

Gross Reservoir Expansion Project – Tree Removal

Feb. 10, 2021

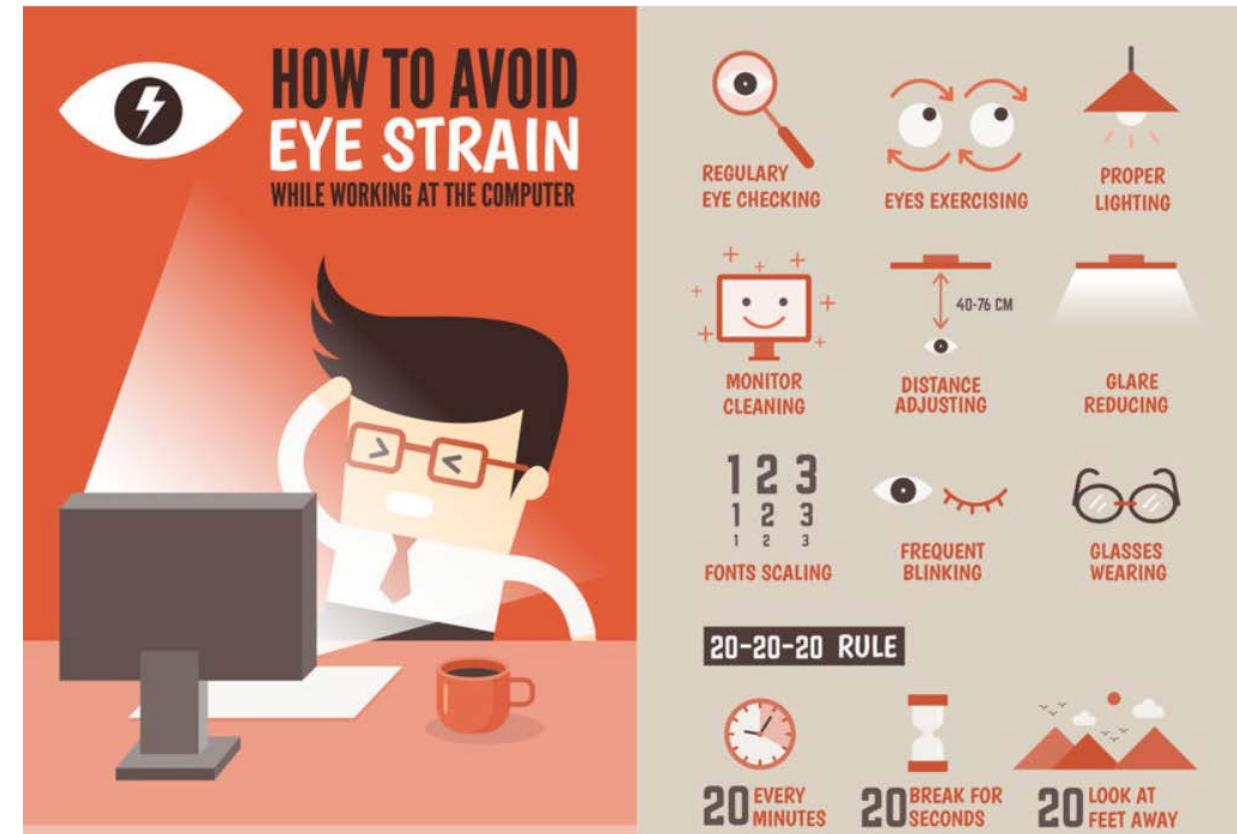


Introductions

HELLO
my name is

Safety Moment – The 20/20/20 Rule For Eye Strain

- The 20/20/20 rule, if followed, helps reduce fatigue and eye strain.
- It is pretty simple and states: Every 20 minutes, take at least 20 seconds and look away from your work/screen and focus on something else that is at least 20 feet away from you.
- Get up out of your chair.
- Blink your eyes rapidly to propagate tear production.
- Stretch your legs and arms.
- Walk around if you are able.
- Turn your neck and move your shoulders around.



Purpose of the Meeting

To facilitate a common understanding across stakeholders of timelines and expectations relating to vegetation clearing, reservoir perimeter tree clearing, timber harvesting and disposition, tree removal waste hauling and planned timelines for operations

What we have heard:

- All stakeholders are concerned about the route of trucks hauling tree removal biomass
- All stakeholders want the least disruptive approach to the tree removal activity



Agenda

- Timeline overview
- Topics:
 - Project and Site Plan Overview
 - Agency Involvement
 - Areas Requiring Tree Removal
 - Tree Removal Methods
 - Processing Alternatives
 - Transportation of Tree Removal Byproducts
 - Schedule
- Discussion

Housekeeping

- Please turn on your cameras.
- We will go topic by topic with time for larger discussion between each...
- But let us know if you have a question:
 - Drop them in the chat.
 - Use the “Raise Hand” function.
 - Jump in!
- Copies of slides will be provided after the meeting.

