

Denver Water
Gross Reservoir Hydroelectric Project
FERC Project No. 2035

VISUAL RESOURCES PROTECTION PLAN
ADDENDUM

FINAL

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Prepared by:



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Contents

1. Introduction	1
1.1 Project Background	1
1.1.1 FERC License Amendment	1
1.1.2 NEPA Review	2
2. Objectives and Scope of the Plan Addendum	3
2.1 Plan Addendum Regulatory Requirements	3
2.2 USFS Scenery Management System (SMS) Guidance	4
2.3 SMS Components in the 2003 VRPP	5
3. Visual Resources Overview	6
3.1 Summary of Visual Impact Determinations from Previous Documents	6
3.2 Recreation Site Descriptions	7
3.2.1 Northern Dam Viewpoint Recreation Area (Relocated Peninsula Recreation Area)	8
3.2.2 Relocated Haul Road Recreation Area	10
3.2.3 Relocated Dam Recreation Area	12
3.2.4 Relocated South Boulder Creek Inlet Trail	14
3.2.5 New Scenic Ridge Trail	17
3.2.6 New Upper Viewshed Trail	20
3.3 Osprey Point Quarry	22
3.3.1 Site Context and Conditions	22
3.4 Saddle Dam	23
4. Selected Key Observation Points and Visual Simulations	23
4.1 Key Observation Points and Simulations	23
4.1.1 Key Observation Points	24
4.1.2 Simulations	24
4.1.2.1 KOP-1 (Field No. 2): Gross Dam Road	25
4.1.2.2 KOP-2 (Field No. 3): Winiger Ridge	25
4.1.2.3 KOP-3 (Field No. 5): North Shore Parking Lot	26
4.1.2.4 KOP4 (Field No. 8): Winiger Ridge Overlook	26
5. Avoidance, Minimization, and Mitigation	27
5.1 Avoidance and Minimization	27
5.1.1 Previous Studies for the Quarry	27
5.1.2 Previous Studies for the Saddle Dam	29
5.2 Mitigation	29
5.3 Recreation Sites	32
5.3.1 Northern Dam Viewpoint (Relocated Peninsula Recreation Area)	32
5.3.2 Relocated Haul Road Recreation Area	32
5.3.3 Relocated Dam Recreation Area	33

5.3.4	Relocated South Boulder Creek Inlet Trail.....	34
5.3.5	New Scenic Ridge Trail	34
5.3.6	New Upper Viewshed Trail	35
5.4	Osprey Point Quarry	35
5.4.1	Visual Change and Mitigation.....	35
5.5	Saddle Dam.....	37
5.6	Nighttime Lighting	37
5.6.1	Temporary Nighttime Construction Lighting.....	37
5.6.2	Permanent Lighting	38
5.6.3	Mitigation for Nighttime Construction Lighting	38
6.	Conclusions and Recommendations	38
6.1	Project Schedule and Related Mitigation Actions	38
6.2	Future Recreation Facility Design Considerations	39
6.3	Restoration Material Procurement and Monitoring	40
7.	References	41

List of Exhibits

Exhibit 1: Northern Dam Viewpoint Recreation Area	10
Exhibit 2: Haul Road Recreation Area	12
Exhibit 3: Dam Recreation Area	14
Exhibit 4: Relocated South Boulder Creek Inlet A	16
Exhibit 5: Relocated South Boulder Creek Inlet B	17
Exhibit 6: Scenic Ridge Trail A	19
Exhibit 7: Scenic Ridge Trail B	20
Exhibit 8: Upper Viewshed Trail	22
Exhibit 9: Visual Mitigation Summary from the 2014 Final EIS (Modified).....	31

List of Tables

Table 1: Selected Key Observation Points	24
Table 2: Summary of Mitigation Strategies.....	27
Table 3: Denver Water Recreation Facility Design Criteria.....	29
Table 4: Project Construction Schedule and Summary of Recommended Mitigation Practices	39

List of Appendices

Appendix A: Figures	
Figure 1: Project Location	
Figure 2: U.S. Forest Service Scenic Integrity Objectives	
Figure 3: Field Viewpoints and Selected Key Observation Points	
Appendix B: Key Observation Point Figures	

Acronyms and Abbreviations

ADA	Americans with Disabilities Act
amsl	Above Mean Sea Level
Corps	Army Corp of Engineers
Denver Water	Board of Water Commissioners for the City and County of Denver
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
Forest Plan	Arapaho and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan
FSORAG	Forest Service Outdoor Recreation Accessibility Guidelines
FSTAG	Forest Service Trail Accessibility Guidelines
GRE Project	Gross Reservoir Expansion Project
Handbook	USDA Forest Service Agricultural Handbook Number 701, Landscape Aesthetics: A Handbook for Scenery Management
KOP	Key Observation Point
NEPA	National Environmental Policy Act
NHWL	Normal High Water Level
NFS	National Forest System
NRCS	Natural Resources Conservation Service
Plan Addendum	Visual Resources Protection Plan Addendum
ROD	Record of Decision
SIO	Scenic Integrity Objectives
SMS	Scenery Management System
USFS	U.S. Forest Service
VRPP	2003 Visual Resources Protection Plan

1. Introduction

The Board of Water Commissioners for the City and County of Denver (Denver Water) is in the process of obtaining the necessary permissions to expand Gross Dam and Reservoir (the Gross Reservoir Expansion Project or GRE Project). Gross Reservoir is within a federal hydropower reserve and is subject to an existing Federal Energy Regulatory Commission (FERC) hydropower license – Gross Reservoir Hydroelectric Project No. 2035. Denver Water therefore had to amend its existing hydropower license to pursue the GRE Project. The FERC Order amending this license was issued July 16, 2020 and mandates the creation of several plans to address impacts related to the expansion and operation of Gross Dam and Reservoir. Per the 2020 FERC Order, Denver Water is required to prepare an addendum to its 2003 Visual Resource Protection Plan (2003 VRPP) for National Forest System lands at Gross Reservoir consistent with Article 414 and 4(e) Condition 23 of the amended license. These National Forest System lands are managed by the U.S. Forest Service (USFS), Arapahoe and Roosevelt National Forests.

This Visual Resources Protection Plan Addendum (Plan Addendum) has been prepared consistent with the 2020 FERC Order, including requirements of Article 414 and applicable measures of 4(e) Condition 23. The 2020 FERC Order requires Denver Water to develop the Plan Addendum in consultation with USFS and submit the Plan Addendum for review and approval by USFS, prior to submittal to FERC. The USFS has approved this Plan Addendum on the condition that Denver Water and USFS will continue to work together to address USFS standards for the reclamation of the permanent saddle dam feature on NFS land. Upon FERC approval, Denver Water shall implement the Plan Addendum.

1.1 Project Background

The following sections describe how this Plan Addendum fits in the context of the FERC hydropower license amendment and the National Environmental Policy Act (NEPA) processes that have been completed to date for the GRE Project. A GRE Project location map is provided as Figure 1 (Appendix A).

1.1.1 FERC License Amendment

The original FERC hydropower license for Gross Reservoir was issued in 1951. Gross Dam was built, but power generation was not included at that time. In 1998, Denver Water filed an application to relicense Gross Reservoir, proposing to continue to maintain and operate the reservoir, and to construct power generating facilities. In 2001, FERC issued a new license (subsequently amended in 2002 and 2004) to Denver Water for the Gross Reservoir Hydroelectric Project, which was subject to certain conditions submitted by USFS under Section 4(e) of the Federal Power Act. Article 414 and 4(e) Condition No. 105 required preparation of a VRPP for National Forest System lands in the Project Area and a VRPP was prepared in 2003.

On November 25, 2016, Denver Water filed a final application with FERC to amend its hydropower license for the Gross Reservoir Hydroelectric Project. The 2020 FERC Order approved the proposed hydropower license amendment and GRE Project with certain revisions and extended the license term.

1.1.2 NEPA Review

Denver Water started the permitting process for the GRE Project in 2003 and submitted an application to the Corps for a permit pursuant to Section 404 of the Clean Water Act in 2009. The GRE Project will increase the storage capacity of Gross Reservoir by raising the dam by 131 feet and lengthening the dam crest by approximately 790 feet (raising the normal maximum reservoir elevation by 124 feet). The normal maximum elevation of the reservoir will increase from 7,282 to 7,406 feet above mean sea level (amsl), increasing its normal maximum surface area from 418 to 842 acres, and expanding its maximum storage volume from approximately 42,000 to 119,000 acre-feet. The GRE Project is located on South Boulder Creek in Boulder County and occupies Denver Water-owned land and National Forest System lands within the Arapaho and Roosevelt National Forests.

Pursuant to NEPA, the Corps issued a Draft Environmental Impact Statement (EIS) on October 30, 2009 and a Final EIS on April 25, 2014. FERC was a cooperating agency with the Corps in the preparation of the Draft and Final EIS, which analyzed the effects of the GRE Project. The Draft and Final EIS documents provide environmental analyses of impacts to the physical, biological, and human environments related to five action alternatives, including Denver Water's Preferred Alternative (the GRE Project), and the no action alternative.

Section 3.17 of the Final EIS describes existing scenic quality and landscape characteristics, relevant management direction, visual absorption capacity, and user sensitivity to change for the GRE Project. Section 5.17 describes the potential short- and long-term visual impacts to the existing landscape character and how that character is perceived via natural and man-made viewpoints, viewsheds, and scenic features. A photo simulation (Figure 5.17-1) of the enlarged reservoir – as seen from the North Shore Recreation Area Parking Lot – was prepared for the GRE Project and is included in the Final EIS.

The Corps issued its Record of Decision (ROD) on July 6, 2017, which reviewed and evaluated Denver Water's Preferred Alternative (GRE Project). Following issuance of the ROD, the Corps issued a Clean Water Act Section 404 permit to Denver Water on September 8, 2017. Following release of the ROD, FERC issued a Final Supplemental Environmental Assessment on February 14, 2019, which analyzed Denver Water's license amendment application. Together, the Corps' Final EIS and FERC's Final Supplemental Environmental Assessment provide a complete record of analysis for Denver Water's GRE Project and proposal to amend the license for the Gross Reservoir Hydroelectric Project.

The location and site map of the GRE Project is shown on Figure 1 (Appendix A). Environmental analyses of visual resources related to the GRE Project have already been completed per NEPA. This Plan Addendum, therefore, provides minimal, yet specific, additional visual impact analysis to supplement the information contained in previous NEPA documentation. The selected key observation points (KOPs) and visualizations presented in Section 4 of this VRPP Addendum were requested by USFS to identify the variation in pool level and to provide additional context for mitigation strategies to blend new facilities into the environment.

2. Objectives and Scope of the Plan Addendum

This Addendum to the 2003 VRPP for Gross Reservoir addresses measures for mitigating the GRE Project's visual impacts to National Forest System lands, including reshaping and revegetating disturbed areas, among other measures. It provides a schedule (Section 6.1) for future facility maintenance and replacement that will incorporate the design considerations of the current 2003 VRPP consistent with the requirements of the 2020 FERC Order described below. It is not designed to provide additional impact analysis beyond the visual simulations from new Key Observation Points discussed in Section 4.

This Plan Addendum has two primary objectives: (1) summarize impacts from the GRE Project (as identified/disclosed in previous NEPA analyses) to visually valued resources on National Forest System lands, and (2) describe potential strategies and practices to mitigate visual impacts from both short-term actions such as GRE Project construction and long-term actions such as the removal of a scenic viewpoint and future facility maintenance and replacements. Relevant to visual impacts, avoidance and minimization measures were employed throughout the GRE Project, and are discussed in detail in Section 5.1.

The scope of this Plan Addendum includes the following key steps:

- Reviewing existing documentation, including the 2014 Final EIS and 2019 Final Supplemental Environmental Assessment, 2003 VRPP, 2021 Recreation Management Plan, 2021 Recreation Monitoring Plan, 2021 Quarry Operations Plan, and 2021 Quarry Reclamation Plan, for the GRE Project (Corps 2014; FERC 2019; Denver Water 2003; Denver Water 2021a, b, c, d respectively).
- Identifying sensitive viewing locations in collaboration with USFS.
- Conducting fieldwork to characterize the existing visual character of the landscape and collect current site photography.
- Identifying KOPs in collaboration with USFS.
- Creation of visual simulations from the identified KOPs.
- Assessing and describing potential mitigation strategies.

2.1 Plan Addendum Regulatory Requirements

Article 414 of the FERC license contains the general requirements of the VRPP. These general requirements are incorporated into this Plan Addendum. The specific requirements for this Plan Addendum are provided below (Section 6.1, Table 4) and are incorporated in this Plan hereinafter. Condition No. 23 of the 2020 FERC Order states:

At least 90 days before ground-disturbing or construction activities on NFS [National Forest System] lands authorized by license amendment, Licensee shall file with FERC an addendum to the 2003 VRPP (approved by FERC on May 22, 2003), developed in consultation with USFS and subject to prior review and approval by the USFS. Upon FERC approval, Licensee shall implement the Plan.

The Plan Addendum shall address, but not be limited to the following:

- *Measures for mitigating visual impacts from Project-related construction activities on [National Forest System] lands, including reclamation treatments for the quarry and relocation and/or reconstruction of roads, trails and recreation facilities.*
- *Measures for reshaping and revegetation of disturbed areas to blend with surrounding visual characteristics on [National Forest System] lands.*
- *Schedule of ongoing facility maintenance and replacement that will incorporate the design considerations listed on pages 48 and 49 of the 2003 VRPP on [National Forest System] lands.*

This Plan Addendum shall adhere to applicable USFS scenery management guidance included in the current Arapaho and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan (Forest Plan) direction (USFS 1997) and USDA Forest Service Agricultural Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management" (Handbook; USFS 1995).

2.2 USFS Scenery Management System (SMS) Guidance

Two USFS guidance documents are used to manage resources on National Forest System lands, including scenery resources, as described below.

The Forest Plan was prepared in accordance with the 1976 National Forest Management Act, NEPA, other laws, and associated regulations. The Forest Plan provides guidance for all resource management activities on National Forest System lands. It establishes:

- Forest-wide multiple-use management goals and objectives.
- Forest-wide management requirements (also known as standards and guidelines).
- Direction applicable to specific management areas and geographic areas.
- Designation of lands suited for timber production and other resource management activities.
- Monitoring and evaluation requirements.
- Recommendations to Congress for the establishment of wilderness and wild and scenic rivers.
- Recommendations to the regional forester for research natural areas.

As described in the Handbook (USFS 1995), USFS uses the SMS to integrate scenery management data into all levels of USFS planning, including the following:

- National overviews.
- Regional plans.
- Landscape province analysis.
- Forest plans.
- Watershed, viewshed, or landscape unit analysis.
- Detailed project plans.
- Project implementation.
- Project monitoring.

2.3 SMS Components in the 2003 VRPP

The following SMS components from the 2003 VRPP are assumed to reflect current conditions and were therefore not re-evaluated in this Plan Addendum. Brief descriptions based on the 2003 VRPP are provided below.

Vegetative Cover Types

Vegetation at Gross Reservoir is predominantly composed of open woodlands of ponderosa pine and Douglas fir. Other vegetative cover types include ephemeral drainageways along ravines and mountain grassland.

Existing Landscape Character

Overall, the landscape character of the reservoir area is composed of views of open water surrounded by bare and rocky shoreline and rugged mountain terrain covered by mixed open woodland. More detailed characterizations of each proposed recreation area are provided in Section 3.2. Refer to Appendix B for site photos depicting the landscape character seen at each KOP.

Scenic Attractiveness/Scenic Classes

The National Forest System lands surrounding the reservoir were classified for their Scenic Attractiveness following USFS SMS guidelines. The three classes of Scenic Attractiveness are Class A (Distinctive); Class B (Typical), and Class C (Indistinctive).

Per the 2003 VRPP, areas with the highest Scenic Attractiveness were located on the north slopes of Winiger Ridge and surrounding Forsythe Canyon, the peninsula adjoining the North Shore, and the slopes surrounding South Boulder Creek inlet.

Existing Scenic Integrity

Building on the Scenic Attractiveness Classes, the landscape surrounding the reservoir was further classified according to its Existing Scenic Integrity, which measures how much a landscape has been altered from a whole or perfect condition. As with Scenic Attractiveness, the areas with the highest Existing Scenic Integrity (*Very High*) are the north slope of Winiger Ridge, slopes surrounding Forsythe Canyon, and the slopes surrounding South Boulder Creek Inlet. The peninsula has *High* Existing Scenic Integrity, but the existence of some small facilities there prevented its classification as *Very High*.

