

MARSEILLE  
DU 27 MAI  
AU 3 JUIN  
**2022**



ICOLD  
27<sup>TH</sup> CONGRESS  
90<sup>TH</sup> ANNUAL  
MEETING



CIGB  
27<sup>ÈME</sup> CONGRÈS  
90<sup>ÈME</sup> RÉUNION  
ANNUELLE



Committee G Environment –

Case studies involving planning, construction and operation of dams demonstrating environmental and social benefits

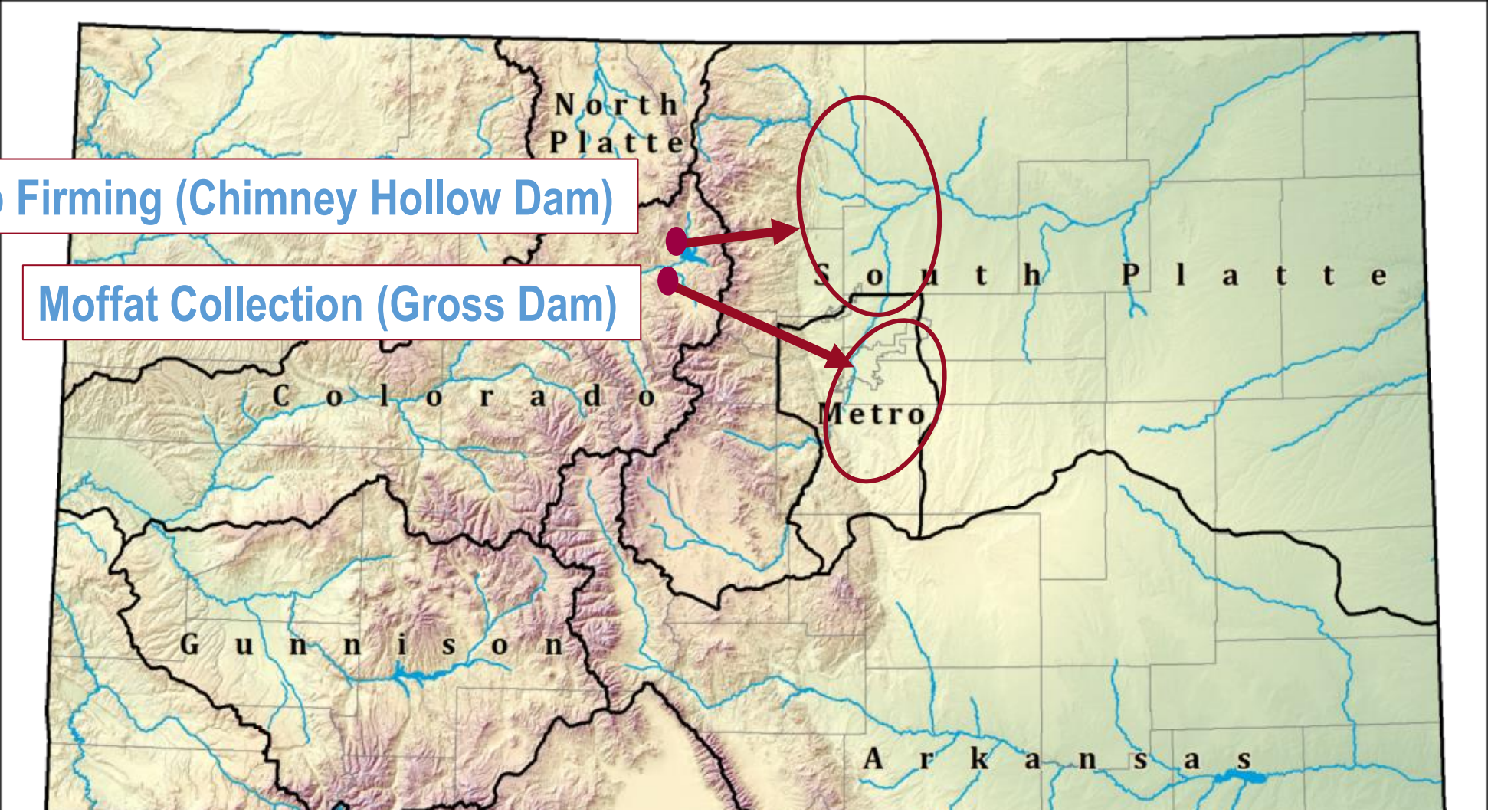
# **Windy Gap Firming Project – Chimney Hollow Dam and Reservoir**