Scope of Gross Reservoir Expansion

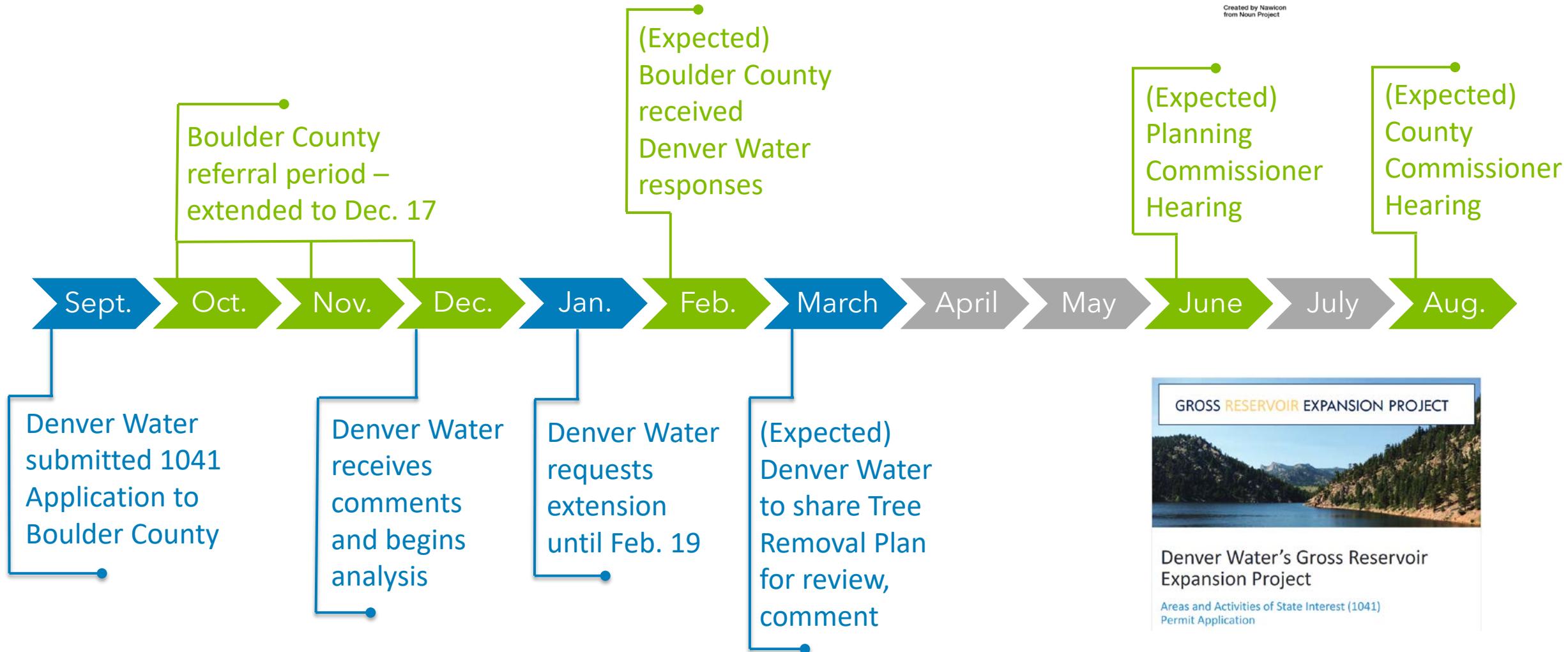
- Initial phase completed in 1954.
- Designed with expansion in mind.
- Increase storage by 77,000 AF.
- Raise height 131 feet.
- Doubling surface area.
- 7,406 spillway elevation at completion.



