

Hidden Treasure Dam Deconstruction Local, State and Federal Governments Working Together to Protect Colorado Citizens

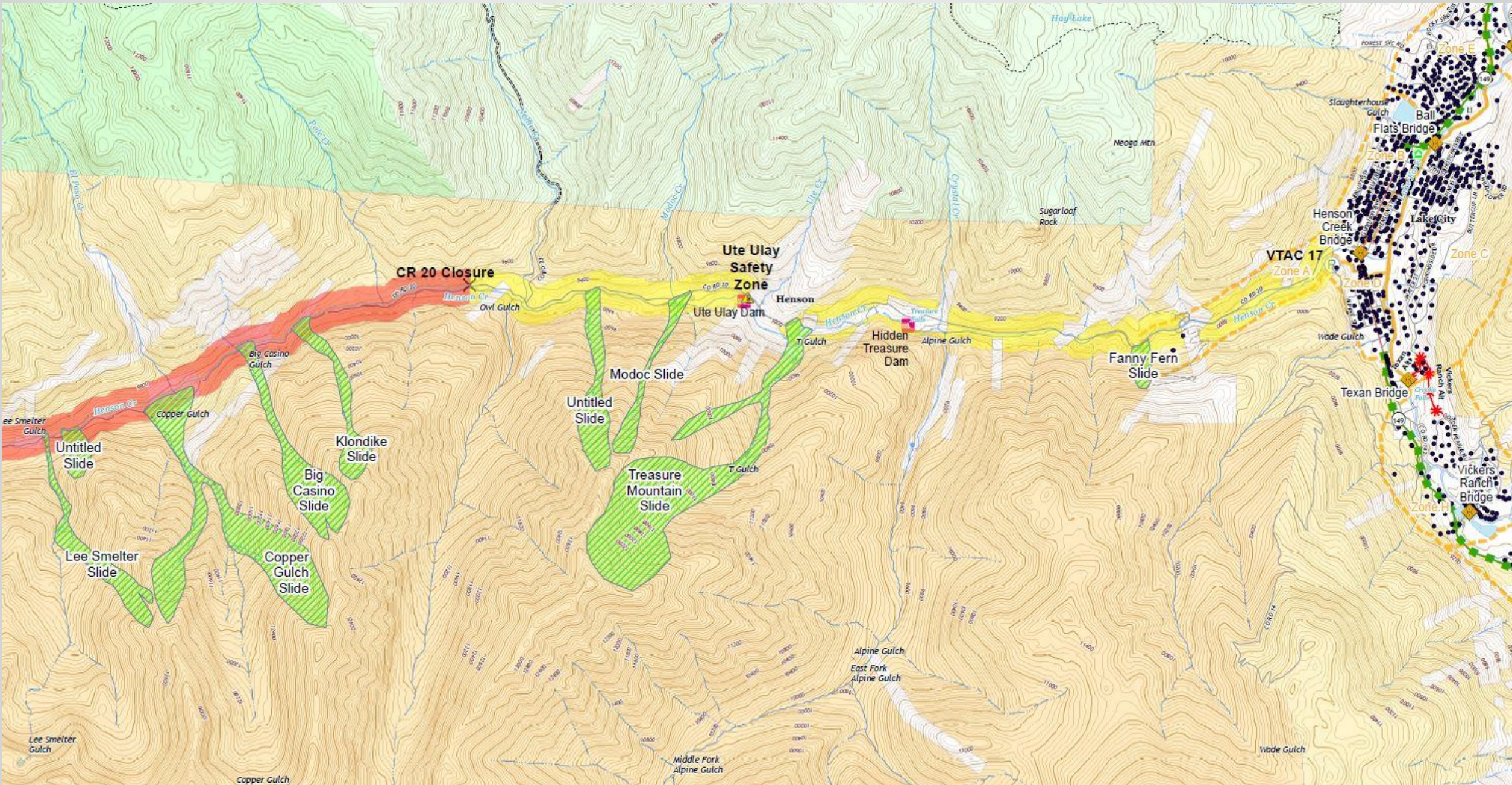
WRRC Briefing
Denver, CO
October 24, 2019