**Jeff Drager – Northern Colorado Water Conservancy District  
Blaine Dwyer – HDR Engineering**



Windy Gap Firming (Chimney Hollow Dam)

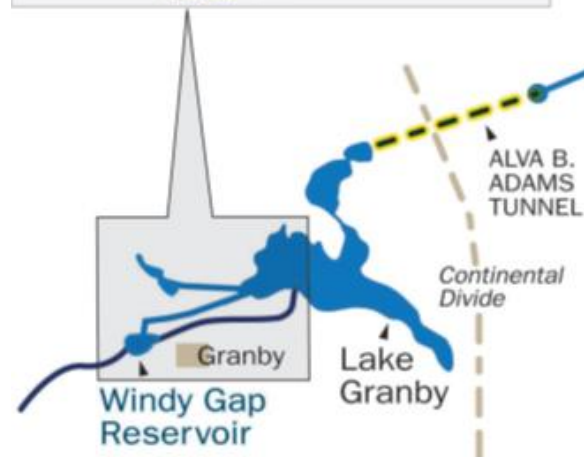
Moffat Collection (Gross Dam)





# The Problem

- Colorado-Big Thompson Project (C-BT)
  - Federal inter-basin water transfer
  - Up to 310,000 AF/yr (382 MCM/yr)
- Existing Windy Gap Project
  - Non-federal extension of C-BT
  - Up to 48,000 AF/yr (59 MCM/yr)
  - Can only divert in wet years when delivery system is full of federal water
  - ***Need more storage!***