In addition to the SMS components summarized above, additional National Forest System data, Scenic Integrity Objectives (SIO), were considered for this analysis.

Scenic Integrity Objectives

USFS provided Denver Water with 1995 USFS SMS SIO data in support of this Plan Addendum. SIO are used to direct National Forest System land management and land use decisions by establishing acceptable levels of human alteration. Figure 2 (Appendix A) depicts those SIO data in the context of the GRE Project facilities. Two SIO levels cover the entire landscape of Gross Reservoir:

- **High:** the landscape character appears unaltered. Landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
- **Moderate:** the landscape character may appear slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Most of the western lands surrounding Gross Reservoir have a moderate SIO, including most of the landscape at Winiger Ridge. Most of the lands to the south and southwest of the reservoir have a high SIO, including the proposed sites of the South Boulder Creek Inlet Trail, relocated Haul Road Recreation Area, and the proposed Upper Viewshed Trail and Scenic Ridge Trail. The National Forest System land adjacent to the Osprey Point Quarry site is designated as high SIO. The new saddle dam location on National Forest System land to the east of the quarry is designated as high SIO.

3. Visual Resources Overview

This section summarizes visual impacts associated with the GRE Project based on review of the documents listed below, which were prepared after the initial 2003 VRPP.

- Federal Energy Regulatory Commission (FERC) Order Amending License and Extending License Term – FERC Project 2035-099, July 16, 2020 (FERC 2020; FERC Order).
- FERC Final Supplemental Environmental Assessment for Amendment of Hydropower License Gross Reservoir Hydroelectric Project – FERC Project No. 2035-099, February 14, 2019 (FERC 2019).
- Denver Water Letter Re: Denver Water (Licensee) comments on Supplemental Environmental Analysis for FERC Project No. 2035-099 (Denver Water April 3, 2018; Denver Water’s comments to FERC SEA).
- U.S. Army Corps of Engineers (Corps) File No. (ACTION ID): NWO-2002-80762-DEN Applicant: Board of Water Commissioners for the City and County of Denver (Denver Water), Project Name: Moffat Collection System Project. Department of Army Section 404 Permit. September 8, 2017.
- U.S. Army Corps of Engineers (Corps) Moffat Collection System Project Record of Decision (Corps July 6, 2017).
- Denver Water Moffat Collection System Project Final FERC Hydropower License Amendment Application Gross Reservoir Hydroelectric Project – FERC Project No. 2035 (Denver Water November 25, 2016; Denver Water’s FERC License Amendment Application).
- U.S. Army Corps of Engineers (Corps) Moffat Collection System Project Final Environmental Impact Statement (Corps April 25, 2014; Corps Final EIS).

3.1 Summary of Visual Impact Determinations from Previous Documents

The primary components of the GRE Project will permanently modify the existing visual condition in the following ways (Denver Water 2020):

- Approximately 424 acres of forested shoreline and existing viewpoints and use areas will be directly affected by being permanently inundated by the expanded reservoir.
- Trees will be removed in the new inundation area to the new high pool elevation (7,406 feet).

- The existing reservoir elevation will be raised approximately 124 feet above the existing normal water level.
- Approximately 13.9 miles of shoreline will be created, approximately 2.8 miles more shoreline than currently exists.
- The concrete dam will be raised approximately 131 feet to an ultimate dam crest of approximately 471 feet high, approximately 1,840 feet long, and 25 feet wide. The enlarged dam also will have a wider foundation at the South Boulder Creek outlet than currently exists.
- A quarry will be developed with terraced horizontal benches and cut slopes with a majority of the quarry being inundated by the new reservoir after construction.
- A new saddle dam will be constructed south of the dam, adjacent to the relocated Haul Road Recreation Area.
- Existing recreation and visitation facilities will be relocated as needed.
- Existing dam and spillway access roads will be relocated as needed.
- Construction staging areas will be disturbed and then restored if outside the new inundation area.
- Borrow material areas will be disturbed and then restored if outside the new inundation area.
- Stockpile and spoil areas and associated haul roads will be disturbed and then restored as needed.
- Reservoir operating elevations (releases, storage, fill rates) will change.

Scenery guidelines in the 2003 VRPP and in the Forest Plan require that “the overall landscape character around the reservoir should remain natural appearing with limited human intervention” (Denver Water 2003, page 41) and that the valued landscape character appear intact.

The Osprey Point Quarry site will not be located on National Forest System lands. However, National Forest System lands adjacent to the quarry site have *High SIO*, meaning that views from National Forest System lands toward the foreground quarry site should strive to meet the following guidelines from the Handbook (USDA 1995: pages 2-4): “Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident”. As described in the 2014 Final EIS, it is not possible to completely mitigate the major short-term direct construction impacts from quarry operations to meet these objectives (Corps 2014).

Overall, the 2014 Final EIS (Corps 2014) found that, over time, the new shoreline and recreational use areas will retain the existing, valued landscape character. The new water elevation, reservoir size, and dam will not be ‘at such a scale that they are not evident’ (per Article 414) in the short-term but will become less evident in the long-term as viewers became accustomed to the new reservoir size. The quarry, if effectively reclaimed, will “repeat the form, line, color, texture, and pattern common to the landscape character ... [in such a way] that they are not evident.” The saddle dam will not be compliant with management guidelines and was considered in the 2014 Final EIS as a major, adverse long-term impact.

3.2 Recreation Site Descriptions

The following site-specific summaries discuss in detail the facility characteristics of Gross Reservoir recreation areas (post-GRE Project) generally based on the information presented in the Recreation Management Plan and updated to reflect current conditions. Current visitation trends and in-field

observations by Denver Water employees offer some insight into future conditions for newly constructed recreation areas.

Because design and construction of all new recreation areas described below has not yet begun, the design and location of these areas may be subject to change during construction of the GRE Project. Allocation of the described facilities for each of the newly proposed areas, therefore, is also subject to change. However, while the distribution of the proposed facilities may change, the overall number of recreation facilities will remain the same post-GRE Project since Denver Water will maintain a one-to-one replacement and/or relocation ratio consistent with the NEPA analyses that were completed for the GRE Project. Minor adjustments will be made in the development of final recreation features.

3.2.1 Northern Dam Viewpoint Recreation Area (Relocated Peninsula Recreation Area)

The descriptions of site characteristics and site conditions for the Northern Dam Viewpoint Recreation Area below are based on Section 3.2.2 of the Recreation Management Plan (Denver Water 2021a). The map of the recreation area is reproduced here as Exhibit 1.

Site Characteristics

The Northern Dam Viewpoint Recreation Area will offer scenic views overlooking Gross Reservoir to the northeast of the dam, trail access to the shoreline, and amenities to promote social gatherings post-GRE Project. This area will be easily accessed from Boulder using Flagstaff Road or from Golden by way of Gross Dam Road.

- **Parking:** Parking spaces for eight cars, including two Americans with Disabilities Act (ADA) spaces, will be provided at the Northern Dam Viewpoint. All parking spaces will be delineated with parking bumpers and respective ADA signage.
- **Picnic Sites:** The Northern Dam Viewpoint will include four individual picnic sites which consist of a crusher-fine base, table, and lockable charcoal grill. The picnic sites sit within widely spaced Ponderosa Pine tree plantings to provide shade and mitigate fire risk. This area will also contain two group picnic sites, one with a shelter cover and one without, each with two picnic tables, and a lockable charcoal grill.
- **Restrooms:** A double vault toilet restroom facility will be placed adjacent to the Northern Dam Viewpoint parking lot.
- **Fishing Access and Hand Boat Launch:** The trail to the Northern Dam Viewpoint will continue down to the reservoir shoreline where it will serve as a fishing and hand-launch boating access point. This 0.1-mile natural surface trail will be maintained to route visitors from the parking area to the shoreline.

Site Conditions

While the Northern Dam Viewpoint is a new location, it will be placed close to a similar visitation location, thus conditions will be similar to that location. Visitation to the Northern Dam Viewpoint is expected to increase following the GRE Project, but overall visitation to Gross Reservoir is not expected to increase due to the GRE Project. Traditionally, the site was used for a quick stop to view the reservoir where

parking overflow occurred regularly. With the implementation of new amenities and shoreline access, higher visitation to the area is anticipated. Recreation staff at Gross Reservoir recognize the potential for site impacts at the Northern Dam Viewpoint to include:

- Parking overflow and illegal parking along Gross Dam Road.
- Trail and shoreline erosion.
- Litter.
- Potential for afterhours use due to proximity to Gross Dam Road.
- Potential for trespassing into restricted areas around the dam and hydropower facilities due to proximity and historic trends.
- Increased water patrol presence with the addition of hand boat launch access from the site.

Denver Water will continue to actively monitor such impacts following the completion of the GRE Project. Mitigation measures related to visual resources are discussed in Section 5.2. Recreational adaptive management strategies may be implemented as described in Denver Water's Recreation Management Plan (Denver Water 2021).

Exhibit 1: Northern Dam Viewpoint Recreation Area

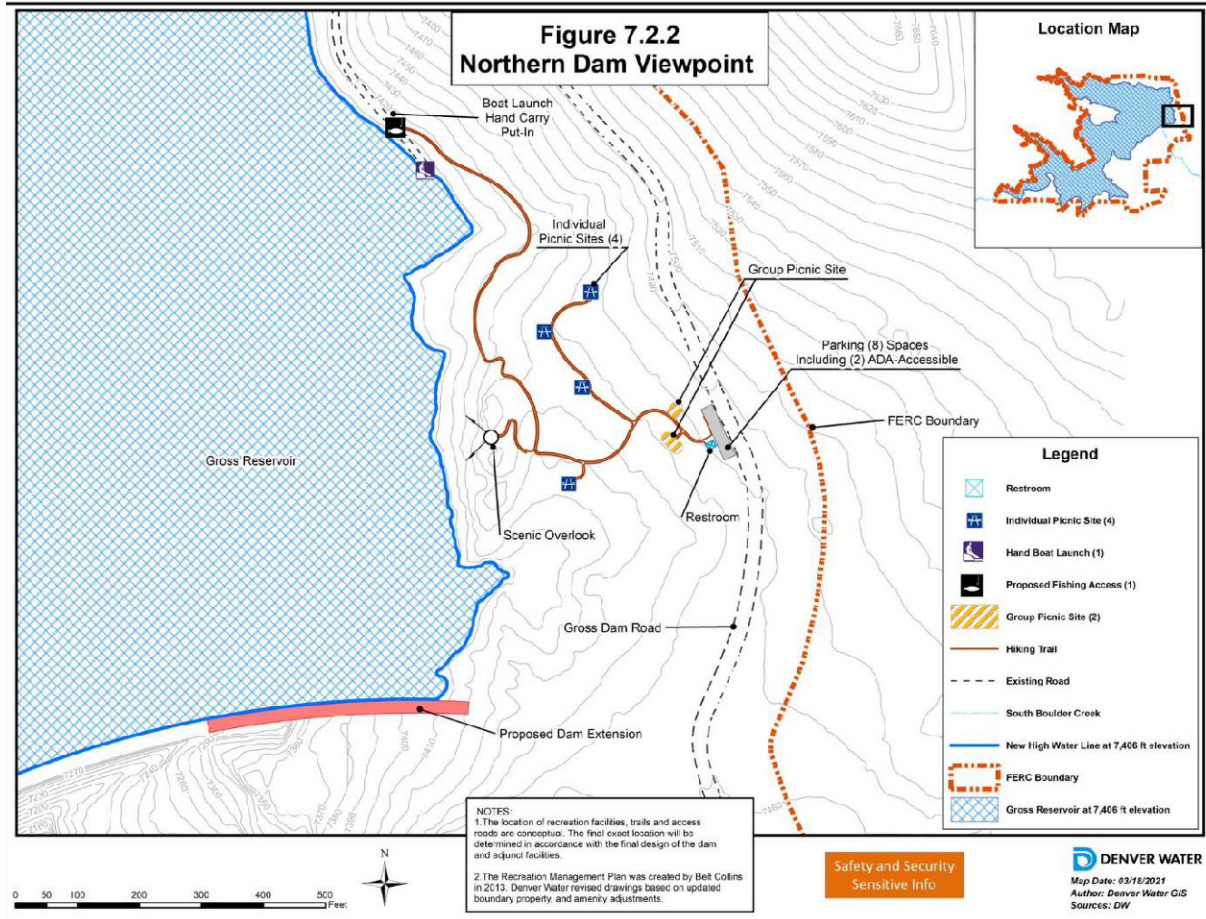


Exhibit Note: The area shown in this Exhibit is owned by Denver Water.

3.2.2 Relocated Haul Road Recreation Area

Three of the proposed reconstructed recreation facilities are located within National Forest System lands: The Haul Road Recreation Area (discussed below), portions of the South Boulder Creek Inlet Trail, and portions of the Scenic Ridge Trail (refer to Section 3.2.4 and Section 3.2.5, respectively). These facilities therefore will follow applicable USFS standards and guidelines regarding site design and outdoor accessibility for the portions on National Forest System lands. The following USFS guidelines apply:

- Forest Service Outdoor Recreation Area Accessibility Guidelines (FSORAG)
- Forest Service Trail Accessibility Guidelines (FSTAG)

The descriptions of site characteristics and site conditions for the relocated Haul Road Recreation Area are based on Section 3.2.3 of the Recreation Management Plan (Denver Water 2021a). A map of the recreation area is reproduced here as Exhibit 2.

Site Characteristics

The Haul Road Recreation Area will be Gross Reservoir's most accessible location for hand launching boats and shoreline fishing. The area will also offer amenities to promote waterfront social gatherings. Access to the South Boulder Creek Inlet Trail and Upper Viewshed Trail is provided from the Haul Road Recreation Area parking lot.

- **Parking:** A parking area and 50-foot radius boat drop off turnaround will be placed to the north of the new saddle dam and 28 parking spaces, including two ADA-accessible spaces, will be provided. Each parking space will be designated with a parking bumper and associated ADA signage.
- **Picnic Sites:** A total of 13 individual picnic sites will be developed northwest of the saddle dam spillway along the shoreline. Each of the sites will have a picnic table and lockable pedestal grill on a crusher-fine base. All facilities will be linked with a crusher-fine trail network. Two group picnic sites will be located north of the saddle dam spillway near the parking area. Each site will contain a shelter, two picnic tables, and a lockable pedestal grill.
- **Restrooms:** One double vault restroom facility will be located adjacent to the parking area.
- **Trails:** The Haul Road Recreation Area parking lot will serve as the primary access point for the South Boulder Creek Inlet Trail. The parking lot also provides access to the Upper Viewshed Trail, which can connect visitors to the Scenic Ridge Trail.
- **Fishing Access and Hand Boat Launch:** Gross Reservoir's main hand boat launch area will be located along the western edge of the turnaround north of the saddle dam at the high-water elevation. Low-water boat access will be along existing bank slopes. During construction of the new Haul Road Recreation Area, a detailed design plan will be developed establishing how ADA access will be provided from the parking area to the water's edge. Fishing access points will be situated along the reservoir's edge throughout the area via a short walk to the shoreline from the parking lot.

Site Conditions

The Haul Road Recreation Area will be replacing the Osprey Point boat launch, Gross Reservoir's second most visited recreation area, which currently sustains 27% of yearly visitation. Recreation staff anticipate the following management challenges for the new Haul Road Recreation Area:

- Parking overflow and illegal parking along southern Gross Dam Road and the Dam Access Road.
- Congested boat launch and boat drop off/ turn around areas.
- Heavy trail and shoreline erosion.
- Increased patrol presence to maintain emergency access to the area and along Gross Dam Road and Dam Access Road.
- Displacement of boaters to other recreation areas that may not allow for/provide hand boat launch access (e.g., Dam Recreation Area).
- Overcrowding and congestion may push visitors to attempt launching their watercraft in less suitable (steep and rocky) areas along the shoreline in an attempt to avoid congested areas at the main boat launch.

Following the completion of the GRE Project, impacts to natural resources, facility conditions, and public safety will be closely monitored to mitigate these impacts.

