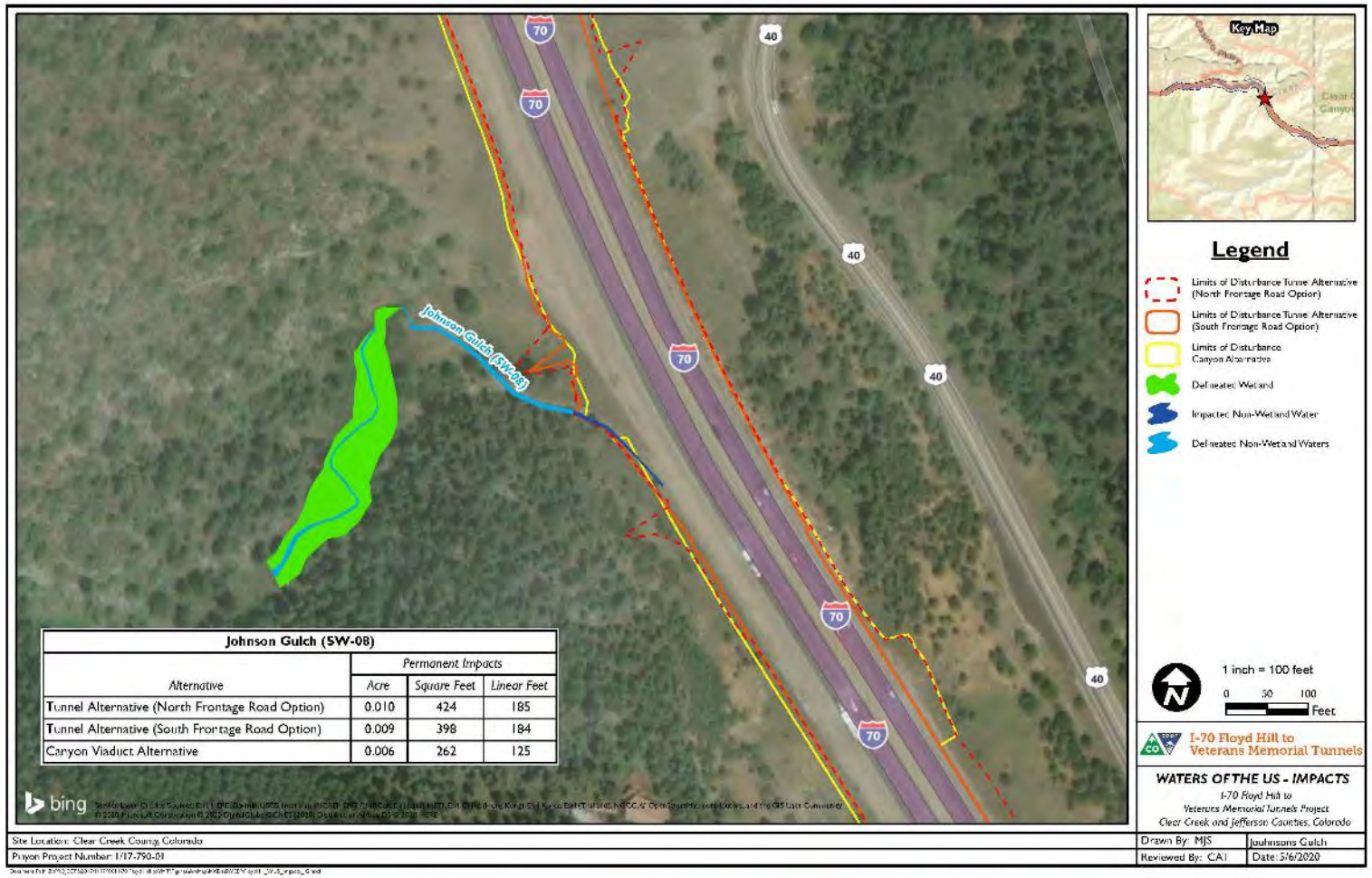
Notes:

PEM = palustrine emergent
PSS = palustrine scrub-shrub

Wetlands and Waters of the US

Johnson Gulch (SW-08)

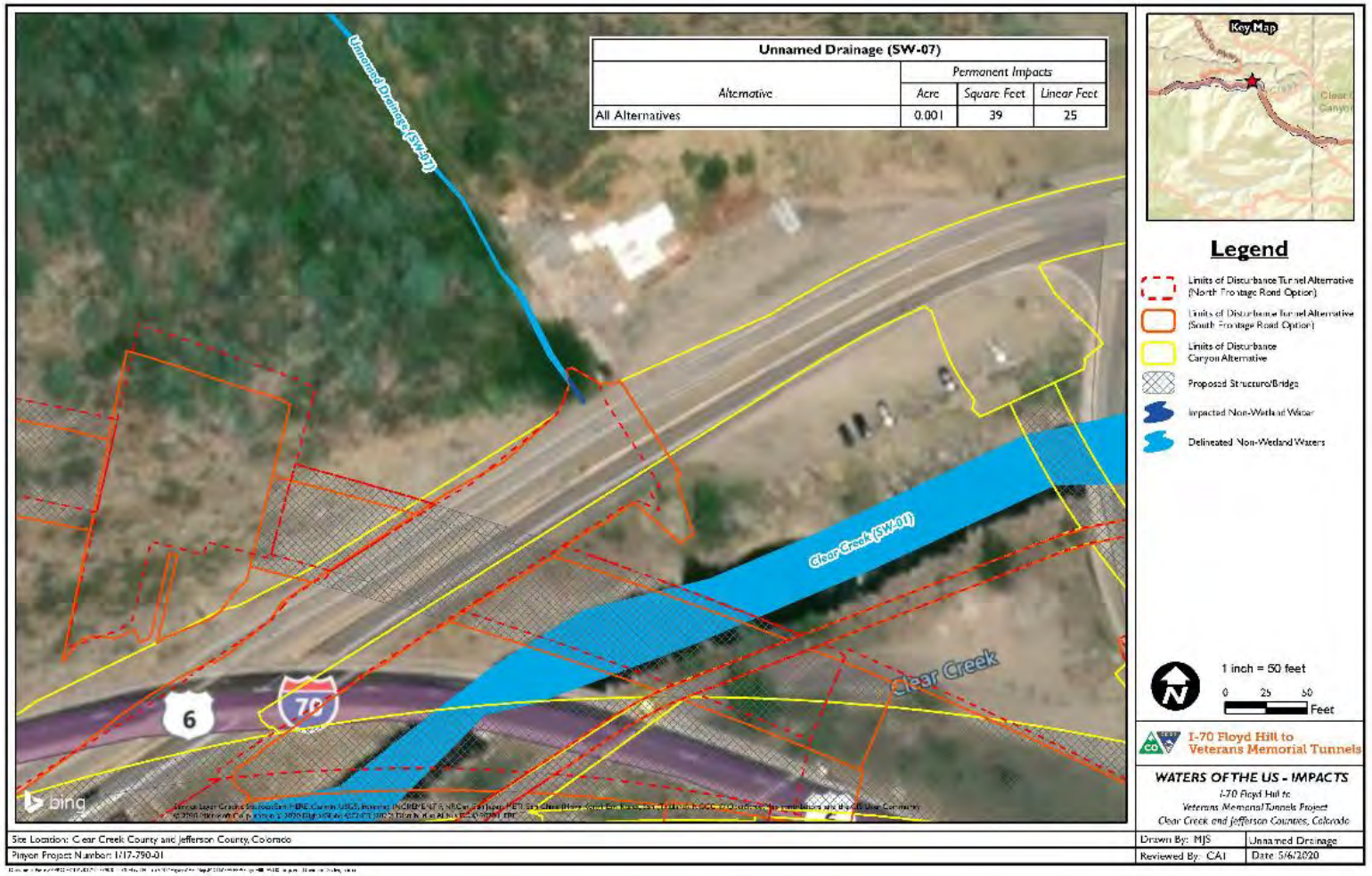
- Impacts vary slightly between action alternatives
- Impacts from:
  - Road widening
  - Grading for toe-of-slope
  - Road stabilization



Wetlands and Waters of the US

Unnamed Drainage (SW-07)

- Impacts are the same for action alternatives
- Impacts from:
  - Slope stabilization for US 6

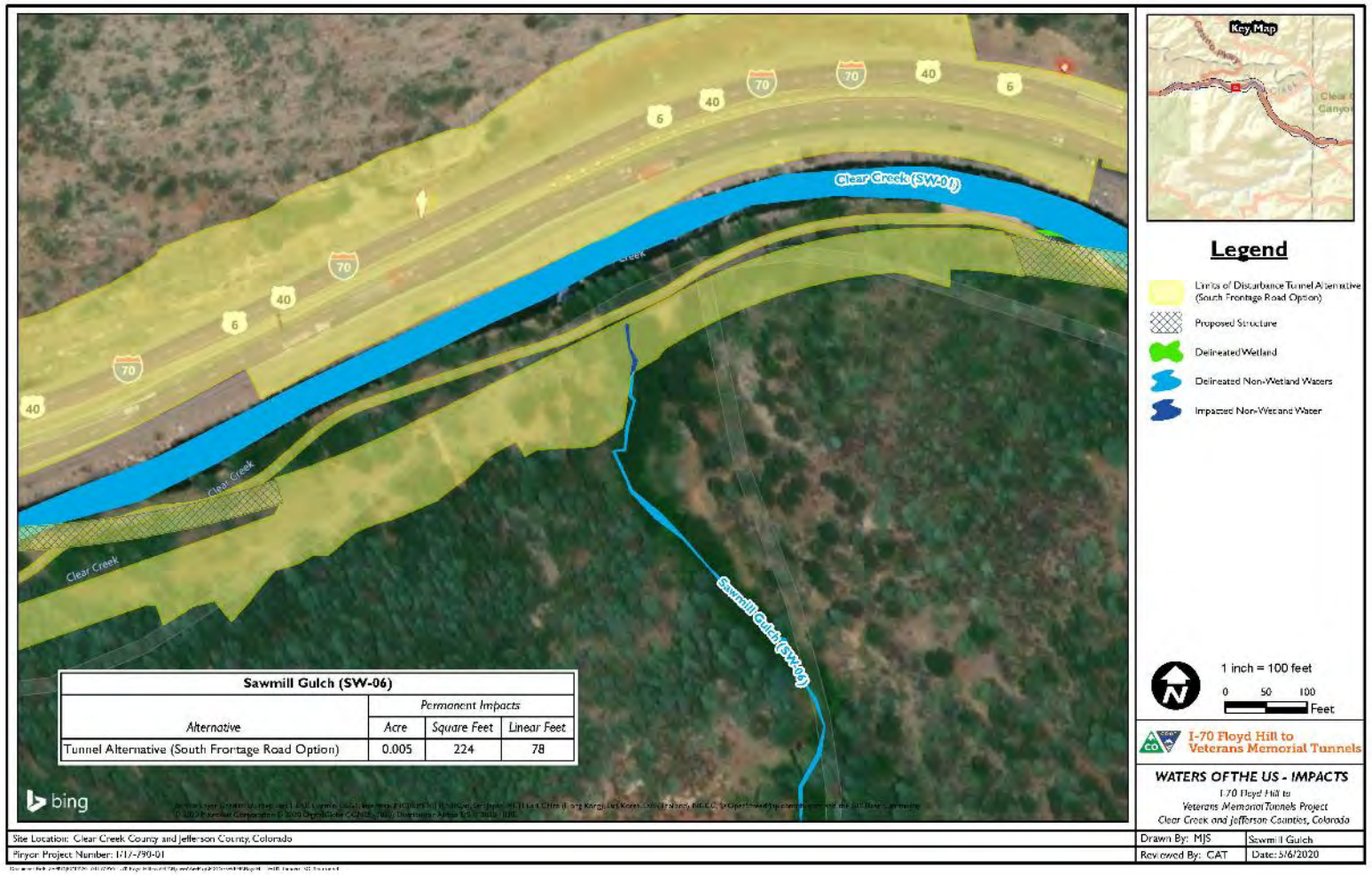


Wetlands and Waters of the US

Sawmill Gulch (SW-06)

Tunnel Alternative, South Frontage Road Option

- Impacts from:
  - Grading activities
  - New road alignment
  - Slope stabilization



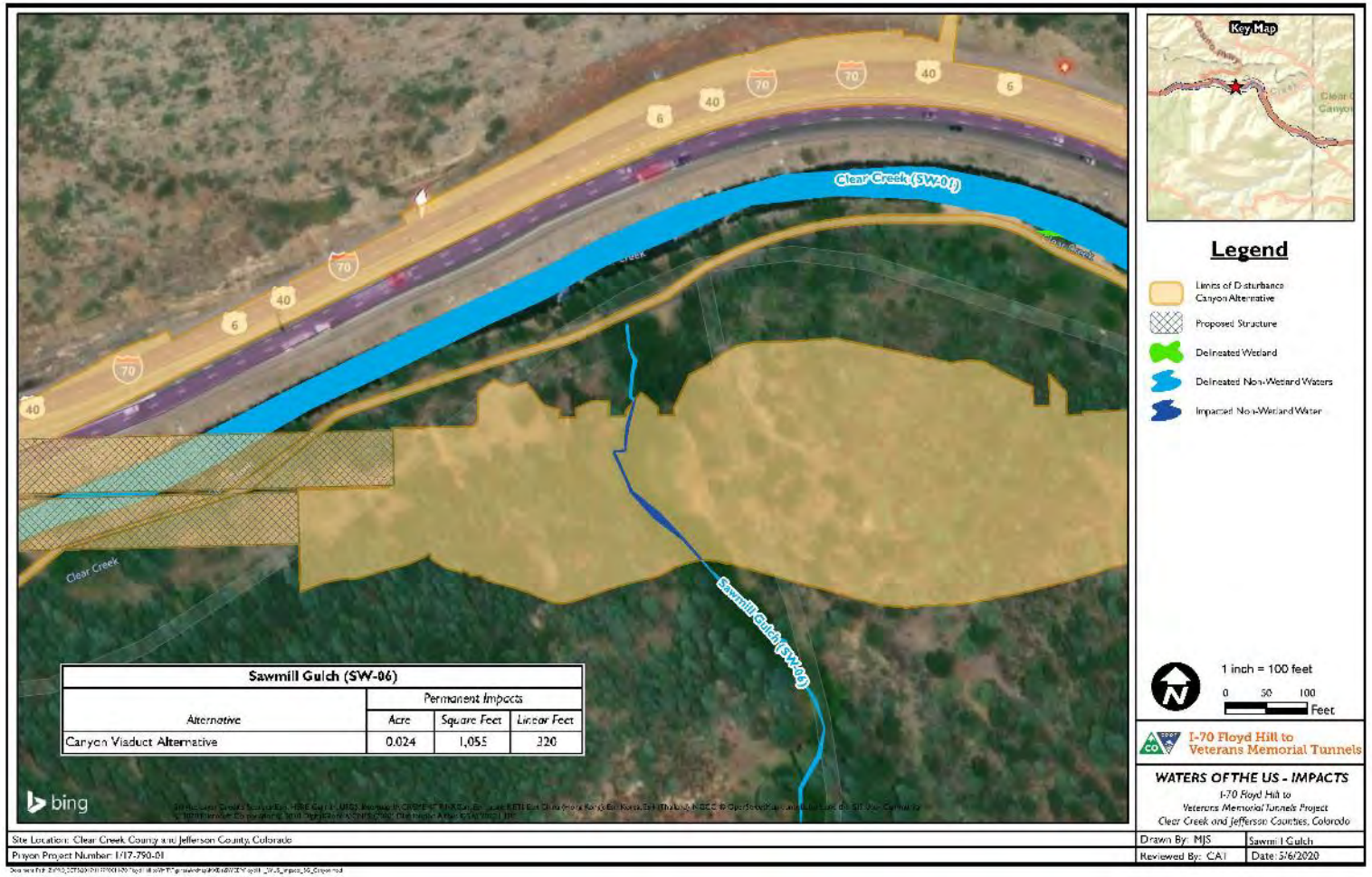
Sawmill Gulch (SW-06)			
	Permanent Impacts		
Alternative	Acre	Square Feet	Linear Feet
Tunnel Alternative (South Frontage Road Option)	0.005	224	78

Wetlands and Waters of the US

Sawmill Gulch (SW-06)

Canyon Viaduct Alternative

- Impacts from:
  - Grading activities
  - New road alignment
  - Slope stabilization



Sawmill Gulch (SW-06)

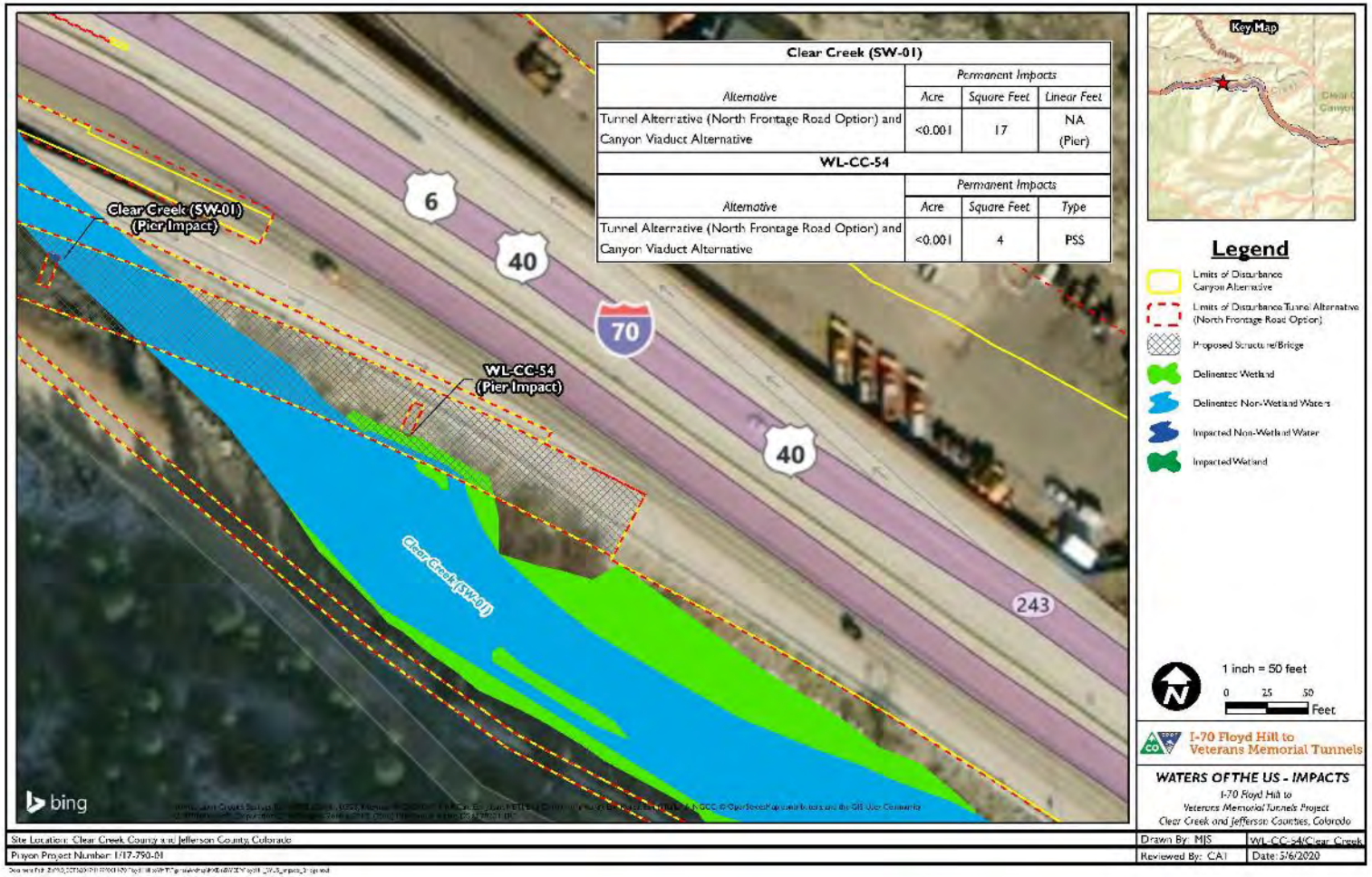
Alternative	Permanent Impacts		
	Acre	Square Feet	Linear Feet
Canyon Viaduct Alternative	0.024	1,055	320