Boulder County 1041 Permit



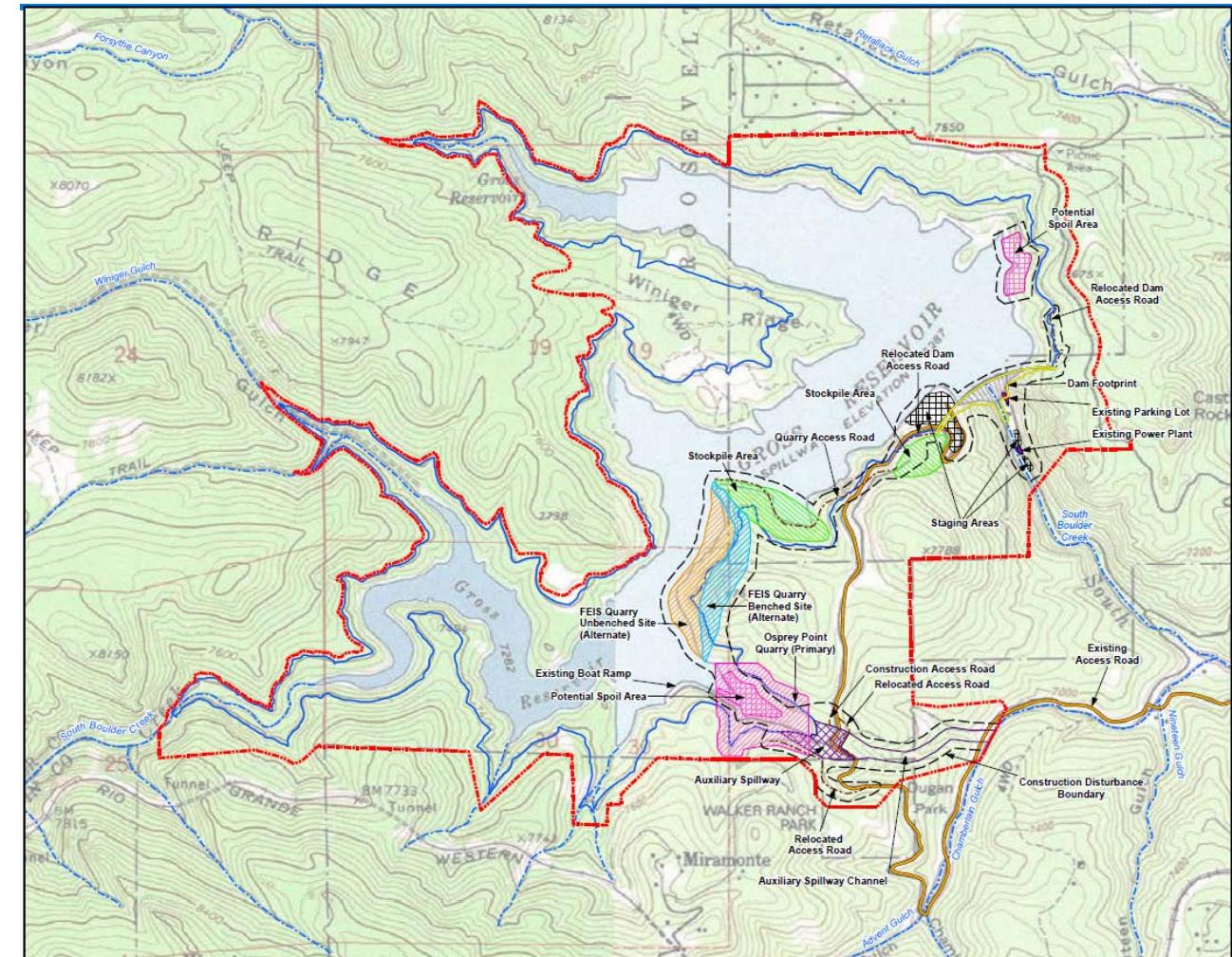
Created by Nounicon
from Noun Project



Gross Reservoir Expansion Site

Areas Disturbed by Construction

- Gross Dam Road & SH 72 Intersection
- Quarry at Osprey Point
- Haul Roads and Staging Areas
- Aggregate Crushing Plant
- Concrete Batch Plant
- Raised Dam Foundation
- Reservoir Perimeter Below Elev. 7406
- Relocated Recreation Areas



Overall Gross Reservoir Expansion Site Plan

Agency Stakeholders



US Army Corps
of Engineers®



COLORADO
Division of Water Resources
Department of Natural Resources



COLORADO
Department of
Transportation



COLORADO
Department of Public
Health & Environment



 CITY OF
ARVADA


JEFFERSON
COUNTY COLORADO



Federal Energy Regulatory Commission Order 2035-099

FERC Order issued July 16, 2020

Major Plans Required by the FERC in 2021:

- Tree Removal Plan
 - Aquatic Invasive Species/Noxious Weed Plan
 - Recreation Management and Monitoring Plan
 - Traffic Management Plan
 - Quarry Development and Reclamation Plan
 - Archaeological Plan and Historic American Engineering Record (HAER) documentation

Plan submission to the FERC required by July 16, 2021 with jurisdiction comments and responses

Construction start required by July 16, 2022

Dam Completion required by July 16, 2027

172 FERC ¶ 61,063
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Neil Chatterjee, Chairman;
Richard Glick, Bernard L. McNamee,
and James P. Danly.

City and County of Denver, Colorado

Project No. 2035-099

ORDER AMENDING LICENSE AND EXTENDING LICENSE TERM

(Issued July 16, 2020)

1. On November 25, 2016, as supplemented on March 24, 2017, the City and County of Denver, Colorado, acting by and through its Board of Water Commissioners (Denver Water or licensee),¹ filed an application to amend its license for the Gross Reservoir Hydroelectric Project No. 2035 (Gross Reservoir Project or project) to raise the project's dam and enlarge the project's reservoir. Denver Water also proposes to delete and amend certain license articles and to extend the license term by 10 years. The project is located on South Boulder Creek in Boulder County, Colorado and occupies land within the Roosevelt National Forest administered by the U.S. Forest Service (Forest Service). As discussed below, this order approves the proposed amendment with certain revisions and extends the license term as requested by Denver Water.

I. Background

2. On March 16, 2001, the Commission issued a new license to Denver Water to operate and maintain the Gross Reservoir Project for a period of 40 years, and to construct a powerhouse with an installed capacity of five megawatts (MW).² On October 1, 2004, the Commission issued an order amending license to authorize an increase in installed capacity to 7,598 MW and a new powerhouse design.³

¹ Denver Water is a municipal corporation that provides water to the City and County of Denver, Colorado, and surrounding suburbs.

² City and County of Denver, Colorado, 94 FERC ¶ 61,313, on reh'g, 95 FERC ¶ 61,222 (2001) (2001 License Order).

³ *City and County of Denver, Colorado*, 109 FERC ¶ 62,002 (2004).

Tree Removal Planning – General

Detailed Tree Removal Plan being developed and will be shared with jurisdictions in March 2021

- Tree removal will occur in 2 phases
 - Initial clearing of the quarry, haul roads, staging areas, plant locations and the dam footprint
 - Reservoir perimeter clearing as dam completion nears

The Tree Removal Plan will address:

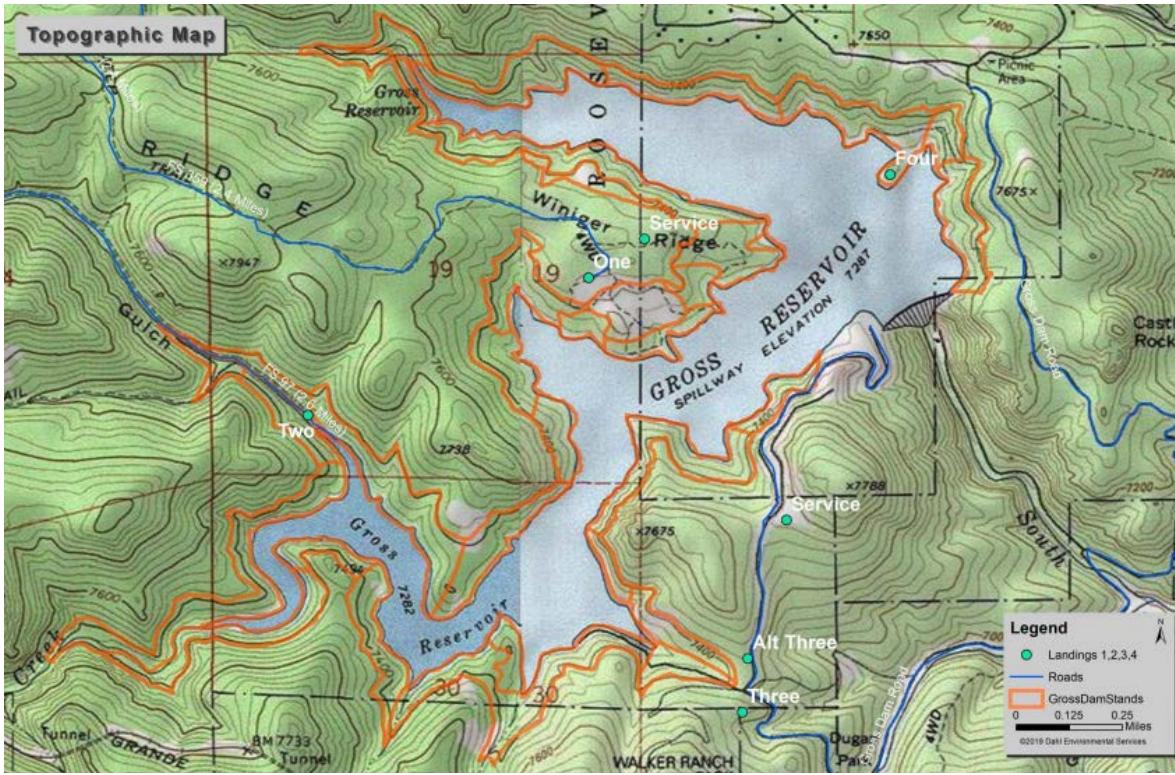
- Transportation management during tree removal activities
- Environmental protections to be followed during tree removal process
- End use of all tree removal material

Forest Resources and Inventory

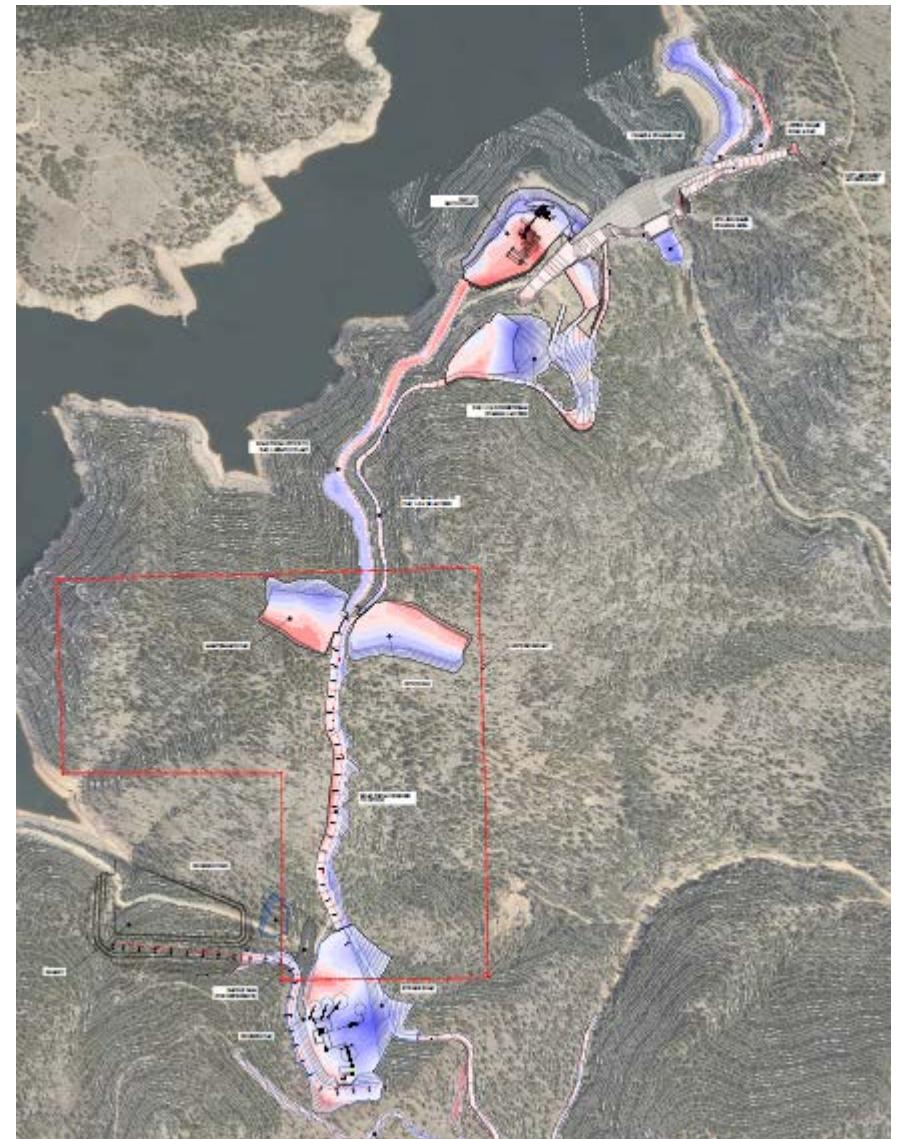
- Updated plan in 2019 using 2005 and 2008 reports as a base. Identified four removal options and moving forward with one option in 2021 update.
- Tree Removal Plan identifies 36 unique stands of trees for removal. Vegetation predominately ponderosa pine and Douglas fir, with some Colorado blue spruce and Rocky Mountain juniper.
- An estimated 24,000 tons of forest biomass to be generated during reservoir clearing operations.
- The value of the sawtimber is considered non-merchantable (i.e., biomass) but this will be revisited at the time of tree removal contracting.
- The Tree Removal Plan requires all quantities of biomass are completely removed down to a minimum material length and diameter of 2 inches within the inundation area.