The current Osprey Point boat launch was originally intended to support 20 parking spots. However, as recreation demand has increased, the 20-spot capacity is regularly exceeded. Accommodations have been made to safely allow for additional parking. Adaptive management strategies such as enforcing strict capacity limitations, allowing for an overflow staging area, additional parking, or a reservation system may be implemented at the new Haul Road Recreation Area. Visual mitigation is discussed in Section 5.3.

Exhibit 2: Haul Road Recreation Area

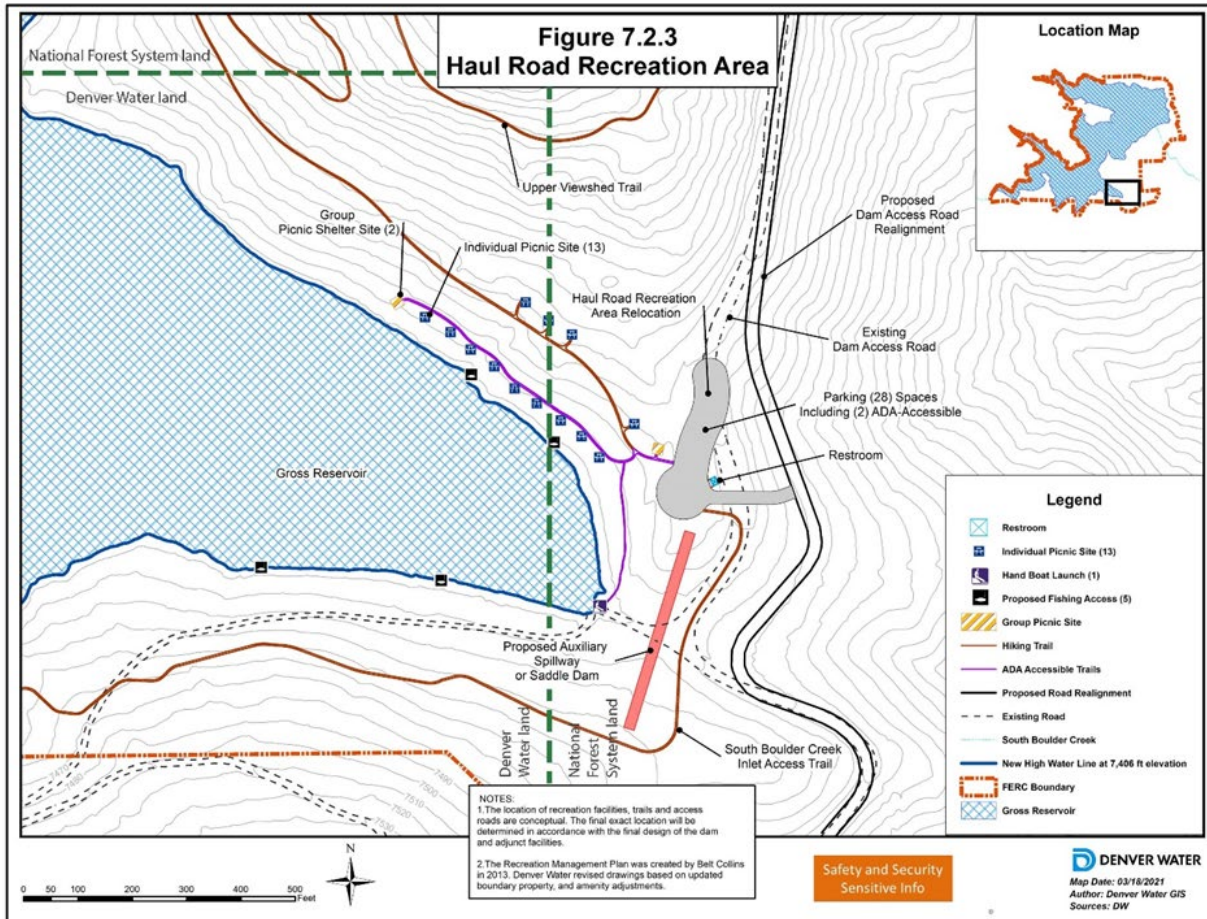


Exhibit Note: Green dashed lines were inserted into this Exhibit during development of the VRPP Addendum to depict land ownership boundaries.

3.2.3 Relocated Dam Recreation Area

The descriptions of site characteristics and site conditions for the relocated Dam Recreation Area are based on Section 3.2.4 of the Recreation Management Plan (Denver Water 2021a). A map of the recreation area is reproduced here as Exhibit 3.

Site Characteristics

The new Dam Recreation Area will provide visitors with an up-close view of Gross Dam and allow for easy access to the water's edge. This area will benefit visitors looking for a shoreline picnic or fishing access. Due to the close proximity to the dam, however, boaters will be discouraged from launching watercraft from this site.

- **Parking:** Parking spaces for eight cars, including two ADA spaces will be provided at the Northern Dam Viewpoint. All parking spaces will be delineated with parking bumpers and respective ADA signage.
- **Picnic Sites:** Two individual picnic sites will be located at the Dam Recreation Area positioned between the shoreline and parking lot. Each of the sites will have a picnic table and lockable pedestal grill on a crusher-fine base.
- **Restrooms:** One single vault restroom facility will be located adjacent to the parking lot.
- **Trails:** A 0.1-mile natural surface trail will connect the Dam Recreation Area parking lot to the point of the Scenic Ridge Trail, providing access to Scenic Ridge Trail picnic sites and a scenic viewpoint.
- **Fishing Access:** A short walk from the parking lot to the water's edge will provide quick access to shoreline fishing.

Site Conditions

The Dam Recreation Area will provide supplemental parking on the south side of the reservoir replacing the existing Windy Point Picnic Area and South Side Picnic Area. Given historical trends and the limited number of parking spaces (eight) proposed to accommodate the new Dam Recreation Area, compared to the current parking capacity at the Windy Point and South Side Picnic areas (38 spaces, some of which will be relocated to other recreation areas), recreation staff anticipates the following management challenges for the Dam Recreation Area:

- Parking overflow and vehicular intrusion along Dam Access Road.
- Regular patrol presence to maintain emergency access to the area and Dam Access Road.
- Regular patrol presence to prevent visitors from launching their watercraft from the Dam Recreation Area.
- Potential for trespassing into restricted areas around the dam and hydropower facilities.

Denver Water will continue to actively monitor such impact following the completion of the GRE Project. Mitigation measures related to visual resources are discussed in Section 5.3; recreational adaptive management strategies may be implemented.

Exhibit 3: Dam Recreation Area

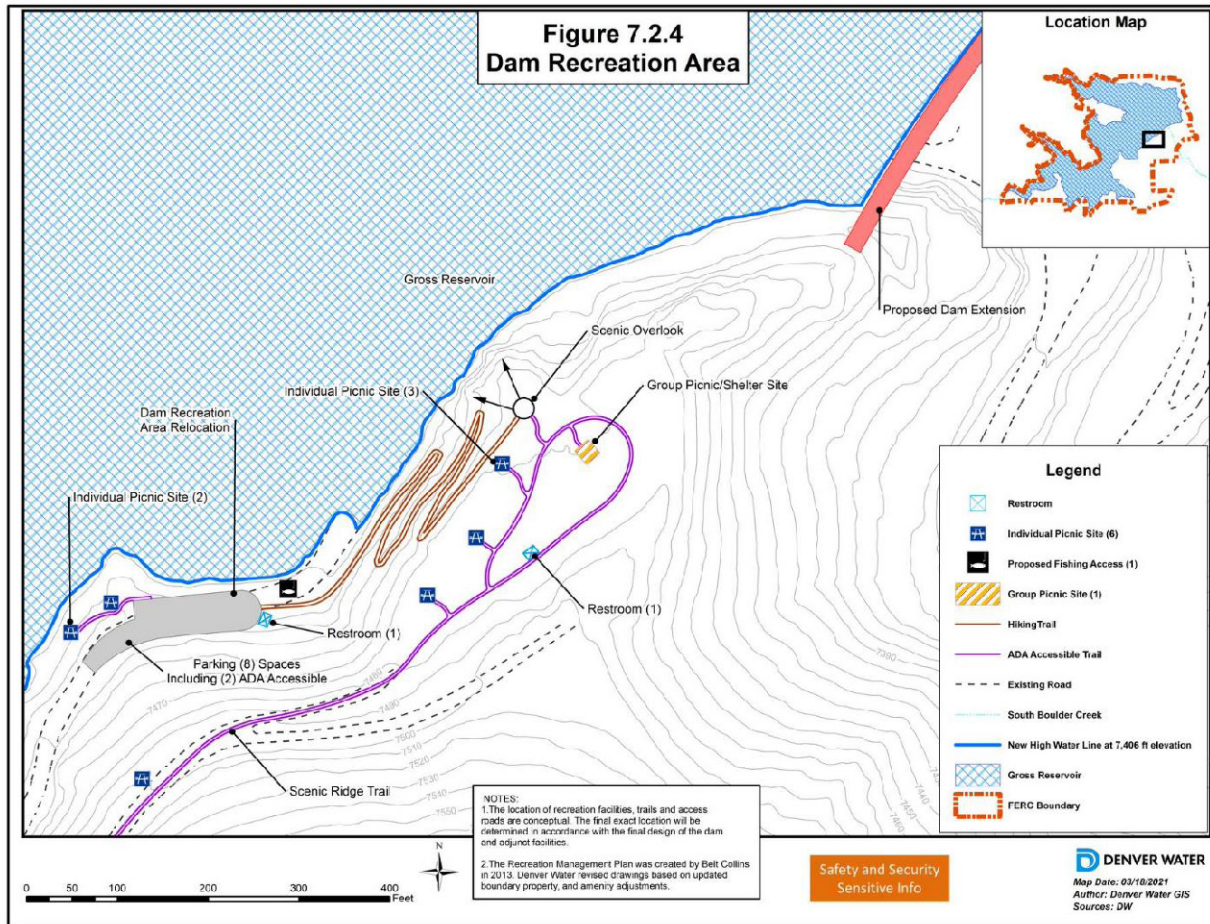


Exhibit Note: The area shown in this Exhibit is owned by Denver Water.

3.2.4 Relocated South Boulder Creek Inlet Trail

Site Characteristics

The proposed Scenic Ridge Trail will be located within National Forest System lands and Denver Water lands. Therefore, USFS standards and guidelines for recreation facility design and accessibility will be applied for the portions on National Forest System lands. Specifically, site design will follow FSORAG and trail design will follow FSTAG.

The descriptions of site characteristics and site conditions for the new South Boulder Creek Inlet Trail are based on Section 3.2.5 of the Recreation Management Plan (Denver Water 2021a). Maps of the recreation area are reproduced here as Exhibit 4 and Exhibit 5.

- **Parking:** Parking for the South Boulder Creek Inlet is located at the Haul Road Recreation Area parking lot (28 spaces).
- **Restrooms:** The Haul Road Recreation Area restroom facility will serve recreators looking to hike the South Boulder Creek Inlet Trail.

- **Fishing Access and Hand Boat Launch:** Multiple designated trail spurs leading from the Inlet Trail to the reservoir's edge will provide for reservoir fishing access along the way to the inlet. Visitors will be permitted to carry their watercraft along the Inlet Trail should they so choose although this is not expected to occur often.

The new South Boulder Creek Inlet Trail alignment was developed in coordination with USFS. Planning and construction of the new trail will adhere to USFS's Handbook 2309.18, Chapter 20. In addition, Denver Water will obtain and adhere to the Trail Management Objective from USFS that outlines specific management intent of the trail, which will maintain similar recreational opportunities currently provided by the existing South Boulder Creek Inlet Trail (hiking and fishing).

During the design phase of the trail, Denver Water determined that a segment of the Inlet Trail traverse through a portion of National Forest System lands to maintain a safe and sustainable trail alignment. This will result in the addition of approximately 2 acres of National Forest System lands within the FERC boundary. Prior to any trail-related construction activities, Denver Water will coordinate with USFS on final trail design, alignment, and construction schedule.

Site Conditions

The existing South Boulder Creek Inlet Trail sees low to moderate use. Recreation staff expects this trend to continue with the implementation of the new South Boulder Creek Inlet Trail. Through examining current use trends associated with the existing Inlet Trail, recreation staff anticipates management challenges for the new trail including, but not limited to:

- Trail erosion in areas with steep grades.
- New, undesignated social trails for shoreline access.
- Increases in litter including human and pet waste.
- Illegal camping.

Denver Water will continue to actively monitor these impacts following the completion of the GRE Project. Mitigation measures related to visual resources are discussed in Section 5.3; recreational adaptive management strategies may be implemented.

Exhibit 4: Relocated South Boulder Creek Inlet A

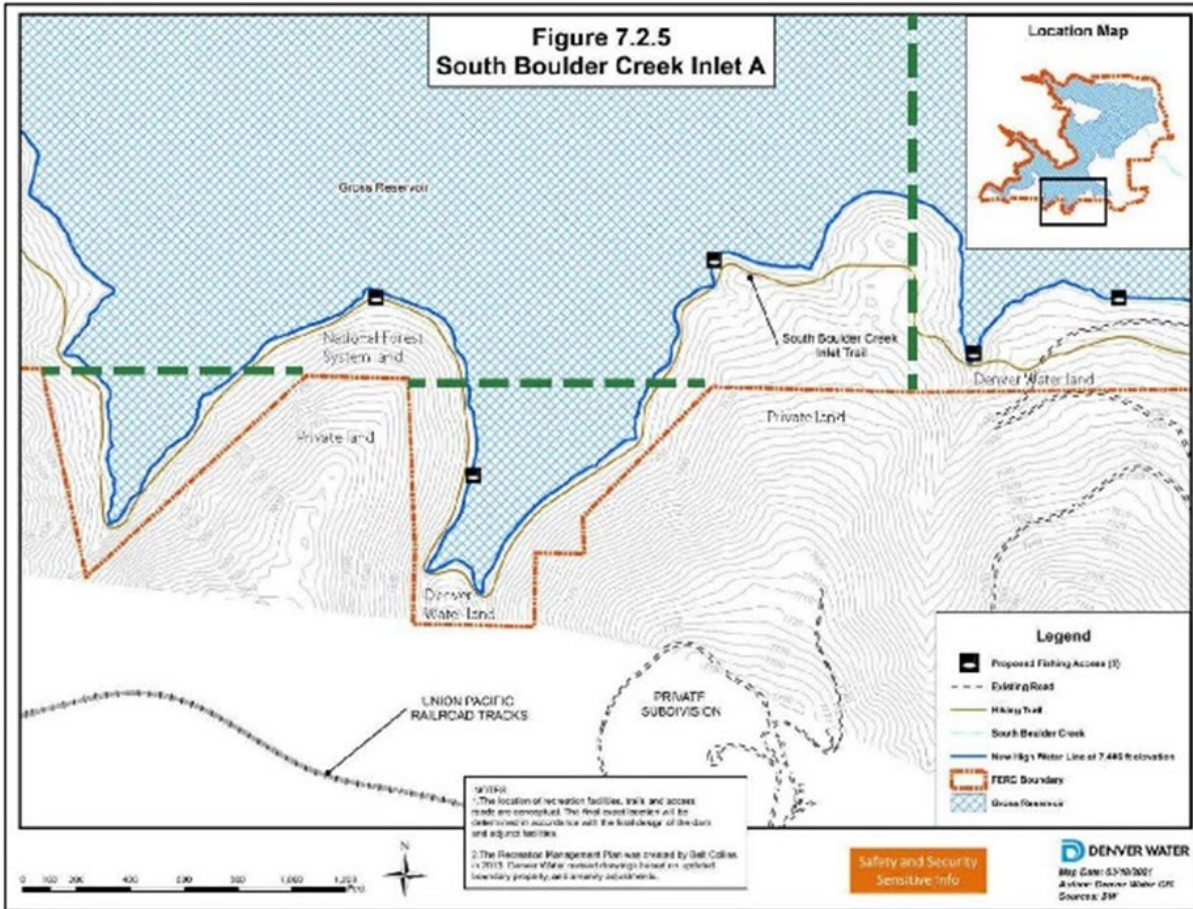


Exhibit Note: Green dashed lines were inserted into this Exhibit during development of the VRPP Addendum to depict land ownership boundaries. Denver Water owns portions of the private land shown on this Exhibit, including the inundation area, portions of the shoreline, and other areas.