Wetlands and Waters of the US

Clear Creek (SW-01/WL-CC-54)

Tunnel Alternative, North Frontage Road Option) and Canyon Viaduct Alternative

- Impacts from
  - Installation of new Bridge Piers

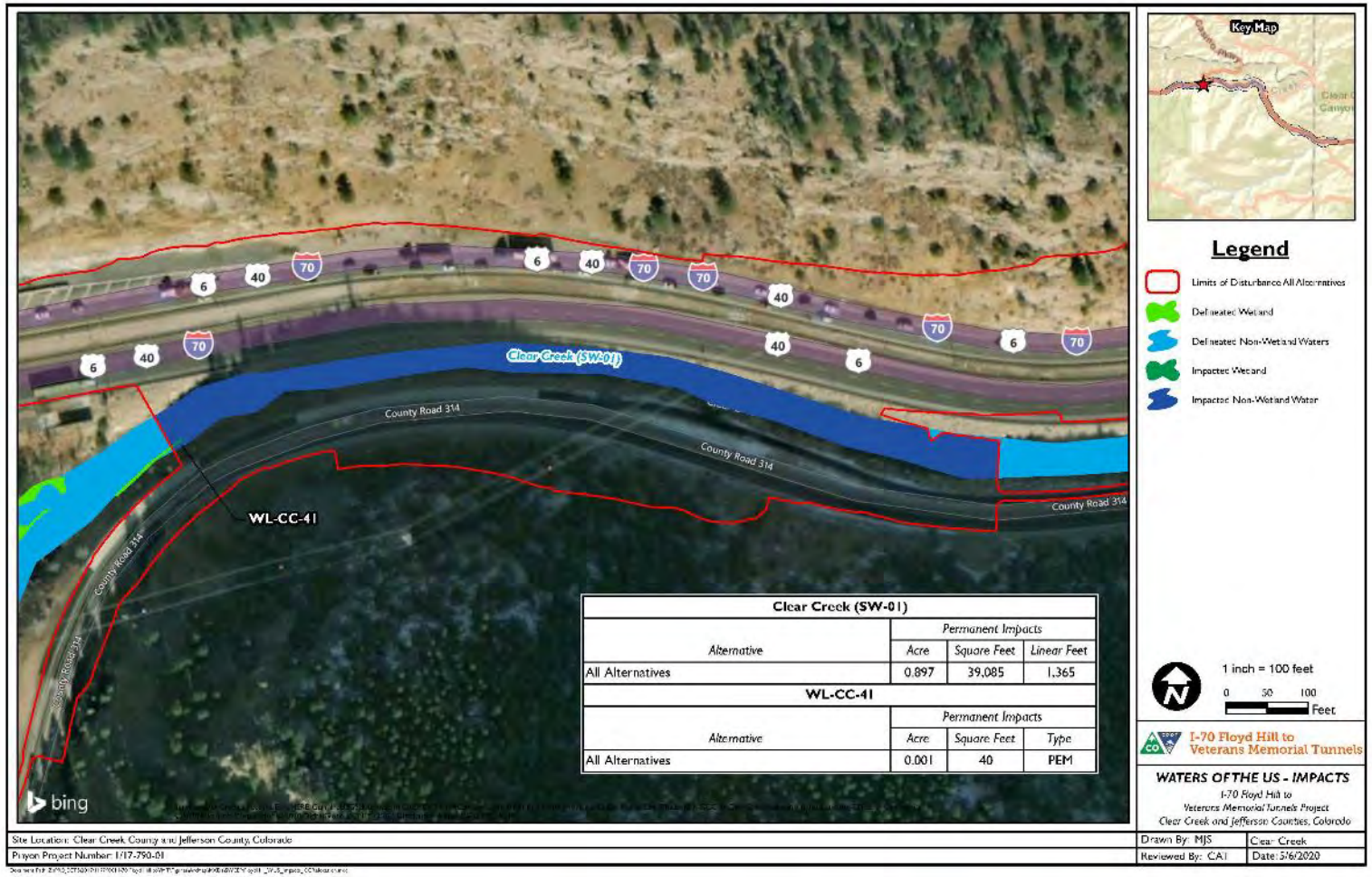


Wetlands and Waters of the US

Clear Creek (SW-01/WL-CC-41)

All Action Alternatives

- Impacts are the same for action alternatives
- Realignment of Clear Creek for new road layout (I-70 and CR 314)



Clear Creek (SW-01)			
	Permanent Impacts		
Alternative	Acre	Square Feet	Linear Feet
All Alternatives	0.897	39,085	1,365

WL-CC-41			
	Permanent Impacts		
Alternative	Acre	Square Feet	Type
All Alternatives	0.001	40	PEM

Wetlands and Waters of the US

Temporary Impacts

- Vegetation removal
- Earthmoving
- Bridge demolition
- Grading activities
- Surface runoff during construction

Wetlands and Waters of the US

Indirect Impacts

- Shading over Clear Creek
- Noxious weeds
- Increased impervious surfaces post construction
- Water Quality

Section 404 Permitting

- Relocation of Clear Creek does not appear to fall under any Nationwide Permit; an Individual Permit is anticipated
- Other impacts could meet Nationwide Permit conditions if permitted separately
- Permitting discussion
  - Informal NEPA/404 Merger process
  - Single vs multiple permits
  - Stream Quantification Tool

COLORADO
Department of Transportation

Relocation of Clear Creek

February 13, 2020

Relocation of Clear Creek

Need for Realignment

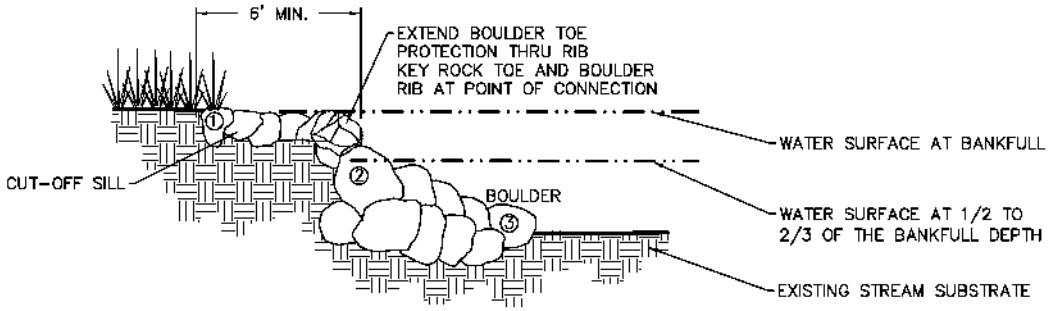
- I-70 Alignment
  - 55-mph design speed (curve radii)
  - Stopping sight distance
  - Rock cuts
  - Alignment with existing tunnels
- County Road 314/Greenway alignment
  - Minimal cross section width
  - Rock cuts to the south
- Hydraulics and floodplain

Limited Opportunities for Enhancements within Realignment Area

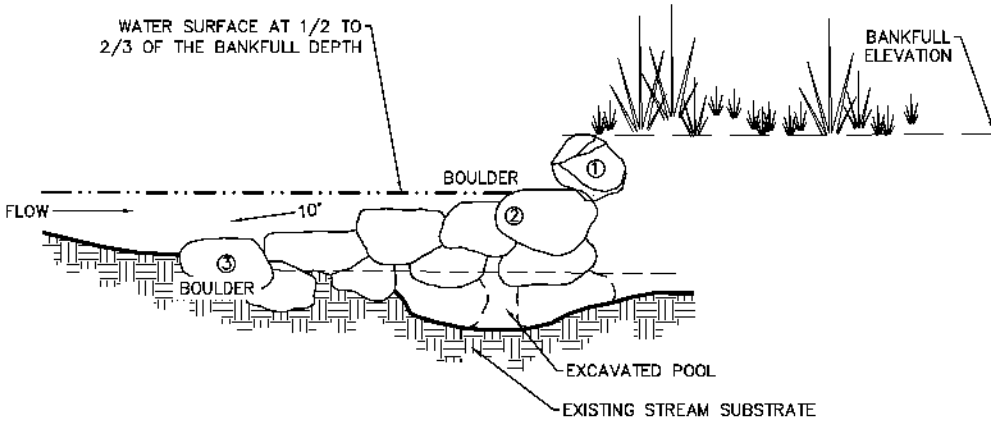
Downstream Enhancement Opportunities

- Wider existing riparian areas
- Areas where I-70 footprint is smaller and can be reclaimed (differs by alternative); open up floodplain and lay back slopes
- Other opportunities to improve (and balance) rafting and creek access

Potential Mitigation Details for Direct Relocation Area (from Twin Tunnels)

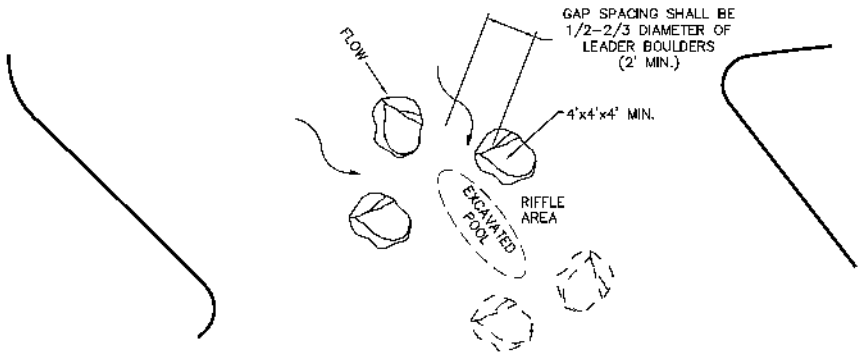


BOULDER RIB – CROSS SECTION
N.T.S.



BOULDER RIB – PROFILE VIEW
N.T.S.

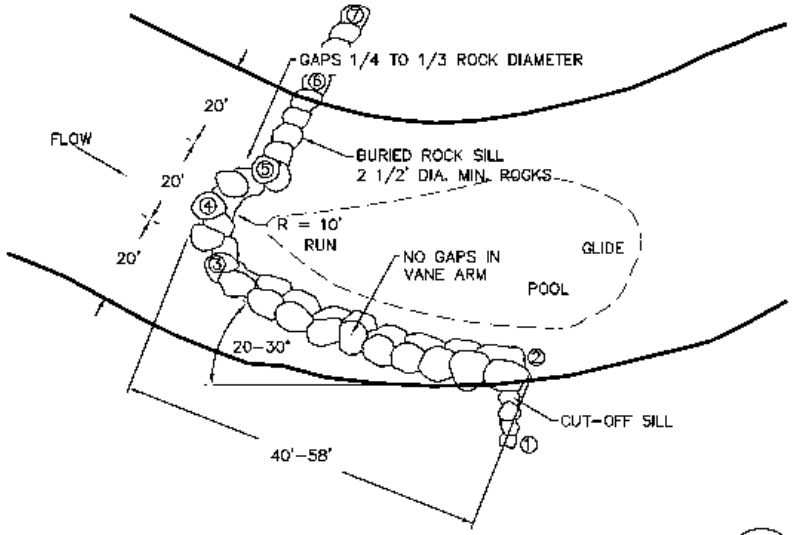
- EACH BOULDER PLACED INTO THE ACTIVE CHANNEL MOVING OUT FROM THE BANK SHOULD BE SET AT A LOWER ELEVATION USING A SLOPE OF 10%
- GAPS BETWEEN BOULDERS SHOULD BE ½ TO ⅔ OF THE BOULDER DIAMETER
- RIBS SHOULD ALTERNATE FROM ONE SIDE OF THE CHANNEL TO THE OTHER AT A SPACING OF 0.5 BANKFULL WIDTHS RESULTING IN INCREASED SINUOSITY.
- BOULDER SHALL BE KEYED INTO THE BANK
- MINIMUM BOULDER SIZE SHALL BE APPROXIMATELY 3'X3'X4'
- PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASED ON INDIVIDUAL ROCK CHARACTERISTICS



1. BOULDER CLUSTERS SHALL BE PLACED ADJACENT TO THE THALWEG.

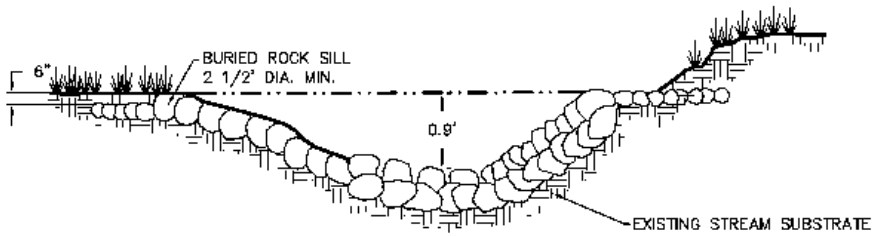
BOULDER CLUSTER – PLAN VIEW
N.T.S.

Potential Mitigation Details for Downstream Enhancements (from Twin Tunnels)

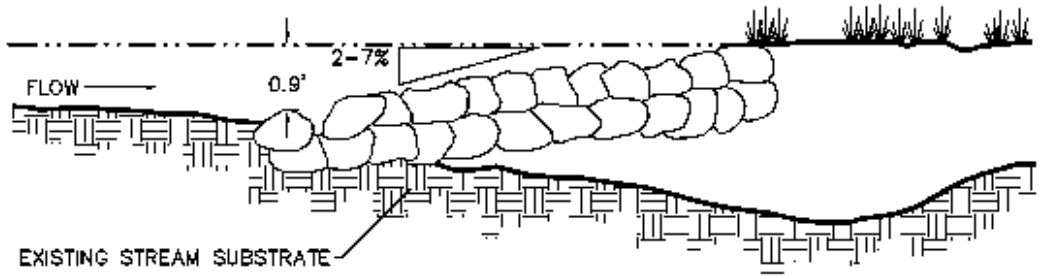


ROCK J-HOOK VANE - PLAN VIEW
N.T.S.

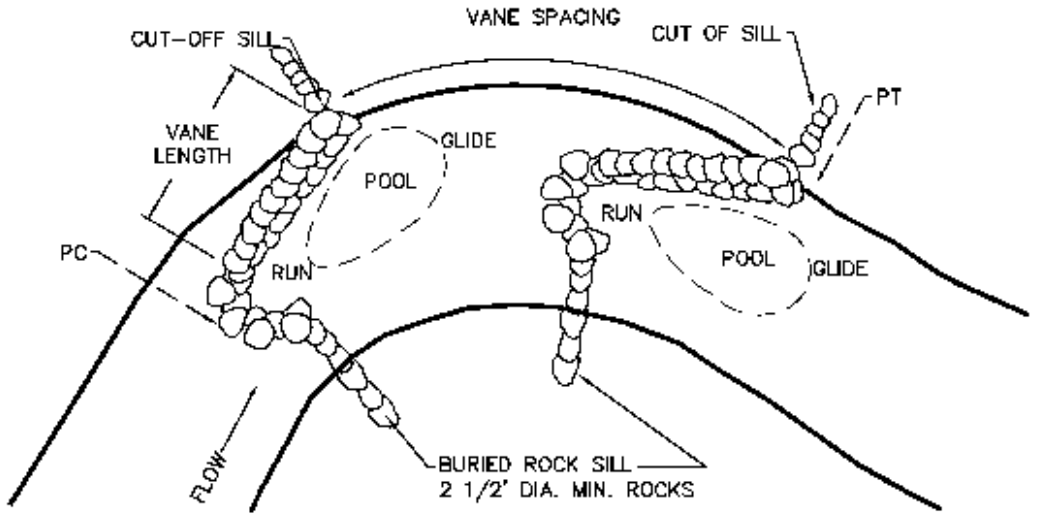
NOTES:
1. J-HOOK POINTS 3, 4 AND 5 SHALL BE PLACED AT A RADIUS OF 10'
2. PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASE ON INDIVIDUAL ROCK CHARACTERISTICS.
3. J-HOOK ROCKS SHALL BE 4-5' DIA. X 2-3' HEIGHT.



ROCK J-HOOK VANE - CROSS SECTION VIEW
N.T.S.



ROCK J-HOOK VANE - PROFILE VIEW
N.T.S.

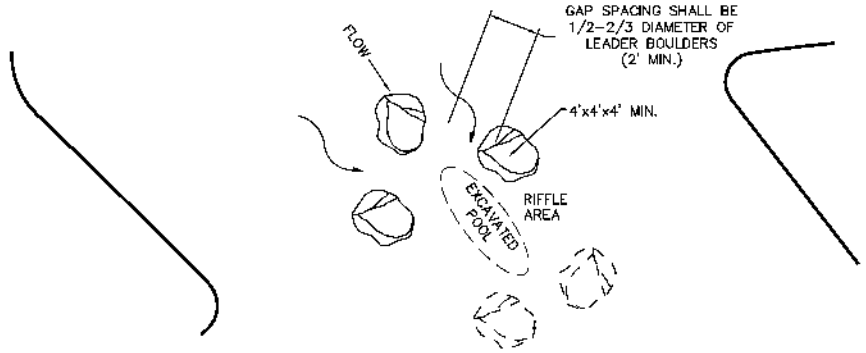


ROCK J-HOOK VANE SPACING
N.T.S.