COLORADO
Division of Water Resources
Department of Natural Resources

Bill McCormick, P.G., P.E.
Chief, Colorado Dam Safety

Location - Henson Creek



Ute Ulay and Hidden Treasure Dams 1973

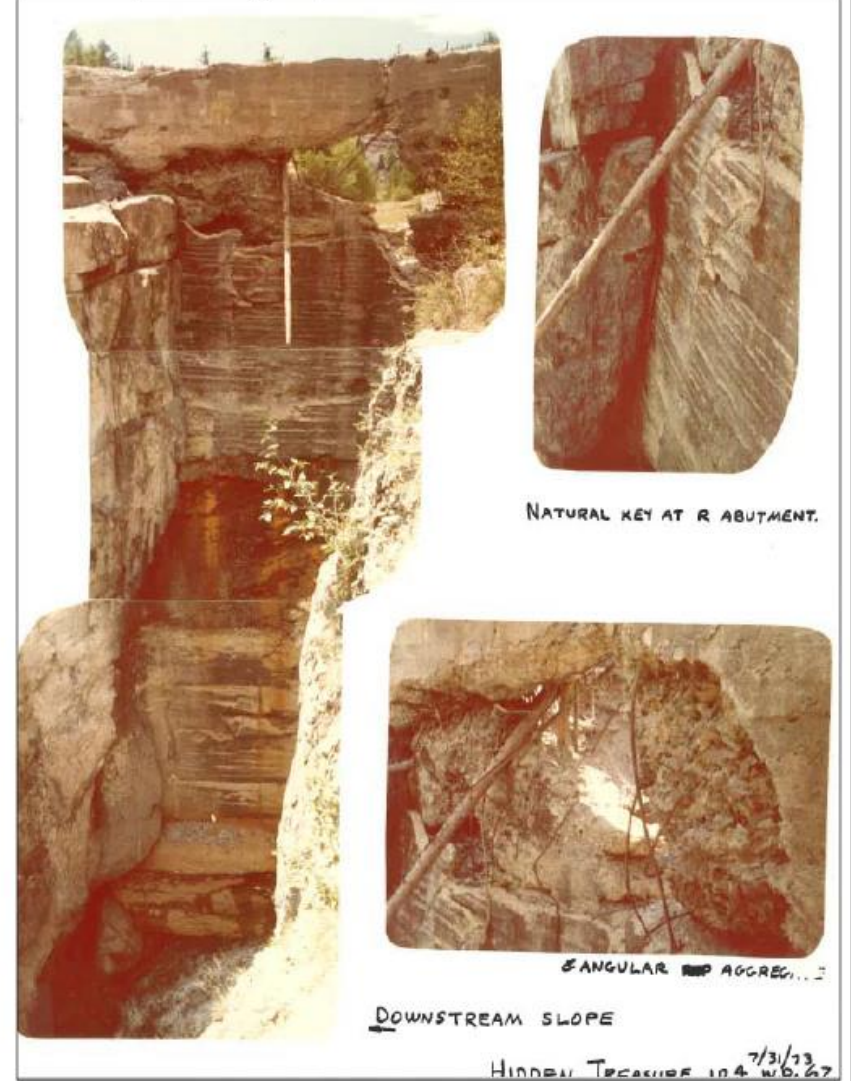
FILE PHOTOS:

Ute Ulay Dam (CO Dam Safety, July 30, 1973)



Historic mining site on BLM land

Hidden Treasure (CO Dam Safety, 1973)