Exhibit 5: Relocated South Boulder Creek Inlet B

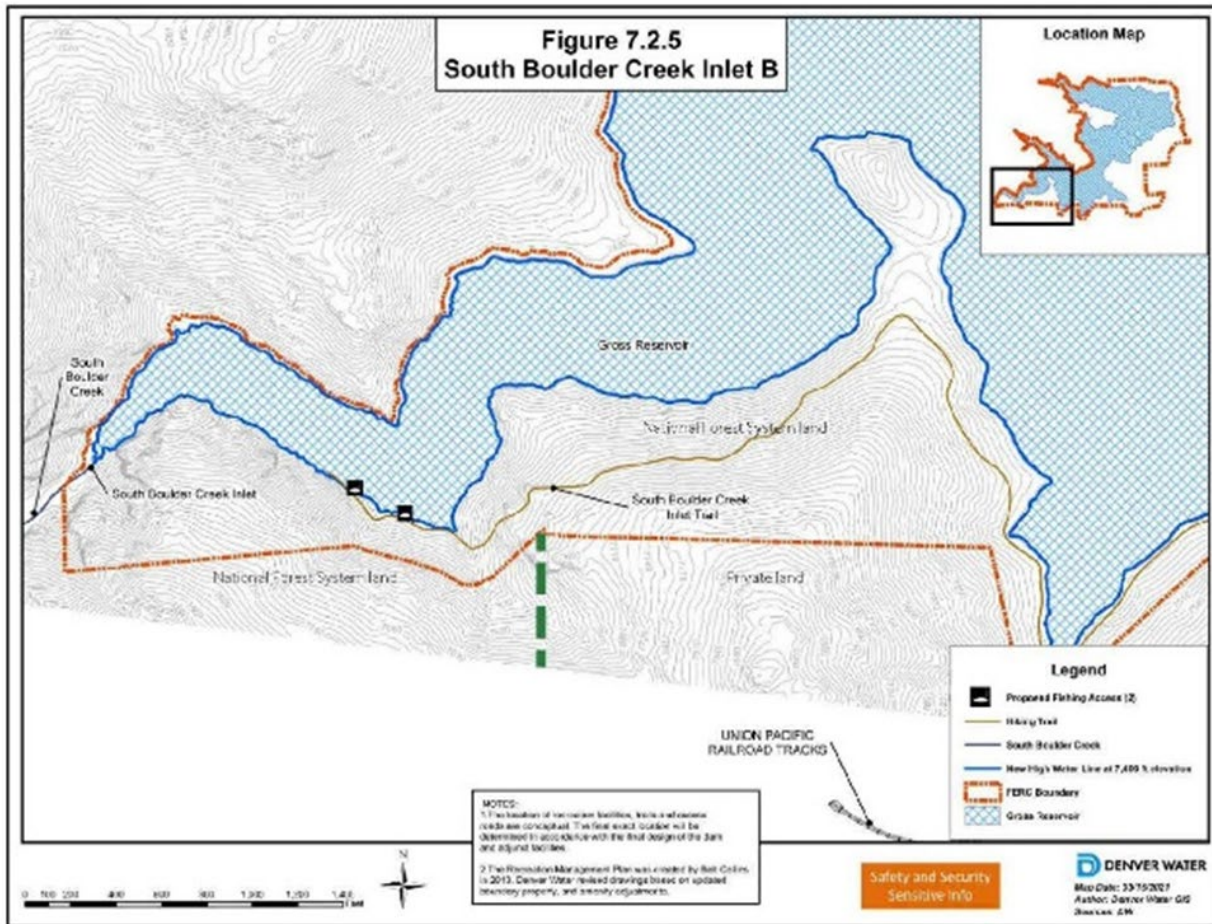


Exhibit Note: Green dashed lines were inserted into this Exhibit during development of the VRPP Addendum to depict land ownership boundaries.

3.2.5 New Scenic Ridge Trail

The proposed Scenic Ridge Trail will be located within National Forest System lands and Denver Water lands. Therefore, USFS standards and guidelines for recreation facility design and accessibility will be applied for the portions on National Forest System lands. Specifically, site design will follow FSORAG and trail design will follow FSTAG.

The descriptions of site characteristics and site conditions for the new Scenic Ridge Trail are based on Section 3.2.7 of the Recreation Management Plan (Denver Water 2021a). Maps of the recreation area are reproduced here as Exhibit 6 and Exhibit 7.

Site Characteristics

The Scenic Ridge Trail and amenities will be developed along a ridge overlooking the reservoir from the southwest side. This approximately 0.5-mile trail will follow along an existing, abandoned roadway bench

that was used during the original construction of the dam. The relatively flat existing grades will enable the trail to be ADA-accessible.

- **Parking:** A parking area will be located at the southern end of the trail. This parking area is sited off the Dam Access Road, midway between its intersection with the Haul Road and the Dam Recreation Area. Fourteen parking spaces, including two ADA-accessible spaces will be available here. This parking area will accommodate Scenic Ridge Trail users, as well as those who wish to hike or picnic on the Upper Viewshed Trail across the Dam Access Road.
- **Picnic Sites:** A total of 16 individual picnic sites will be located along the Scenic Ridge Trail, as well as in an area to the east of the parking area. Along the Scenic Ridge Trail, eight individual picnic sites will be interspersed within the trees adjoining the trail. The remaining eight individual picnic sites will be situated to the east of the parking area on an existing knoll and secondary trail. Each of the sites will have a picnic table and lockable pedestal grill on a crusher-fine base. All facilities will be linked with a crusher-fine trail network. A total of three group picnic shelters are sited along the Scenic Ridge Trail, two at the southern end of the trail adjacent to the parking area, and a third group picnic shelter at the northern end of the trail near the scenic overlook.
- **Restrooms:** Two single vault restroom facilities will be located on the Scenic Ridge Trail. One on the east of the parking area and the other at the northern end of the Scenic Ridge Trail, adjacent to the scenic overlook.
- **Trails:** The Scenic Ridge Trail traverses approximately 0.5 mile. The northern extent of the trail terminates at a scenic overlook that will be located just northeast of the Dam Recreation Area. This overlook will include interpretive signage and will also provide an excellent vantage point from which to get a closer look at the remnants of historic concrete structures and other infrastructure used to construct the original dam.

Site Conditions

Historically, Gross Reservoir has not provided recreational opportunities in the area that will become the Scenic Ridge Trail. Because of this, it is difficult to predict future management challenges associated with the area. However, due to its close proximity to the new Haul Road and Dam Recreation Areas, some inferences can be made. Based on these inferences and the fact that much of the area is situated on National Forest System land, the following management challenges can be expected:

- Parking overflow and vehicular intrusion along Dam Access Road: Scenic Ridge Parking Area serves as the nearest available parking area for visitors who may be seeking access to either the Dam Recreation Area or the Haul Road Recreation Area. Visitors looking to access these adjacent areas may attempt to use the Scenic Ridge Trail parking lot at times when other parking lots are full. Because of this, parking overflow can be expected.
- Illegal camping: because earlier portions of the trail and associated picnic areas are situated on National Forest System land, visitors may falsely be led to believe that dispersed camping is permitted in the area.
- Recreational shooting/hunting: historically, this segment of National Forest System land has been used by recreational shooters and hunters. Increased patrol may be required in the area to ensure all recreational shooters and hunters are at a safe distance and orientation away from Scenic Ridge Trail amenities.

- The development of social trails from visitors looking to summit the adjacent peak.
- Difficulty servicing amenities: many of the amenities provided along the Scenic Ridge Trail are located at its termination point. This includes several picnic tables and a single vault restroom facility. Recreation staff will be required to drive their service vehicles along the trail itself to service this area, putting visitor safety at risk when visitation in the area is high.
- Potential for trespassing into restricted areas around the dam and hydropower facilities, given the proximity of the dam to the Scenic Ridge Trail's termination point.

Denver Water will continue to actively monitor such impacts following the completion of the GRE Project. Mitigation measures related to visual resources are discussed in Section 5.3; recreational adaptive management strategies may be implemented.

Exhibit 6: Scenic Ridge Trail A

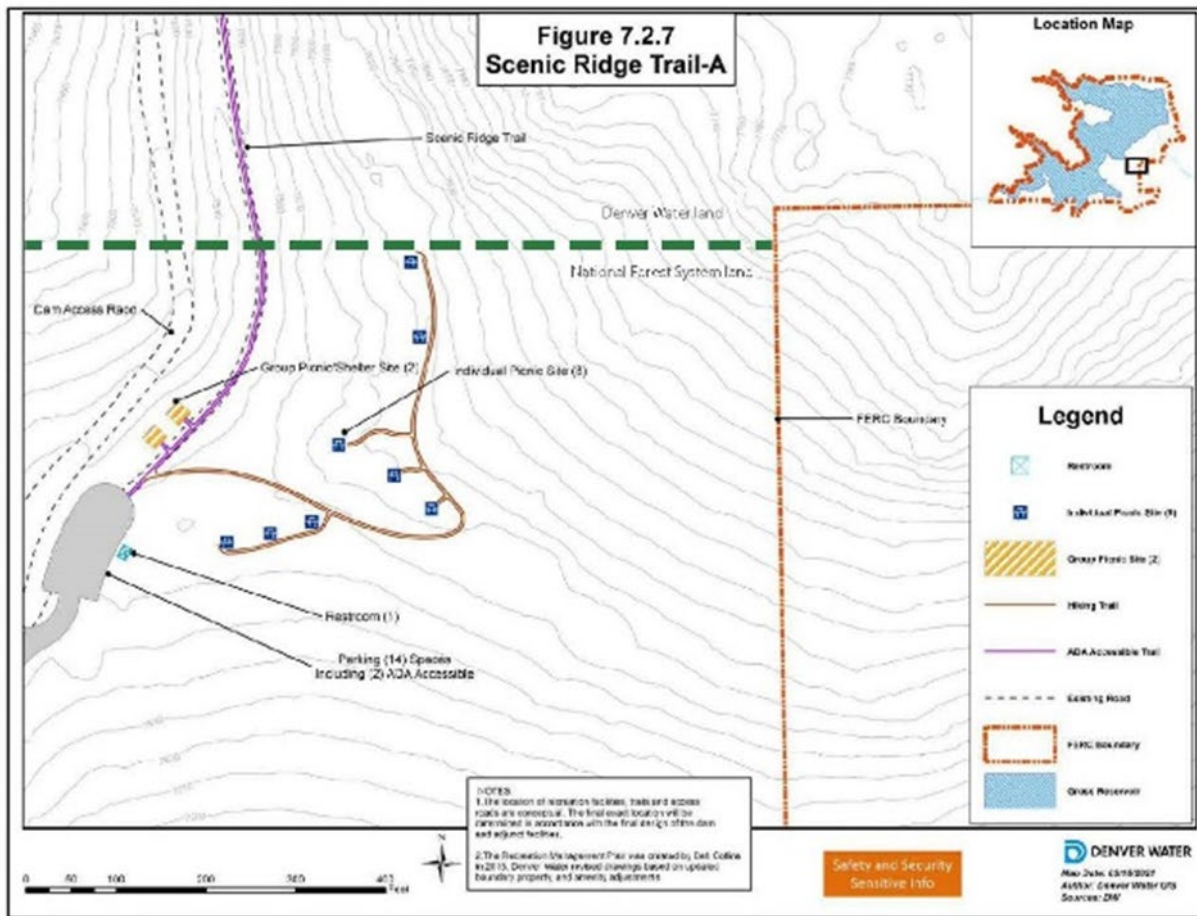


Exhibit Note: Green dashed lines were inserted into this Exhibit during development of the VRPP Addendum to depict land ownership boundaries.

Exhibit 7: Scenic Ridge Trail B

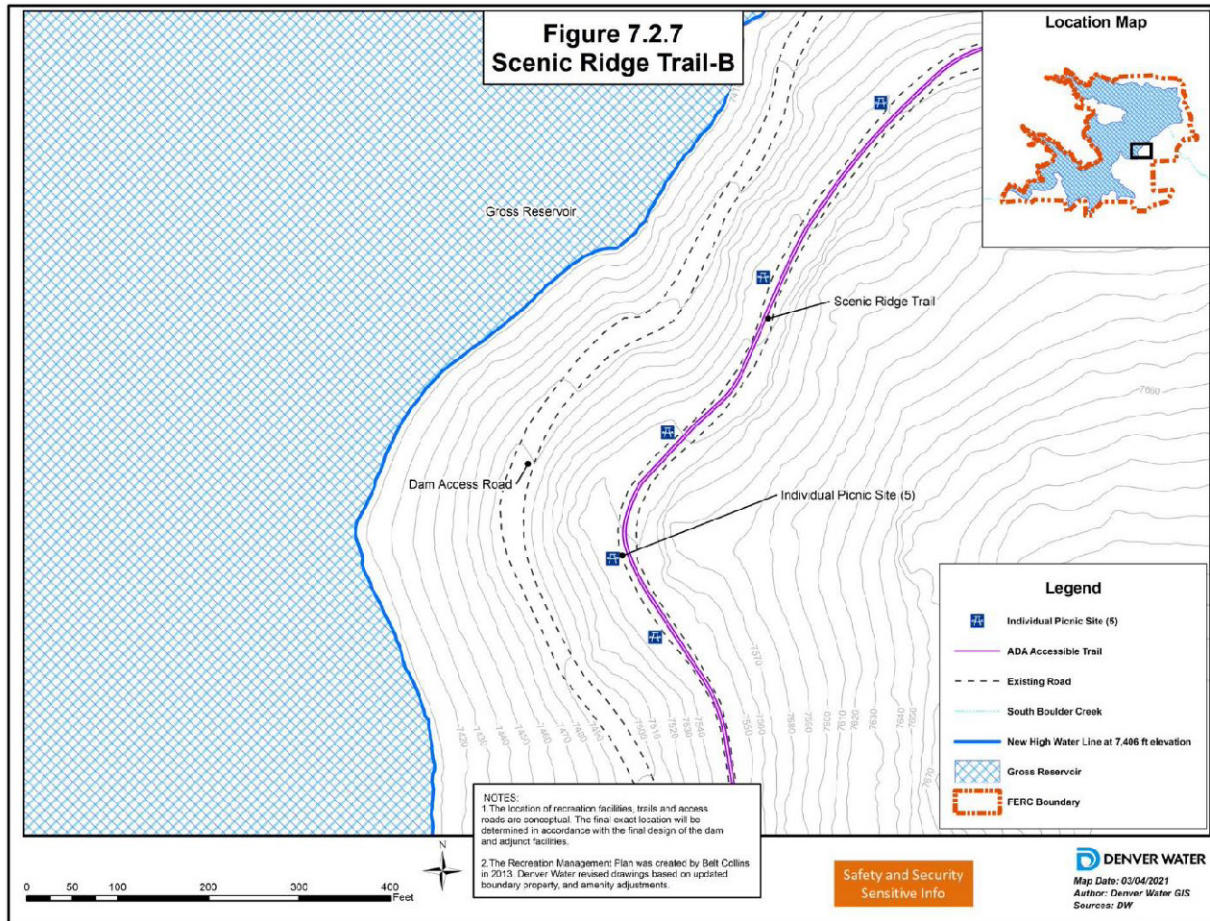


Exhibit Note: The area shown in this Exhibit is owned by Denver Water.

3.2.6 New Upper Viewshed Trail

The descriptions of site characteristics and site conditions for the new Upper Viewshed Trail are based on Section 3.2.8 of the Recreation Management Plan (Denver Water 2021a). A map of the recreation area is reproduced here as Exhibit 8.

Site Characteristics

The Upper Viewshed Trail will be constructed on the west side of the Dam Access Road and will traverse the hillside across from the Scenic Ridge Trail parking area. The trail will provide for spectacular views of the southern wing of the reservoir and the opportunity for secluded picnicking experiences.

- **Parking:** the Scenic Ridge Trail parking lot will provide for the most direct access to the Upper Viewshed Trail (eight spaces). Alternatively, visitors will also be able to access the Upper Viewshed Trail from the Haul Road Recreation Area and the Dam Recreation Area via various trail excursions.

- **Picnic Sites:** a total of five individual picnic sites will be dispersed along the Upper Viewshed Trail's outer most trail spur. Each of the sites will have a picnic table and lockable pedestal grill on a crusher-fine base.
- **Restrooms:** the Scenic Ridge Trail restroom facility will serve as the primary restroom facility for visitors recreators looking to hike the South Boulder Creek Inlet Trail.
- **Trails:** the approximately 0.7-mile loop climbs to the crest of the hill and continues down the other side to a point with spectacular views of the reservoir. Trail connections to two parking areas feed into the Upper Viewshed Trail loop. An approximately 0.5-mile-long spur connects the loop to the Relocated Haul Road parking area, while an approximately 0.2-mile-long spur leads down to a point directly across the Dam Access Road from the parking area at the Scenic Ridge Trail.
- **Fishing Access:** fishing access will be located at the terminus of the Upper Viewshed Trail.