COLORADO
Department of Transportation

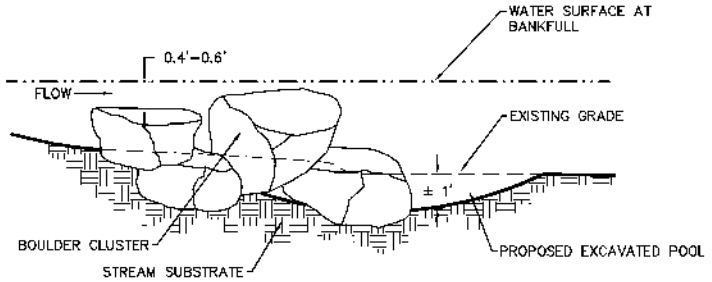
Questions / Comments?

Twin Tunnels Mitigation Project Details



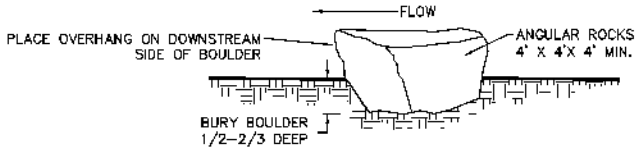
1. BOULDER CLUSTERS SHALL BE PLACED ADJACENT TO THE THALWEG.

BOULDER CLUSTER – PLAN VIEW
N.T.S.



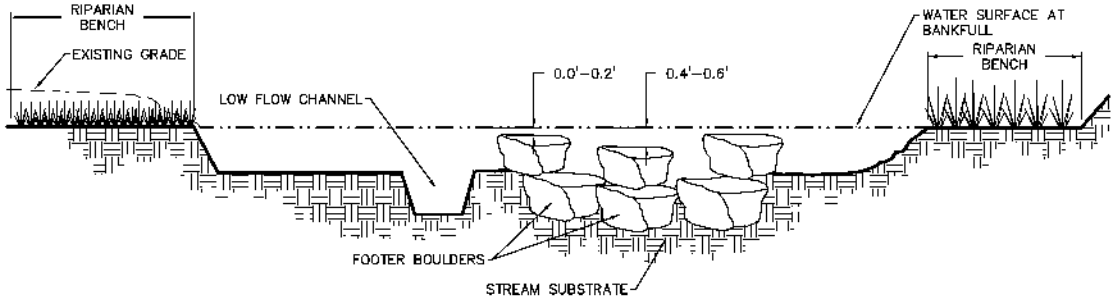
1. BOULDER CLUSTERS SHALL BE OF VARIABLE HEIGHT AND AT THE DISCRETION OF THE ENGINEER (FIELD DIRECTED).

BOULDER CLUSTER – PROFILE
N.T.S.



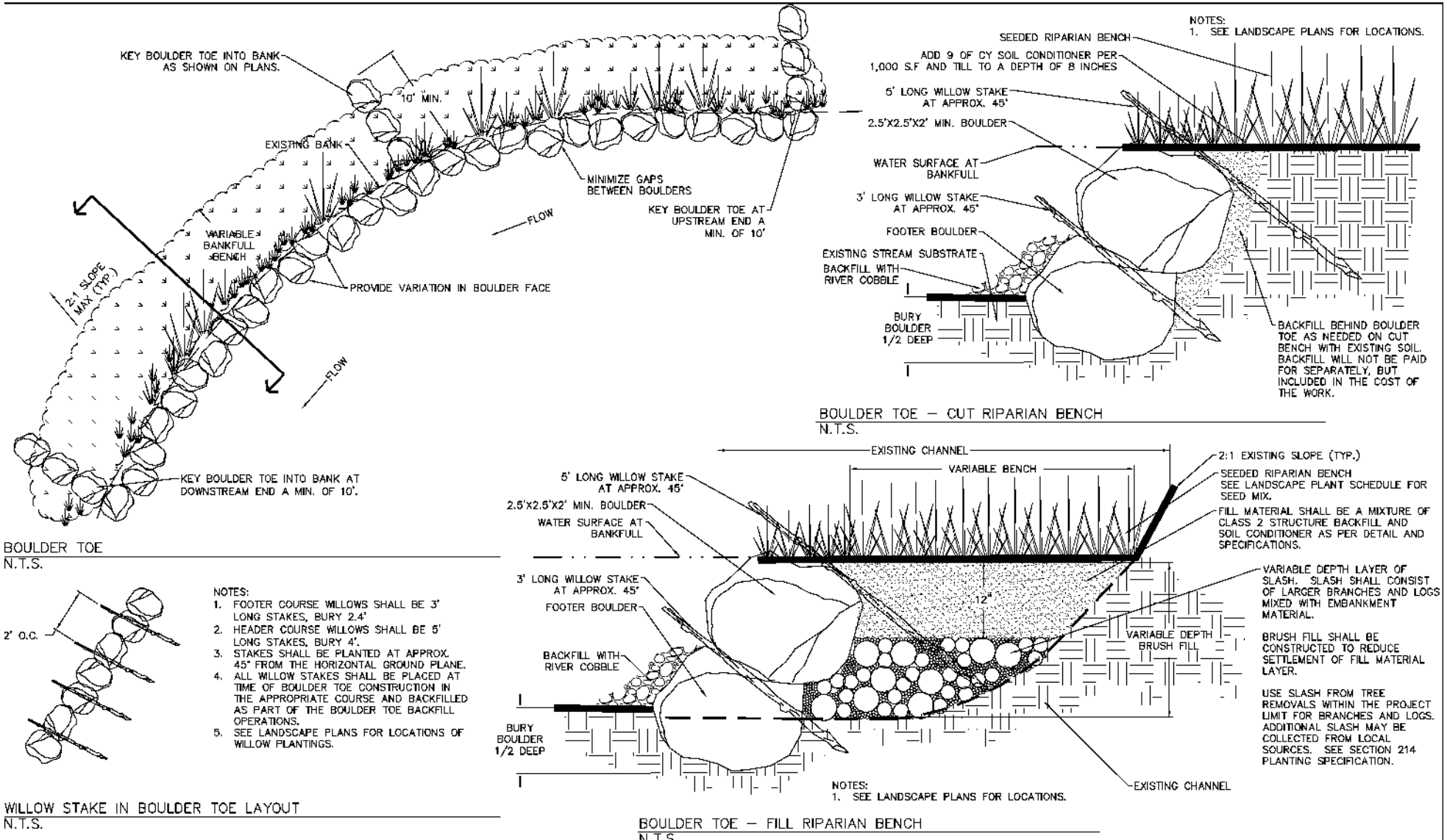
1. SEE PLANS FOR BOULDER PLACEMENT LOCATIONS.
2. BOULDER CLUSTERS MAY CONSIST OF 3–5 ROCK CLUSTERS. (FIELD DIRECTED).
3. PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASED ON INDIVIDUAL ROCK CHARACTERISTICS.

BOULDER PLACEMENT
N.T.S.

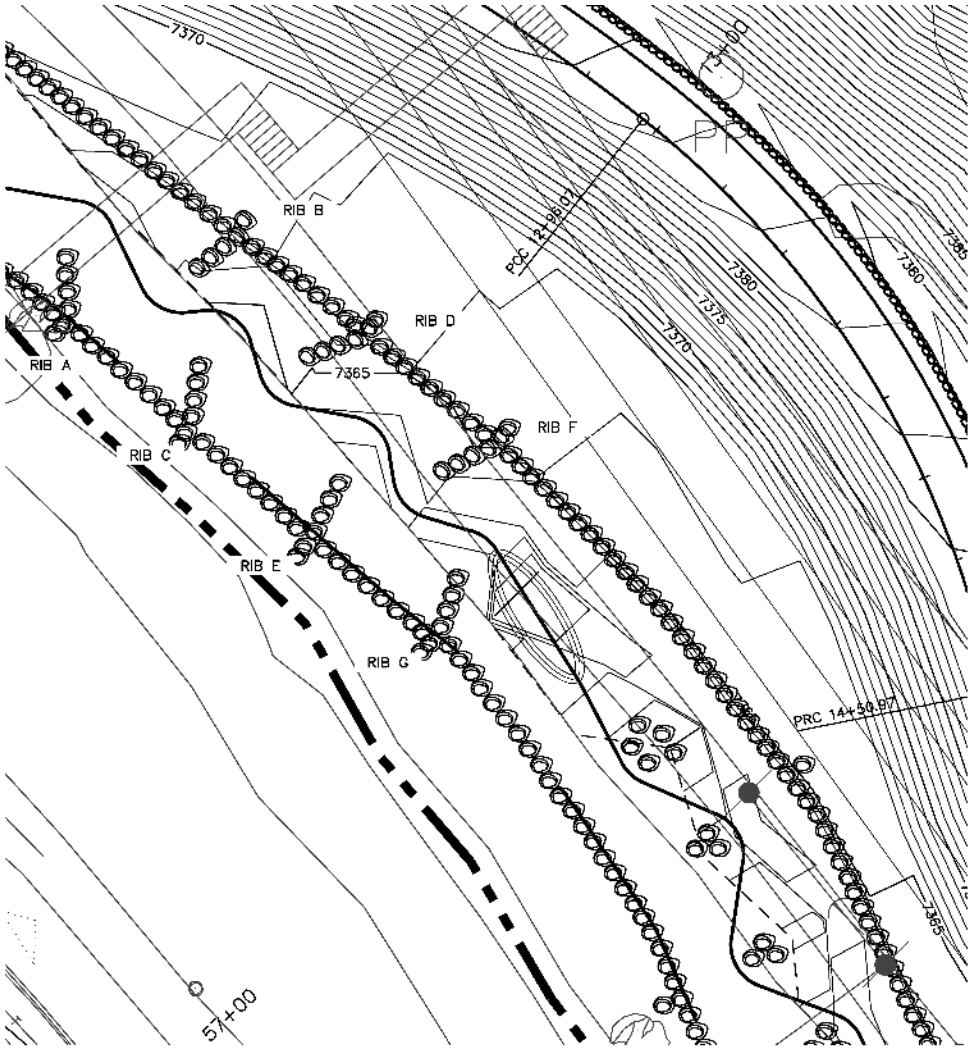


BOULDER CLUSTER – CROSS SECTION
N.T.S.

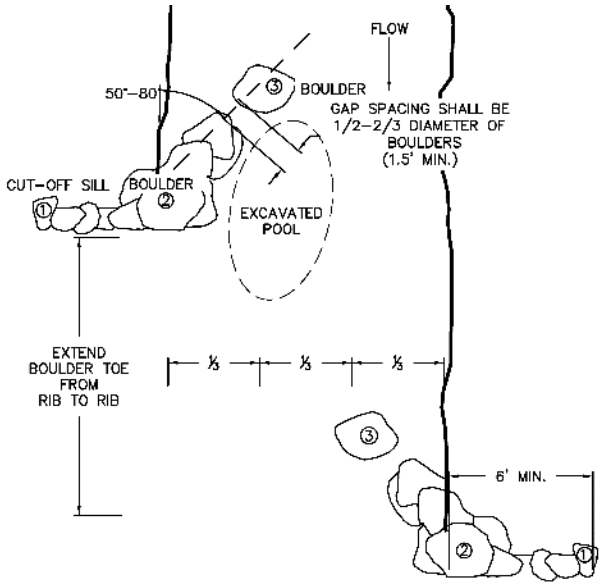
Twin Tunnels Mitigation Project Details



Twin Tunnels Mitigation Project Details



BOULDER RIB – PLAN VIEW
1"=30'-0"

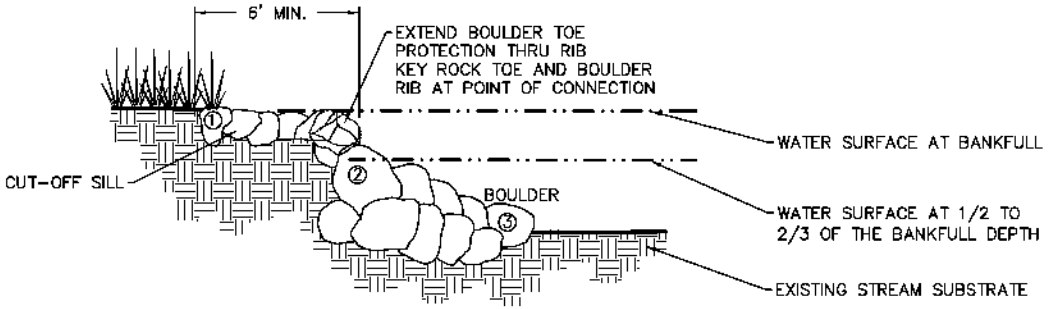


BOULDER RIB (TYP.)
N.T.S.

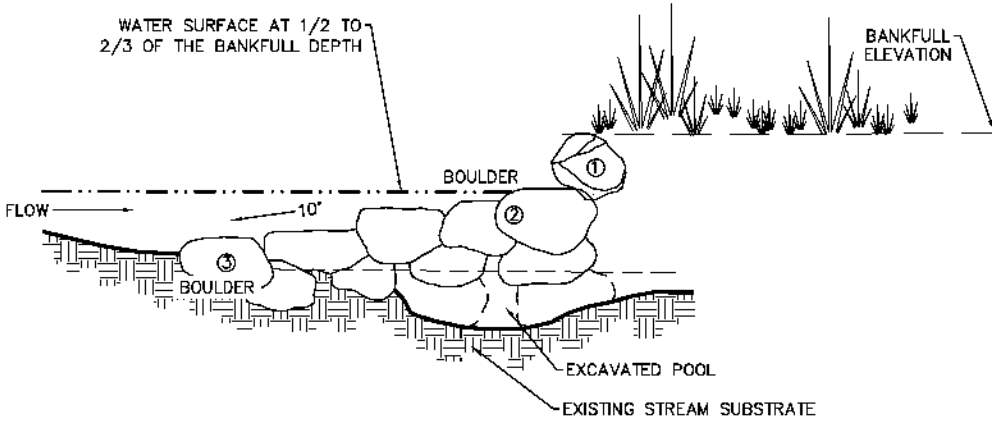
BOULDER RIB INFORMATION

RIB No.	OVERALL LENGTH	ANGLE FROM BANK (DEGREES)	BOULDER① ELEV. BACK ROCK OF TOE		BOULDER② ELEV. ROCK AT BANK		BOULDER③ ELEV. END ROCK IN CHANNEL	
			Elevation	North/East	Elevation	North/East	Elevation	North/East
A	15.8'	50	7368.90	695840.57 1006708.952	7368.08	695845.233 1006715.677	7366.50	695861.072 1006712.170
B	13.4'	78.5	7368.50	695896.657 1006752.182	7367.21	695864.206 1006750.694	7365.87	695855.458 1006740.505
C	15.5'	57	7367.80	6958163.396 1006736.557	7366.97	695821.277 1006740.415	7365.42	695836.609 1006742.623
D	15.8'	58.5	7367.40	695846.585 1006783.067	7366.55	695841.335 1006780.050	7364.97	695836.106 1006765.164
E	14.4'	74.5	7366.90	695792.545 1006764.206	7365.94	695768.207 1006768.207	7364.50	695810.022 1006774.440
F	15.3'	66.5	7366.30	695821.887 1006885.584	7365.53	695816.773 1006809.316	7364.00	695809.910 1006795.665
G	15.4'	60.5	7365.90	695769.124 1006792.116	7365.04	695773.588 1006796.174	7363.50	695788.190 1006801.213

Twin Tunnels Mitigation Project Details



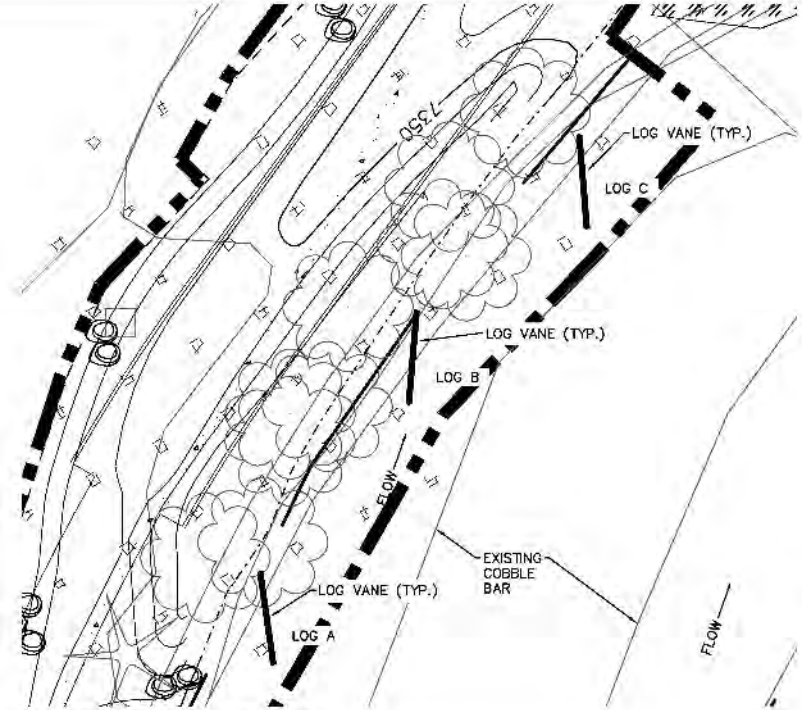
BOULDER RIB – CROSS SECTION
N.T.S.



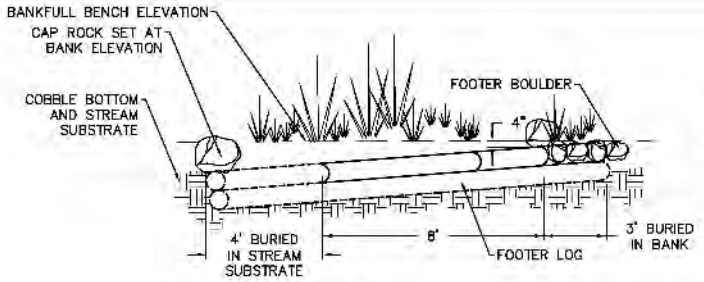
BOULDER RIB – PROFILE VIEW
N.T.S.

- EACH BOULDER PLACED INTO THE ACTIVE CHANNEL MOVING OUT FROM THE BANK SHOULD BE SET AT A LOWER ELEVATION USING A SLOPE OF 10%
- GAPS BETWEEN BOULDERS SHOULD BE ½ TO ⅔ OF THE BOULDER DIAMETER
- RIBS SHOULD ALTERNATE FROM ONE SIDE OF THE CHANNEL TO THE OTHER AT A SPACING OF 0.5 BANKFULL WIDTHS RESULTING IN INCREASED SINUOSITY.
- BOULDER SHALL BE KEYED INTO THE BANK
- MINIMUM BOULDER SIZE SHALL BE APPROXIMATELY 3'X3'X4'
- PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASED ON INDIVIDUAL ROCK CHARACTERISTICS

Twin Tunnels Mitigation Project Details

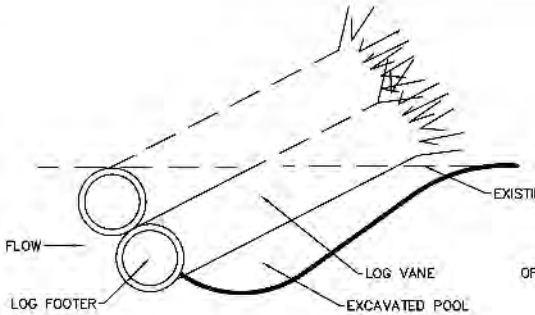


LOG VANE – LOCATION PLAN
N.T.S.