Where is tree removal required?

- Aggregate quarry, haul roads, staging areas, dam footprint
- Reservoir perimeter below Elev. 7406



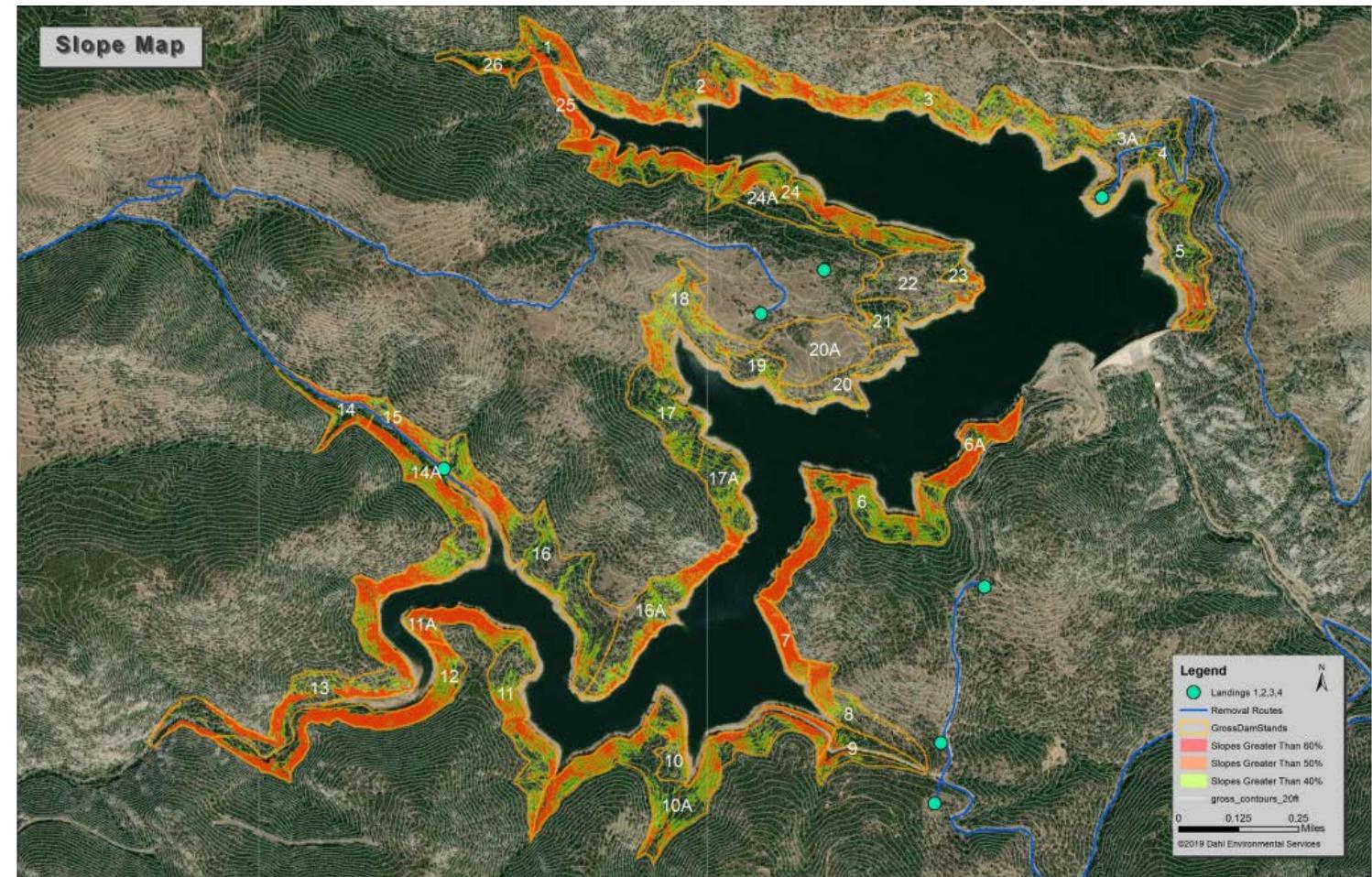
Reservoir perimeter



Early clearing for quarry, dam and staging areas

Terrain Where Tree Removal is Required is Steep

- Orange areas indicated terrain too steep for tracked or wheeled equipment.
- Different tree removal methods are required throughout the area to be cleared.



Tree Removal Equipment



Feller Buncher



Cable



Skidder



Mulchers
Masticators

Helicopter Logging

- Method of logging that can be used where stands are inaccessible.
- Cables are dropped from the helicopter and used to remove cut trees and woody biomass.
- The use of helicopters reduces the infrastructure required to log a specific stand and greatly reduces the schedule and timing of operations.



Helicopter Logging Landing Site

- Helicopter landing sites stage trees and biomass collected from around the reservoir.
- Trucks hauling biomass offsite are loaded at the landing sites.



Disposal Options

- Landfill disposal of biomass is the status quo disposal option from the 2019 TRP study.
- Air Curtain Destructor: Reduction in biomass can be achieved but air quality considerations and seasonal restrictions due to fire restrictions may limit the effectiveness.
- Grinding: Large grinders are used to convert entire trees into rough chips then hauled to biomass facilities is an option for debris disposal.
 - Chips can be used as fuel for steam generation, compost or transported to a landfill.
 - Several facilities operate in the greater project working area:
 - Eagle Valley Green Energy in Gypsum.
 - Confluence Energy in Kremmling.
- Cordwood production may be possible for disposal/use by local vendors. The Nederland Community Forestry Sort Yard may be used at the time of tree clearing.
- Biochar: Evaluated for on-site use but has limitations. Still an option for offsite disposal.