Site Conditions

Visitor use on the Upper Viewshed Trail is expected to be high as the trail connects parking areas and offers excellent reservoir views. As with most trails around Gross Reservoir, we expect to encounter the following impacts:

- Trail erosion and widening due to heavy use.
- Increased litter in the area.
- Development of undesignated social trails leading down to the water's edge and cutting switchbacks.
- Illegal camping: because nearly the entire trail and associated picnic areas are situated on National Forest System land, visitors may be falsely led to believe that dispersed camping is permitted in the area.
- Recreational shooting/hunting: historically, this segment of National Forest System land has been used by recreational shooters and hunters. Increased patrol may be required in the area to ensure all recreational shooters and hunters are at a safe distance/orientation away from Scenic Ridge Trail amenities.
- Visitors seeking to access the Upper Viewshed Trail will likely put additional pressure on surrounding area parking lots.
- Additional challenges for enforcement and safety monitoring due to the secluded nature of the trail.

Denver Water will continue to actively monitor such impact following the completion of the GRE Project. Mitigation measures related to visual resources are discussed in Section 5.3; recreational adaptive management strategies may be implemented.

Exhibit 8: Upper Viewshed Trail

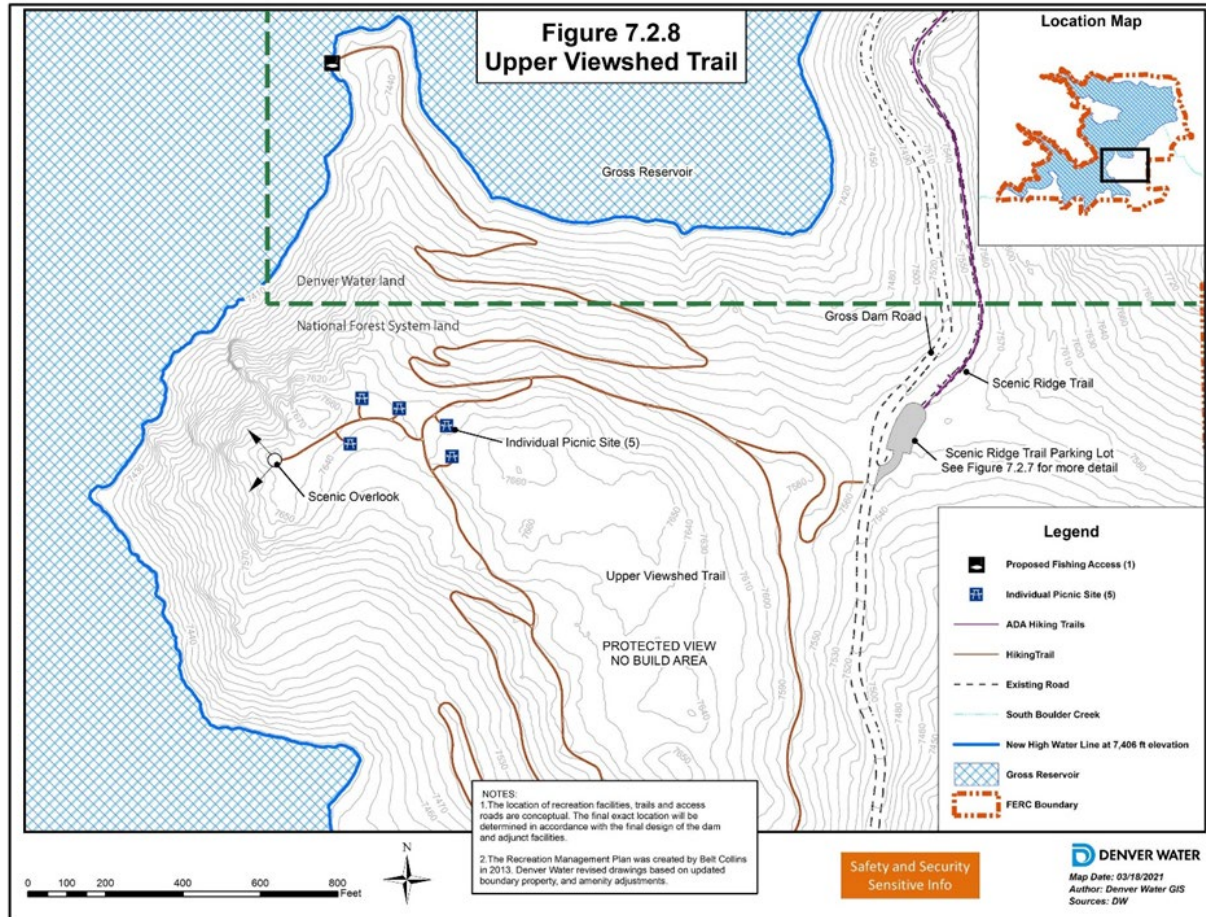


Exhibit Note: Green dashed lines were inserted into this Exhibit during development of the VRPP Addendum to depict land ownership boundaries.

3.3 Osprey Point Quarry

3.3.1 Site Context and Conditions

The Osprey Point Quarry site is located in the southeast portion of the reservoir, where an existing ravine drains to the northwest. Figures 1, 2, and 3 (Appendix A) each show the location of Osprey Point Quarry in relation to the other GRE Project elements. The existing landscape includes the V-shaped mouth of the ravine drainage point, a rocky shore, and the open woodland-covered steep slopes typical of the Project landscape character. The Osprey Point boat launch is a designated recreation site on the adjacent National Forest System lands to the west.

Approximately 900,000 cubic yards of concrete will be needed to raise Gross Dam to its proposed height of 471 feet (Corps 2014). After studying various options to acquire the amount of sand and gravel aggregate to produce this volume of concrete material, Denver Water selected an appropriate on-site quarry location that will ultimately become mostly inundated by the enlarged reservoir. Known as Osprey

Point Quarry, the site is owned by Denver Water but surrounded to the north, east, and west by National Forest System lands that will have foreground views toward the excavation while the Quarry is operational and, following its reclamation and final condition, as mostly inundated by the future reservoir. (Existing recreational facilities adjacent to the Osprey Point Quarry, i.e., Gross Reservoir Boat Launch, would be permanently closed prior to quarry excavation activity.) One of the driving reasons for the Osprey Point Quarry site's selection was that it will require a smaller footprint and result in fewer visual impacts than other on-site quarry locations explored. More detailed information about the Osprey Point Quarry site selection is included below in Section 5.1. Additional information on the Osprey Point Quarry, geotechnical data, and operations is contained in the Quarry Operations Plan (Denver Water 2021c).

Detailed information about the proposed Quarry reclamation, including detailed before-and-after grading drawings, is contained in the Quarry Reclamation Plan (Denver Water, 2021d). The Quarry Reclamation Plan includes sections on reclamation goals, current site description, reclaimed topography, growth media, reclaimed land erosion management, revegetation, mulching, roads and trails, reclamation schedule, weed control and reclamation monitoring, and success standards. More information on mitigation measures associated with the Osprey Point Quarry is included in Section 5.4.

3.4 Saddle Dam

The saddle dam will be located in the southeast portion of the reservoir, south of the relocated Haul Road Recreation Area and east of the quarry and on National Forest System lands as shown in Figure 2 (Appendix A). It will be constructed of a roller-compacted concrete core, covered with crushed rock, and will span the ravine west of the existing boat launch facility. The outflow channel, lined with riprap, will be directed to the southeast.

4. Selected Key Observation Points and Visual Simulations

As described in Section 1, several previous documents have assessed existing visual conditions at Gross Reservoir and the potential visual impacts from the GRE Project. This Plan Addendum, therefore, was limited in its scope for further visual analysis. This analysis focused on specific requests from USFS, which included a small selection of representative KOPs and visualizations upon which to understand the elevated reservoir pool levels, resulting changes to the visual character, and to inform potential strategies for mitigation from visual changes that will introduce contrasts to the form, line, color, and texture of the existing landscape visual character. Locations or views from the post-GRE Project that potentially present a conflict with the established the USFS SIO will be discussed, and mitigation strategies described.

4.1 Key Observation Points and Simulations

The selected KOPs and visualizations presented in Section 4 and Appendix B were requested by USFS to visualize the variations in seasonal pool level and convey measures to blend new facilities into the existing environment.

A field visit was conducted in August 2021 to assess the existing visual character of the landscape and to inventory current conditions at a select set of 14 viewing locations (Figure 3; Appendix A). The field

inventory included three components: (1) identification and photo-documentation of sensitive viewing locations; (2) classification of visual sensitivity at the locations visited; and (3) description of expected Project visibility from locations visited. Following the field inventory, a subset of the sensitive viewing locations was selected as representative KOPs (Figure 3; Appendix A) for use in the evaluation.

Simulations were created for each KOP view using Autodesk InfraWorks, a three-dimensional modeling software that is a composition of information leveraging tools and resources applicable to a building information modeling-based workflow. The InfraWorks 3D model inputs included available GIS information overlaid with traditional digital design information, including existing topographical surfaces and design surfaces of proposed features. Key structures, including the raised dam, were modeled based on design development documents and imported into the InfraWorks model. Three dimensional views of the model environment provide the context for collaboration and communication of design and construction progression as well as a reasonable visual representation of the overall Project. Further work was performed using Adobe Photoshop to enhance the InfraWorks model views, increasing the realistic look and feel of the final simulations, while still being based on accurate design information.

4.1.1 Key Observation Points

KOPs are representative views of a project study area that can be used to compare existing conditions with digitally created visualizations of potential changes resulting from a proposed project. For the GRE Project, representative KOPs were selected by visual resources analysts based on input from Denver Water and USFS. Of the 14 initially identified inventory points, four locations were ultimately selected as KOPs that focused on the primary locations requested by USFS and locations with potential views towards the new recreation areas as listed in Table 1.

Table 1: Selected Key Observation Points

KOP No.	KOP Name	View Direction and Comments
KOP-1 (Field No. 2)	Gross Dam Road	Facing southwest toward dam and Dam Recreation Area
KOP-2 (Field No. 3)	Winiger Ridge	Facing south/southeast on National Forest System land toward Winiger Ridge Parking Lot
KOP-3 (Field No. 5)	North Shore Parking Lot	Facing southwest on private land toward dam
KOP-4 (Field No. 8)	Winiger Ridge Overlook	Facing southeast on National Forest System land toward Scenic Ridge Trail parking

4.1.2 Simulations

Using GIS, design drawings, and the Autodesk InfraWorks three-dimensional modeling, graphic visualizations were created for each KOP viewpoint to depict the proposed GRE Project conditions. The final Adobe Photoshop simulations included in Appendix B are intended to identify and convey the general types of changes to the landscape as a result of the GRE Project. Because the seasonally-fluctuating reservoir water level has such a strong influence on surrounding visual character, separate visualizations were created to represent a typical September water level (approximately 7,375 feet above mean sea level) and April water level (7,326 feet amsl) for each KOP. High water levels typically occur in June or July; low water levels tend to occur in April. Water levels will vary by year and by season.

4.1.2.1 KOP-1 (Field No. 2): Gross Dam Road

Existing View

KOP-1 (Field No. 2), looking southwest, is located north and east of the dam, along Gross Dam Road and south of North Shore Recreation Area. Conifer trees in the foreground screen much of the reservoir body and direct views of Gross Dam, which is located to the west (left side of the simulation image). The developed terrain of South Side Picnic Area is visible south across the reservoir body. Dark green conifer-forested slopes create the remaining backdrop surrounding the irregular edge of the reservoir body. The prominent landform of the peninsula is visible to the west; this feature was described in the 2003 VRPP as having high Scenic Attractiveness.

Post-Project Conditions

With the raising of the dam elevation, the form of the reservoir body presents a more dominating feature and is closer to the viewer. The peninsula is fully inundated. The dam wall is extended west into the scene, introducing a strong line and form in contrast with the natural surroundings, and the redeveloped recreation area at North Shore is prominently visible. The surrounding mountainous landform backdrop remains unchanged.

With the lowering of the dam elevation, the “bathtub ring” effect becomes more visually prominent and contrasts strongly with the water body and the unaffected vegetated landforms above. Overall, times of low water level (April) will result in greater visual contrast compared with the high-water level (June or July), but this seasonal rhythm of fluctuating water levels is consistent with what viewers currently experience at the reservoir.

4.1.2.2 KOP-2 (Field No. 3): Winiger Ridge

Existing View

KOP-2 (Field No. 3), looking south-southeast, is located across the reservoir from the dam on the elevated landform of Winiger Ridge. A meadow of diverse grasses and forbs dominates the view in the foreground, a small portion of water is observed in the midground, and the forested mountains provide a consistent backdrop. An access road and the Winiger Ridge Recreation Area parking lot is visible down the slope, but the configuration, materials, and scale of these facilities enable the surrounding landscape to mostly absorb the contrast; the parked cars present the most distracting element.

Post-Project Conditions

The proposed condition (during high water level) at KOP-2 (Field No. 3) is not dramatically different from existing because the viewer is positioned away from the shoreline and clustered conifer trees screen much of the water from view. The effects from the GRE Project occur in the midground of the view. The foreground meadow remains the most dominant feature. Even so, the elevated water level raises the prominence of the water body in the overall scene composition and the far landforms are less dominant.

At low water level condition, the exposed rocky slopes of the same “bathtub ring” are visible but are not dominant because of the screening trees. Overall, the post-GRE Project effects during low water level are very similar to those observed during high water level, and this fluctuation in water levels is consistent with what viewers currently experience at the reservoir.

4.1.2.3 KOP-3 (Field No. 5): North Shore Parking Lot

Existing View

KOP-3 (Field No. 5) is looking southwest from North Shore Recreation Area, toward the dam and South Side Picnic Area. The form, line, color and texture of the dam presents a prominent contrasting feature, but it is visually balanced in scale with the surrounding forested landforms and waterbody. The development at South Side Picnic Area also visually contrasts with the surrounding landscape: its terraced landform and comparably unvegetated texture reduces scenic integrity of the view.

Post-Project Conditions

The proposed condition (high water level) at KOP-3 (Field No. 5) introduces a somewhat more visually dominating dam structure compared with the existing condition due to two related factors. First, the dam is lengthened to the east and west and raised 131 feet, enlarging its scale relative to the adjacent landforms. The top of the dam comes closer to the distant horizon terrain. Second, the elevated water level reduces the overall size and proportion of the remaining exposed landforms, i.e., the mountainous landscape forms adjacent to the dam appear smaller compared to the existing condition because they are inundated and less of its form is visible.

During low water level, more of the dam surface is visible, so the visual contrast it presents in its form, line, and texture is stronger. Compared with existing conditions, there is a slight increase in the visual contrast presented by the dam structure for both high pool and low pool, but the fluctuation in water levels is consistent with what viewers currently experience at the reservoir.

4.1.2.4 KOP4 (Field No. 8): Winiger Ridge Overlook

Existing View

KOP4 (Field No. 8) is located well away from the shoreline, off of Forest Service Road 359. The view is oriented east-southeast, along the Winiger Ridge landform and toward the reservoir in the midground. Gross Dam is visible but not prominent in the midground. Seen from an “overlook” (i.e., elevated) perspective, the attractive foreground, broad views of the reservoir, and the surrounding mountains with few human-made features combine for a memorable scene.

Post-Project Conditions

The proposed condition at KOP4 (Field No. 8) (high water level) is visually similar to the existing condition because of the viewer’s distance from the water (i.e., the elevated water level is less visually apparent compared with closer views). The memorable effect of the water form remains and is enhanced slightly by the enlarged water surface area and stronger visual presence.

During low water level, the dam is more visually prominent (especially in color, form, and texture) even though it is in the distant midground. The visual contrast of the “bathtub ring” effect – mostly in color and texture – is also more noticeable during low water level. However, the fluctuation in water levels is consistent with what viewers currently experience at the reservoir.

5. Avoidance, Minimization, and Mitigation

This section provides recommended mitigation measures to lessen visual impacts from construction and operations of the GRE Project. As with any large project located in a sensitive landscape, mitigation measures can be categorized according to the following guidance developed by the Council on Environmental Quality (Table 2).