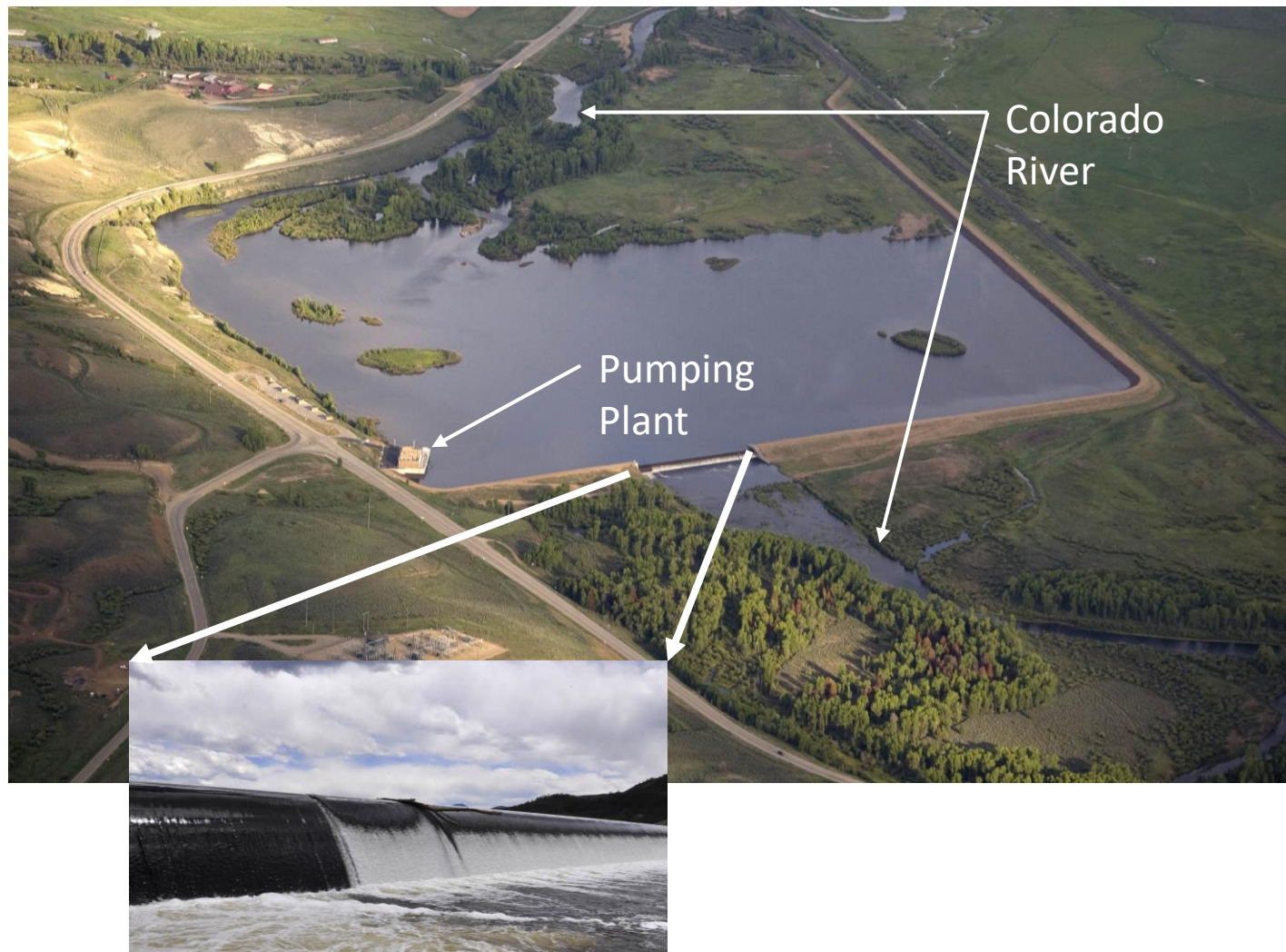


## Windy Gap Firming Project



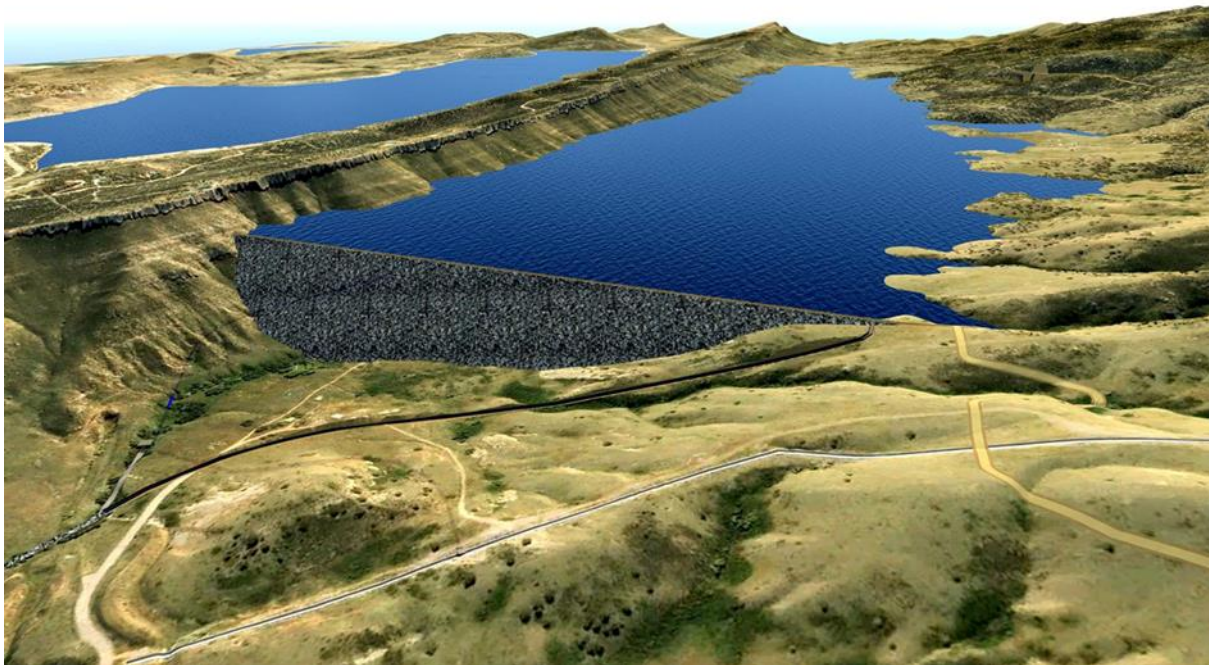
# Existing Diversion

- On mainstem of Colorado River
- 445 AF Reservoir (0.55 MCM)
- Four 12,000 Hp Pumps to deliver up to 600 cfs (17CMS)





## New Off-Stream Reservoir will Fortify Water Reliability for 12 Colorado Water and Power Agencies and Improve River Health