Air Curtain Burning of Biomass

- Air curtain destructors (ACDs) are designed and constructed to optimize the air curtain concept.
- High velocity air is blown across and down at an optimum angle into the box creating the air curtain on top and a rotational turbulence within the firebox.
- The combustion process reduces the wood waste to usable biochar and carbon ash by approximately 98 percent, leaving about **2 percent** in volume (100 tons of wood, or 2 to 4 tons of ash and biochar)



Biomass Grinding and Transport

- Non-merchantable tree biomass requires grinding and transport offsite.
- Logging roads in National Forest require USFS approval for construction and reclamation.
- Chip vans require suitable grades and curves between processing yards and connections to local access routes.



Wood chip grinding equipment (typical)



Possum belly trailers allow the purchaser to haul more chips per load but limit the ability to get into sites due to low ground clearance.



Regular box vans likely required to haul chips

Environmental Considerations for Tree Removal

The schedule for tree removal would consider, among other items:

- Key winter range timing for elk (December 1 through March 30).
- Raptor nesting season (April 1 through July 31).

Noise mitigation through equipment selection and haul route selection.

Installation of erosion control features and BMP's prior to tree removal operations.

Follow USFS requirements on National Forest lands.

Dust suppression on gravel roads during hauling operations.

Having spill response equipment and containment equipment on site as a precautionary measure. Monitoring fueling operations for safety and spill prevention.

Stand and Biomass Removal Methods

Selection criteria for the approach to tree removal considers:

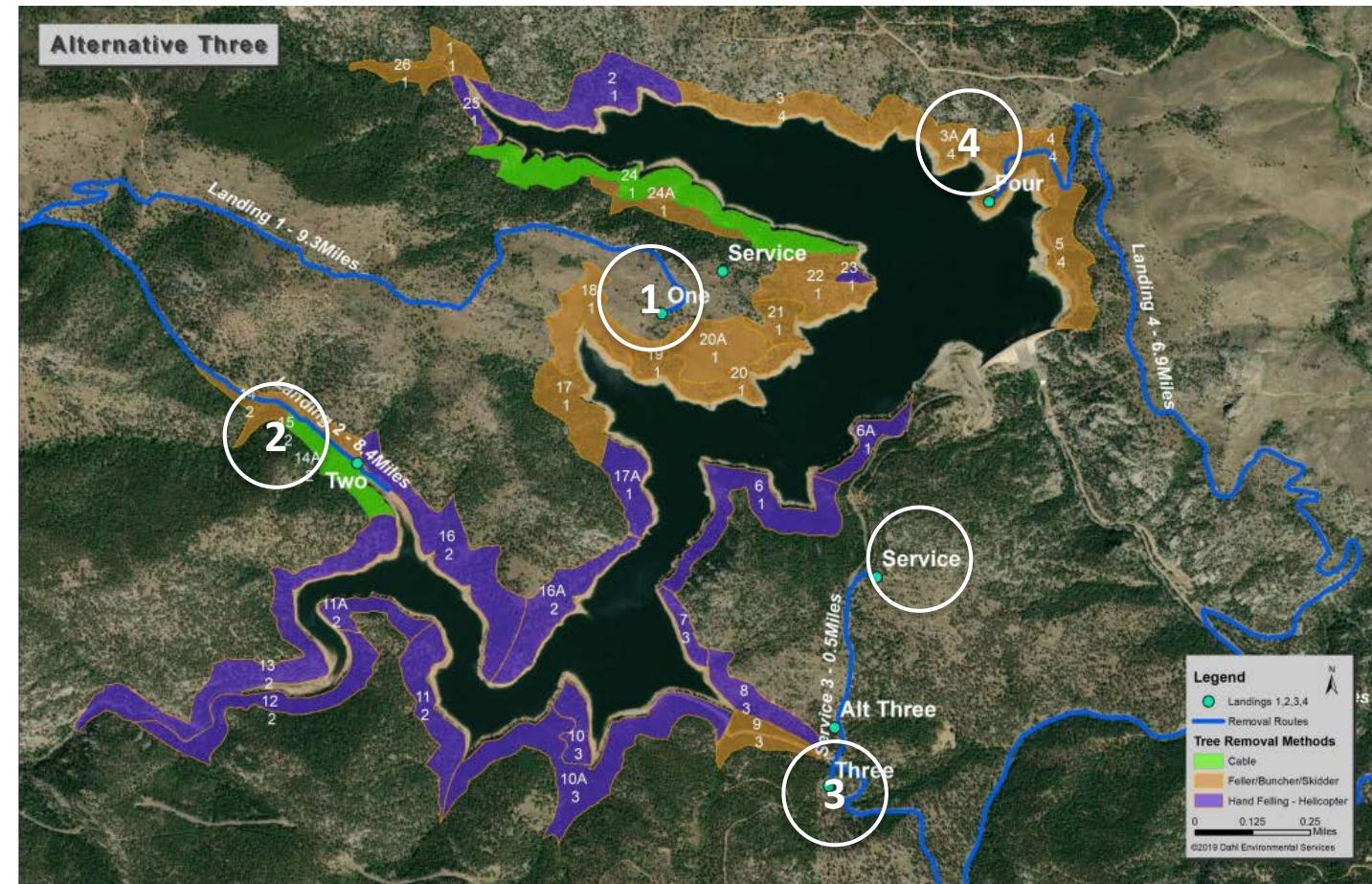
- The most cost-effective and efficient tree removal and disposal option.
- Maximize biomass utilization.
- Minimize tree removal traffic.
- Minimize nuisance factors such as noise, light, and odor.