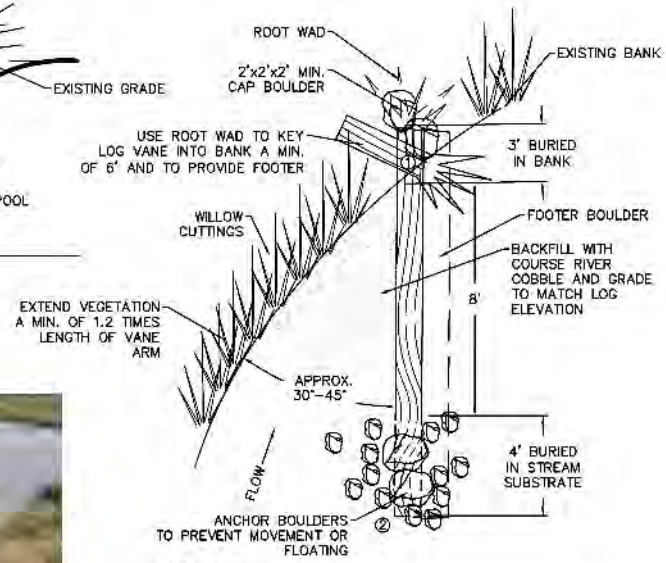


LOG VANE – ELEVATION
N.T.S.

- LOGS SHALL BE 12" DIA. MIN.
- ROOT WAD SHALL BE COVERED IN BANK BY CAP ROCKS.
- LOGS SHALL BE DE-LIMBED AND FREE OF BRANCHES.
- ELEVATIONS SHALL BE DETERMINED IN THE FIELD BASED ON EXISTING CHANNEL ELEVATIONS.
- FISH SPAWNING AREAS SHALL BE FLAGGED BEFORE CONSTRUCTION BEGINS AND WILL BE A NON-DISTURBANCE ZONE.
- LOG VANE LOCATIONS MAY BE ADJUSTED OR ELIMINATED IN THE FIELD TO ACCOUNT FOR FISH SPAWNING AREAS AND BEDROCK CONDITIONS AT THE DISCRETION OF THE ENGINEER (FIELD DIRECTED).



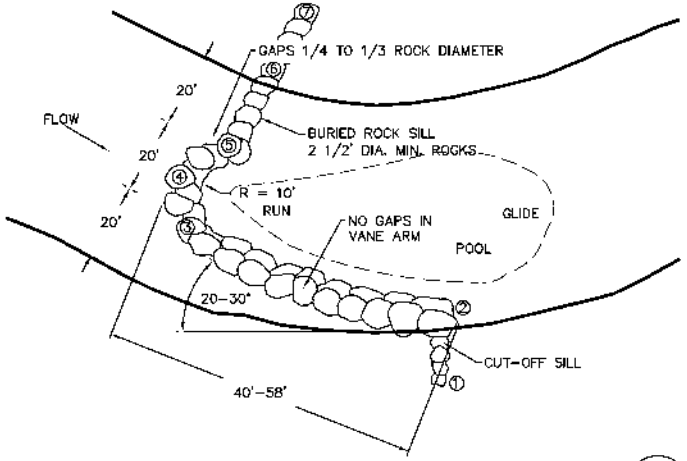
LOG VANE – PROFILE
N.T.S.



LOG VANE – PLAN
N.T.S.

LOG VANE No.	LOG LENGTH	ANGLE FROM BANK	LOG	
			Elevation	North/East
A	15	35 Deg.	① 696062.616 ② 696047.665	1007544.651 1007593.869
B	15	30 Deg.	① 696034.726 ② 696019.779	1007566.751 1007565.488
C	15	45 Deg.	① 695993.056 ② 695978.206	1007541.788 1007543.905

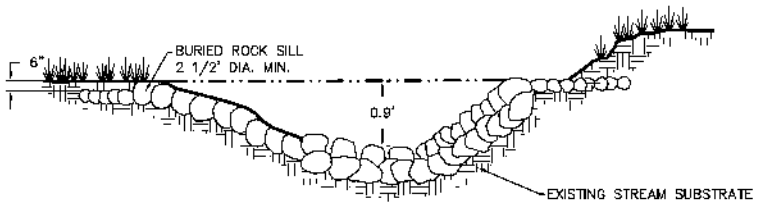
Twin Tunnels Mitigation Project Details



ROCK J-HOOK VANE – PLAN VIEW
N.T.S.

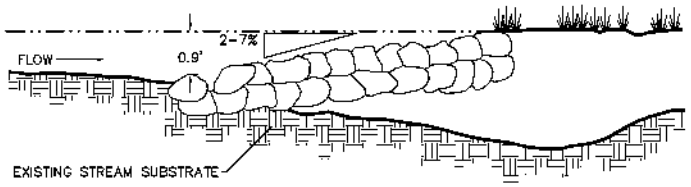
X
XX

NOTES:
1. J-HOOK POINTS 3, 4 AND 5 SHALL BE PLACED AT A RADIUS OF 10'
2. PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASE ON INDIVIDUAL ROCK CHARACTERISTICS.
3. J-HOOK ROCKS SHALL BE 4-5' DIA. X 2-3' HEIGHT.



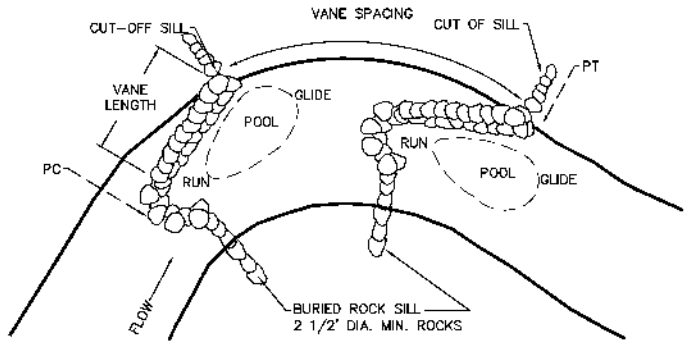
ROCK J-HOOK VANE – CROSS SECTION VIEW
N.T.S.

X
XX



ROCK J-HOOK VANE – PROFILE VIEW
N.T.S.

X
XX



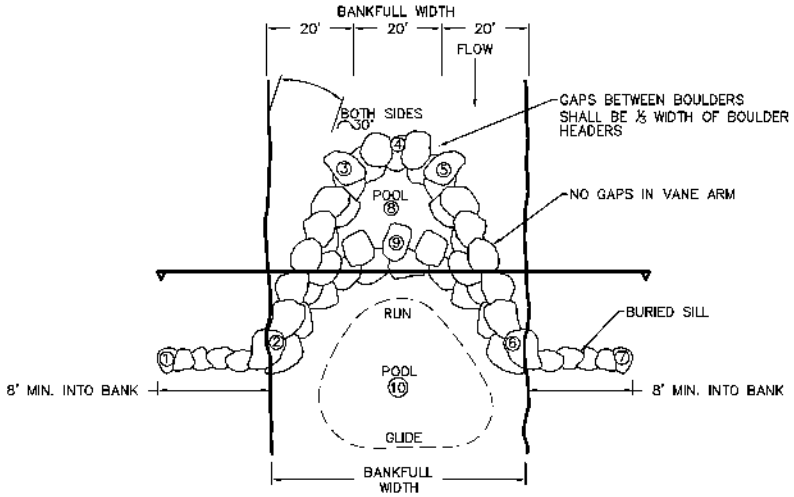
ROCK J-HOOK VANE SPACING
N.T.S.

X
XX

J-HOOK INFORMATION

J-HOOK No.	VANE ARM LENGTH	ANGLE FROM BANK	BOULDER 1 Elevation	BOULDER 1 North/East	BOULDER 2 Elevation	BOULDER 2 North/East	BOULDER 3 Elevation	BOULDER 3 North/East	BOULDER 4 Elevation	BOULDER 4 North/East
				695342.984		695346.297		695375.712		695391.434
1	40	30 Degrees	7360.0	1007104.201	7360.0	1007106.018	7359.9	1007092.443	7359.4	1007099.068
			BOULDER 5 Elevation	BOULDER 5 North/East	BOULDER 6 Elevation	BOULDER 6 North/East	BOULDER 7 Elevation	BOULDER 7 North/East		
				695391.701		695406.642		695419.512		
			7359.9	1007106.709	7360.1	1007117.410	7360.3	1007124.709		
			BOULDER 1 Elevation	BOULDER 1 North/East	BOULDER 2 Elevation	BOULDER 2 North/East	BOULDER 3 Elevation	BOULDER 3 North/East	BOULDER 4 Elevation	BOULDER 4 North/East
				695389.223		695390.757		695376.565		695379.852
2	40	30 Degrees	7355.0	1007473.715	7355.0	1007470.338	7354.6	1007438.944	7354.1	1007425.903
			BOULDER 5 Elevation	BOULDER 5 North/East	BOULDER 6 Elevation	BOULDER 6 North/East	BOULDER 7 Elevation	BOULDER 7 North/East		
				695391.849		695414.856		695442.622		
			7354.6	1007426.432	7356.0	1007409.482	7358.5	1007389.967		

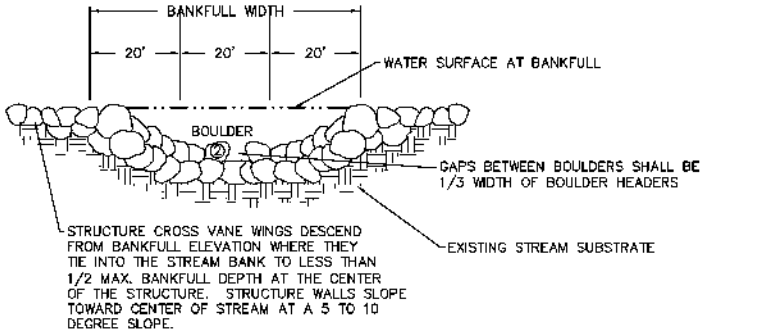
Twin Tunnels Mitigation Project Details



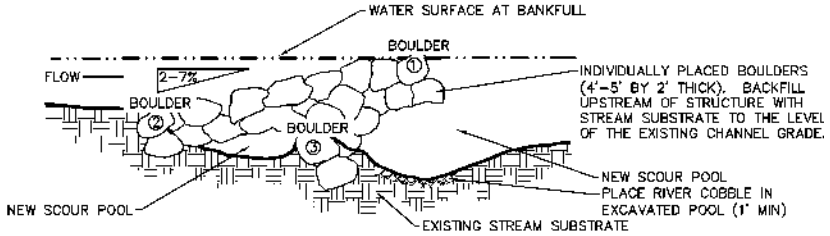
INDIVIDUALLY PLACED FOOTER ROCKS 4' TO 5' BY 2' THICK (MIN. TWO ROWS OF FOOTER ROCKS PLACED TIGHTLY TOGETHER WITH INTERSTITIAL SPACES FILLED WITH COBBLE AND GRAVEL).

CROSS VANE – PLAN VIEW
N.T.S.

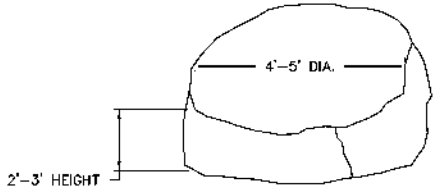
POINT	Northing	Easting	Elevation
1	695752.253	1007484.138	7349.0
2	695751.960	1007492.149	7349.0
3	695699.272	10047509.4	7348.0
4	695695.573	1007518.726	7347.9
5	695696.538	1007528.212	7348.0
6	695749.985	1007551.516	7349.0
7	695749.588	1007559.564	7349.0
8	695701.581	1007520.927	7347.0
9	695707.465	1007520.152	7347.5
10	695717.802	1007520.397	7345.0



CROSS VANE – CROSS SECTION
N.T.S.



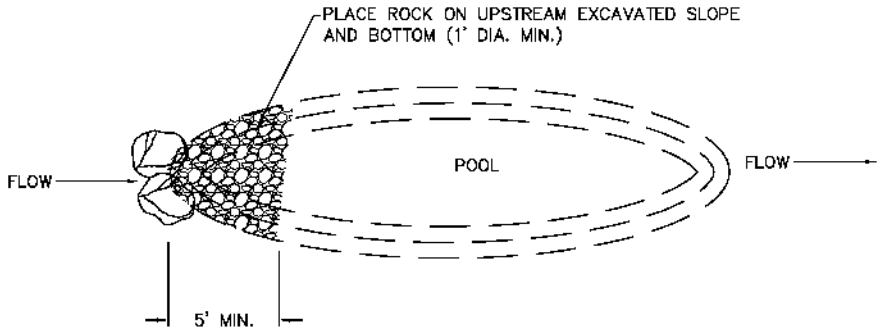
CROSS VANE – PROFILE
N.T.S.



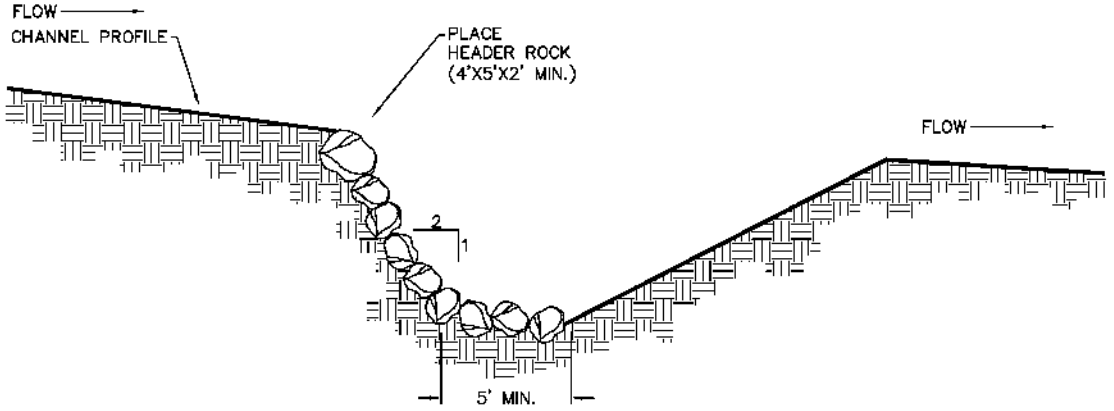
PLACEMENT OF ROCK WILL BE FIELD DIRECTED BASED ON INDIVIDUAL ROCK CHARACTERISTICS.

TYPICAL BOULDER HEADER/FOOTER
N.T.S.

Twin Tunnels Mitigation Project Details



TYPICAL POOL PLAN VIEW
N.T.S.



NOTE:
1. POOL ARMORING IS TO BE USED ONLY UNDER FIELD DIRECTION.

TYPICAL POOL PROFILE VIEW
N.T.S.

Meeting Notes

I-70 Floyd Hill to Veterans Memorial Tunnels

SNC·LAVALIN ATKINS

Project: I-70 Floyd Hill to Veterans Memorial Tunnels NEPA and 30% Design
Meeting: 21912 Floyd Hill SWEEP #2
Date: October 25, 2018
Location: CDOT Golden Region 1, Lookout Mountain

Summary of Action Items	Responsibility
1. Complete wetlands functional assessment.	Atkins
2. Set up meeting with CDOT Maintenance to determine existing vehicles and dimensions, maintenance activities and requests, traction sand application rates.	Atkins
3. Discuss BMP locations with CDOT Maintenance.	CDOT
4. Confirm that CDOT maintenance is aware of fire suppression emergency vault and procedures for closing the valve.	CDOT
5. Confirm BMP ponds will drain within 24 hours as required (to mitigate against standing water).	Atkins
6. Determine and map groundwater elevations to aid in impact analysis and design.	Atkins
7. Review as-builts and incorporate existing BMP locations into proposed design as applicable.	Atkins
8. Evaluate impacts of snow plowing over creek locations and consider opportunities to reduce snow from entering creek directly.	Atkins
9. Note that the curve modifications reduce the potential for truck overtopping and hazardous spills and need for sand oil separators. This note should be incorporated into the sediment control design and hazmat section of the EA and technical report.	Atkins
10. Provide project update to the Upper Clear Creek Watershed Association.	CDOT
11. Show wetland areas in roll plots for future meetings.	Atkins
12. Provide total impervious area and the capture volume of the BMPs.	Atkins

Summary of Discussion

The SWEEP Issue Task Force meeting #2 followed the attached agenda and presentation followed by a roll plot discussion of specific sediment control recommendations. Attendees are indicated in the sign-in sheet. *Green* notes indicate notes and discussions after the meeting.