Table 2: Summary of Mitigation Strategies

Mitigation Strategy	Action
Avoidance	Avoiding the impact altogether by not taking a certain action or parts of an action
Minimization	Minimizing impacts by limiting the degree or magnitude of the action and its implementation
Rectifying	Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
Reducing	Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
Compensation	Compensating for the impact by replacing or providing substitute resources or environments

5.1 Avoidance and Minimization

Many substantive mitigation measures were employed throughout the GRE Project. These include extensive alternatives analysis and re-design of the quarry site and saddle dam area to avoid and minimize impacts to the greatest extent possible.

5.1.1 Previous Studies for the Quarry

Development of a quarry to provide material needed for the dam raise was analyzed in the 2014 Final Environmental Impact Statement (FEIS) for the GRE Project. Denver Water has conducted several quarry studies with the goal of avoiding and minimizing impacts of the quarry operations. A high-level summary of the quarry studies completed to date is presented here with additional information provided in Appendix D of Denver Water’s July 2021 Final Quarry Reclamation and Quarry Operations Plans prepared consistent with Articles 424 and 425 of the 2020 FERC Order.

The concrete will consist of approximately 90% sand and gravel aggregate and 10% cementitious materials. As part of preliminary engineering evaluations completed by Denver Water, multiple alternatives were considered for obtaining the aggregate necessary to complete the GRE Project.

Producing fine aggregate (sand-sized fraction) can be difficult and options for importing material from an offsite source were considered in addition to scouting multiple onsite quarry locations. Impacts to the natural topography and National Forest System lands were considered for evaluating potential onsite sources. Denver Water also considered impacts to local communities and traffic associated with transporting aggregates from offsite for importing the necessary sand material.

Denver Water evaluated the bedrock as a parent source for sand and gravel aggregate in 2013. The evaluation produced positive results in regard to the ability to manufacture sand and gravel aggregate of

sufficient quality onsite with standard crushing equipment. A subsequent 2015 study found that the onsite granodiorite material could be crushed down to aggregate efficiently with minimal waste material. By producing both the sand and gravel aggregate onsite, Denver Water estimates that the amount of spoil material needed to be disposed of onsite would be reduced significantly. In addition, Denver Water estimates that more than 16,000 truck trips would be eliminated from the roads by producing all aggregate onsite. This would be a reduction in approximately 70% of the truck traffic necessary for material deliveries to the site related to concrete construction. Based on these evaluations, Denver Water elected to design the dam using an onsite quarry to produce both the sand and gravel aggregate.

Several geotechnical studies were conducted across the site to identify suitable onsite quarry locations to support construction. Ultimately, two potential onsite quarry locations were identified for the project. A location north of the existing boat ramp area within the FERC Project boundary, on both Denver Water property as well as National Forest System lands, was identified and included in the FEIS for the project. This site became known as the FEIS Quarry. An alternative quarry site located exclusively on Denver Water property along the existing access road to the Osprey Point boat ramp was identified in subsequent studies following the FEIS in an effort to further reduce the impacts of quarry operations. The alternative site became known as the Osprey Point Quarry. The Osprey Point Quarry is located within the new reservoir inundation area, and therefore the primary benefit of this location (compared to the FEIS Quarry location) is that nearly all of the quarry will be submerged during normal reservoir operations following completion of the GRE Project. Impacts associated with the Osprey Point Quarry and FEIS Quarry were discussed in a memo prepared by Denver Water in 2016. In 2017, the Corps concurred with Denver Water's impact assessment of the Osprey Point Quarry.

Based on an evaluation of the two primary sites, the Osprey Point Quarry location provides several advantages over the FEIS Quarry location:

- The Osprey Point Quarry occupies a smaller footprint than the FEIS Quarry. The FEIS Quarry would occupy a total area of approximately 29 acres compared to 17 acres for the Osprey Point Quarry.
- The Osprey Point Quarry is located exclusively on Denver Water land and significantly reduces National Forest System resource impacts related to the GRE Project.
- The most notable advantage is that the majority of the Osprey Point Quarry is located within the expanded reservoir footprint and will be almost entirely submerged during normal reservoir operations.

Note that annual fluctuations of the reservoir water level occur today and will occur in a similar pattern in the future at the expanded reservoir. This location reduces the total land disturbance related to project construction and minimizes the visual impacts associated with the quarry and surrounding topography. In summary, Denver Water selected the Osprey Point Quarry location in an effort to reduce:

1. Impacts to National Forest System lands.
2. The number of surface acres requiring mitigation or reclamation.
3. Visual impacts to the viewshed of residences and recreationists.
4. Impacts associated with trucking in aggregates.

In 2017, the U.S. Army Corps of Engineers approved development of the Osprey Point Quarry, due to the minimization of resource impacts as compared to the FEIS Quarry, as noted in its Record of Decision and 404 Permit for the GRE Project. See Appendix D of Denver Water's July 2021 Final Quarry Reclamation and Quarry Operations Plans prepared consistent with Articles 424 and 425 of the 2020 FERC Order, for

more information on the alternatives considered and additional supporting information on the Osprey Point Quarry selection.

5.1.2 Previous Studies for the Saddle Dam

The original dam design in the FEIS included an auxiliary spillway at the location of the saddle dam, which would have required approximately 50 acres of construction disturbance, based on the analysis in the FEIS. This feature was needed because preliminary hydrological analysis concluded that the highest flood event may not be able to pass through the primary spillway on the dam face without overtopping the dam. Additional analysis lessened the likelihood of needing the auxiliary spillway, and in June 2021 the final phase design memorandum confirmed that a saddle dam could be used instead of the auxiliary spillway. The saddle dam is needed to ensure water passes through the primary spillway during high flow events and to reduce seepage. By comparison, the saddle dam will require less than approximately 10 acres of construction disturbance and less rip-rap.

The change in design from an auxiliary spillway to a saddle dam substantially reduced the area of disturbance associated with this required dam safety feature. Reducing the area of disturbance minimizes the visual impacts. The saddle dam also avoids the visual impacts associated with what would have been the auxiliary spillway’s unvegetated, concrete and rip-rap appearance down the hillslope. Instead, the saddle dam will use native rock and occupy a less visually intrusive position on the landscape.

5.2 Mitigation

In addition to avoidance and minimization measures described above, many of the mitigation strategies described in Table 3 (Denver Water Recreation Facility Design Criteria) are focused on rectification (rehabilitating and restoring the surrounding landscape) and reduction (strategic landscaping and screening to lessen impacts from construction disturbance and enhance newly created viewpoints).

As described in the Recreation Management Plan (Denver Water 2021a), newly constructed recreation facilities and trails have been designed to complement and harmonize with the form, lines, colors, textures and patterns of existing landscape characteristics of Gross Reservoir. Table 3 summarizes the general aesthetics practices Denver Water follows in the design of its recreation facilities.

Table 3: Denver Water Recreation Facility Design Criteria

Principle	GRE Project Specific Comments
All facilities will be constructed of materials appropriate for the location.	Parking areas and trails will be mostly native surfacing or crushed aggregate surfacing to complement the colors and textures of the surrounding landscape character. Pedestrian fencing, when installed, will be made of indigenous materials like Douglas fir wood.
Picnic shelters will be standard Denver Water-type made of wood and steel roof construction. Roofs will be painted forest green to blend with surrounding landscape. Each shelter will include two picnic tables.	No additional comments.

Principle	GRE Project Specific Comments
All facilities will be located and screened in a visually sensitive manner.	Parking areas will be designed to follow the surrounding topography, which will lessen their visual impact. New restrooms and shelters will be placed at transitional areas where they can be screened by existing or newly installed vegetation and site topography. New high-contrast facilities (parking areas, restrooms) will be screened from view from new and existing trails and viewpoints.
All screening vegetation will be indigenous plant species and will blend with the surrounding environment.	No additional comments.
Any replacement of power line for new facilities will utilize existing corridors and alignments, except for when the powerlines originate from the switch yard, in such cases power lines will be constructed directly from the location of the switch yard.	No additional comments.

While some of the proposed actions from the GRE Project will result in changes to the visual landscape (such as the enlarged dam and saddle dam), environmentally sensitive recreation facility design and post-construction restoration and native planting efforts will combine to greatly reduce negative visual impacts over time. In addition, mitigation practices called for in the 2003 VRPP (Denver Water 2003) for the Gross Reservoir recreation facilities will remain effective for the GRE Project. These “best practices” include thoughtful design considerations for:

- Facility configuration and alignments.
- Building materials and colors.
- Conservation of vegetation.
- Landscaping and screening.
- Erosion control and restoration techniques.

In addition to the best practices listed above, the 2014 Final EIS (Corps 2014) contained a summary of mitigation actions and enforcement mechanisms. Exhibit 9 is based on this summary and has been updated to reflect current conditions. Note this Plan Addendum is a component of the required mitigation.

Exhibit 9: Visual Mitigation Summary from the 2014 Final EIS (Modified)

Summary of Project Impact	Required Mitigation	Enforcement Mechanism
<p>Visual impacts from the permanent facilities, including the expanded reservoir, enlarged dam, saddle dam, relocated recreation facilities, and quarry site.</p> <p>Short-term visual effects from ground disturbance, stockpile and staging areas, and temporary lighting for nighttime construction.</p>	<p>For all visual resource impacts on National Forest System lands, Denver Water will continue to comply with existing FERC License Article 414 for visual resource protection.</p> <p>Prior to ground-disturbing or construction activities on National Forest System lands, Denver Water will file with FERC an addendum to its Article 414 Visual Resources Protection Plan (developed in consultation with USFS and approved by FERC on May 22, 2003). The Visual Resources Protection Plan will address visual effects from developing an on-site quarry, including reclamation treatments and measures for re-shaping and revegetating disturbed areas to blend with surrounding visual characteristics of the landscape.</p> <p>For the Osprey Point Quarry, which is not on National Forest System lands, Denver Water will prepare a Reclamation Plan to address visual effects with measures similar to those described above for any portions of the quarry above the new high-water line (7,406 feet).</p>	<p>Pursuant to FERC Order Article 422(a), update to be filed with FERC 90 days before ground-disturbing activities.</p> <p>Mitigation to be specified in the Quarry Operations and Reclamation Plans required by FERC Order Article 424.</p> <p>Mitigation to be specified in the Traffic Management Plan required by FERC Order Article 425.</p>
	<p>On Denver Water lands, all staging areas and temporary disturbances above the new high-water line will be restored to approximate pre-existing conditions following construction. The majority of the reclamation work will be completed during the last year of construction when quarry operations have finished.</p>	<p>Mitigation to be specified in the Quarry Operations, Reclamation, and Traffic Management Plans required by FERC Order Articles 424 and 425.</p>
	<p>Parking for construction workers will occur primarily on Denver Water land at appropriate locations (e.g., stockpile and staging areas).</p> <p>Yard lights used for nighttime lighting of facilities will be downcast, thereby minimizing upward diffusion of light at the construction site.</p>	<p>Mitigation to be specified in the Quarry Operations, Reclamation, and Traffic Management Plans required by FERC Order Articles 424 and 425.</p>

The following descriptions list specific measures to be undertaken to reduce visual impacts from construction of individual recreation sites around the reservoir.

Regarding native seed mixes to be applied for restoration, Denver Water will use the same native seed mixes (as ecologically appropriate) for lands on their property as for National Forest System lands to achieve a consistent appearance over the larger landscape contained within the FERC boundary. Specific seed mixes planned for application are listed in the Recreation Management Plan (Denver Water 2021a).

Following USFS guidance, Denver Water will reclaim and restore areas disturbed on National Forest System lands by construction of the GRE Project, except for areas that are repurposed for recreation activities or Project facilities (i.e., saddle dam). At the conclusion of construction, these areas shall be restored and revegetated so that they blend visually with the adjacent landscape to the greatest extent possible. Disturbed ground will be reclaimed by July 16, 2027, as required by the FERC Order.

5.3 Recreation Sites

5.3.1 Northern Dam Viewpoint (Relocated Peninsula Recreation Area)

As described in Section 3.2.1 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a), the Northern Dam Viewpoint will be a new facility involving construction of a small parking lot (eight stalls) adjoining Gross Dam Road, a short trail, two group picnic shelters, four individual picnic sites, and an informal viewpoint atop an existing promontory, each accessed by a spur trail. The trail will also provide shoreline access for hand boat launching.

This site is not located on National Forest System lands, and so does not have specific SIO. Visual mitigation for the construction at Northern Dam Viewpoint will include:

- Trail alignments shall follow the natural topography as much as possible, reducing earthwork disturbance.
- Vegetative/landscape screening of restroom facilities and group picnic shelters from Gross Dam Road.
- Use fallen logs and site boulders to direct foot traffic to designated trails; predict and prevent social trails from forming and causing erosion and vegetation loss.
- Use of log bumpers at parking lot, as used elsewhere on site, to keep vehicles in designated stalls.

5.3.2 Relocated Haul Road Recreation Area

As described in Section 3.2.2 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a), the relocated Haul Road Recreation Area will involve minor re-alignment of the Dam Access Road, construction of a parking area (28 stalls), restrooms, new ADA-accessible and non-ADA trails, numerous individual and group picnic sites, and new shoreline fishing access points. This facility will be located downslope from the existing Upper Viewshed Trail, so views toward the reservoir from that route should be considered and protected during final placement and construction of the relocated Haul Road Recreation Area.

A saddle dam will also be constructed in this location to prevent outflow in high water events and seepage. Refer to Section 5.5 for discussion of visual mitigation measures planned for the saddle dam.

This site is located on National Forest System lands in an area with a high SIO (refer to Figure 2, Appendix A). Minimization and restoration efforts will be undertaken to mitigate disturbed areas to meet this objective and reduce the evidence of human disturbance. Visual mitigation for the construction at the relocated Haul Road Recreation Area will include:

- Following natural topography as much as possible for road design. Avoidance of severe engineered cut or fill slopes; instead blend grading into existing topography.
- Ensuring trail alignments follow the natural topography as much as possible, reducing earthwork disturbance.
- Using vegetative screening and landscaping surrounding the parking lot to screen views from the realigned roadway using natural-appearing clusters of native conifer trees and shrubs. Screen views of the parking lot from the Upper Viewshed Trail above.
- Using vegetative screening for individual and group picnic sites/shelters from the Upper Viewshed Trail.
- Using log bumpers at parking lot, as used elsewhere on site, to keep vehicles in designated stalls.
- Using fallen logs and boulders to direct foot traffic to designated trails, predict and prevent social trails from forming and causing erosion and vegetation loss. For example, placement of large landscape boulders and native plantings between the ADA-accessible trail and the hiking trail upslope where social trails are likeliest to form.
- Revegetating and restoring slopes disturbed by road realignment, parking lot and other construction. Including landscape boulders in naturally appearing clusters in graded slopes along with native plantings.

Assuming current visitor demand trends continue, proactive recreational adaptive management strategies may be required to protect the scenic qualities of this area, such as establishment of user limitations or site reservations.

5.3.3 Relocated Dam Recreation Area

As described in Section 3.2.3 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a), the Dam Recreation Area will involve construction of a small new parking area (8 stalls), restrooms, an ADA-accessible loop trail providing access to several individual picnic sites and one group picnic site, and a switchback trail leading to a new scenic overlook with views oriented west and north.

This site is outside National Forest System lands and so does not have specific SIO. However, it may be visible from Winiger Ridge across the reservoir, so those views will be considered during final site layout and revegetation. Visual mitigation for the construction at the Dam Recreation Area will include:

- Parking area and accessible trail will be installed along contours as much as possible, reducing earthwork disturbance.

- Restorative plantings and vegetative screening will be installed upslope from the parking area and around restrooms to minimize views of them from trails and picnic sites.
- Boulders and select native shrubs will be installed on the slope between segments of the switchback trail to prevent erosion and discourage users from cutting across the contours.
- Use of simple fencing (wood and wire or split-rail) along accessible trail to prevent creation of social trails and slope erosion.
- Use of log bumpers at parking lot, as used elsewhere on site, to keep vehicles in designated stalls.
- Slopes disturbed by construction will be revegetated and restored. Landscape boulders will be included in naturally appearing clusters in graded slopes along with native plantings.