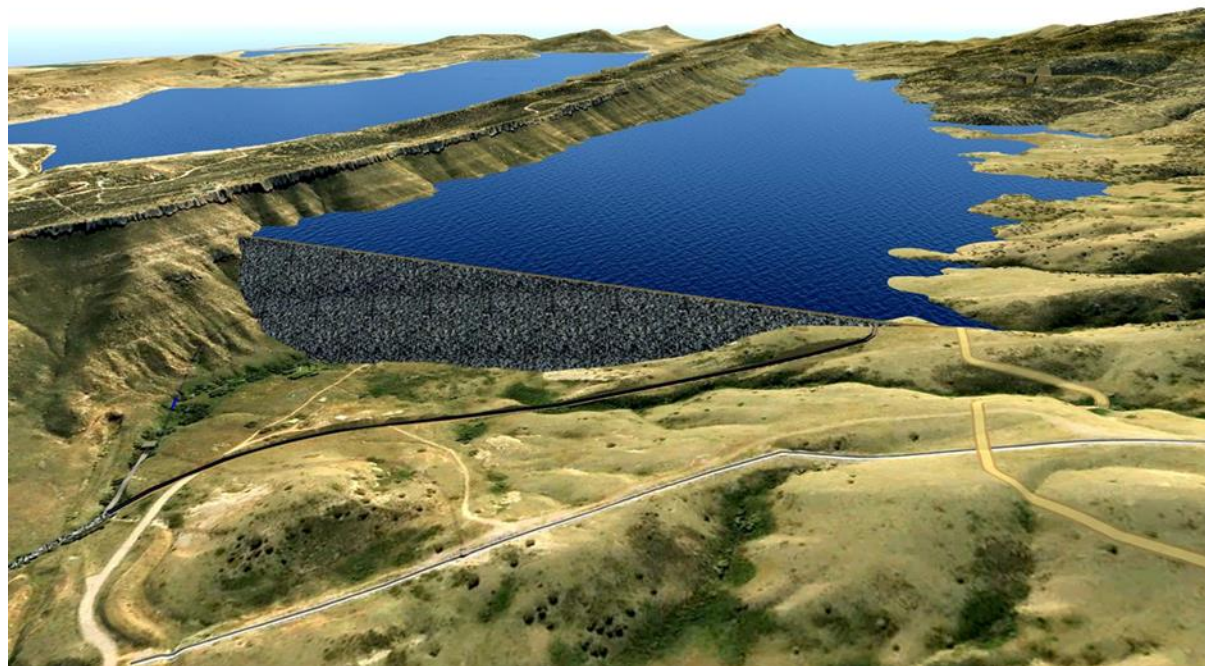
- New 350 foot (107 meter) high asphaltic core dam and 90,000 acre-foot (111 MCM) reservoir
- Construction began September 2021 and will take four years

Artist's rendering of new Chimney Hollow Dam and Reservoir – courtesy Northern Water



# Outline

- A. Planning and Permitting Processes
- B. Environmental Mitigations and Enhancements
- C. Lessons Learned