1. Introductions

2. Issues and Actions from SWEEP Meeting No. 1

a) Water Quality Concerns Raised Previously
   i) Creek geology and moving the Creek
   ii) Sediment generated with moving the Creek and associated turbidity
   iii) Wetland complex at Beaver Brook
   iv) Methodology for Environmental Assessment
      a) Project location is outside of a MS4 Permit area
      b) Concern with Magnesium Chloride (MgCl) and other salts that cannot be captured; monitoring shows an overall increase in chlorides in the Creek

b) Status of Action Items from Meeting No. 1
   i) Complete wetland investigations
      a) Wetland delineation completed
      b) Wetland functional assessment will be completed
      c) Potential fen wetlands tested in the Beaver Brook area; while soil testing (conducted by Colorado State University (CSU) laboratory per USACE standards) showed organic soils, the testing did not support fen designation
   ii) Confirm maintenance use of traction sand
      a) Maintenance continues to use sand, especially on Floyd Hill due to steep grades. *After the SWEEP meeting, Maintenance confirmed that they no longer use sand east of the Veterans Memorial Tunnels (VMT) (even for traction) and only use Ice Slicer*
      b) Warmer winters leads to less application of sand; sand is weather dependent
      c) Design team intends to meet with Maintenance to document application rates *After the SWEEP meeting, Maintenance confirmed the application rate for sand is zero (the SCAP assumptions are too high)*
   iii) Concern about effects of chlorides from deicers entering the Creek
      a) Sand is more natural and preferred (Jim Ford) since the Black Hawk treatment plant can filter out the sand
      b) There are no readily available BMPs to capture chlorides
      c) CDOT continues to do research on deicers
      d) Need to continue coordination with Black Hawk regarding potential effects of chlorides on town water supply (intake located within the project area)

3. Proposed Action Updates: Design proposes moving approximately 1,000 feet of the Creek between VMT and Hidden Valley approximately 50 feet to the south. In this reach:

a) Highly channelized; no spawning habitat per CPW
b) EA needs to evaluate impacts to fishing and rafting; these may be in conflict
c) Creek modifications could provide opportunity for enhancements
d) 404 permitting could not rely on restoration NWP as the primary purpose is for transportation
e) SWEEP ITF is interested in reviewing and providing input to the tunnel and creek realignment designs as these elements are advanced

4. Water Resources Updates

a) Wetlands and waters of the U.S.
   i) Field delineations conducted for most of study area. In cases where properties were inaccessible (right of entry not granted), an advanced desktop review was conducted for properties.
   ii) Organic material was identified within two wetland complexes at the top of Floyd Hill: High-quality wetlands; however, not classified as fen wetlands based on CSU lab results—7% Total Organic Compound (TOC) versus the 12% TOC required to classify as fen.
   iii) Wetlands and waters of the U.S. are associated with Clear Creek and Beaver Brook

b) Streams and Riparian Areas
   i) CPW monitored fish populations in the stretch of Clear Creek east of the VMT from 2012 to 2017 (associated with the Twin Tunnels project commitments)
      a) No spawning areas in the area east of the improved section (after the bend at the doghouse rail bridge): Mostly resulting from channelization (the channelized section is favorable to rafting)
   ii) Boreal toads are not present in the project area to Mandy or Chase's knowledge. *After the meeting, Mandy consulted with the wildlife discipline lead and confirmed that boreal toad habitat has been mapped by CPW, and the eastern edge of suitable habitat is about 10 miles west of the Floyd Hill Project study area.*
   iii) Channelization of Clear Creek is a challenge for stream health as channelization increases stream erosion, transports more sediment, accelerates velocity of the water, and reduces vegetation along the stream bank resulting in poor habitat.
      a) Gary Frey provided input to the factors needed to assess stream health and habitat potential, such as water quality, flow, and stream structure, such as sinuosity and presence of pools, shelters, and barriers.
   iv) Sedimentation
      a) Sediment enters streams in the Project area from erosion generated from offsite sources and rock/landslides, winter maintenance of the highway, and mining influences, including metal runoff from mill sites
      b) Upper Clear Creek Watershed Association has water quality information for reference. The Upper Clear Creek Watershed Association would also be in interested in a project update. CDOT provides updates at their regularly scheduled meetings – the next scheduled CDOT update is in January.
   v) Response to hazmat spills has not yet been determined or coordinated with the state Fire Marshall. No determination has been made whether Hazmat vehicles will be allowed though the proposed tunnel or need to detour around on the frontage road. Additional discussion and coordination to occur in later design phases.
   vi) Stream enhancements must consider rafting, fishing, and water recreation, including access to minimize impacts to channel health and function

c) Winter Maintenance
   i) SWEEP group would prefer the use of sands instead of salt

ii) Plowing practices and associated snow storage need to be considered and incorporated into the design

5. Sediment Control

a) SCAP Recommendations

i) The SCAP is a planning-level document that provides a menu and identification of potential BMPs that could be incorporated into future I-70 projects in the Clear Creek watershed, as appropriate

ii) Within the Floyd Hill Project Area, numerous BMPs are identified (as described later in the meeting)

b) Project Approach and BMP Recommendations

The design team developed a venn diagram to illustrate the three overlapping considerations in developing sediment control facilities: engineering, maintenance, and environmental. Each of these factors is important to ensuring feasible facilities that can be maintained and integrated into the landscape into the future.

i) Engineering: Feasibility, efficiency, size and cost:

a) Effectiveness is most important feature of a BMP

(a) Holly Huyck indicated that a facility that works may not be aesthetically pleasing, but is preferable to one that does not work as well but looks nice.

(b) Need to capture sediment and drain properly

(i) The basin design at the east end of the Lawson bridge does not drain, and standing water has attracted mosquitos.

(ii) Jo Ann Sorenson receives annual reports on the sediment basins from the EB PPSL project that show the structures are not capturing sediment. Need to design them so that they work. *Based on discussions with Maintenance after the meeting, the lack of sediment may also be due to the lack of sand use in the area.*

ii) Maintenance

a) Maintenance of sediment control facilities is critical to their long-term effectiveness

b) Maintenance prefers fewer facilities that can be safely accessed within existing environments

c) Ideally maintenance would occur on an annual schedule (i.e., the facilities are large enough to hold a full season of sediment)

iii) Environmental: Natural looking, effective

a) BMP location and sizing should consider resiliency; proposed location should not be too close to Clear Creek. If they are within the 100-year floodplain, they need to be designed to withstand flooding impacts

b) It was recommended that grass not be planted adjacent to the roadway because it attracts wildlife closer to the roadway and may increase wildlife vehicle collisions

c) BMP Menu Overview: SCAP proposed versus Floyd Hill Conceptual Proposed BMP Design

i) Based on a review of the various criteria within the engineering, maintenance, and environmental categories, the design team has proposed two primary BMP types (basins and swales) that best balance the needs.

ii) Sediment Basins:
   a) 27 shown in the SCAP
   b) 12 Proposed with the Project design

iii) Roadside Swales
   a) Proposed with the Project due to limited right-of-way and trying to limit the Project's disturbed area.
   b) The swales will provide some treatment of runoff prior to being discharged into Clear Creek

iv) Loading Dock Traps:
   a) 3 shown in the SCAP
   b) 1 proposed with the Project because there is no room for a sediment basin in that area.
   c) The location is not in a highly visible area based on the current proposed design and the design will ensure that it is as minimally visible as possible

v) Inlet Sediment Traps:
   a) 26 in the SCAP
   b) None proposed for the Project
   c) Dangerous and difficult to maintain because Maintenance has to do lane closures at night to clean them
   d) Not effective because they are not maintained

6. Open Discussion: Walk through roll plot: See notes on attached roll plot pdf

a) Jo Ann Sorensen noted that the sediment basin installed at the east end of the EB PPSL project holds water and generates mosquito larvae. Josh Giovannetti believes it's because the BMP is not working correctly. Note that the WB PPSL project will be fixing the Lawson sediment basin.

b) Loading dock trap at the east end of the VMT is for spills, materials used during fires in the tunnels, and sediment capture; this one needs to be noted and maintained in the design

c) Recommended communication and hand off; provide a map of BMPs to:
   i) Maintenance
   ii) Fire response

d) Design considerations/review:
   i) Station 1022+00: Capture area (tunnel to bridge) sediment basin is just upstream of the intake: Proposed design must not impact or modify the existing water intake for the Black Hawk water treatment facility
   ii) Permanent Water Quality (PWQ) Outlet Structure must have a well screen to mitigate clogging and ensure better performance
      a) May need to modify existing PWQ feature from Central City and treat some of I-70
         (a) Approximate location is north of the highway and may be in between I-70 and Central City Pkwy to the west of the treatment plant
         (b) Need to coordinate with Central City because this location is one of their PWQ features
      b) Tunnel hazmat containment will be taken care of in future phases of design

c) Existing pond east of the proposed loading dock is filled with water (is not functioning properly)
d) Acquire groundwater information at all proposed sediment basin locations in future phases of the project

iii) Three informal ponds just west of U.S. Highway 6 (US 6); Atkins to investigate further. *After the SWEEP meeting, Atkins reviewed as-builts and conducted field investigations to locate these informal ponds; however, the review and field investigation could not identify these ponds. As a result, the "three informal ponds" will not be considered in design.*
iv) Step/tier ditches: Coordinate design to ensure that CDOT Maintenance vehicles are accommodated
v) Clean outs: Adhere to CDOT criteria for manhole spacing
vi) Possibility to have a PWQ facility east of US 6 where the rafters currently pull out of the Creek; however, there's a concern that trying to make something work within the site constraints will remove efficiency of a small PWQ facility.
vii) Wildlife crossing: One large one at the top of Floyd Hill on the east end of the project and will add separated benches whenever the opportunity arises under bridges to allow for better crossings such at the US 6 interchange
viii) Coordinate future development work at east end of the project
ix) Review as-builts and incorporate existing conditions into the proposed design
x) West end by the bridges:
a) Shoulder width is 6 ft inside and 10 ft outside
b) Storage cannot occur on bridges; lanes and medians must be clear for vehicle access
c) Specific areas for snow storage not included in the design but can consider snow capture options for specific areas such as bridges and over the Greenway/creek
d) Ensure that snow does not get plowed onto the Greenway and limit use of the recreational area
xi) Sand Oil Separators: Concerns with spills from overturned trucks going into Clear Creek
a) Just east of the VMT, trucks frequently overturn; Proposed improvements will smooth that curve out, which should help with trucks overturning
b) Provide verbiage that indicates the design smooths out curves, which reduces the potential for track overtopping and spills. As a result, sand oil separators are not anticipated. This should occur within sediment control design and hazmat section of the environmental documents.
c) Considering providing an Incident Management Plan in future phases of the project

Floyd Hill- SWEEP Meeting # 2 10/25/2018

Name	Organization	Email
Holly Hoyde	Clear Creek Watershed Foundation	hhoyde@phoenixgeosciencegroup.com
Ethan Aumann	EPA	aumann.ethan@epa.gov
Lisa Lloyd	EPA NEPA	lloyd.lisa@epa.gov
Gary Frey	CoTest Unlimited	gbfrey@msn.com
Josh Giovannetti	CDOT	josh.giovannetti@state.co.us
Lauren Boyle	CDOT	Lauren.Boyle@state.co.us
Becky Pierce	CDOT HQ	rebecca.pierce@State...
Mandy Whorton	Peak Consulting	mandy.whorton@peak-consulting.us
Stephanie Gibson	FHWA	Stephanie.gibson@dot.gov
Fred. Rollenhagen	Clear Creek Co.	frollenhagen@co.clear-creek.co.us
Jim Ford	City of Black Hawk	jford@cityofblackhawk.org
Anthony Pisano	Atkins	Anthony.Pisano@Atkinsglobal.com
Angelle Greer	USACE	angelle.v.greer@usace.army.mil
Chase Taylor	Pinyon Env.	Taylor@pinyon-env.com
Jorden Lowe	Atkins	Jorden.Lowe@atkinsglobal.com
Vanessa Henderson	CDT	vanessa.henderson@state.co.us
Tammy Eggers	Atkins	tammy.eggers@atkinsglobal.com

Floyd Hill- SWEEP Meeting # 2 10/25/2018

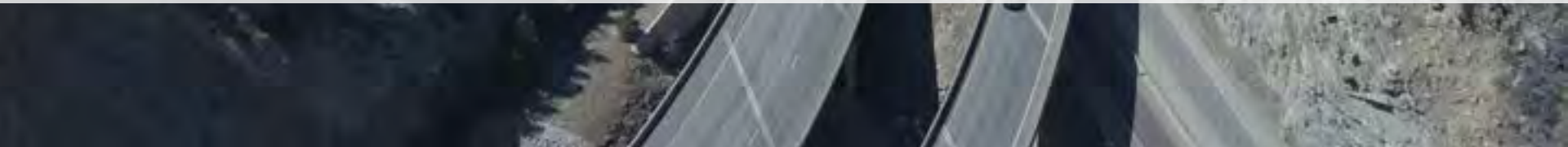
Name	Organization	Email
Holly Hoyde	Clear Creek Watershed Foundation	hhoyde@phoenixgeosciencegroup.com
Ethan Aumann	EPA	aumann.ethan@epa.gov
Lisa Lloyd	EPA NEPA	lloyd.lisa@epa.gov
Gary Frey	CoTest Unlimited	gbfrey@msn.com
Josh Giovannetti	CDOT	josh.giovannetti@state.co.us
Lauren Boyle	CDOT	Lauren.Boyle@state.co.us
Becky Pierce	CDOT HQ	rebecca.pierce@State...
Mandy Whorton	Peak Consulting	mandy.whorton@peak-consulting.us
Stephanie Gibson	FHWA	Stephanie.gibson@dot.gov
Fred. Rollenhagen	Clear Creek Co.	frollenhagen@co.clear-creek.co.us
Jim Ford	City of Black Hawk	jford@cityofblackhawk.org
Anthony Pisano	Atkins	Anthony.Pisano@Atkinsglobal.com
Angelle Greer	USACE	angelle.v.greer@usace.army.mil
Chase Taylor	Pinyon Env.	Taylor@pinyon-env.com
Jorden Lowe	Atkins	Jorden.Lowe@atkinsglobal.com
Vanessa Henderson	CDT	vanessa.henderson@state.co.us
Tammy Eggers	Atkins	tammy.eggers@atkinsglobal.com

I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS

SWEEP Meeting #2

October 25, 2018



I-70 Floyd Hill to Veterans Memorial Tunnels

Agenda

- Welcome / Introductions
- Issues from SWEEP #1 Meeting
  - Committee Concerns
  - Action Items
- Proposed Action Updates
- Water Resources Updates
  - Wetlands and Waters of the US
  - Streams and Riparian Areas
  - Winter Maintenance
- Sediment Control
  - SCAP Recommendations
  - Project Approach and BMP Recommendations
- Next Steps & Review of Action Items

I-70 Floyd Hill to Veterans Memorial Tunnels

Initial Stakeholder Concerns

- Water quality
  - Traction sand, magnesium chloride, and erosion
  - I-70 and frontage road maintenance
  - Fish and riparian habitat
- Creek geology and moving the creek
- Wetland complex at Beaver Brook
- Methodology for environmental assessment

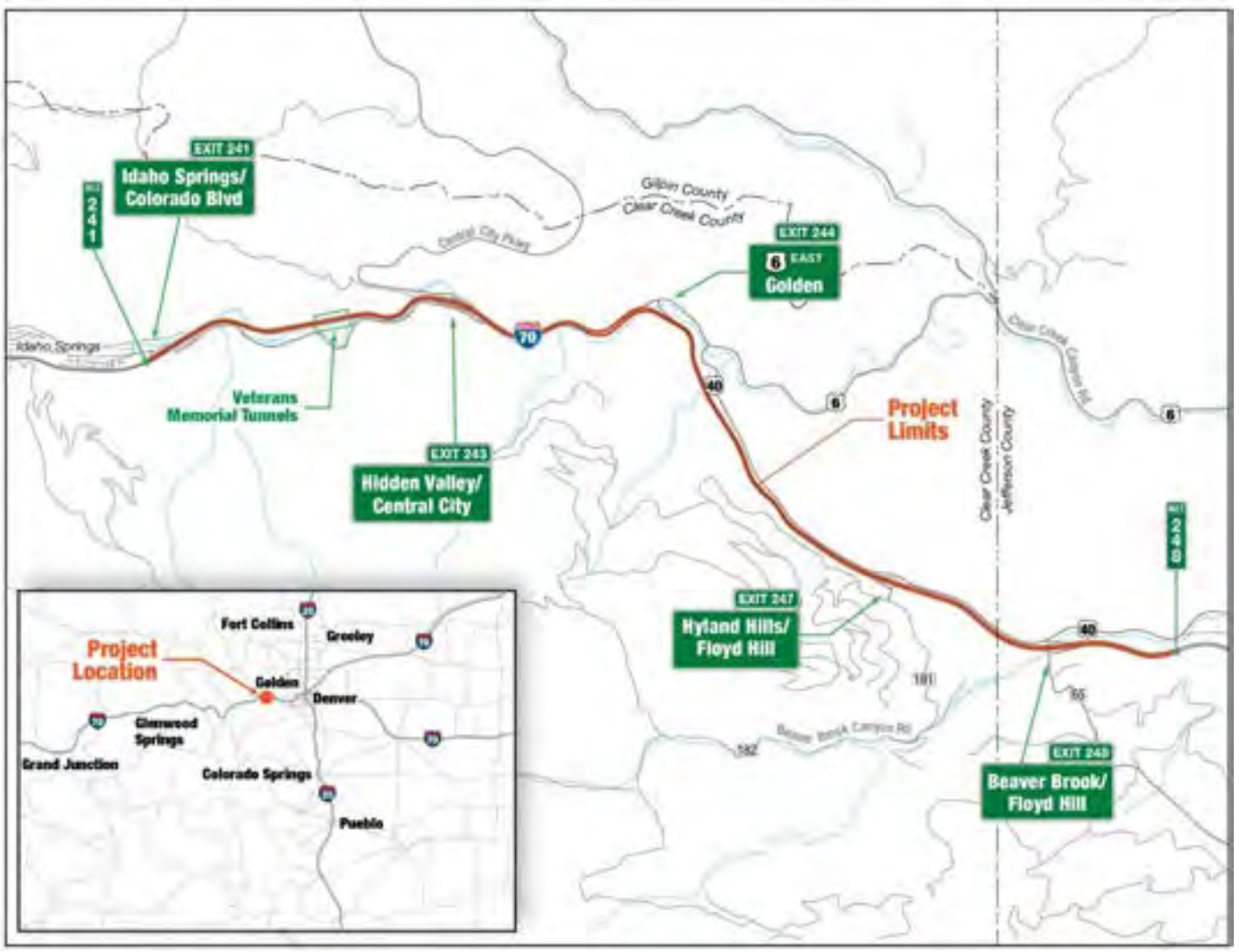
I-70 Floyd Hill to Veterans Memorial Tunnels

Action Item Review

Action Items from April 2018 Meeting	Status
1. Obtain information/figure on wetland area preserved by development approval near Floyd Hill/CR 65	Provided by Fred Rollenhagen (CCC).
2. Follow up to see if there are site specific locations that may still be using sand for treatment	CDOT maintenance confirmed that sand is used in spot locations to supplement chloride deicing when traction is an issue (such as on grades).