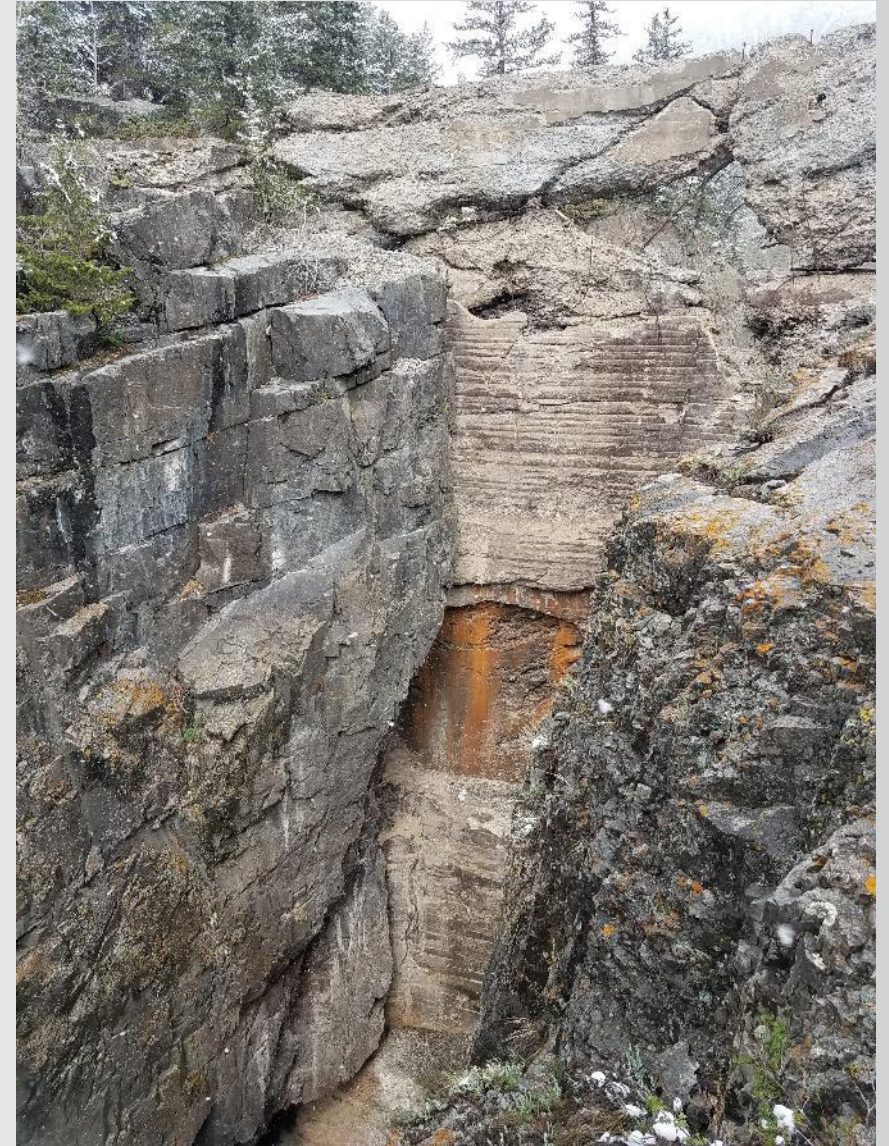


Bottom blows out, flushing tailings and sediment

Ute Ulay and Hidden Treasure Dams 2019



**BLM Interpretive Historic Site
Reclaimed mine site (DRMS)**



**Private - George and Beth Hurd
Part of a commercial tourist attraction**

Dam Failure Inundation Map

4/24/2019 Assumptions

- Ute Ulay Dam = Worst Case
- 185 af storage
- Instantaneous failure
- 10 m DEM (topo data)

Limitations

- 10 m DEM (topo data) looks “off”
- Clock is ticking

Needs

- LiDAR
- Concrete Expertise



Starts with One Email and Quickly Grows

April 23

- CDPS-DHSEM
- DOLA
- CGS
- CAIC
- CWCB
- DWR

April 29

- CDPS-DHSEM
- DOLA
- CGS
- CAIC
- CWCB
- DWR
- BLM
- CDOT
- Lake City
- Hinsdale County
- Private
- DRMS
- CDPHE
- SHPO
- NWS
- USGS
- NRCS

The problem areas we discussed are:

- Removal of wood debris from the waterway (CDOT, BLM, Hinsdale County, Lake City,...)
- Effect of debris on historic dams and what to do (DWR-DAM Safety, BLM, CDOT, Hinsdale County,...)
- Bridges (CDOT, Hinsdale County, Lake City, BLM, and Private Land Owners,...)
- Mill tailings (Division of Mine Reclamation and Safety, CDPHE,...)
- Town - water wells (Lake City, CDPHE,...)
- Town – wastewater (Lake City, CDPHE,...)
- Monitoring and trigger points (NWS, DHSEM, RWEACT, USGS, DWR, CWCB, Hinsdale County,...)
- Alert and Warning (Hinsdale County, Lake City, Gunnison County OEM, NWS,...)
- Economic impact (Hinsdale County, Lake City, DOLA, COEDIT,...)



No funding or authority to take action, so lots of discussion trying to sort out what true concerns were

Disaster Declarations

- Executive Order D 2019-003 Disaster Declaration - March 13
Severe winter weather and blizzard conditions
- Executive Order D 2019-005 Disaster Declaration - May 6
Avalanche debris and flood risk in Hinsdale County
- Executive Order D 2019-009 Disaster Declaration Extension - June 5
Extend effective response, recovery and mitigation activities

May 7-23 Activities

- Resource Requests for LiDAR acquisition
 - Drone technology
 - Juniper Unmanned (Golden, CO)
 - RR 5/7, approved 5/13, contract 5/14, on-site data collection May 21, data processed and delivered 6/1
- Resource Requests for concrete expert consultation
 - Gannett Fleming (Greenwood Village, CO)
 - RR submitted 5/7, approved 5/10, contract 5/15, on-site 5/18
- Additional hydraulic modeling to support planned SQRA, 5/20-21
- On-site discussion with contractors 5/22
- NRCS EWP funding identified 75%/25% match
- Semi-Quantitative Risk Assessment (SQRA) workshop 5/23 (2-6 pm)
- Report out to Governor's cabinet (5/23, 8:00pm)

SQRA for Decision Support

Semi-quantitative risk assessment is generally used where one is attempting to optimize the allocation of available resources to minimize the impact of a group of risks under the control of one organization.