Stand Removal Method	Biomass Removal Method
Hand Felling – Helicopter	Hand work, Heli-bucket
Feller/Buncher/Skidder	Mulcher
Cable	Cable Cleanup

Preferred Tree Removal Approach – 4-Log Landings

4 Landing and Staging Sites

1. NW landing on Winiger Ridge
2. SW landing near end of Lazy Z Road (CR 97E)
3. SE landing near Osprey Point
4. NE landing near North Shore peninsula



Preferred Tree Removal Approach – 4-Log Landings

- This alternative would make use of four log landing sites: (1) Winiger Ridge, (2) Winiger Gulch Road, (3) Osprey Point Road, and (4) North Shore Point for primary processing of all harvested logs and biomass.
- Reduces west side community haul truck traffic impacts.
- Best operational options from unplanned shutdowns or mechanical issues with four landing areas.
- The least helicopter round trips for yarding biomass.
- Provides a spectrum of biomass disposal opportunities i.e., cordwood, chips and energy.
- Provide opportunities to minimize impacts on wildlife.

Highways and Roadways in Gross Reservoir Vicinity

State Highways

- State Highway 72 Coal Creek Canyon Drive
- State Highway 93
- State Highway 119

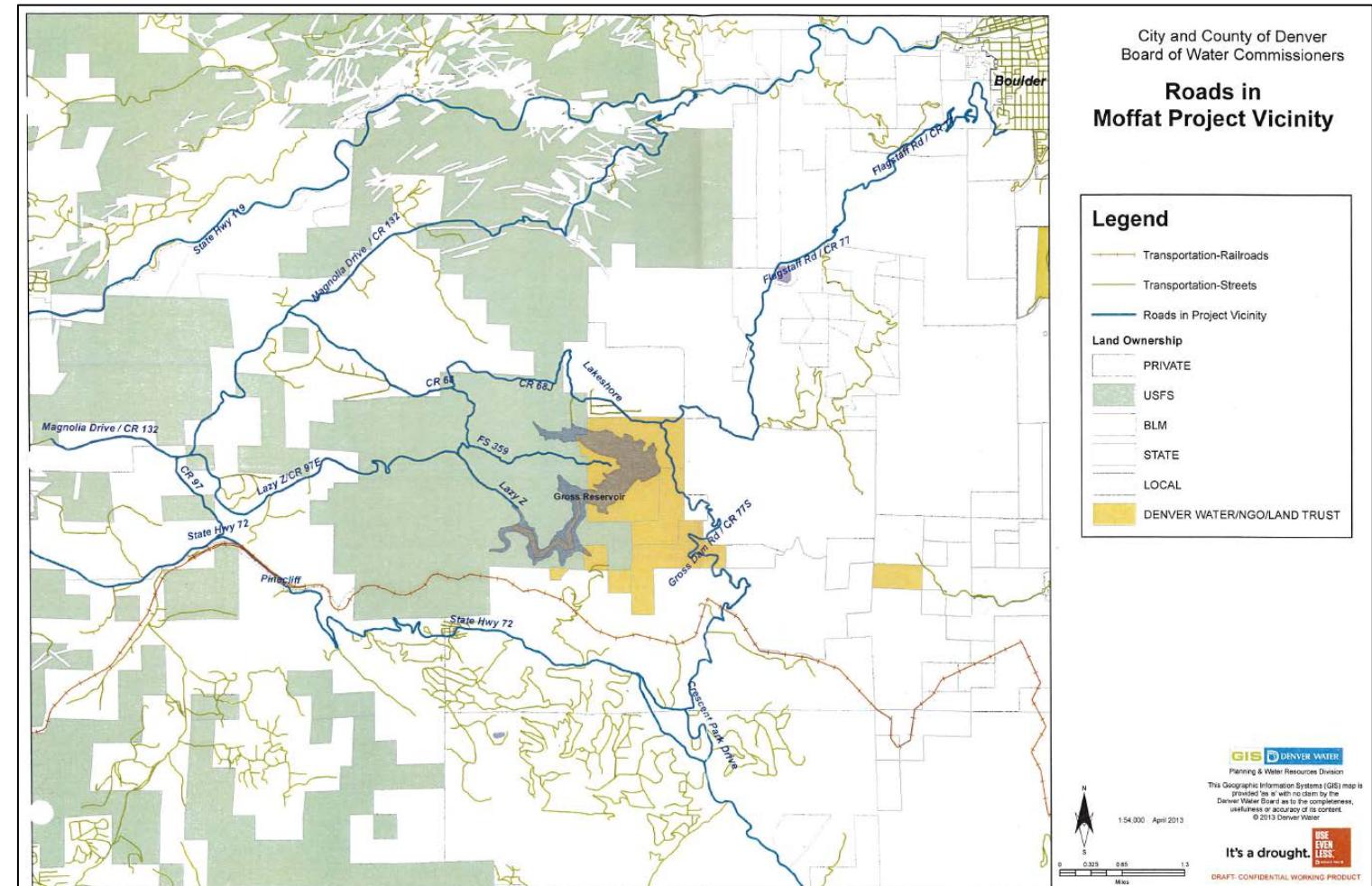
Boulder County

- CR 77S – Gross Dam Road
- CR 77 – Flagstaff Road
- CR 132 Magnolia Dr
- CR 97
- CR 97E Lazy Z Road

Gilpin County (SH 72 & CR 97)