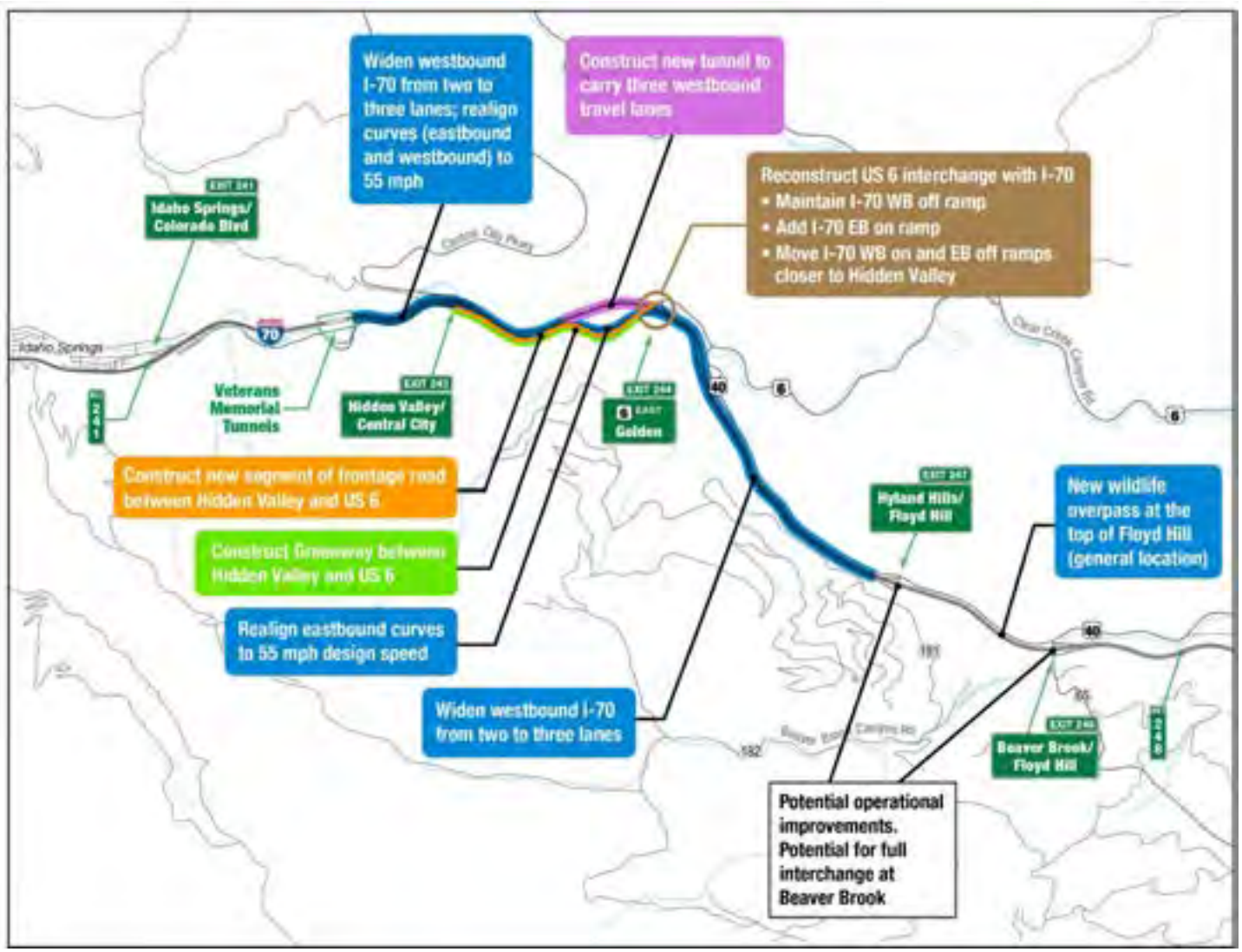
I-70 Floyd Hill to Veterans Memorial Tunnels

Project Area



I-70 Floyd Hill to Veterans Memorial Tunnels

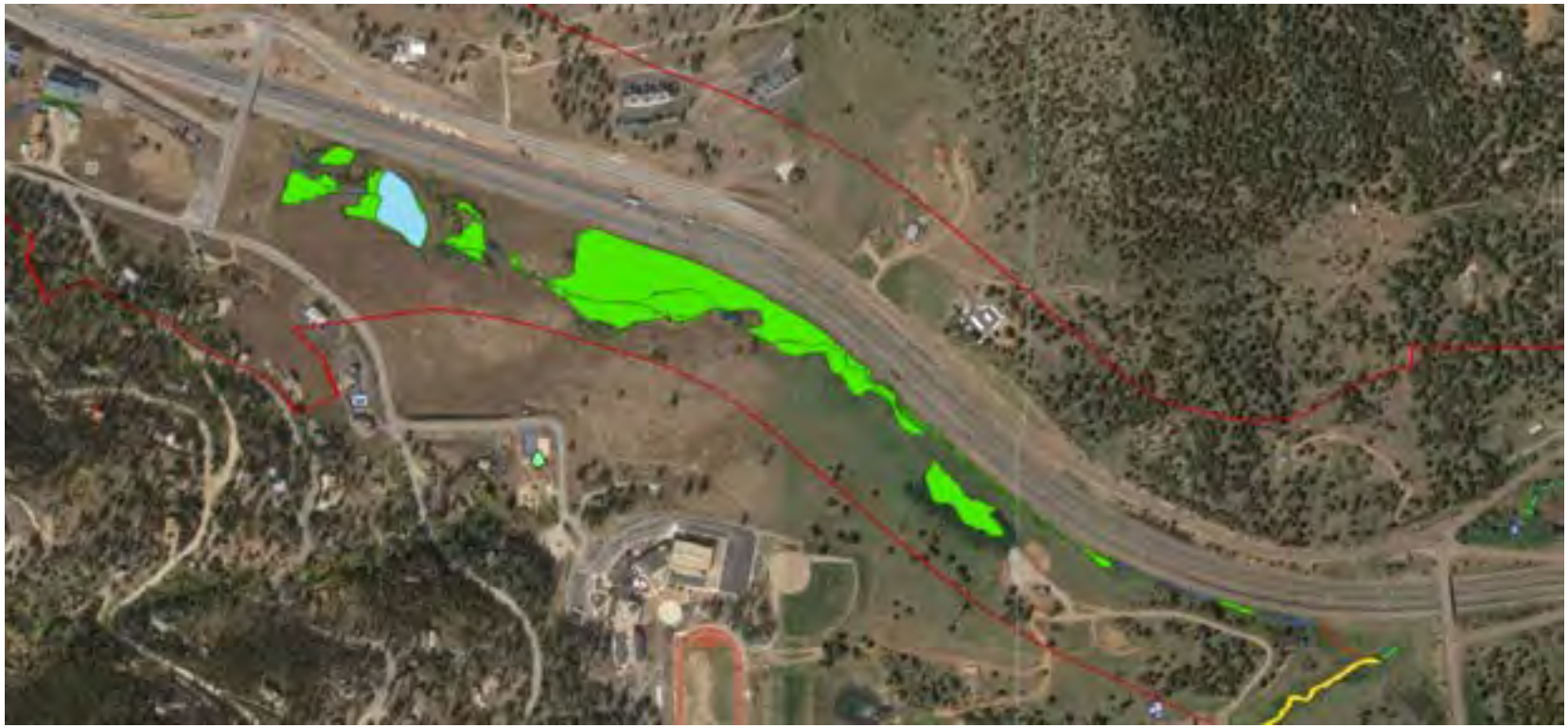
Proposed Action



I-70 Floyd Hill to Veterans Memorial Tunnels

Wetlands and Waters of the US

- WUS Delineations completed
- Additional characterization of wetlands at Beaver Brook
- Organic soils presented possibility of fen wetlands



I-70 Floyd Hill to Veterans Memorial Tunnels

Fen Wetland Testing

- Testing by Colorado State University following US Army Corps of Engineers protocol
  - August 21, 2018 sampling
  - Two week testing period
- Methods
  - Measure Total Organic Carbon
    - Fen wetlands minimum 12% TOC
    - Classified as histisol soils
  - Tested Samples Twice
- Results
  - Histic epipedon soils
  - TOC content around 7%
  - Not fen wetland

I-70 Floyd Hill to Veterans Memorial Tunnels

Streams and Riparian Areas

- Riparian areas limited due to channelization
- Sedimentation from erosion and winter maintenance (sand) negatively affects fish habitat
- Fish populations
  - Colorado Parks and Wildlife has been monitoring fish east of the Veterans Memorial Tunnels
  - No redds or spawning habitat in the project area due to channelization and rafting
  - No genetically pure greenback cutthroat trout in this stretch of Clear Creek

Other Stream Considerations

- Rafting, fishing, and water recreation (including access)
- Stream health (channelization and highway encroachment)
- Hazmat spills and response
- Mining (mineral) influences

Maintenance

- CDOT maintenance activities
  - De-icing (chlorides)
  - Traction sand
  - Snow plowing and storage
- Sediment capture (sand) is well understood
- CDOT continues to conduct research on deicing and chlorides

CDOT Water Quality Monitoring

SCAP Considerations

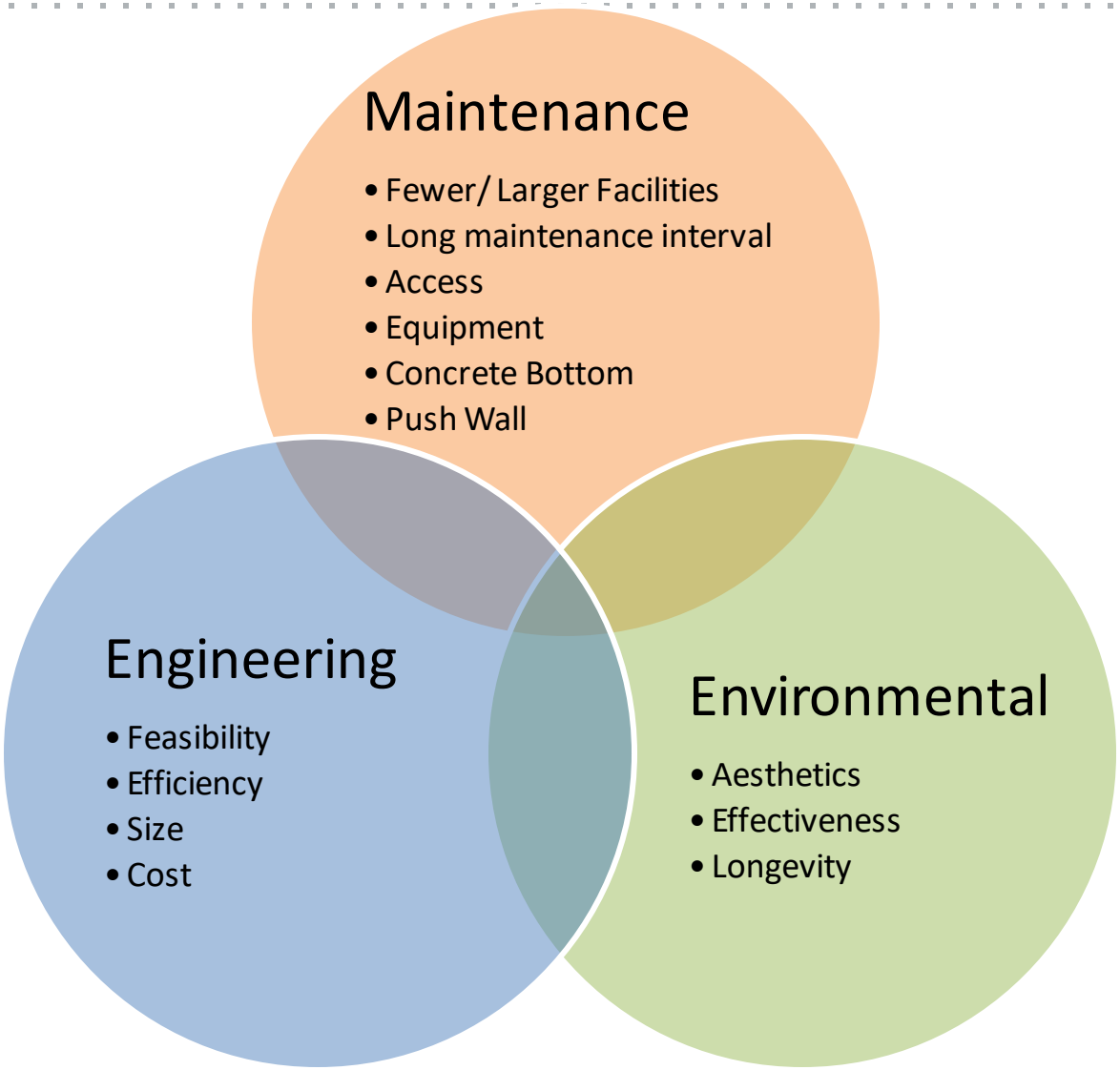
SEDIMENT CONTROL

Sediment Control

- Clear Creek Sediment Control Action Plan (SCAP) is a tool to better manage roadway traction sand and other highway-related sediment sources that can adversely impact Clear Creek
  - Provides a BMP menu to improve water quality
  - BMP details developed during preliminary design

From SCAP: "It is well documented that total phosphorus and total metals associated with sediment can also be controlled with adequate BMPs. Dissolved salts related to I-70 cannot be easily mitigated by conventional sediment control BMPs. However, retention of salt-laden runoff in control structures will also reduce direct salt loading to Clear Creek."

Sediment Control



Environmental Considerations

Aesthetics	The facility should not be identifiable from the highway or surrounding areas. It should look like a natural part of the environment.
Effectiveness	The facility needs to be able to capture and store traction sand and other contaminants of concern.
Longevity	Any constructed facility should be designed for a long life span.

Maintenance Considerations

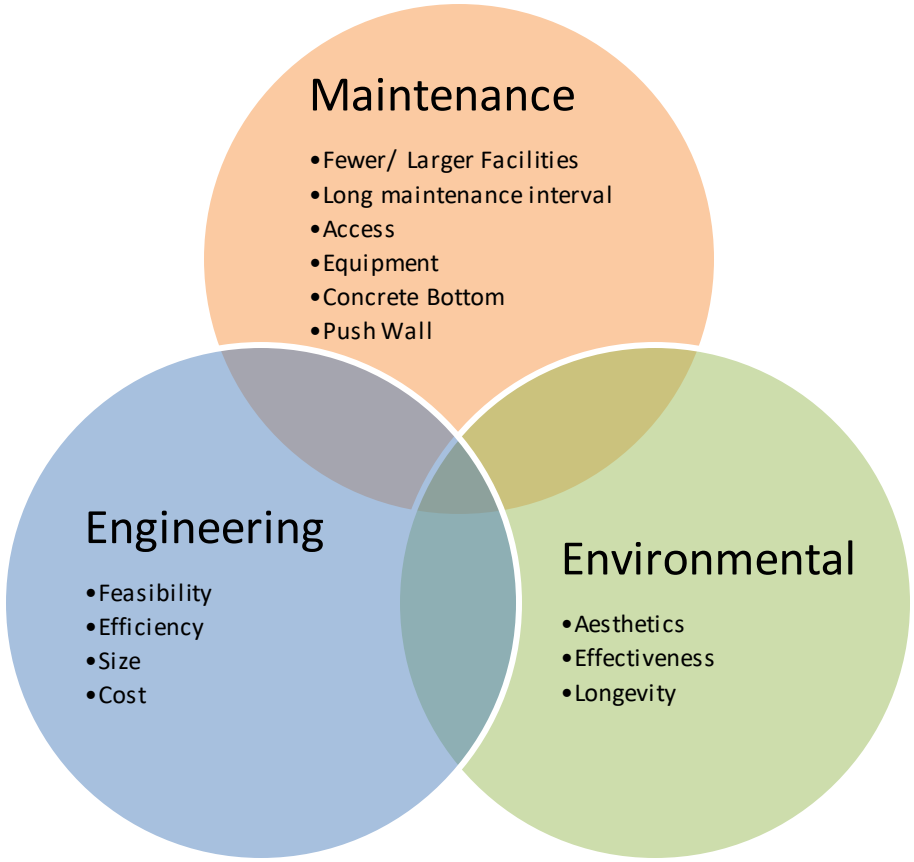
Fewer/Larger Facilities	Easier to maintain fewer facilities.
Long Maintenance Interval	The annual maintenance window for the corridor is limited to the summer months and must be shared with all roadway and faculties assigned to the Crew.
Access	The sediment capture system must be located so that it can be easily reached by maintenance equipment. Maintenance of Traffic should also be considered.
Equipment	Does CDOT have the required equipment to maintain a facility?
Concrete Bottom	Facilitates cleaning by providing a defined bottom. Easy to clean with a front loader or skidsteer.
Push Wall	Provides boundaries to help push sediment and debris into the bucket.

Engineering Considerations

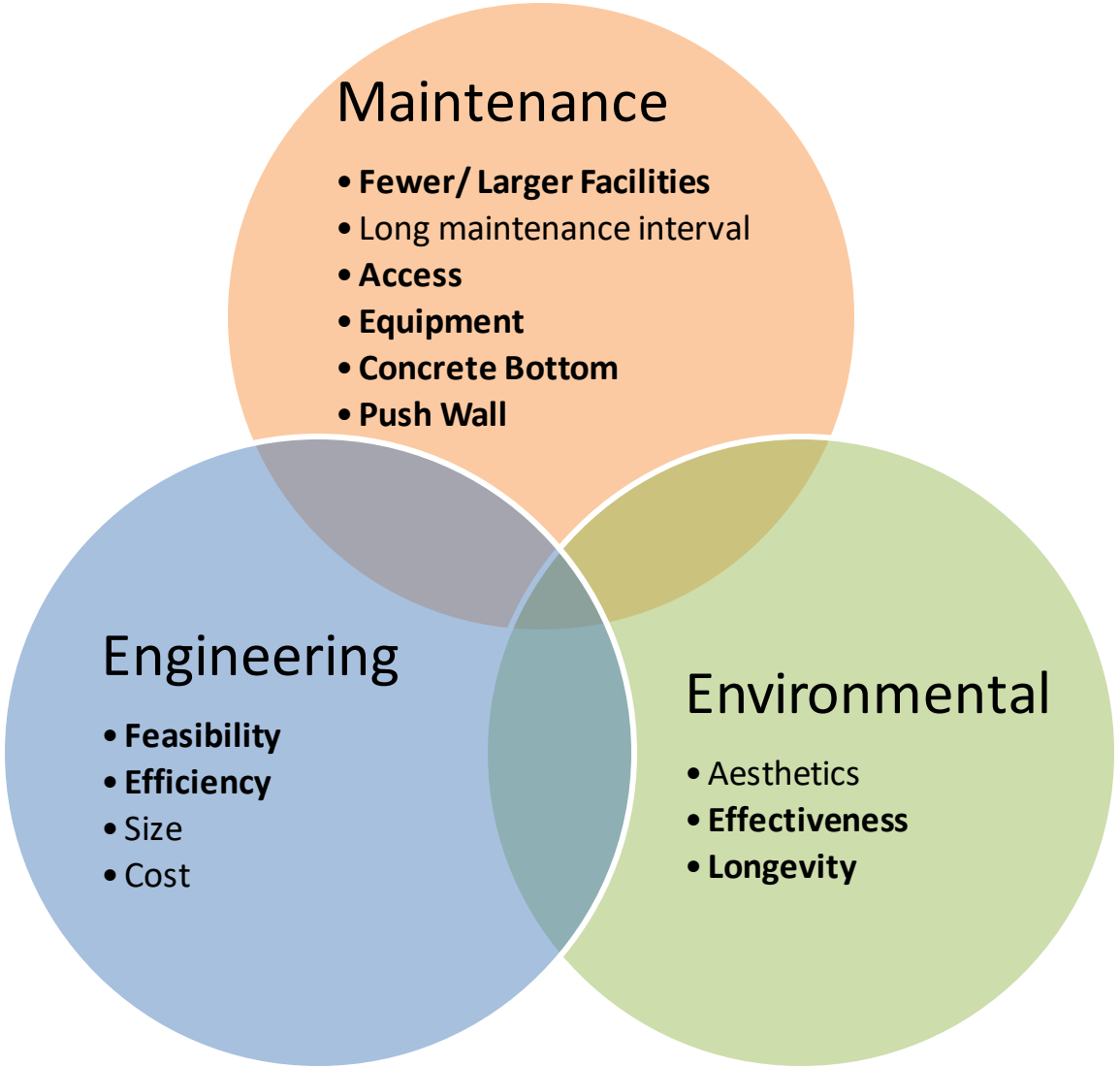
Feasibility	Can we capture and convey runoff to the facility?
Efficiency	The facility needs to be able to capture and store traction sand and other contaminants of concern that are routed to it.
Size	Can it fit and be maintained within the project limits?
Cost	Is it economical to construct and to maintain?