SQRA Team

- DWR
- CDPS-DHSEM
- DOLA
- CGS
- CAIC
- BLM
- Lake City
- Hinsdale County
- Private - Dam
Owner
- Consultant
- NRCS

Hidden Treasure Dam

Actions to reduce Likelihood of Failure and Consequences:

1. Dam Safety
 - a. Potential Failure Mode: Moderate Likelihood; Moderate Confidence
 - b. Complete removal of the dam.
 - i. Expediting funds and schedule.
2. Natural Hazards
 - a. Monitoring of streamflow and debris transport.
 - b. Debris removal in Henson Creek.
 - c. Improve flood mapping based on new LiDAR data.
 - i. Model: Continue to inform alert and warning
 - ii. Model: Consider debris loading

Ute Ulay Dam:

Actions to reduce Likelihood of Failure and Consequences:

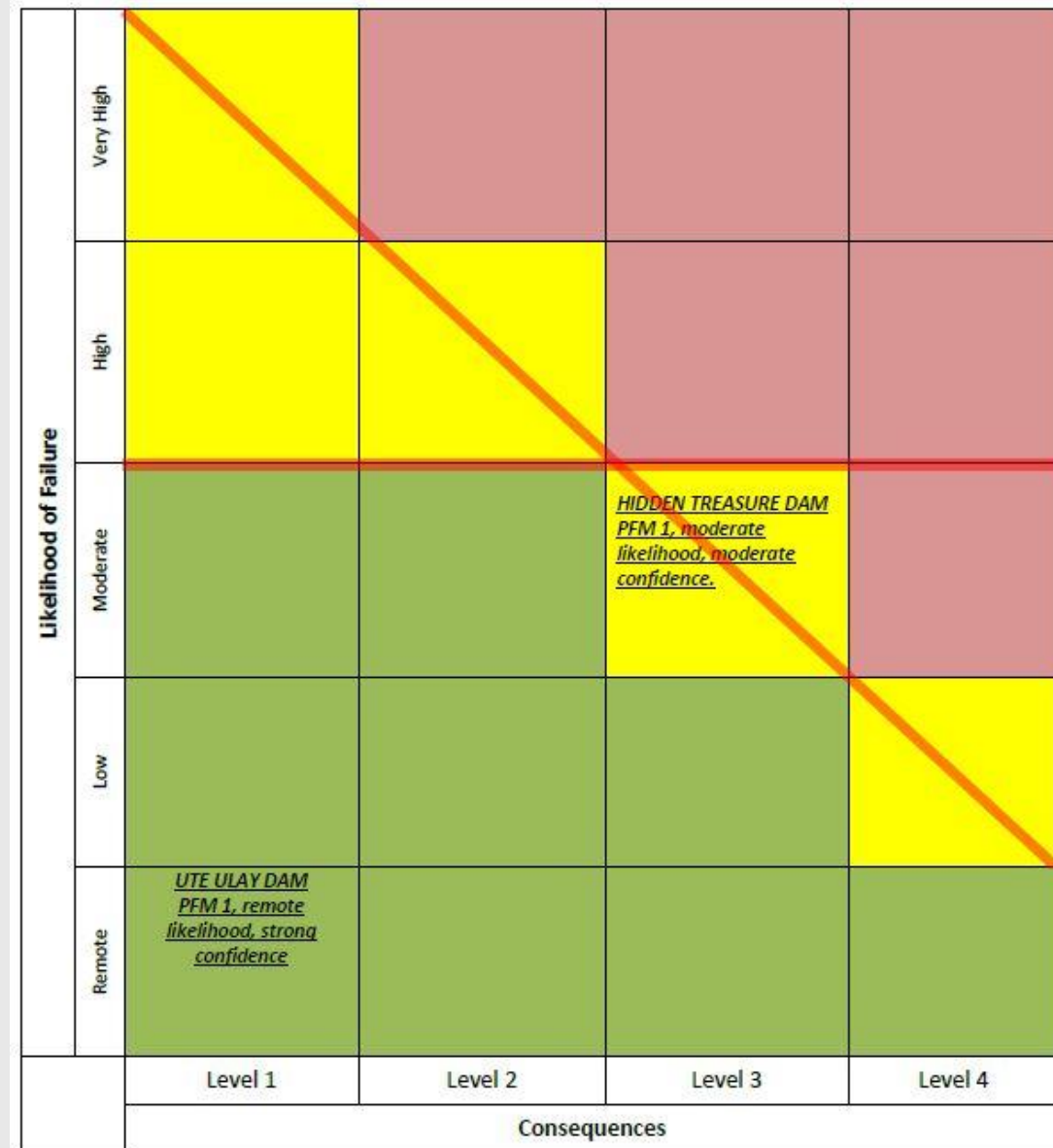
1. Dam Safety
 - a. Potential Failure Mode: Remote Likelihood; Strong Confidence
 - b. No action.
2. Natural Hazards
 - a. Monitoring of streamflow and debris transport.
 - b. Debris removal in Henson Creek.