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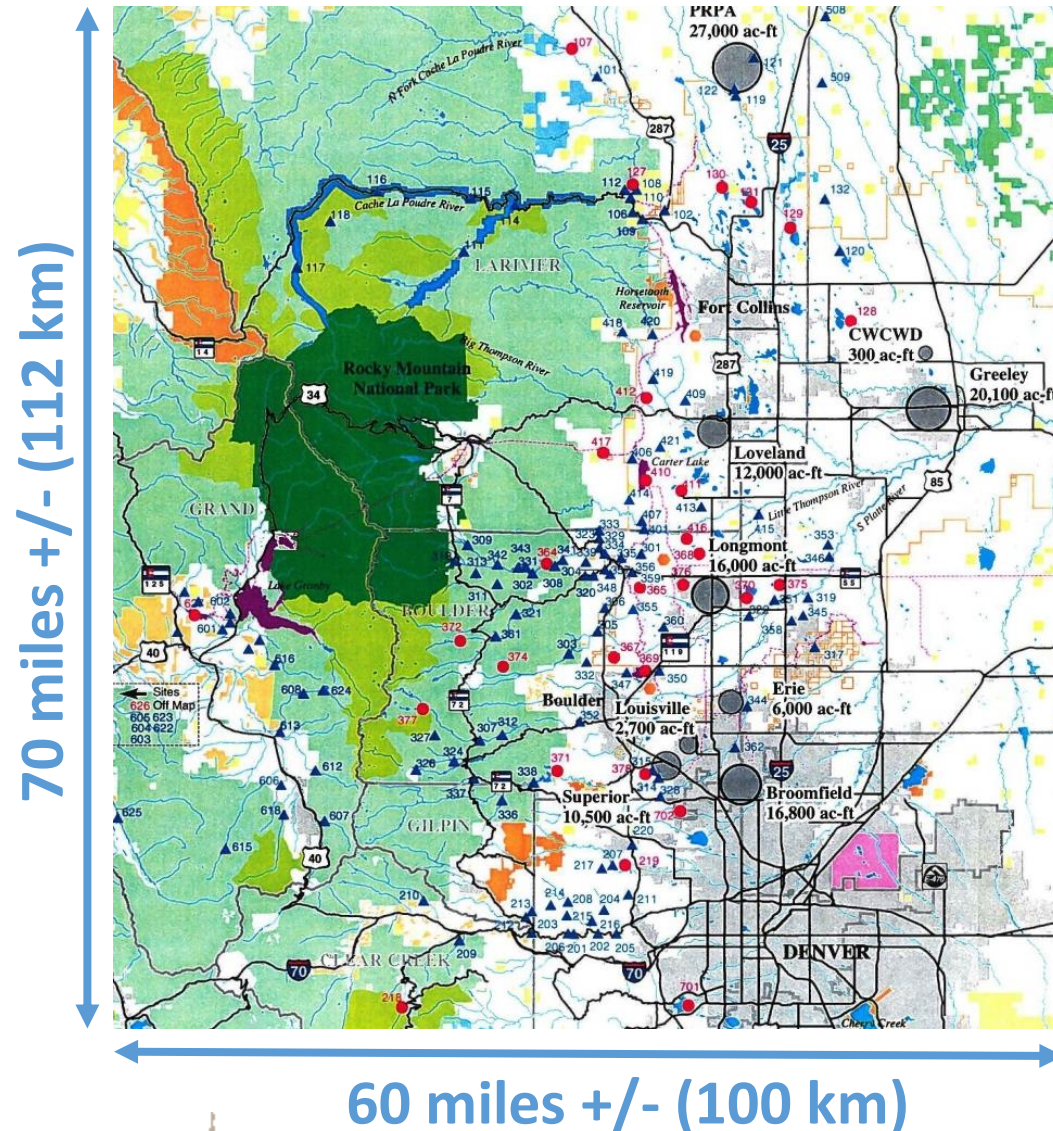
# Planning and Permitting Processes





# Prior to Federal Permitting

- New model to simulate flows and reservoir operations
- Alternatives evaluation – 177 storage sites





# The “Preferred Alternative”

The Chimney Hollow site only 1.3 acres (0.52 hectares) of wetlands under the jurisdiction of the federal government and is on a very small stream that flows intermittently



# Federal Laws

A large blue umbrella with a black handle, positioned over the three images below.

## National Environmental Policy Act



**Endangered Species Act**



**Clean Water Act**



**Safe Drinking Water Act**







# Required Permits

Permit/Approval	Agency	Why Required
NEPA - Environmental Impact Statement (EIS)	U.S. Bureau of Reclamation with other cooperating agencies	Connection to federal facility and potential impacts to protected resources (no federal funding)
CWA Section 404 Permit	U.S. Corps of Engineers	Wetlands/waters impacts
CWA Section 401 Certification	Delegated to the State of Colorado, Department of Public Health and Environment	Water quality impacts
Fish and Wildlife Mitigation and Enhancement	State of Colorado, Parks and Wildlife Division	Protection of fish and wildlife resources
“1041” Permit	Grand County	Impacts on County resources





# Environmental Mitigations and Enhancements





# Do not just compensate for direct impacts

- Many innovative approaches and solutions:
  - Additional water supplies near the river diversion
  - Streamflow and aquatic habitat
  - Funding committed for unidentified ecosystem management projects
  - Water quality improvements - funding for wastewater treatment plants
  - Cooperative long-term Colorado River management effort called “Learning By Doing”
  - Modifications to the existing Windy Gap Dam and Reservoir