SCAP BMP Menu

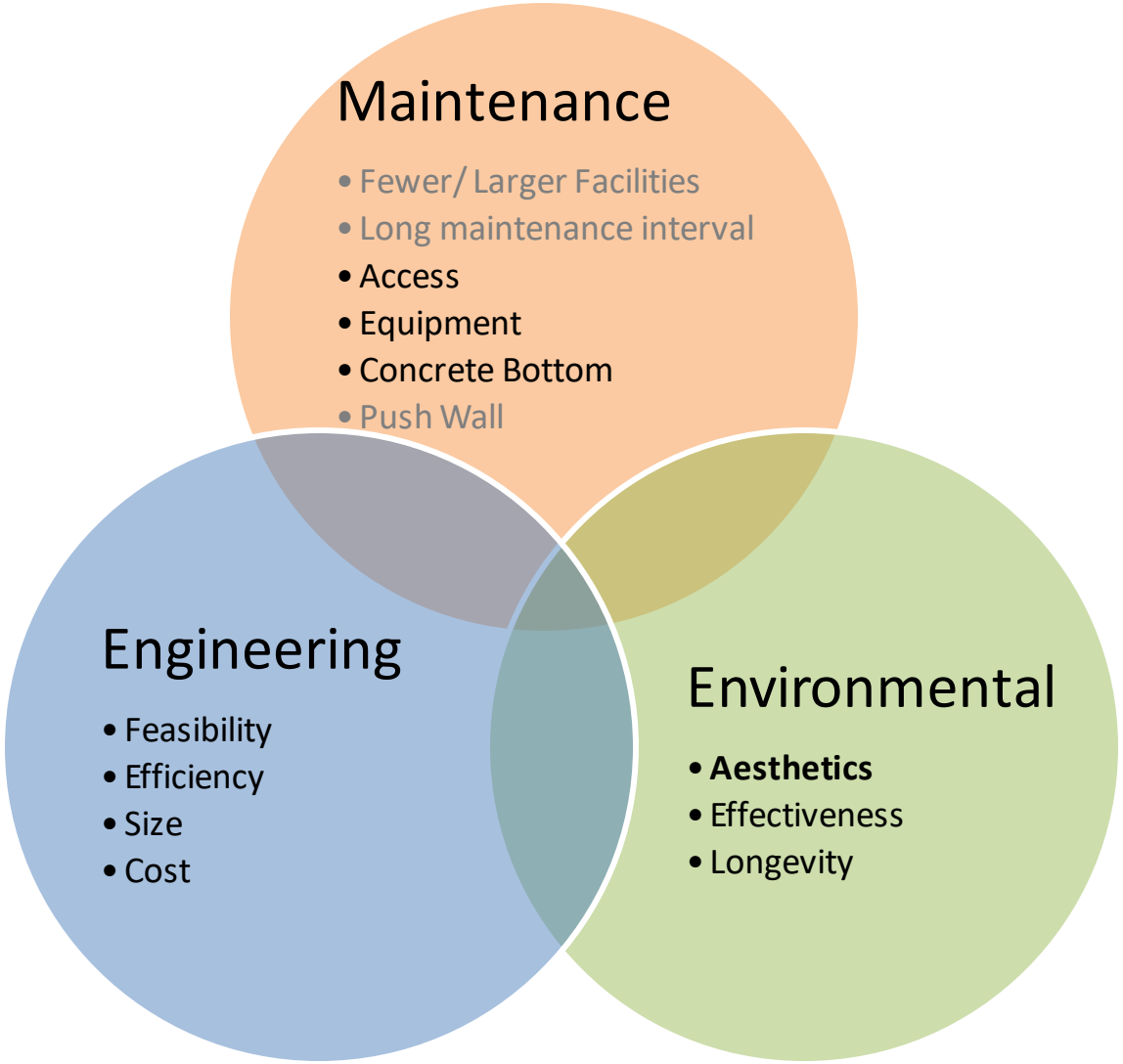
- Roadway Swale
- Curb & Gutter, Concrete Fan
- Filter Strip
- Bench Trap
- Sediment Basin
- Loading Dock Trap
- Inlet Sediment Trap
- Snow Storage Area
- Drainage Rundown
- Slope Stabilization & Revegetation
- Clean Water Diversions
- Underground Vault
- Sand/Oil Separator



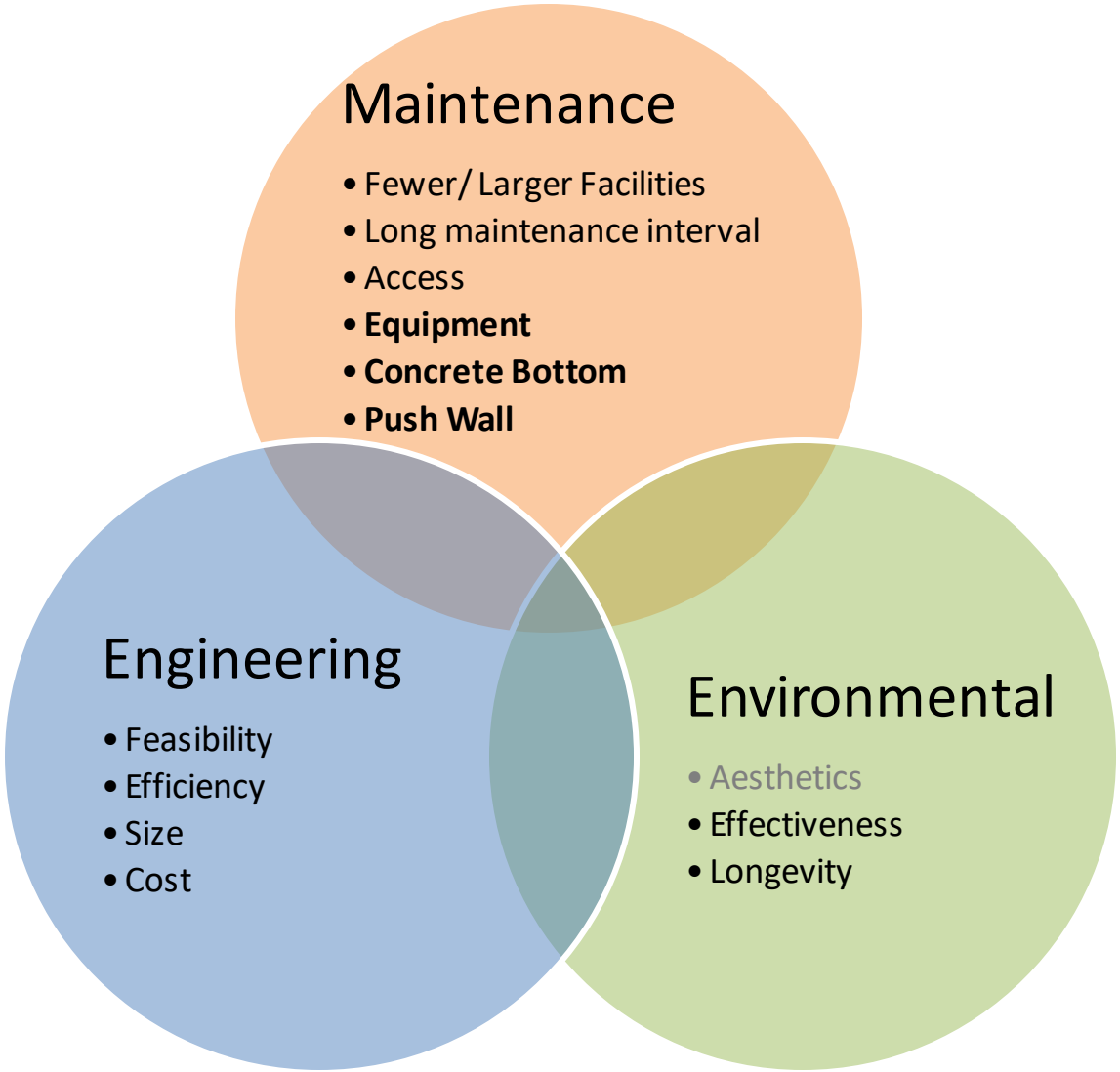
Sediment Ponds



Roadside Swale



Loading Dock Trap

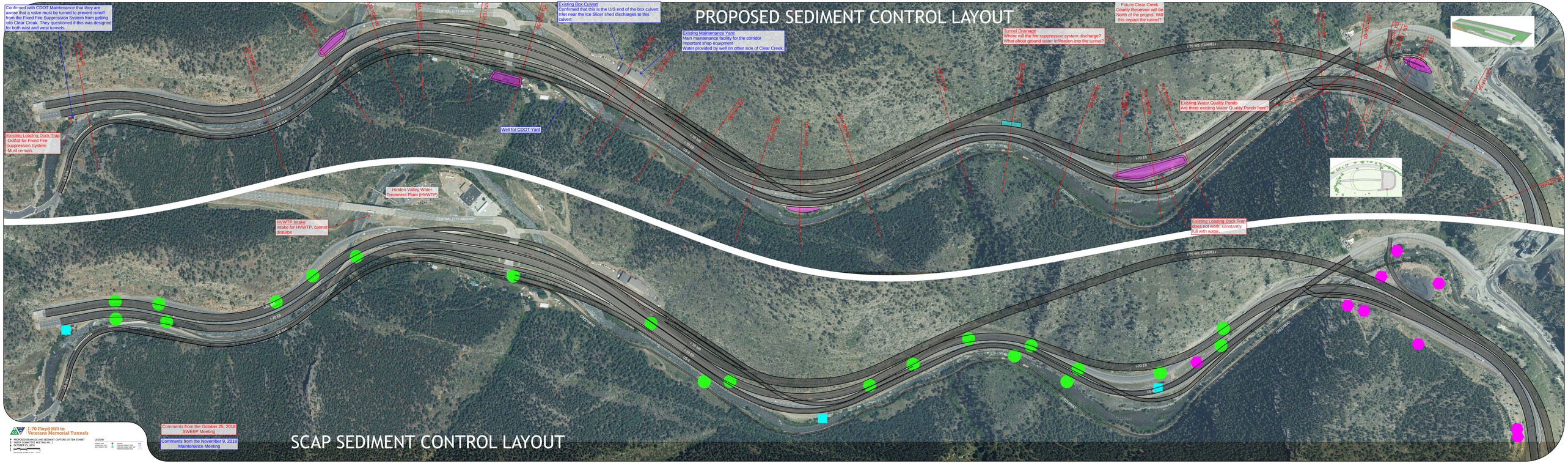


SCAP Recommended Sediment Control

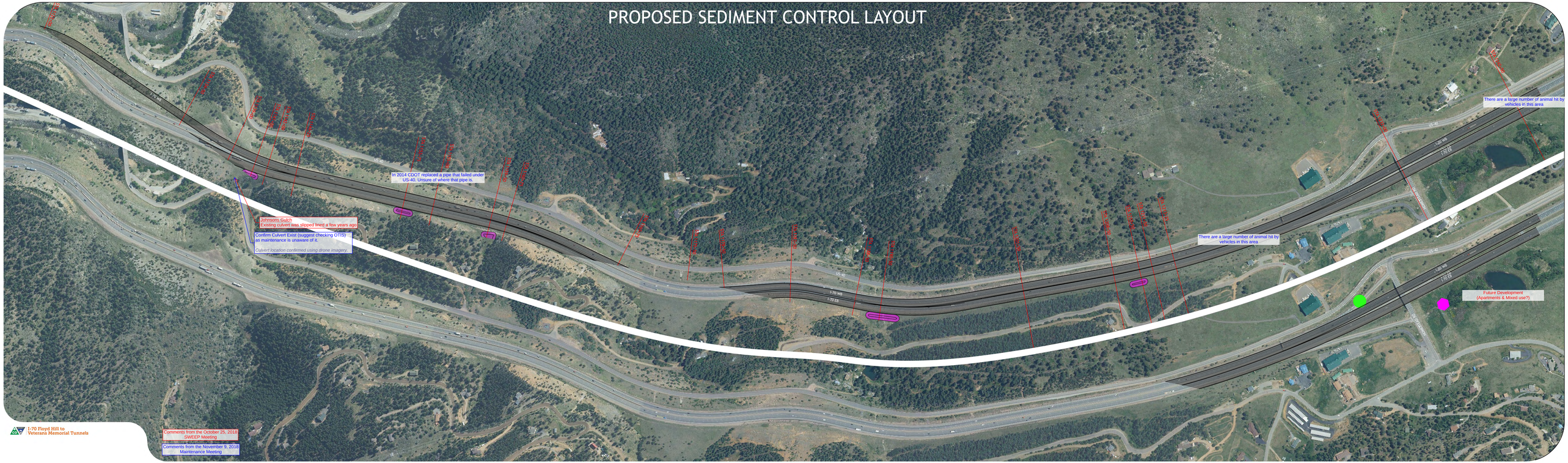
Proposed Sediment Control

I-70 Floyd Hill to Veterans Memorial Tunnels

Discussion, Questions, and Action Items


PROPOSED SEDIMENT CONTROL LAYOUT
SCAP SEDIMENT CONTROL LAYOUT
Confirmed with CDOT Maintenance that they are aware that a valve must be turned to prevent runoff from the Fixed Fire Suppression System from getting onto Clear Creak. They questioned if this was designed for both east and west tunnels.
Existing Box Culvert
Confirmed that this is the U/S end of the box culvert inlet near the Ice Slicer shed discharges to this culvert
Existing Maintenance Yard
Main maintenance facility for the corridor
Important shop equipment
Water provided by well on other side of Clear Creek.
Tunnel Drainage
Where will the fire suppression system discharge?
What about ground water infiltration into the tunnel?
Future Clear Creek County Reservoir will be North of the project. Will this impact the tunnel?
Existing Water Quality Ponds
Are there existing Water Quality Ponds here?
Existing Loading Dock Trap
-Outfall for Fixed Fire Suppression System
-Must remain.
Well for CDOT Yard
Hidden Valley Water Treatment Plant (HVWTP)
HVWTP Intake
Intake for HVWTP, cannot disturbe
Existing Loading Dock Trap
does not work, constantly full with water.
Comments from the October 25, 2018 SWEEP Meeting
Comments from the November 9, 2018 Maintenance Meeting
I-70 Floyd Hill to Veterans Memorial Tunnels
PROPOSED DRAINAGE AND SEDIMENT CAPTURE SYSTEM EXHIBIT
SWEEP COMMITTEE MEETING NO. 2
OCTOBER 25, 2018
LEGEND
I-70 EB
I-70 WB
I-70 WB (TUNNEL)
US-6
CENTRAL CITY PARKWAY
GREENWAY

PROPOSED SEDIMENT CONTROL LAYOUT



I-70 Floyd Hill to Veterans Memorial Tunnels

Comments from the October 25, 2018 SWEEP Meeting

Comments from the November 9, 2018 Maintenance Meeting

Meeting Notes

I-70 Floyd Hill to Veterans Memorial Tunnels

Project:	I-70 Floyd Hill to VMT
Meeting:	**SWEEP Issues Task Force Meeting**
Date:	**April 17, 2018; 1:00 pm to 3:00 pm**
Location:	**CDOT Region 1, 425 Corporate Circle, Golden, CO**

Attendees:
See Attached Sign-in Sheet

Summary of Action Items	Responsibility	Status
1. Obtain information/figure on wetland area preserved by development approval near Floyd Hill/CR 65	Fred	Complete
2. Follow up to see if there are site specific locations that may still be using sand for treatment	Neil	In progress

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.

Lisa Lloyd (EPA): Is there a summary of the project description? The summary will be included with the notes for this meeting, and will be available on the website (https://www.codot.gov/projects/i-70-floyd-hill-to-veterans-memorial-tunnels-improvements).

Chase Taylor (Pinyon) reviewed the Stream and Wetland Ecological Enhancement Program (SWEEP) committee and the SWEEP Memorandum of Understanding (MOU) (January 2011). https://www.codot.gov/projects/i-70-old-mountaincorridor/final-peis/final-peis-documents/20_App_D_SWEEP_MOU_Signed_01_2011_Rev50.pdf

Clear Creek Sediment Control Action Plan (SCAP) https://www.codot.gov/projects/i-70-old-mountaincorridor/documents/clear-creek-scap-final-report.pdf

Other planning documents/elements considered include:

- A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor (https://www.codot.gov/projects/i70twintunnels/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)
- Guidelines for Improving Connectivity for Terrestrial and Aquatic Wildlife in the I-70 Mountain Corridor (https://www.codot.gov/projects/contextsensitivesolutions/docs/pdfs/i-70-guidelines-for-enhancing-wildlife.pdf)

Other relevant projects include:

- Veterans Memorial Tunnels (https://www.codot.gov/library/studies/i70twintunnels-environmental-assessment)
- Westbound I-70 Peak Period Shoulder Lane (https://www.codot.gov/projects/i-70-westbound-peak-period-shoulder-lane)

3) Fisheries, Wetlands, and Mining Issues and Concerns

Chase Taylor (Pinyon) reviewed fisheries, wetlands and wildlife concerns as shown in the attached presentation.

4) Mitigation Recommendations

Chase Taylor (Pinyon) discussed the mitigations as identified in the SCAP.

5) 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.

Neil Ogden (CDOT): 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.**

Holly Huyck (Clear Creek Watershed Foundation): Traction sand still exists in this area, ponds should be able to capture historic sand and erosion.

Lisa: Design of the corridor needs to keep some flexibility for future decisions (sand vs magnesium chloride)

Map 1

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.

Map comment: look at moving the creek north of the highway

Scott Haas (USFS): Need to be careful and consider geology when moving the creek. Issues were not encountered when work was done for Twin Tunnels.

Holly: Would rather have the tunnel option from a water quality perspective.

Map 2

Allison Michael (USFWS): Can the creek be moved north of the highway? Rather than kept between. May end up being a double move of the creek (move south to build the road, then relocate north).

Gary Frey (Trout Unlimited): Concerned about increased use of magnesium chloride going into the stream, and if that's really worse than the sand. Would like to see a study of comparison between the two.

Holly: Magnesium chloride has impacts on vegetation and reduces what will grow, need a buffer between the road and the stream.

Fred Rollenhagen (CCC): Frontage road issues with sanding/traction, this section of the creek may start to see more activity (potential for more sedimentation into the creek).