5.3.4 Relocated South Boulder Creek Inlet Trail

As described in Section 3.2.4 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a), the relocated South Boulder Creek Inlet Trail will replace an existing section of trail to be impacted by the dam raise. The trail will be located within an area with high SIO, so efforts will be made to maintain and restore disturbed natural qualities during final design and following construction. Visual mitigation for construction at the relocated portion of South Boulder Creek Inlet Trail will include:

- Trail alignment will follow the natural topography as much as possible, reducing earthwork disturbance and visual contrast viewed from other locations.
- Existing trees and native vegetation will be preserved as much as possible.
- Use of fallen logs and boulders to direct foot traffic to designated trails, predict and prevent social trails from forming and causing erosion and vegetation loss.

5.3.5 New Scenic Ridge Trail

The proposed new Scenic Ridge Trail is described in Section 3.2.5 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a). A small parking area (14 stalls) off Gross Dam Road is proposed, along with individual and group picnic areas, and a 0.5-mile ADA-accessible trail leading north to the elevated viewpoint at the Dam Recreation Area. Mitigation for construction of facilities at the Dam Recreation Area are described in Section 5.3.3, above.

The existing landscape where the trail will be installed has high SIO. Mitigation for the construction of the new Scenic Ridge Trail will include:

- Trail alignment will follow the natural topography as much as possible, reducing earthwork disturbance.
- Existing trees and native vegetation will be preserved as much as possible.
- Use of fallen logs and boulders to direct foot traffic to designated trails, predict and prevent social trails from forming and causing erosion and vegetation loss.
- Use of simple fencing (wood and wire or split-rail) along accessible trail to prevent creation of social trails and slope erosion.
- Vegetative screening and landscaping surrounding the parking area and restroom to screen views of these facilities using natural-appearing clusters of native conifer trees and shrubs. Screen views of the parking area from other viewpoints across the reservoir, such as from Winiger Ridge.

- Use of log bumpers at parking lot, as used elsewhere on site, to keep vehicles in designated stalls.
- Direct erosive drainage flows to naturally occurring low points and protect slopes from erosion. Restore and revegetate all slopes disturbed by construction.

5.3.6 New Upper Viewshed Trail

The proposed new Upper Viewshed Trail is described in Section 3.2.6 of this Plan Addendum and detailed in the Recreation Management Plan (Denver Water 2021a). Access to the trail will be provided from the same new parking area off Gross Dam Road that provides access to the proposed Scenic Ridge Trail described in the previous section. The Upper Viewshed Trail will be a simple footpath, with a small spur trail leading to five individual picnic sites and a scenic overlook with views oriented west, north and south across the reservoir. The other segment of the trail will provide access to the shoreline for fishing.

The existing landscape at this site has high SIO. Mitigation measures for the construction of the Upper Viewshed Trail will be similar to those described Section 5.3.5, above, for the Scenic Ridge Trail, including:

- Trail alignment will follow the natural topography as much as possible, reducing earthwork disturbance.
- Existing trees and native vegetation will be preserved as much as possible.
- Use of fallen logs and boulders to direct foot traffic to designated trails: predict and prevent social trails from forming and causing erosion and vegetation loss.
- Screening of individual picnic sites from scenic trail segments.

5.4 Osprey Point Quarry

This section addresses mitigation measures related to the Osprey Point Quarry, particularly re-grading disturbed slopes that will remain exposed following the dam raise, and portions of the disturbed area that may be exposed during low water levels. The quarry will not be on National Forest System lands.

5.4.1 Visual Change and Mitigation

As described in the Quarry Reclamation Plan (Denver Water 2021d) most of the quarry footprint and highwalls will be inundated when the reservoir reaches the planned NHWL at 7,406 feet above mean sea level. At this level, a total of approximately 3 acres of graded 2H:1V slope within the disturbance boundary will be visible on the southwest, southeast, and northeast sides of the quarry.

During quarry operations, excavation and earthwork will create landscape scarring that will be visible from across Gross Reservoir, until it is adequately reclaimed and revegetated. Much more information about the Osprey Point Quarry site reclamation is contained in the Quarry Reclamation Plan (Denver Water 2021d). The Quarry Reclamation Plan lists the primary goals to mitigate and/or eliminate the visual impacts caused by resource extraction and to recreate a functioning, aesthetically appealing natural landscape. Quarry development will result in visible surface disturbance. The Osprey Point Quarry Operations Plan addresses measures in both design and implementation intended to minimize visual impacts associated with resource extraction and related disturbance. However, the Quarry Reclamation Plan incorporates key elements and operations prior to, during, and after resource extraction that are the

most effective in mitigating visual impacts associated with the quarry. For example, the Quarry Reclamation Plan:

- Prioritizes contemporaneous reclamation to expediently reclaim land following extraction and accelerate plant community development.
- Requires the exposed slopes disturbed above the normal high-water level (NHWL) to be graded to blend in with adjacent undisturbed lands and have a variable surface topography that mimics adjacent undisturbed land.
- Salvages and uses onsite soil materials to construct a reclaimed plant growth medium that will have colors and textures that blend visually with adjacent undisturbed soils.
- Uses only native plant species found in the immediate region that will establish diverse permanent plant communities within reclaimed areas with the same seasonal colors, shapes, and visual textures found in adjacent undisturbed plant communities.

With these overarching goals in mind, the key design elements that have been incorporated into the Osprey Point Quarry Reclamation Plan include the following:

- Provide a stable post-construction surface topography.
- Establish stable drainage features capable of routing stormwater around, away from, or through reclaimed land.
- Reconstruct a plant growth medium suited to the establishment of a permanent, diverse, native vegetation community above the designed NHWL.
- Establish a permanent reclaimed plant community suitable for wildlife habitat using plant species native to the area.

In addition to the processes described in the Quarry Reclamation Plan (Denver Water 2021d), the following mitigation measures will be employed:

- Visual impact mitigation efforts related to earthwork and grading at the quarry site will address disturbed slopes adjacent to the reservoir that will be visible to recreationists on nearby National Forest System land. Exposed highwall slopes remaining visible from the quarry excavations will be graded to blend into the adjacent landforms or screened from high-use viewing points using landscape material. Denver Water will follow the detailed quarry reclamation requirements specified in the FERC-approved Quarry Reclamation Plan.
- Native topsoil at the quarry site will be stripped and stockpiled for later re-application over disturbed areas.
- Final grading design of disturbed slopes associated with the quarry site will mimic the immediately surrounding contours.
- Micro-topography features will be included in exposed slopes, i.e., steeper areas blended into less steep slopes allowing for undulation in slope surfacing.
- Large, uniformly sloping planes lacking undulating or varied features will be avoided where possible.
- Where appropriate, cut slopes will be rounded off and softened where they “catch” (i.e., meet the upslope topography) during final fine grading to avoid a noticeably unnatural ridgeline. Rounded off slopes will be restored and revegetated the same as cut slopes. This practice necessitates a larger

disturbance area, however, and so will be considered where its long-term visual and restoration benefits outweigh the temporary disturbance.

- Large boulders from the surrounding site will be incorporated into remaining exposed slopes. Boulders will be embedded into the soil in a way that mimics the natural landscape and positioned with consideration of long-term stability and safety.
- Following final grading, native soil material stripped and stockpiled prior to excavation, will be placed over all disturbed slopes in a manner that blends the stockpiled material into the undisturbed surface.
- Remaining exposed slopes adjacent to the inundation areas will be revegetated with locally sourced native vegetation, including grasses, forbs and tree species that replicate the immediately adjacent native plant communities.

5.5 Saddle Dam

Areas graded and disturbed for construction around the saddle dam will be restored with stockpiled topsoil and revegetated with native seeding following the installation of the saddle dam. Native rock sourced from the GRE Project quarry will be used to construct the saddle dam, which will provide consistency in color and material with the surrounding landscape. Denver Water is in the process of developing a Site Reclamation Plan, which will address seeding and topsoil of the saddle dam to the greatest extent possible, consistent with FERC requirements, to address visual impacts of this feature.

5.6 Nighttime Lighting

Sources of nighttime lighting will be associated with construction and permanent site lighting. Permanent site lighting will be very similar to existing conditions except when the lighting has been physically raised in elevation commensurate with the raised dam.

Receptors with potential views of the GRE Project area during nighttime hours include existing residences located north of Gross Reservoir (located 0.6 mile from the existing dam), and visitors using the 26 designated overnight camp sites at Winiger Ridge. Following GRE Project construction, nighttime views of Gross Reservoir are expected to be very similar to pre-GRE Project conditions.

5.6.1 Temporary Nighttime Construction Lighting

In general, construction activities will occur throughout the day with most of the construction activities taking place during daylight hours. Certain activities, such as blasting, will be limited to daylight hours. Other activities, such as concrete placement and excavation will occur throughout the day following local noise ordinances. Should it become necessary, efforts will be made to minimize the duration of nighttime activity and limit the amount of light used to a level that meets safety standards for personnel. Construction activities will be concentrated primarily at the dam site, Osprey Point Quarry, and, eventually, the new recreation areas.

Temporary portable trailers will be staged near these locations during construction to provide office space for the contractor and GRE Project team. Temporary construction trailers are often equipped with small outdoor light fixtures at each door for safety and security. Exterior lighting used on construction trailers for the GRE Project will be fitted with hoods, shields, and/or diffusers to prevent light pollution and glare.

5.6.2 Permanent Lighting

As determined by the Final EIS, permanent post-GRE Project lighting will be very similar to existing conditions (Corps 2014). Lighting will be affixed to the top of the dam, following applicable requirements for safety and security. Except for camping at Winiger Ridge, the recreation areas surrounding the reservoir are day use only, so visitors are permitted from sunrise to sunset. These hours of operation will continue post-GRE Project.

5.6.3 Mitigation for Nighttime Construction Lighting

The following mitigation practices will be followed for the duration of Project construction to minimize light intrusion and glare:

- Limiting construction activities to daylight hours to the extent possible.
- Where nighttime lighting is deemed necessary, requiring downward directed fixtures, plus light fixture hoods and/or shields to direct lighting toward work areas and away from designated campsites on National Forest System lands (such as on Winiger Ridge) and residential areas.
- Limiting nighttime lighting to only that required for construction personnel safety and security, as determined by the Occupational Health and Safety Administration.
- Use of low-pressure sodium light fixtures where practicable, which reduces the effects of light pollution.

6. Conclusions and Recommendations

The 2014 Final EIS (Corps 2014) described the following effects to visual resources at Gross Reservoir from the GRE Project:

With the exception of the permanent quarry site and the auxiliary spillway [saddle dam], the general character of the landscape will not change, but viewers will have a different perspective due to the larger scale of the water feature and dam in the viewshed. Overall, with time the impacts are considered minor to moderate.

By incorporating the best practices listed above in Section 5, and the site-specific restoration strategies described for each recreation area, visual effects from the recreation area construction will blend the new facilities into the existing landscape. With adequate site reclamation and restoration as described in the Quarry Reclamation Plan (Denver Water 2021d) and mitigation practices described in Section 5.2, visual effects of the quarry disturbance will continue to soften and blend into the existing landscape over time.

6.1 Project Schedule and Related Mitigation Actions

Table 4 lists the major construction events over the course of the planned 6-year construction schedule and the associated key mitigation practices for each.

Table 4: Project Construction Schedule and Summary of Recommended Mitigation Practices

GRE Project Dates	Major Activities	Mitigation/Reclamation Practices
April 2022–May 2028	Closure of South Side Dam Recreation Area, Haul Road Recreation Area, Scenic Overlook Recreation Area.	N/A
January 2022–May 2022	Construction of Temporary Parking Lot at Northshore Recreation Area. Improvements to access road to Peninsula Recreation Area.	<ul style="list-style-type: none"> • Locate construction staging areas in already developed, less scenic areas to minimize negative visual effects to visitors. • Maintain clear, consistent, and directive visitor signage throughout construction, especially related to available parking, so users are not tempted to park in undesignated areas, potentially damaging resources. • Maintain and monitor erosion and sediment controls throughout construction.
January 2022–May 2028	Denver Water continues operations of temporary and remaining recreation facilities.	
April 2022–September 2023	Osprey Point Quarry site begins construction preparations: perimeter controls installed, clearing and grubbing, overburden excavations, crusher setup.	
April 2024–October 2025	Osprey Point Quarry operations/excavation. Excavations to crusher.	
January 2026–December 2027	Inundation area tree clearing. Establishment of final conditions: recreation areas to remain receive improvements. Construction of new recreation facilities.	
April 2026–October 2027	Osprey Point Quarry site reclamation.	
2028	Recreation facilities open in new configuration. First year of elevated reservoir high water level.	

6.2 Future Recreation Facility Design Considerations

As per Condition 23, future facility maintenance and replacement will be required to incorporate the design considerations of the current 2003 VRPP. The following list of design considerations is based on the 2003 VRPP, with modifications. While not all of these design considerations remain relevant, they will remain in effect for all newly constructed and existing recreation facilities to remain post-GRE Project. Furthermore, these design considerations will continue to be applied consistently as facilities at Gross Reservoir change over time.

- Parking is permitted only in designated parking spaces and permanent parking areas will not exceed 150 spaces. Temporary parking area proposed at North Shore Recreation Area to accommodate visitors during construction of the GRE Project is excluded from this criterion.
- Designated accessible parking spaces will be provided at all major recreation sites. Accessible parking spaces will measure 12 feet by 20 feet.
- Non-ADA parking spaces will measure 10 feet by 20 feet.
- All parking spaces will be clearly designated with a log parking bumper.
- Boulders sourced from on-site (minimum size 3.5 feet by 2.5 feet) will be used as traffic control devices in parking areas and along certain roads to prevent vehicle access and protect sensitive resources.
- All major parking areas will be designed to accommodate access for emergency vehicles. Gates will be provided as necessary for emergency vehicle access.
- Along long stretches of road, visually compatible fencing will be used for traffic control.
- All restroom facilities and designated picnic sites will be accessible.
- Restrooms will be standard Denver Water vault type of formed concrete construction.
- Picnic shelters will be standard Denver Water type made of wood and steel roof construction. Roofs will be painted forest green to blend into the surrounding landscape. Each shelter shall include two picnic tables.
- Matching Pilot Rock site furnishings will be used at all recreation areas. Furnishings shall include picnic tables, pedestal grills, fire rings, and trash receptacles.
- Bear-proof trash receptacles will be provided at appropriate locations.
- A uniform signage program will be established throughout the recreation area.
- Group picnic facilities will be separated from individual picnic sites wherever possible.
- All facilities will be located and screened in a visually sensitive manner.
- All screening vegetation will be native plant species found in on-site communities and will blend in with the established surrounding environment.
- No facilities will be proposed along the reservoir shoreline at an elevation below 7,406 feet (NHWL).
- All trails will be designated not to exceed 15% grades wherever possible.
- Efforts will be made to minimize impacts to wildlife habitats and to provide uninterrupted corridors for movement. Roads, trails, and fences will be designed and located in a habitat-sensitive manner.

6.3 Restoration Material Procurement and Monitoring

In addition to the Recreation Monitoring Plan (Denver Water 2021b) and the recreation area design plans that were prepared for the Recreation Management Plan (Denver Water 2021a), Denver Water expects to prepare a Site Reclamation Plan to address GRE Project-specific restoration and the mechanics of the co-management agreements with USFS. This plan will document installation specifications, reclamation/restoration material procurement responsibilities, ongoing restoration monitoring, and the process to follow and agency responsibilities until restoration actions are successful.