SQRA for Decision Support

PFM Failure Likelihood Rating	Failure Likelihood Description
VERY HIGH An active failure mode is in process or likelihood of a failure is judged to be extremely high, such that immediate actions are necessary to reduce risk.	There is direct evidence or substantial indirect evidence to suggest it is occurring and/or is likely to occur or a flood or an earthquake with an annual exceedance probability more frequent (greater) than 10E-2 would likely cause failure.** **Use this column to differentiate AEP's between High, Sig. and Low Hazard Dams in the future.**
HIGH Potential failure mode is judged to present very serious risks, due to high probability of failure, which justifies an urgency in actions to reduce risk.	The fundamental condition of defect is known to exist; indirect evidence suggests it is plausible; and key evidence is weighted more heavily toward likely than unlikely (or a flood or an earthquake with an AEP between 10E-4 and 10E-2) would likely cause failure.
MODERATE Potential failure mode appears to be dam safety deficiency that poses a significant risk of failure, and actions are needed to better define risks or to reduce risks.	The fundamental condition of defect is known to exist; indirect evidence suggests it is plausible; and key evidence is weighted more heavily towards unlikely than likely (or a flood or an earthquake with an AEP between 10E-5 and 10E-4) would likely cause failure.
LOW Potential failure mode(s) appear to indicate a potential concern, but do not indicate a pressing need for action.	The possibility cannot be ruled out, but there is no compelling evidence to suggest it has occurred or that a condition or flaw exists that could lead to its development (or a flood or an earthquake with an AEP more remote than 10E-5 would likely cause failure).
REMOTE Potential Failure mode(s) at the facility do not appear to present significant risks, and there are no apparent dam safety deficiencies.	Several events must occur concurrently or in series to create failure. Most, if not all, events are unlikely to very unlikely, and failure potential is negligible or non-credible. Remote Total Failure Probability with Moderate to High Confidence. The failure probability is estimated to be low and is unlikely to change with additional investigations or study.

Confidence Level	Description
STRONG	The team is confident in the order of magnitude for the assigned category and, it is unlikely that additional information would change the estimate.
MEDIUM	The team is relatively confident in the order of magnitude of the assigned category, but key additional information might possibly change the estimate
POOR	The team is not confident in the order of magnitude for the assigned category, and it is entirely possible that additional information would change the estimate.

Consequence Categories	
LEVEL 0	No significant impacts to the downstream population other than temporary minor flooding of roads or land adjacent to the river.
LEVEL 1	Downstream discharge results in limited property and/or environmental damage. Although life-threatening releases occur, direct loss of life is unlikely due to severity of location of the flooding, effective detection and evacuation.
LEVEL 2	Downstream discharge results in moderate property and/or environmental damage. Some direct loss of life is likely, related primarily to difficulties in warning and evacuating recreationists/travelers and small population centers (in the range of 1 to 10).
LEVEL 3	Downstream discharge results in significant property and/or environmental damage. Large direct loss of life is likely, related primarily to difficulties in warning and evacuating recreationists/travelers and small population centers, or difficulties evacuating large population centers with significant warning time (in the range of 10 to 100).
LEVEL 4	Downstream discharge results in extensive property and/or environmental damage. Extensive direct loss of life can be expected due to limited warning for large population centers and/or limited evacuation routes.



NRCS EWP Process

Cost Share Agreement

- 75 % EWP
- 20% Emergency Funds
- 5% County

Process Timeline

- Initiated 5/23
- Agreements signed by NRCS and County 5/30
- Contractor Mob 5/29
- Contractor NTP 5/30
- Start work 5/30
- 10 days to complete
- 10 day ext allowed

	TASK	Date complete
1	Total values at risk determined and transmitted to NRCS	05/21/2019
2	Feasibility study is completed by DWR on dam removal	
3	Cost estimate for dam removal is determined and transmitted to NRCS	
4	Determination is made that dam demolition is a go (order approving)	
5	Engineering completed on demolition, P.E.?	
6	Develop map showing where work is going to be done including staging areas, roads, and debris removal areas (for step 11)	
7	Identify potential contractors to complete demolition	
8	Meet with contractors and align cost estimate with bids	
9	Meeting with Hinsdale County between NRCS and OGM on how to successfully navigate EWP.	
9a	Present NRCS sponsorship agreement to Hinsdale County	
9b	Develop state cost share agreement and present to Hinsdale County (OGM)	
10	Hinsdale County signs sponsorship agreement and cost share agreement at BoCC meeting.	
11	Initiate workgroup to manage permitting issues and make notification to federal agencies with jurisdiction (State, NRCS, Hinsdale County)	
11a	Notify agencies regarding biological assessment	
11b	Approach USACE with intention to conduct emergency work in waterway	
11c	Approach USFWS with intention to conduct emergency work	
12	Letter of approval for demolition from SHPO	
13	Get letters of support approval and easement agreements from BLM and private property owners agreeing to the demolition and staging of equipment	
14	Determine where the removed material is going to go and complete environmental permits for placement of removed debris	
15	Ensure safety zones for work	