Map 3

Fred: a lot of erosion in this area, maybe there would be some opportunities for erosion mitigation coming off of I-70 and onto US 40.

Map 4

Holly: Preble's Meadow Jumping Mouse trapped here in 2004 (NE corner of CR 65).

*Fred: Wetlands on the south side of I-70, county approved development and attempted to preserve wetlands (**try to get figure**) between Floyd Hill and CR 65 (protected in the approval of the subdivision).*

Map comment: provide erosion control

6) Next Steps

Next steps for the project include:

- Next SWEEP meeting (late summer/early fall)
- Field Reconnaissance (wetlands)
- Agency Coordination
- Identify Mitigation
- Coordination with Design Team
- Partnership Opportunities

7) 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

8) Remaining Questions

Neil: Next meeting is after we have design, will there be more SWEEP meetings? Likely will have more meetings and more information from the field surveys.

Gary: Will the group get to see the field study report/methodology document? Will be included in a short presentation at an upcoming tech team meeting.

Gary: Are there any drinking water concerns with the additional chemicals in the creek? Not that we are aware of.

Sign-In Sheet

ATKINS

I-70 Floyd Hill to Veterans Memorial Tunnels

Project: I-70 Floyd Hill to Veterans Memorial Tunnels EA

Meeting: **SWEEP Issues Task Force Meeting**

Date/Time: **April 17, 2018; 1:00 pm to 3:00 pm**

Location: CDOT Region 1, 425 Corporate Circle, Golden, CO

Initial	Name	Agency	Address	Phone	E-Mail
CAT	Chase Taylor	Pinyon Env.	3222 S. Vance street 5200 Lakewood, CO 80227	303-980-5200	Taylor@pinyon-env.com
HH	Holly Huyck	Clear Creek Watershed Foundation		720-472-1511	hhuyck@phoenixgeosciencesgroup.com
Alism	Alism Michael	USFWS		303 236-4758	alism_michael@fws.gov
RMP	Becky Pierce	CDOT HQ		303-512-4051	rebecca.pierce@state.co.us
CW	Carrie Wallis	Atkins			carrie.wallis@atkinsglobal.com
AP	Anthony Pisano	Atkins	7604 Technology way Suite 400, Denver 80237	720-475-7013	Anthony.Pisano@atkinsglobal.com
NO	NEIL OGDEN	CDOT R1	425A Corp Circle Golden CO 80401	(720) 497-6938	neil.ogden@state.co.us
JG	Josh Giovannetti	CDOT R1	South Holly	303 757 9925	josh.giovannetti@state.co.us
JRB	Jacob Beedle	Atkins	7604 technology way	707-373-7618	Jacob.Beedle@Atkinsglobal.com
LB	Lauren Boyle	CDOT R1	425A Corporate Cir	720.930.8604	Lauren.Boyle@state.co.us
LH	Lisa Lloyd	EPA R8	1595 Wynkoop Denver, Co	303-232-7604	lloyd.lisa@epa.gov
JJW	Joe Walter	CPW	6060 Broadway Denver CO	303-916-1180	joseph.walter@state.co.us
SPG	Scott Garncarz	CDPHE	4300 Cherry Creek Drive S. Denver, Co 80246	303-692-2314	scott.garncarz@state.co.us

Sign-In Sheet

I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS

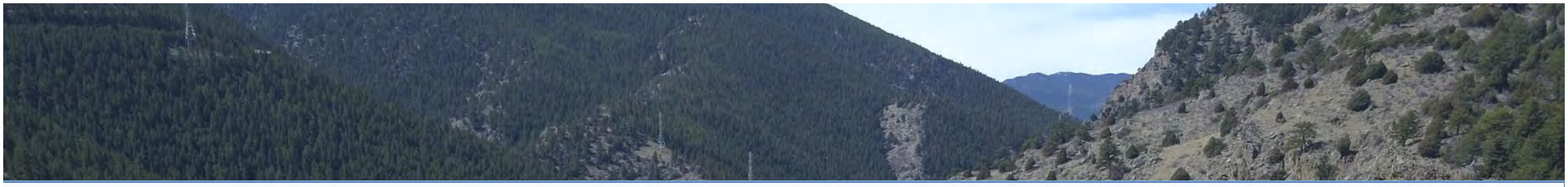
Project: I-70 Floyd Hill to Veterans Memorial Tunnels EA

Meeting: **SWEEP Issues Task Force Meeting**

Date/Time: **April 17, 2018; 1:00 pm to 3:00 pm**

Location: CDOT Region 1, 425 Corporate Circle, Golden, CO

Initial	Name	Agency	Address	Phone	E-Mail
	Gary Frey	CTU		3.986.014	gbfrey@msn.com
FRH	Fred Rollenhagen	Clear Creek County	PO B 2000 Georgetown, CO 80444	3-679-2360	frollenhagen@co.clear-creek.co.us
VH	Vanessa Henderson	CDOT		7/497-6924	vanessa.henderson@state.co.us



I-70 Floyd Hill to Veterans Memorial Tunnels

ATKINS

SWEEP Meeting

April 17, 2018

I-70 Floyd Hill to Veterans Memorial Tunnels

Agenda

- Welcome/Introductions
- Project Overview
- Fisheries, Wetlands, and Mining Issues and Concerns
- Mitigation Recommendations
- Next Steps
- Project Schedule
- Questions

I-70 Floyd Hill to Veterans Memorial Tunnels

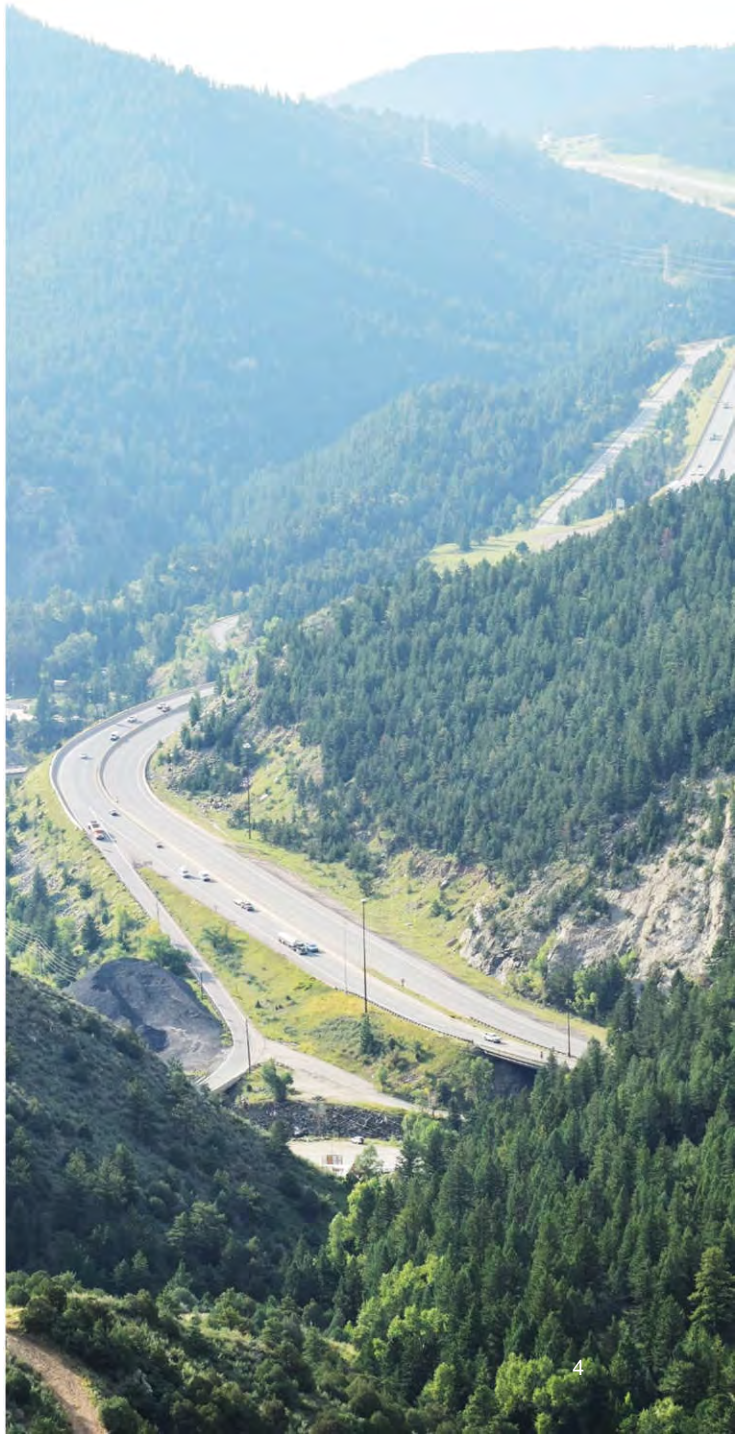
Project Overview and Background

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.



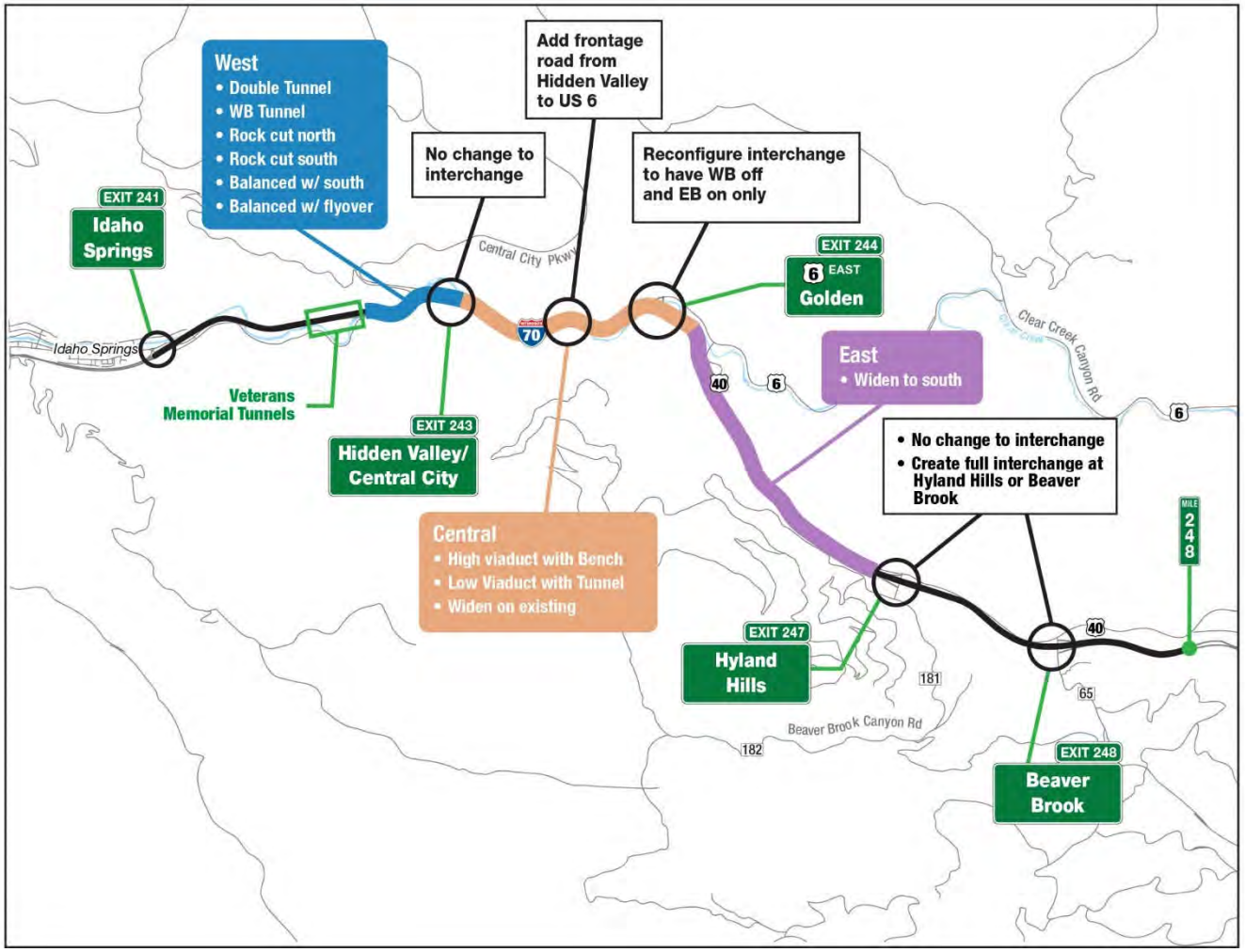
I-70 Floyd Hill to Veterans Memorial Tunnels

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

SWEEP Committee

The I-70 Mountain Corridor passes through several watersheds that support numerous aquatic resources.

- I-70 impacts water quality and viability of watershed ecology.
- Lead agencies formed a working group to address these issues through the Stream and Wetland Ecological Enhancement Program (SWEEP) committee.
- The committee works to identify and recommend appropriate mitigation strategies
- The SWEEP Memorandum of Understanding (MOU) (January 2011)
- This allows for holistic consultation and documentation by streamlining this process for all projects along the corridor.

I-70 Floyd Hill to Veterans Memorial Tunnels

Planning Elements

Clear Creek Sediment Control Action Plan (SCAP) finalized in 2013

- SCAP study area covers 33 mile Clear Creek I-70 Corridor from EJMT to Beaver Brook
- Recommends sediment control BMPs for highway-related impacts
- Three areas identified as higher priority for highway sediment and nutrient loading (FH).
- Areas with highly mineralized rock cuts or mine waste residuals were identified
- Other areas in general should use sediment control improvements as detailed in the SCAP

Photos: CDOT

I-70 Floyd Hill to Veterans Memorial Tunnels

Planning Elements

- SWEEP MOU and Implementation Matrix
- A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor
- Guidelines for Improving Connectivity for Terrestrial and Aquatic Wildlife in the I-70 Mountain Corridor

Photos: CDOT

I-70 Floyd Hill to Veterans Memorial Tunnels

SWEEP Implementation Matrix

Considerations during project development:

- Sediment management
- CWA Section 303 (d) list
- Mine workings in I-70 right-of-way
- Mine waste as road bed
- Wetlands protection
- Special status species
- Aquatic species as a recreation resource
- Information and research needs.

I-70 Floyd Hill to Veterans Memorial Tunnels

Other Relevant Projects

Veterans Memorial Tunnels

- Completion date 2015
- Implemented Clear Creek water quality monitoring program for Hidden Valley segment

Westbound I-70 Peak Period Shoulder Lane

- Environmental Evaluation and Analysis in Progress
- Approximately Fall 2018 for final design followed by construction

I-70 Floyd Hill to Veterans Memorial Tunnels

SWEEP Issues Discussion

Identify:

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

Graphic: Google Images

I-70 Floyd Hill to Veterans Memorial Tunnels

Initial Stakeholder Concerns

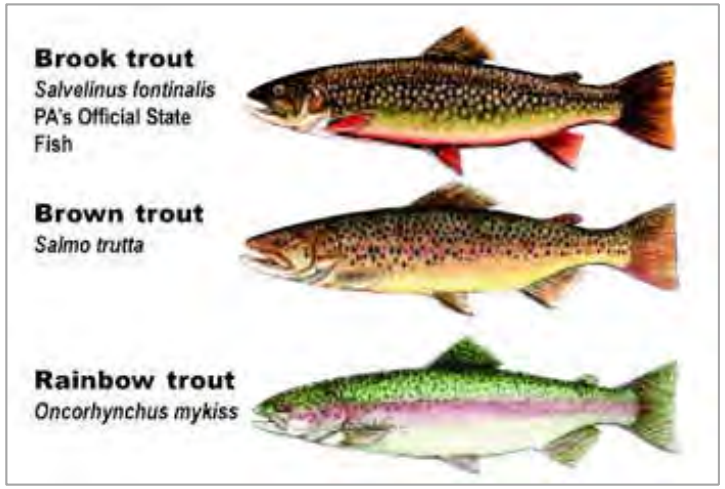
- Clear Creek is a high value fishery
- Channelization of Clear Creek
- Clear Creek Sediment Control Action Plan
- Minimize wetlands impacts
- Stream Cross Drains should be fish friendly
- Mining waste and mineralization
- Recreational Use and Quality of Experience
- Maintain fishing access

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Fishery and Aquatic Species

Fish

- Brown trout
- Rainbow trout
- Brooke trout
- Cutthroat trout
- Various Suckers
- Benthic Invertebrates



Graphic: www.fishandtrout.com

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Fishery and Aquatic Species

Construction and Maintenance Elements

- Increased storm water runoff from impervious surface
- Drainage Pattern Changes
- Petroleum discharge from spills and vehicles
- Maintain fish passage upstream/downstream during construction
- Sedimentation

Photo: www.streamcontinuity.org

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Wetlands

- Multiple potential wetlands identified in the project area
- Primarily associated with Clear Creek and Beaver Brook (eastern end)
- Potential for wetlands along Sawmill Gulch, Johnson Gulch and unnamed tributaries
- Potential for impacts

Photo: Google Images

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Mine Waste & Mineralization

- Mine Waste Residuals
- Mineralized Rock Cuts
- Historic Mining Claims and Shafts

Photo: www.mindat.org

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Water Quality

- Floyd Hill identified in SCAP as one of three higher priority areas for erosion and sediment control
- High sedimentation rates resulting from slope erosion and traction sand from Beaver Brook (MP 248) to MP 244 (US 6)

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Water Quality

- Impacted streams include Beaver Brook, Johnson Gulch, and Clear Creek
- SCAP integrates westbound and eastbound drainage and sediment control BMPs
- SCAP improvements also specified for 2-mile Hidden Valley segment.

I-70 Floyd Hill to Veterans Memorial Tunnels

Issue: Water Quality

- Baseline water quality data available for Clear Creek in Hidden Valley area for highway-related sediment/salt loading.
- Clear Creek is identified as 303(d) listed water body requiring TMDL's (COSPCL11 Mainstem of Clear Creek from a point just above the Argo Tunnel discharge to the Farmers Highline Canal diversion in Golden, Colorado)
  - Cadmium (Dissolved) High Priority (Roadway Pollutant of Concern per CDOT's MS4 Permit)
  - Temperature High Priority

I-70 Floyd Hill to Veterans Memorial Tunnels

Mitigation Recommendations

- Implement improvements identified in the SCAP as appropriate
- SCAP for Floyd Hill area identifies the following:
  - 32 sediment basins
  - Inlet sediment traps
  - Culvert pipe rundowns to prevent slope erosion
  - Implement standard construction BMPs
  - Develop a construction Materials Management Plan
- Aquatic permeability should be improved if culverts are replaced

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

- Next SWEEP meeting (late summer/early fall)
- Field Reconnaissance (wetlands)
- Agency Coordination
- Identify Mitigation
- Coordination with Design Team
- Partnership Opportunities

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