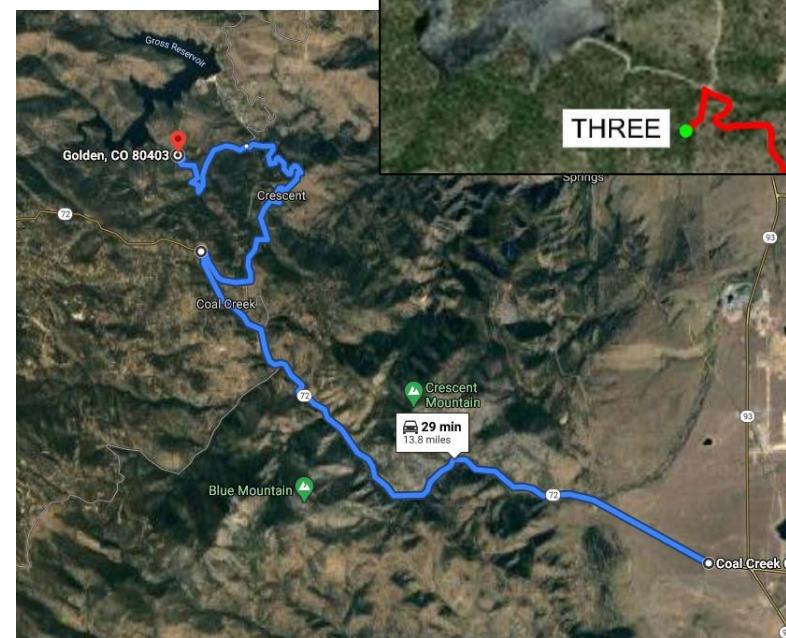
Jefferson County

- Crescent Park Drive



Access Routes for Trucking of Biomass - East

- East side haul via Gross Dam Road and SH 72 to the East.
- Early trucking of biomass uses Crescent Park Drive until SH 72 and Gross Dam Road intersection improved (Q4 2022).
- No truck traffic on SH 72 from Gross Dam Road intersection to Pinecliff.
- No truck traffic on Flagstaff Road.



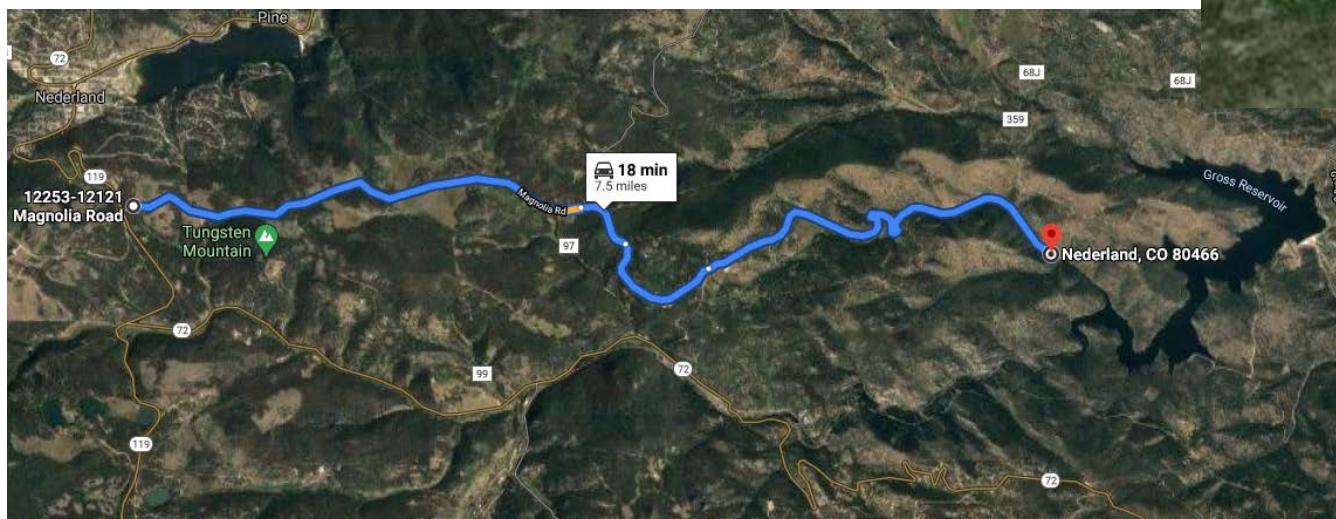
Truck route from site to SH 72 and SH 93 intersection



On-site Access Roads

Access Routes for Trucking of Biomass - West

- West Side Access via Lazy Z Road (CR 97E) to CR 97 to SH 72 or SH 119 depending on destination
- No Trucking on SH 72 from Gross Dam Road intersection to Pinecliff
- No trucking on CR 132 Magnolia Rd East to SH 119



Truck route from site to CR 132 and SH 119 intersection



On-site Access Roads

Schedule

- Develop Access and Support Facilities, Materials Lab, Initial Tree Clearing, Surface Prep of Dam – 2022
- Foundation Excavation and Grouting – 2023
- Stilling Basin and Dam Raise – 2024 thru 2026
- Reservoir Tree Clearing – 2025-2026
- Dam Bridge, Crest, HPU Building, Reclamation, Demobilization - 2027

Anticipated Project Timeline

Activity	1	2	3	4	5	6	7
Site Mobilization							
Dam surface preparation, Materials Lab, early site grading for temporary facilities							
Public access to South Shore closed (North Shore open throughout construction)							
Install temporary recreation facilities, public road improvements, site development							
Quarrying operations							
Dam foundation excavation, grouting, plant setup							
Dam raise activities - materials trucking							
Forestry activities/tree clearing							
First fill							

Presently, Denver Water anticipates Year 1 to begin in 2022. Updated 8/2020

Discussion

- Did we answer the questions you had?
- Is there any other feedback you have for us?