Construction 5/30-6/9



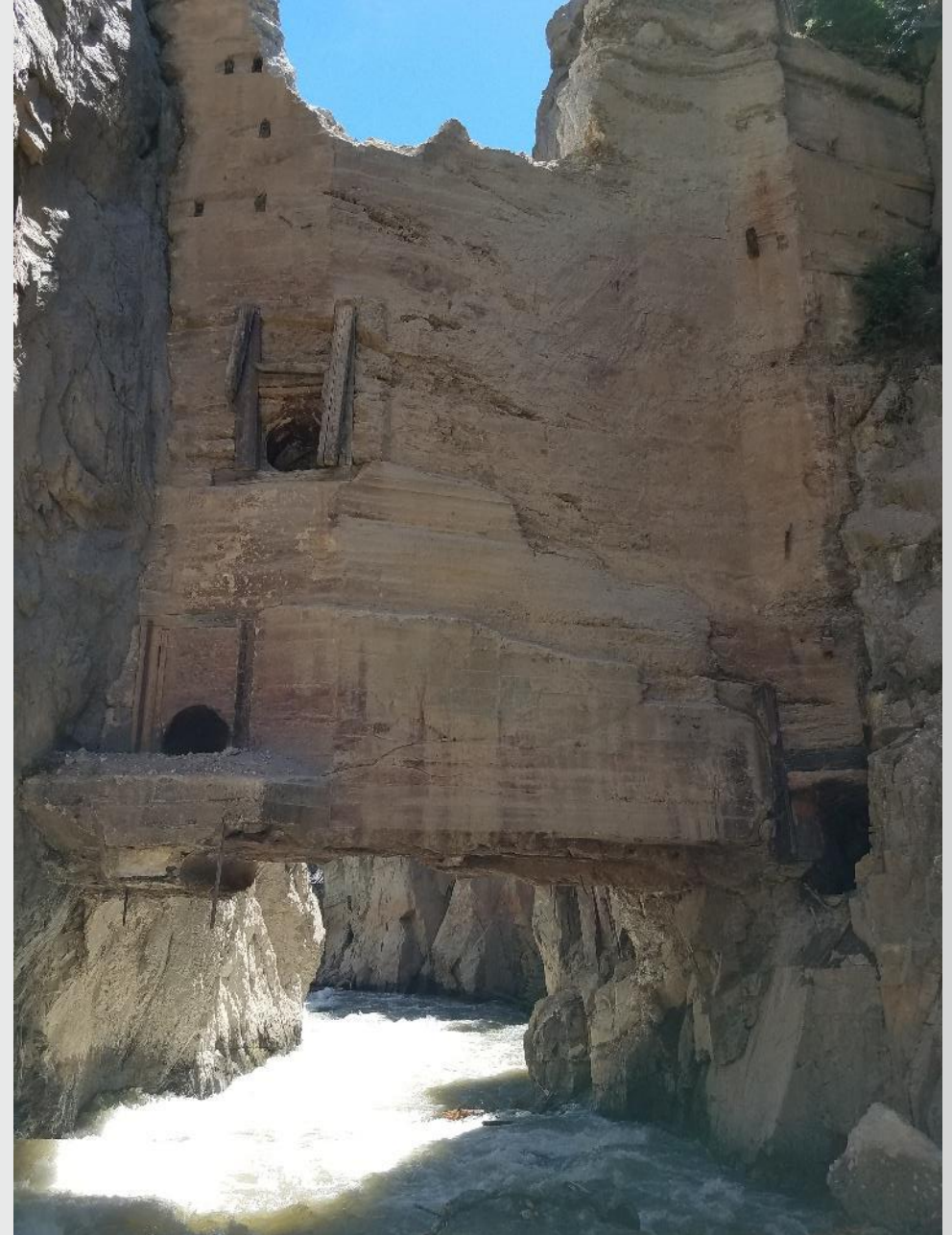
Construction 5/30-6/9



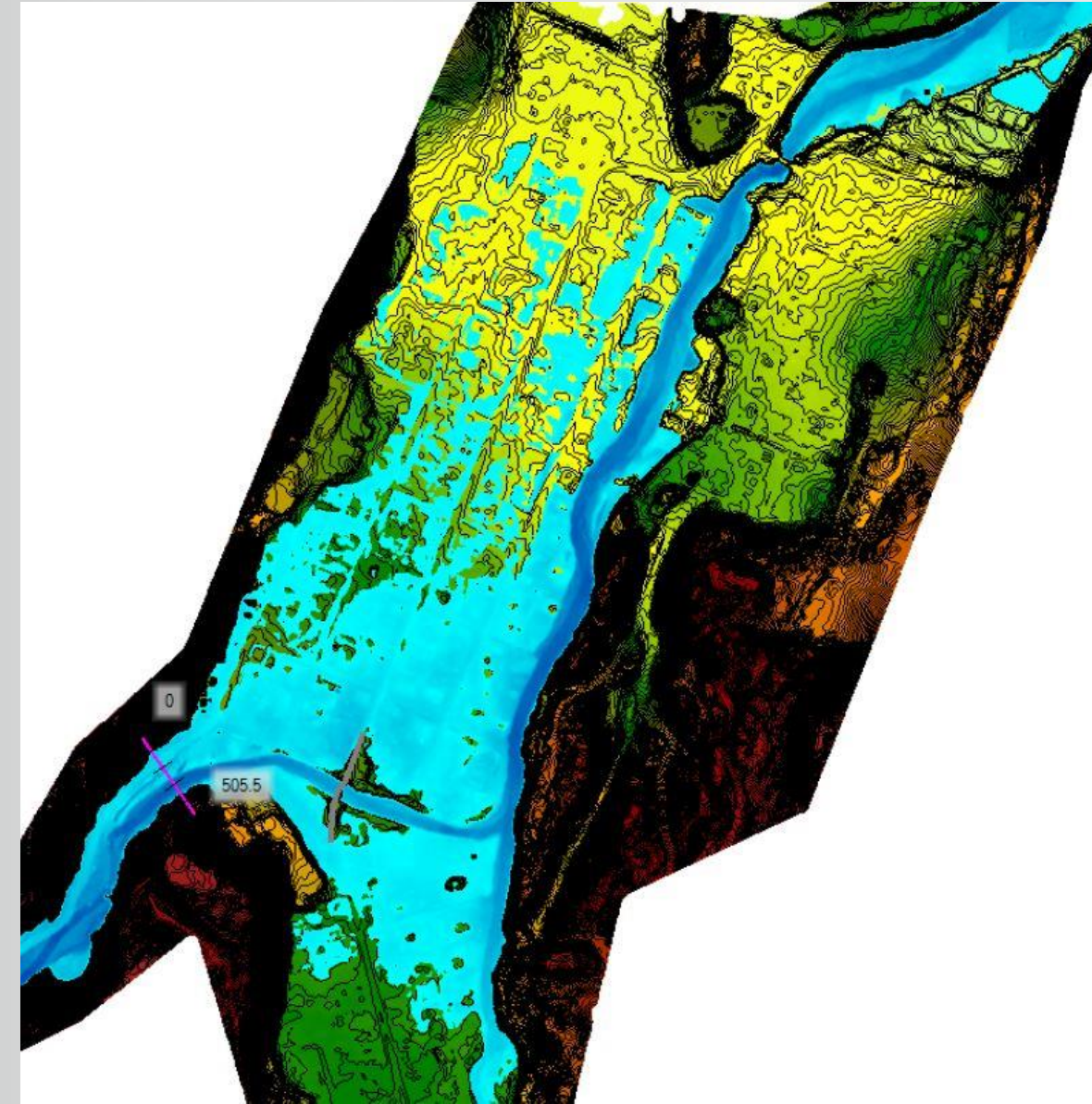
Construction 5/30-6/9



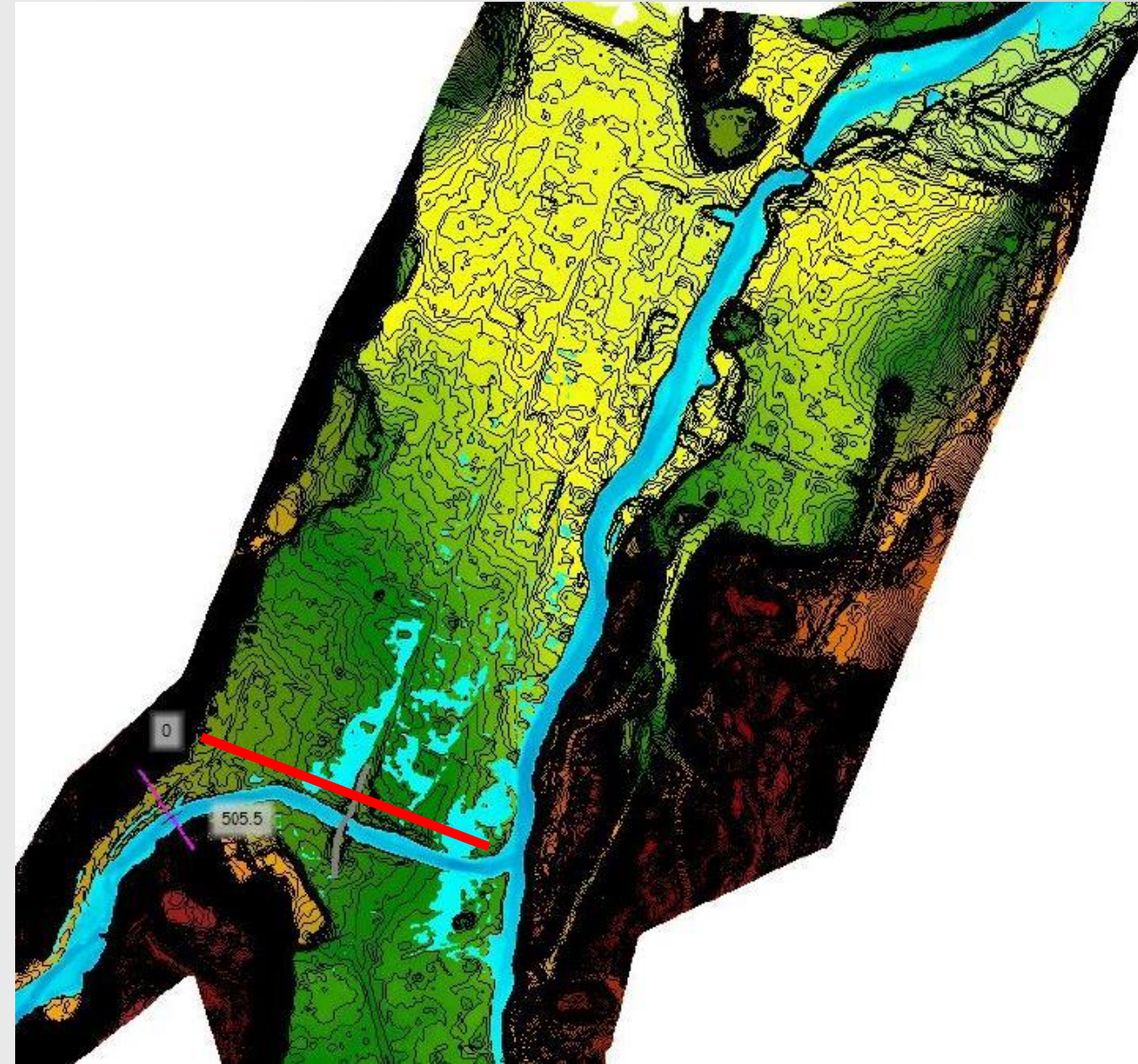
Construction 5/30-6/9



Final Modeling with LiDAR



Failure without dam mods



Failure with dam mods (crest lowering)

Benefits of SQRA Driven Construction Changes

- Defensible decision making
- Lowered construction cost
- Reduced environmental impacts in Henson Creek
- Reduced impacts to historic assets in Hinsdale County

Nest Steps - Project Close-out

- Concrete debris assessment and removal
- Site visit Nov 4 with stakeholders (County, dam owner, DWR, DHSEM, NRCS, BLM, USACE)
- USACE EWP Permit close out by Dec 31

Final Report

<http://water.state.co.us/damsafety/dams.asp>

The screenshot shows the Colorado Department of Natural Resources website. The header includes the Colorado and DNR logos, the text "COLORADO Division of Water Resources Department of Natural Resources", and navigation links for Home, Ground Water, Surface Water, Data & Maps, Documents & Forms, and Division Offices. The main content area is titled "Dam Safety Home" and contains a "Dam Safety" sidebar with links to Dam Safety Contacts, Design and Construction, Education & Outreach, Safety of Existing Dams, Flood Information, Hydrography & Satellite Monitoring, Interstate Compacts, Rainwater Collection, Rulemaking & Advisory Groups, and Water Rights. The main text describes the Dam Safety Program, its units, and its goals. A yellow box highlights "New! Dam Safety Data & Resources" with links to Potential Failure Mode Analysis Tools, Active Design Review Dataset & Map, and Jurisdictional & Non-Jurisdictional Dams. Below this are two large blue boxes: "Dam Safety Rulemaking" with links to Draft 2019 Dam Safety Rules, Meetings Schedule and Agenda, Summary of Proposed Revisions to Rules, and Stakeholder Meetings Presentation; "Dam Safety Data" with links to Active Design Review Dataset, Active Design Review Map, Jurisdictional Dam Dataset, and Non-Jurisdictional Dam Dataset; "Dam Safety Resources" with links to Dam Safety Forms, Dam Safety Manual (PDF format - 15MB), Dam Safety Project Review Guide, Subsurface Investigation Requirements and Guidelines, and Rules and Regulations for Dam Safety & Construction; "Colorado Dam Safety Performance Reports" with a link to 2015 Dam Safety Performance Report; "Dam Safety Help" with links to Frequently Asked Questions and Dam Safety Engineer Contacts; "CO-NM Regional Extreme Precipitation Study" with a link to Final Reports and Tools; "Mountain Basin Hydrologic Study" with links to Advances in Flood Hydrology for Modeling High Elevation Mountain Basins in Colorado with Applications to the Gross Dam Enlargement Study and Mountain Basin Hydrology Study; "Potential Failure Mode Analysis (PFMA) Tools" with a link to Comprehensive Dam Safety Evaluation Tools; "Western Dam Engineering Technical Notes" with a link to View All Newsletters; "Emergency Preparedness & Consequence Reduction" with a link to Emergency Action Planning; "Legislation" with a link to HOUSE BILL 15-1247 (Fees for design and construction); and "Links" with links to Association of State Dam Safety Officials (ASDSO) and Federal Dams in Colorado (Bureau of Reclamation).

HINSDALE COUNTY FLOODING MITIGATION AND PREPAREDNESS MITIGATION OBJECTIVE (MO) 2: ENSURE DAM SAFETY FINAL REPORT

Prepared by:
Colorado Dam Safety

June 20, 2019



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