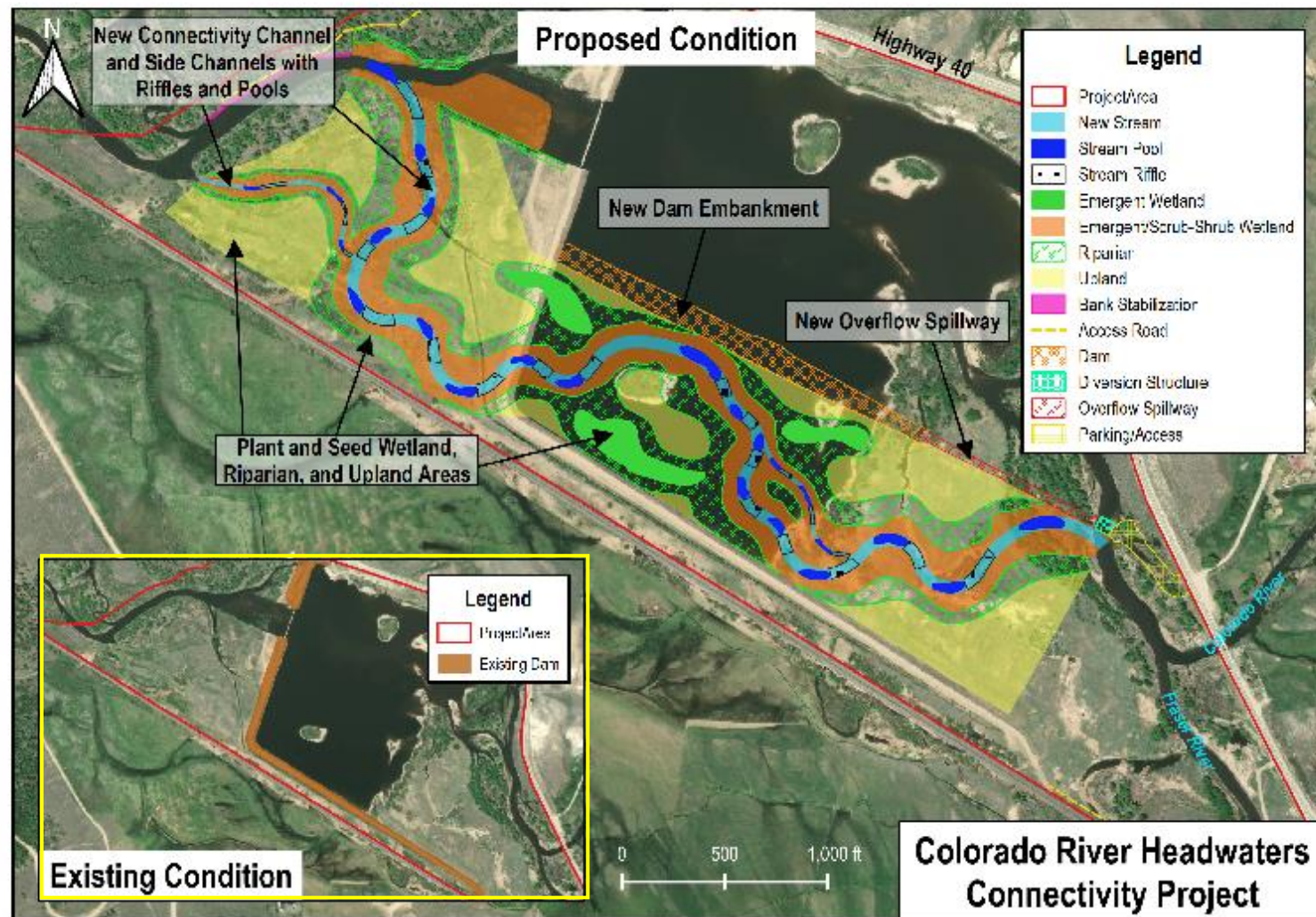
# Existing Dam and Reservoir





# Reconfigured

- Moves the dam and reservoir out of the river channel
- Reconnects the river above and below





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# Lessons Learned



## Many Lessons Were Learned – At least two may apply to all water storage projects

- Fully engage diverse interests early and throughout the planning and permitting processes
- Go beyond mitigating direct project impacts to address impacts from previously-constructed projects and, most importantly, develop strong and lasting relationships to address evolving issues in the future.

*In this case, the result is a project that regulatory agency personnel said **“will lead to a healthier river than we see today.”***





# Questions and Comments?



**Q: How long does it take to get federal permits in the U.S. for a water storage project?**

**A: 13 years and 3 feet of human growth!**



6' 2" at completion

3' 1" at the start