7. References

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Appendix A: Figures

**Denver Water
Gross Reservoir
Expansion Project**

**Figure 1
Project Location**

Boulder County, CO

Project Features

- New Scenic Overlook
- New/Relocated Trail
- Existing Trail
- New/Relocated Recreation Area
- Existing Recreation Area
- Osprey Point Quarry
- New High Water Level (elev. 7,406 ft.)
- FERC Boundary

Land Manager

- U.S. Forest Service

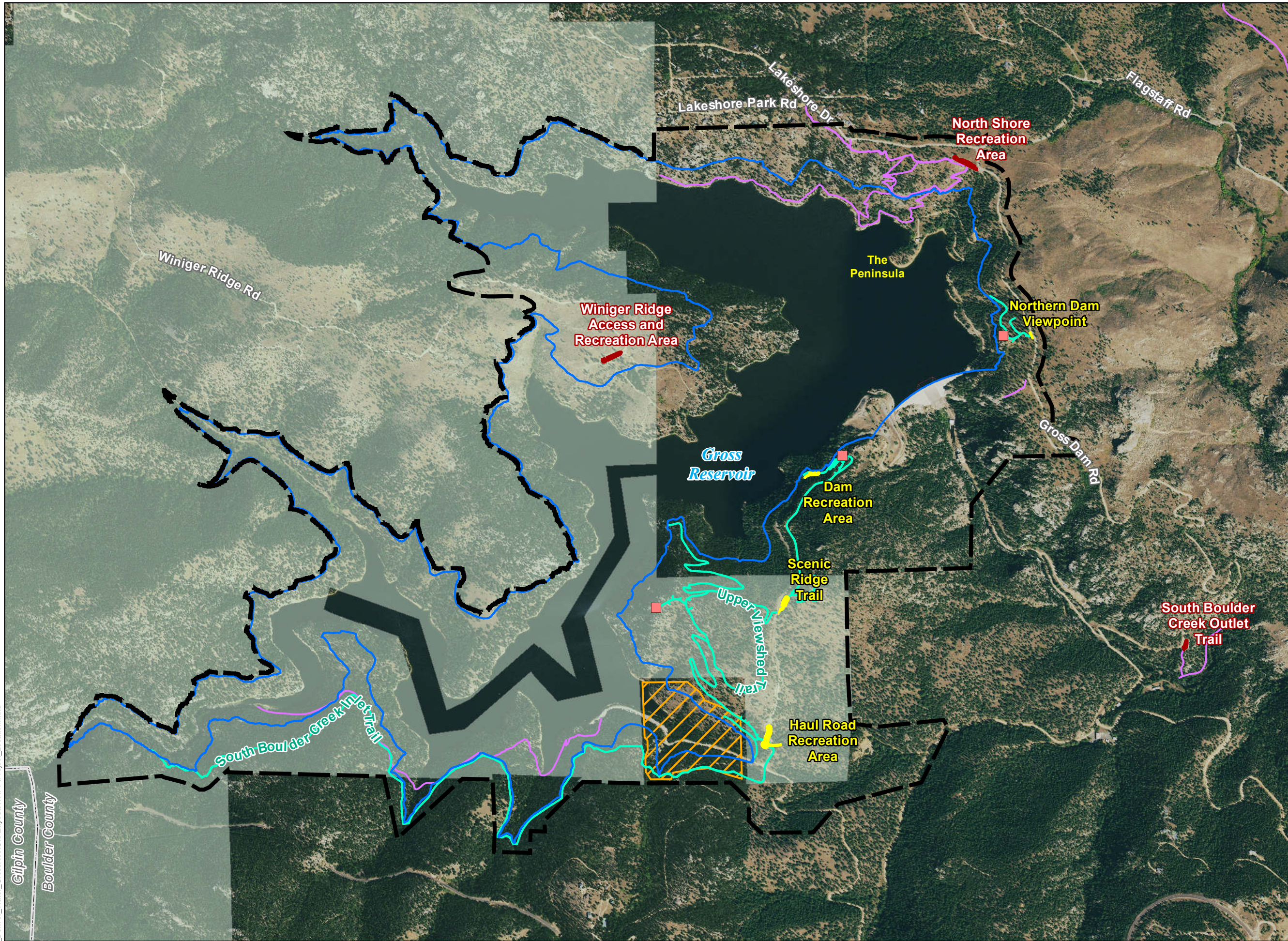
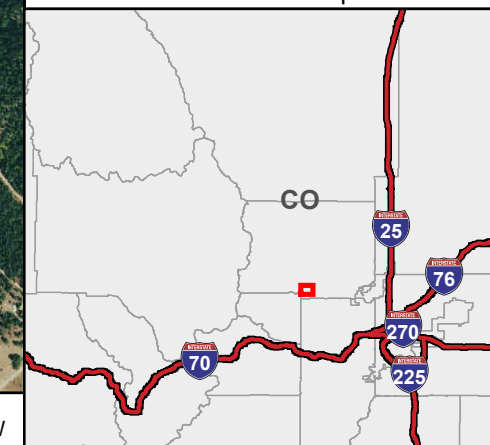
Boundaries

- County Boundary



NOT FOR CONSTRUCTION

Reference Map

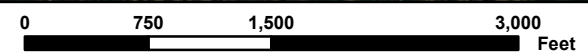


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Gilpin County
Boulder County



1:14,000 NAD 1983 StatePlane Colorado Central FIPS 0502 Feet



Source: ESRI, USDA NAIP, U.S. Census, USFS, Denver Water, CPW

**Denver Water
Gross Reservoir
Expansion Project**

**Figure 2
U.S. Forest Service
Scenic Integrity Objectives**

Boulder County, CO

Project Features

- New Scenic Overlook
- ⬆ Selected KOP*
- New/Relocated Trail
- Existing Trail
- New/Relocated Recreation Area
- Existing Recreation Area
- Osprey Point Quarry
- New High Water Level (elev. 7,406 ft.)
- FERC Boundary

Land Manager

- U.S. Forest Service

USFS Scenic Integrity Objectives

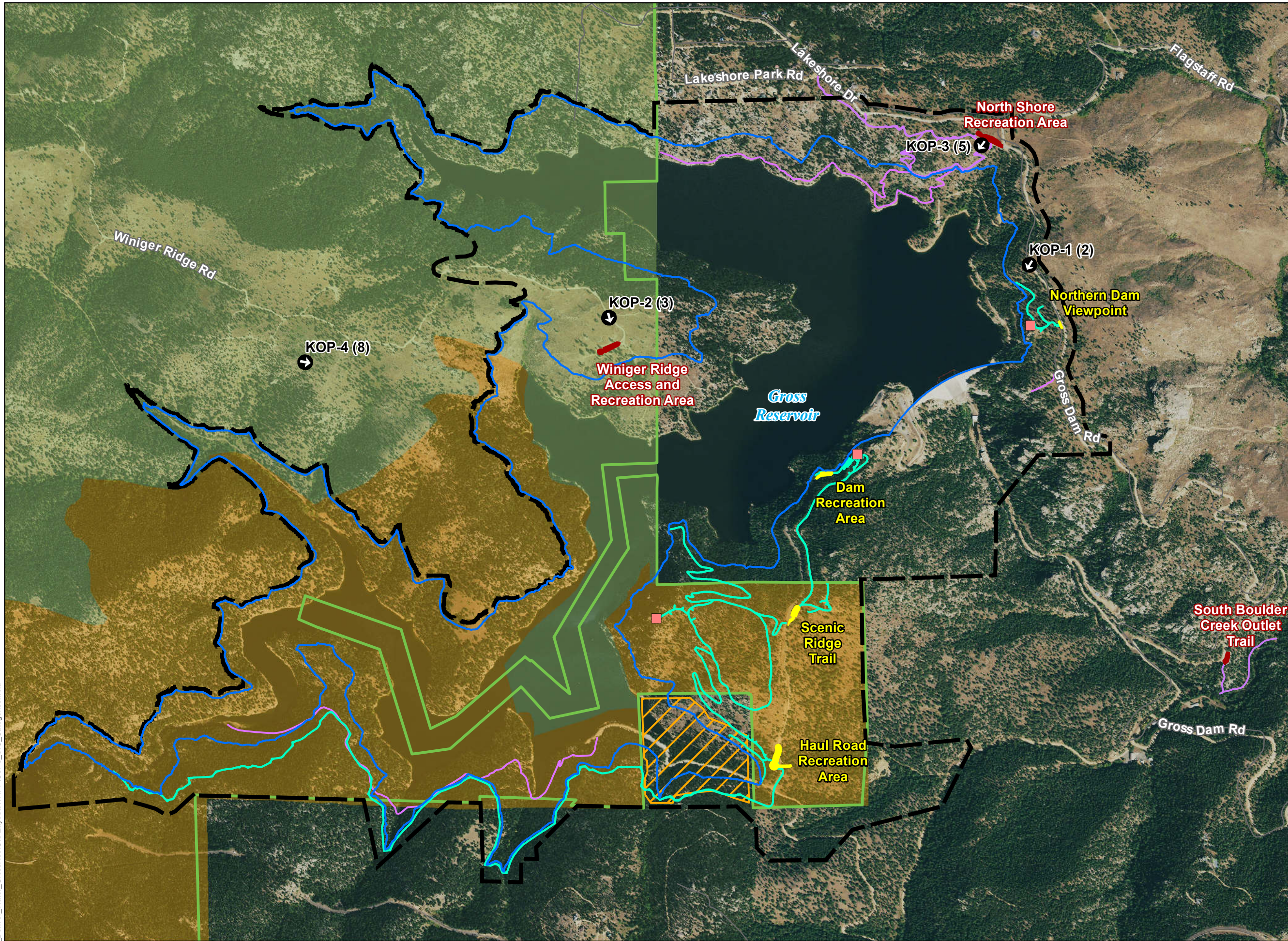
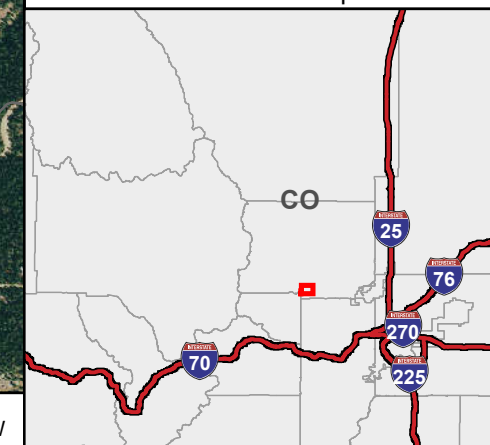
- Moderate
- High

*Symbol rotated on map to represent direction of camera while photos were taken



NOT FOR CONSTRUCTION

Reference Map





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**Denver Water
Gross Reservoir
Expansion Project**

**Figure 3
Field Viewpoints and Selected
Key Observation Points**

Boulder County, CO


Project Features

- Field Inventory
-  Selected KOP*
- New Scenic Overlook
- New/Relocated Trail
- Existing Trail
- New/Relocated Recreation Area
- Existing Recreation Area
- Osprey Point Quarry
- New High Water Level (elev. 7,406 ft.)
-  FERC Boundary

Land Manager

- U.S. Forest Service

Boundaries

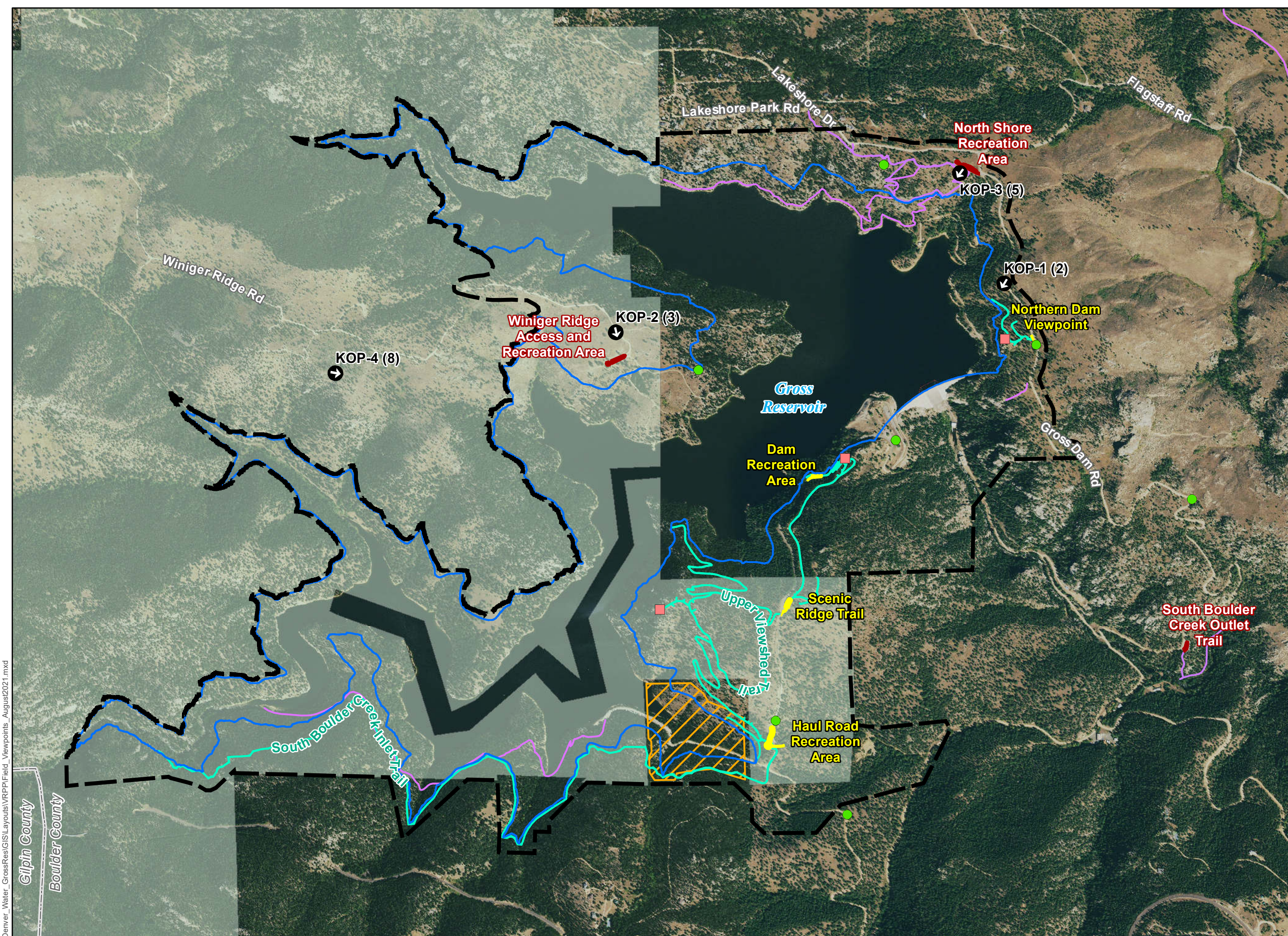
-  County Boundary

*Symbol rotated on map to represent direction of camera while photos were taken



NOT FOR CONSTRUCTION

Reference Map



P:\6590_Denver_Water_GrossRes\GIS\Layouts\VRPP\Field_Viewpoints_August2021.mxd

Appendix B: Key Observation Point Figures



KOP-1 (Field No. 2): Gross Dam Road Modeled View with trees and vegetation removed to elevation 7,406 ft amsl – Depicting water level of 7,275 ft amsl, which is currently typical during August.



KOP-1 (Field No. 2): Gross Dam Road Simulated View – Depicting water level of 7,326 ft amsl, which will be typical during April after implementation of the GRE Project.



KOP-1 (Field No. 2): Gross Dam Road Simulated View – Depicting water level of 7,375 ft amsl, which will be typical during September after implementation of the GRE Project.



KOP-2 (Field No. 3): Winiger Ridge Modeled View with trees and vegetation removed to elevation 7,406 ft amsl – Depicting water level of 7,275 ft amsl, which is currently typical during August.



KOP-2 (Field No. 3): Winiger Ridge Simulated View – Depicting water level of 7,326 ft amsl, which will be typical during April after implementation of the GRE Project.



KOP-2 (Field No. 3): Winiger Ridge Simulated View – Depicting water level of 7,375 ft amsl, which will be typical during September after implementation of the GRE Project.



KOP-3 (Field No. 5): North Shore Parking Lot Modeled View with trees and vegetation removed to elevation 7,406 ft amsl – Depicting water level of 7,275 ft amsl, which is currently typical during August.



KOP-3 (Field No. 5): North Shore Parking Lot Simulated View – Depicting water level of 7,326 ft amsl, which will be typical during April after implementation of the GRE Project.



KOP-3 (Field No. 5): North Shore Parking Lot Simulated View – Depicting water level of 7,375 ft amsl, which will be typical during September after implementation of the GRE Project.



KOP-4 (Field No. 8): Winiger Ridge Overlook Modeled View with trees and vegetation removed to elevation 7,406 ft amsl – Depicting water level of 7,275 ft amsl, which is currently typical during August.



KOP-4 (Field No. 8): Winiger Ridge Overlook Simulated View – Depicting water level of 7,326 ft amsl, which will be typical during April after implementation of the GRE Project.



KOP-4 (Field No. 8): Winiger Ridge Overlook Simulated View – Depicting water level of 7,375 ft amsl, which will be typical during September after implementation of the GRE Project.